

APSEZL/EnvCell/2024-25/082

Date: 28.11.2024

To

The Inspector General of Forest / Scientist C,

Integrated Regional Office (IRO),

Ministry of Environment, Forest and Climate Change,

Aranya Bhawan, A Wing, Room No. 409,

Near CH 3 Circle, Sector – 10A,

Gandhinagar – 382007.

E-mail: eccompliance-guj@gov.in, iro.gandhingr-mefcc@gov.in

Sub : Half yearly Compliance report for Expansion of Waterfront Development Plan of Mundra Port in an area of 3335 ha for handling of additional 289 MMTPA of multi-purpose cargo in addition to the existing approved capacity of 225 MMTPA, located at Mundra, Kachchh, Gujarat.

Ref : Environment and CRZ clearance granted to M/s Adani Ports & SEZ Limited vide F. No 10-24/2019-1A-III dated 13/08/2024.

Dear Sir,

Please refer to the above cited reference for the said subject matter. In connection to the same, it is to state that copy of the compliance report for the Environmental and CRZ Clearance for the period of April 2024 to September 2024 is being submitted through soft copy (e-mail communication).

Kindly consider above submission and acknowledge.

Thank you,

Yours Faithfully,

For, **M/s Adani Ports and Special Economic Zone Limited**



Bhagwat Swaroop Sharma

Head – Environment

Mundra & Tuna Port

Encl: As above

Copy to:

- 1) The Director (IA Division), Ministry of Environment, Forests & Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003.
- 2) The Zonal Officer, Regional Office, CPCB – Western Region, Parivesh Bhawan, Opp. VMC Ward Office No. 10, Subhanpura, Vadodara – 390023.
- 3) The Member Secretary, GPCB – Head Office, Paryavaran Bhavan, Sector 10 A, Gandhi Nagar – 382010.
- 4) The Director, Forests & Environment Department, Block – 14, 8th floor, Sachivalaya, Gandhi Nagar – 382010.
- 5) The Regional Officer, Regional Office GPCB (Kutch-East), Gandhidham – 370201.

Adani Ports and Special Economic Zone Ltd
Adani House,
PO Box No. 1
Mundra, Kutch 370 421
Gujarat, India
CIN: L63090GJ1998PLC034182

Tel +91 2838 25 5000
Fax +91 2838 25 51110
info@adani.com
www.adani.com

Environmental Clearance Compliance Report



Expansion of Waterfront Development
Plan,
Mundra, Dist. Kutch, Gujarat

Adani Ports and SEZ Limited
Mundra, Kutch

For the period of
April-2024 to September-2024

Index

Sr. No.	Particulars	Page Nos.
1	Environment and CRZ Compliance Report	1-56
	Annexures	
	Annexure - A Compliance of CRZ Recommendation	59-79
	Annexure - B EMP compliance of WFDP Expansion	81-94
	Annexure - 1 Copy of Forest Clearance	96-99
	Annexure - 2 Copy of GUIDE Mangrove monitoring study report	101-149
	Annexure - 3 Copy of Algal Removal Report	151
	Annexure - 4 Mangroves Conservation Day Celebration Report	153-157
	Annexure - 5 Adani Foundation CSR report	159-184
	Annexure - 6 Correspondence with Green Credit Cell, ICFRE regarding compensatory mangrove afforestation.	186-190
	Annexure - 7 Copy of GPCB ToR to CtE Permission	192-237
	Annexure - 8 Copy of GPCB CC & A Permissions	239-272
	Annexure - 9 Compliance to the marine biodiversity study recommendation by Gujarat Institute of Desert Ecology (GUIDE)	274-284
	Annexure - 10 Half yearly Monitoring Report	286-397
	Annexure - 11 Photographs of Culvert & bridges.	399-407
2	Annexure - 12 Photographs of safeguard measures implemented for abatement of dust / fugitive emissions	409-411
	Annexure - 13 Oil Spill Contingency Plan	413-609
	Annexure - 14 Oil Spill Mock Drill report	611-617
	Annexure - 15 Copy of Onsite emergency plan	619-826
	Annexure - 16 Safety Mock drill report	828-868
	Annexure - 17 Copy of QRA report	870-1092
	Annexure - 18 Copy of Disaster Management Plan	1094-1259
	Annexure - 19 Photographs of roof top rainwater duct of operational building (Tug berth building within MPT)	1261
	Annexure - 20 Expenditure details of past 3 year	1263
	Annexure - 21 Report of GUIDE for Shoreline Change Assessment Study	1265-1298
	Annexure - 22 Details of permissions / agreements of hazardous waste vendors.,	1300-1316
	Annexure - 23 Details of Greenbelt development	1318-1319
	Annexure - 24 Copy of ISO 45001:2018 certification	1321
	Annexure - 25 Latest health checkup report	1323-1338
	Annexure - 26 Copy of Environment Policy	1340

Status of the conditions stipulated in Environment and CRZ Clearance

Annexure - 27	Environment Management Cell Organogram	1342
Annexure - 28	Copy of the newspaper advertisement	1344-1352
Annexure - 29	Acknowledgement copy of submission of EC/CRZ letter to concerned authorities.	1354-1357
Annexure - 30	Acknowledgement copy of the Environmental Statement (Form V) of FY 2023-24	1359-1361
Annexure - 31	Detail information on firefighting facility available at APSEZ	1363-1380

	Adani Ports and Special Economic Zone Limited, Mundra.	From : Apr'24 To : Sep'24
Status of the conditions stipulated in Environment and CRZ Clearance		

APSEZ has been granted EC & CRZ Clearance for Expansion of Waterfront Development Plan of Mundra Port in an area of 3335 ha for handling of additional 289 MMTPA of multi-purpose cargo in addition to the existing approved capacity of 225 MMTPA from MOEF&CC, located at Mundra, Kachchh District, Gujarat by Adani Ports & SEZ Ltd vide F. No 10-24/2019-1A-III dated 13/08/2024.

Note: APSEZ has been accorded Consent to Establish (ToR to CtE) from GPCB vide dated 19th May, 2020 and the same become valid after getting EC & CRZ clearance from MoEF&CC vide its order dated 13th August, 2024. Therefore, compliance status of ongoing work undertaken after getting EC & CRZ clearance is being submitted in this half yearly compliance report.

Activities/facilities approved, major components completed and proposed future activities as per Environment and CRZ Clearance are as below:

Sl. No.	Description	Approved as per EC & CRZ Clearance	Already Developed till 30.09.2024	Balance to be developed	Remarks
1	Quay Length (m)	16760	7870	8890	Development of additional quay length in South port @ 615 meter (400 meter Jetty for Liquid / Gas / Cryogenic cargo handling + 215 meter Multi-purpose T2 Jetty extension) along with its related infrastructure facilities / back-up area is in process.
2	Dredging (MCuM)	120	Nil	120	Capital dredging activity for development additional quay length and basin area is in process.
3	Effluent Treatment Plant (KLD)	1065	265	800	ETP of 265 KLD already developed as part of earlier clearances granted till 2009. Based on the future requirement, ~800 KLD is proposed to be developed on Modular basis.
4	Sewage Treatment Plant (KLD)	50055	55	50000	STP of 55 KLD already developed as part of earlier clearances granted till 2009. Based on the future requirement, 50 MLD is proposed to be developed on Modular basis.
5	Desalination Plant (MLD)	447	47	400	Desalination plant of 47 MLD capacities already developed as part of earlier clearances granted in 2009. Additional development of 33 MLD capacity Desalination plant is in progress. Balance 367 MLD capacity units will be developed on a Modular basis. The existing Intake and Outfall channel is suitable for 300 MLD

	Adani Ports and Special Economic Zone Limited, Mundra.	From : Apr'24 To : Sep'24
Status of the conditions stipulated in Environment and CRZ Clearance		

Sl. No.	Description	Approved as per EC & CRZ Clearance	Already Developed till 30.09.2024	Balance to be developed	Remarks
					Desalination capacity. For additional desalination plant capacity will have intake & outfall with pipeline system.
6	Sea Island Jetty	1	Nil	1	Not developed so far
7	Single Point Mooring (SPM)/ Single buoy Mooring (SBM)	3	2	1	02 SPMs / SBMs already developed as part of earlier clearances granted till 2009.

- ✓ The proposed expansion of west port and south port along with supporting utilities/infrastructure facilities will be undertaken over an area of 3335 ha. For handling of additional 289 MMTPA of multi-purpose/Liquid/gas/cryogenic cargo will be handled in addition to the existing approved capacity of 225 MMTPA. Cargo handling for the FY 2023-24 is 165 MMT.
- ✓ The entire existing and proposed quay length will be used for handling Multipurpose/Liquid /Gas/Cryogenic cargo.

Note:

EC & CRZ Clearance has been granted for Expansion of WFDP @ Mundra port. Compliance of relevant conditions has been given as per current practices those are being followed as per existing operational activities in line with permission granted earlier from competent authorities. The same practice will also be continued during proposed expansion activities also.

Status of the conditions stipulated in Environment and CRZ Clearance

Cargo Mix and its handling capacity for Proposed Expansion of Waterfront Development Plan is approved as below.

S. No	Cargo type	Cargo Mix	Cargo Handling Capacity (MMTPA)
1	Dry Bulk & Break Bulk Cargo	Multipurpose Cargoes including Coal / Iron ore / limestone / Mines & Minerals & other dry bulk/Fertilizers and raw materials for manufacture of fertilizer / food grains / sugar / clinker / cement / Project cargo / timber & wood / machines/ Iron steel products / Bulk/Break Bulk etc.	140
2	Containers	Container, Ro – Ro & Automobiles and any other non-hazardous cargo	250
3	Liquid Cargo	All Class A, B, C petroleum products, excluded petroleum products Including Petrochemical products, Hazardous, Toxic and Non-Hazardous chemicals/Liquids and other Liquid cargoes. Tentative list of hazardous liquid cargo but not limited to are as follows: Ethylene, Propylene (Propene), Butadiene, Pentane, Ethyl Mercaptan Motor Spirit, Propylene Oxide, Hexane, Naphtha, Acetone, Methyl Chloride / Chloro Methane, Cyclohexane, Benzene, Ethyl Acetate, Acrylonitrile Acetonitrile, Methyl Methacrylate, Meth acrylonitrile, Methanol (Methyl Alcohol), Isopropyl Alcohol, Ethyl Alcohol (Ethanol), Ethylene di chloride, Methyl Isobutyl Ketone, Ethyl Benzene, N-Butyl Acetate, Isobutyl Alcohol (Iso Butanol), N-Butyl Alcohol (N-Butanol), Epichlorohydrine, Styrene, O-Xylene, Acetic Acid, Acetic Anhydride, Nonedible/ Mentha Oil Low Sulphur Heavy Stock/ Furnace oil, Aniline, Methyl Ethyl Ketone Peroxide, Ethyl Hexanol-2, Vinyl Chloride, Phenol, Naphthalene, Ethylene Glycol, Mono Ethylene Glycol, Toluene 2.4 -di isocyanate, Diphenyl Methane Di-Isocyanate, Edible oil/Palm Oil, Paraffin, Bitumen, Sulphur, Coal, CNG, NG, Ammonia (NH ₃), Diammonium Phosphate, Muriate of Potash (MOP), Soda Ash (Sodium Carbonate), Urea, Limestone, Caustic Soda, Sulphuric acid, Phosphoric acid, Piperine/ Piperdine, Chloroform, Hydrochloric Acid (HCL), Ethylene diamine (EDA), CMDI etc. PoL such as Motor Spirit, Naptha, HSD, Crude Oil, Aviation Fuel, Kerosene, Low Sulphur Heavy stock/Furnace Oil, Carbon Black Feedstock, Paraffin, Bitumen, Lube Oil, Asphalt etc.	84
4	Gas /Cryogenics/ Liquid	LNG, Propane, Butane, n-Butane, Ethane, LPG, CNG, NG and All Class A, B, C petroleum products, excluded petroleum products Including Petrochemical products, Hazardous, Toxic and Non-Hazardous chemicals/Liquids and other Liquid cargoes.	40
TOTAL			514



**Adani Ports and Special Economic
Zone Limited, Mundra.**

**From : Apr'24
To : Sep'24**

Status of the conditions stipulated in Environment and CRZ Clearance

Compliance Report of Environmental and CRZ Clearance

	Adani Ports and Special Economic Zone Limited, Mundra.	From : Apr'24 To : Sep'24
Status of the conditions stipulated in Environment and CRZ Clearance		

Half yearly Compliance report for Expansion of Waterfront Development Plan of Mundra Port in an area of 3335 ha for handling of additional 289 MMTPA of multi-purpose cargo in addition to the existing approved capacity of 225 MMTPA, located at Mundra, Kachchh District, Gujarat by Adani Ports & SEZ Ltd."

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
1. Specific Conditions		
1.1	Construction activity shall be carried out strictly according to the provisions of the CRZ Notification, 2011. No construction work/activity other than those permitted in Coastal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.	Complied. Construction activity would be carried out in accordance with existing rules & regulations of CRZ Notification, 2011 and as amended from time to time after getting requisite permissions from the competent authorities. No construction work/activity other than those permitted in Coastal Regulation Zone Notification will be carried out in CRZ area.
1.2	All the recommendations and conditions specified by the Gujarat Coastal Zone Management Authority vide letter no. ENV/10/2024/37/T dated 20th April, 2024 shall be implemented.	Complied. Point wise compliance report of CRZ recommendations issued by GCZMA (Gujarat Coastal Zone Management Authority), Gandhinagar vide letter ENV/10/2024/37/T dated 20 th April 2024 attached as Annexure A .
1.3	All the storage proposed in the CRZ area shall be in line with the CRZ notification, 2011. No storage is allowed other than the products mentioned in the CRZ notification, 2011 in the CRZ area.	Complied. Storage of all the cargo proposed in CRZ area will be carried out in line with CRZ Notification, 2011 and its amendments thereafter as well as permissions granted by regulatory authorities.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024																													
1.4	<p>Multipurpose Backup Area of 252.3 ha proposed in the CRZ-IA area only permissible activities shall be taken up. And in no case mangroves falling in proposed backup area shall be disturbed and 50-meter buffer should be kept around mangroves.</p>	<p>Complied.</p> <p>This reply covers condition no 4 and 5.</p> <p>Multipurpose Backup Area of 252.3 ha proposed in the CRZ-IA area is part of 1840 Ha reserved forest area, which had been diverted vide 30th September 2009 for development of port based SEZ. Copy of Forest clearance is attached as Annexure - 1. There are no mangroves, or any other eco-sensitive area falls within this proposed Multipurpose Backup Area in line with CRZ notification, 2011 and its amendments thereafter.</p> <p>Activities permitted as per CRZ Notification, 2011 and as amended from time to time would be carried out in the proposed Multipurpose backup area only.</p>																													
1.5	<p>In no case mangrove area falling within proposed Multipurpose Backup Area shall be disturbed and a buffer of 50 meters shall be provided all around the mangroves area.</p>	<p>Other than this, APSEZ is carrying out mangrove monitoring at regular time intervals as part of mangrove conservation plan prepared by NCSCM and approved by GCZMA. The details of the same are described below.</p> <p>Conservation of mangroves:</p> <table border="1"> <thead> <tr> <th>Mangrove mapping Year</th> <th>Monitoring Agency</th> <th>Mangrove cover total Area (Ha.)</th> <th colspan="2">Mangrove cover area Increased</th> </tr> <tr> <td colspan="3"></td> <th>Ha</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>2011</td> <td rowspan="2">NCSCM</td> <td>2094</td> <td>-</td> <td>-</td> </tr> <tr> <td>2011 to 2016-17</td> <td>2340</td> <td>246</td> <td>11.75%</td> </tr> <tr> <td>2017 to 2019 till Sep</td> <td>NCSCM</td> <td>2654</td> <td>314</td> <td>13.42%</td> </tr> <tr> <td>2019 to 2021 till March</td> <td>GUIDE</td> <td>2723</td> <td>69</td> <td>2.6%</td> </tr> </tbody> </table> <p>Hence, overall increase in mangrove cover area in creek system in and around APSEZ from 2011 (2094 Ha) to 2021 (2723 Ha) is 629 Ha (30%).</p> <p>As a part of GCZMA recommendations and NCSCM mangrove conservation action plan, APSEZ has undertaken the following activities.</p>	Mangrove mapping Year	Monitoring Agency	Mangrove cover total Area (Ha.)	Mangrove cover area Increased					Ha	%	2011	NCSCM	2094	-	-	2011 to 2016-17	2340	246	11.75%	2017 to 2019 till Sep	NCSCM	2654	314	13.42%	2019 to 2021 till March	GUIDE	2723	69	2.6%
Mangrove mapping Year	Monitoring Agency	Mangrove cover total Area (Ha.)	Mangrove cover area Increased																												
			Ha	%																											
2011	NCSCM	2094	-	-																											
2011 to 2016-17		2340	246	11.75%																											
2017 to 2019 till Sep	NCSCM	2654	314	13.42%																											
2019 to 2021 till March	GUIDE	2723	69	2.6%																											

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024		
		Sr. No	Recommendations	Compliance
		1.	Mangrove mapping and monitoring in and around APSEZ	<ul style="list-style-type: none"> APSEZ entrusted NCSCM, Chennai to carry out Monitoring of mangrove distribution in creeks in and around APSEZ and shoreline changes in Bocha island. As a part of this study, overall growth of mangroves in the creeks in and around APSEZ was assessed comparing Google earth images of 2017 & 2019 and it is observed that there was increase in mangrove cover between March 2017 and September 2019 to the extent of 256 Ha, which is about 10.94%. This suggests that the mangroves and the tidal system in the creeks remain undisturbed over this period. Analysis of data between categories indicated that there was an increase in dense mangroves and also conversion of scattered to sparse which also shows that the growth of mangroves in a progressive direction. Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is 502 Ha between 2011 and 2019. The cost of the said study was INR 23.56 Lacs incurred by APSEZ. According to GUIDE Mangrove monitoring study report November 2023 (report attached as Annexure 2), the distribution of mangroves in Kotadi, Baradi mata, Navinal, Bocha and Khari creeks as well as in the Bocha island was studied using LISS IV satellite images for the duration of March 2019 to March 2021. The mangrove cover in the creeks in and around APSEZ showed a positive trend from March 2019 to March 2021, with an overall increase of 52.79 ha (1.9%) compared to the cover during the year 2019. The total mangrove cover during 2019 was 2670 ha which has increased to 2723 ha during the year 2021.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024																											
			<ul style="list-style-type: none"> Hence, overall increase in mangrove cover area in creek system in and around APSEZ from 2011 (2094 Ha) to 2021 (2723 Ha) is 629 Ha (30%). The cost of the said study was INR 23.60 Lacs incurred by APSEZ. <p>Summary of Mangrove mapping and monitoring (from 2011 to 2021):</p> <table border="1"> <thead> <tr> <th rowspan="2">Mangrove mapping Year</th> <th rowspan="2">Mangrove cover total Area (Ha.)</th> <th colspan="2">Mangrove cover area Increased</th> </tr> <tr> <th>Hac.</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>2011</td> <td>2094</td> <td>-</td> <td>-</td> </tr> <tr> <td>2011 to 2016-17</td> <td>2340</td> <td>246</td> <td>11.75%</td> </tr> <tr> <td>2017 to 2019 till March</td> <td>2596</td> <td>256</td> <td>10.94%</td> </tr> <tr> <td>2019 to 2021 till March</td> <td>2723</td> <td>127</td> <td>4.89</td> </tr> <tr> <td>Total</td> <td>2723</td> <td>629</td> <td>--</td> </tr> </tbody> </table>	Mangrove mapping Year	Mangrove cover total Area (Ha.)	Mangrove cover area Increased		Hac.	%	2011	2094	-	-	2011 to 2016-17	2340	246	11.75%	2017 to 2019 till March	2596	256	10.94%	2019 to 2021 till March	2723	127	4.89	Total	2723	629	--
Mangrove mapping Year	Mangrove cover total Area (Ha.)	Mangrove cover area Increased																											
		Hac.	%																										
2011	2094	-	-																										
2011 to 2016-17	2340	246	11.75%																										
2017 to 2019 till March	2596	256	10.94%																										
2019 to 2021 till March	2723	127	4.89																										
Total	2723	629	--																										
	2. Tidal observation in creeks in and around APSEZ		<ul style="list-style-type: none"> APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari creeks under the guidance of NCSCM. The observed tidal ranges indicate that the creeks experience normal tidal ranges, adequate for the growth of mangroves. The cost of the said activity was INR 1.0 Lacs. 																										
	3. Removal of Algal and Prosopis growth from mangrove areas		<ul style="list-style-type: none"> Algal and Prosopis growth monitoring was done in and around mangrove area and algal encrustation was found in some of the mangrove areas, which has been removed manually. The cost of the said activity was Rs. 80000 during FY 2023-24. The algal removal report attached as Annexure 3. 																										
	4. Awareness of mangroves importance in surrounding communities		<ul style="list-style-type: none"> Adani Foundation – CSR Arm of Adani group has done awareness camps/activities created in the community regarding importance of mangroves. Adani Foundation provides Good Quality dry and green fodder to 25 Villages. Project is covering total 15005 Cattles and hence enhancing cattle 																										

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024	
			<p>productivity. Dry Fodder 10,90,875 Kg Green – 27,64,920 Kg.</p> <ul style="list-style-type: none"> • Awareness of mangroves importance in surrounding communities & Fodder support - The expenditure for fodder supporting activities was approx. 132.0 Lacs during FY 2024-25 till Sep'24, which was incurred by APSEZ. • Grass Land development: 213 acres of gauchar land has been cleaned and allocated for Grass land development with strong Community Contribution and Mobilization. • Other than this dedicated security guard with gate system deployed by APSEZ across the coastal area and no unauthorized persons allowed within coastal as well as mangrove areas. • APSEZ has celebrated the International Day for the Conservation of the Mangrove Ecosystem with coordination of Adani Foundation from 24th to 26th July 2024 to raise awareness of the importance of mangrove ecosystems as "a unique, special and vulnerable ecosystem". The report for the same is attached as Annexure - 4. • Refer CSR report attached as Annexure - 5. <p>To comply with the GCZMA recommendations regarding mangrove monitoring at every 2 years, presently APSEZ has awarded the work order to NCSCM, Chennai vide order no. 4802055905, dated 24/09/2024 with cost 45.87 Lacs for mangrove mapping in and around APSEZ March 2021 to March 2023. The said work will be undertaken by NCSCM shortly.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
1.6	<p>Compensatory Mangrove Afforestation over 100 ha, as also stipulated in GCZMA conditions and agreed by the PP, shall be carried out at the Project cost. Accordingly, plan shall be prepared in consultation with state Forest Department or any other agency authorized by the government. The plan shall be submitted to the IRO of MoEFCC within 3 months of the issue of EC/CRZ clearance and implementation of the plan shall be submitted in 6 monthly monitoring report.</p>	<p>Will be complied.</p> <p>The said Compensatory Mangrove Afforestation over an area of 100 Ha required to be carried out through Green Credit Programme in line with GCZMA recommendation issued to this project. APSEZ is following-up with Green Credit Cell, ICFRE to undertake the said work, however we are in receipt of below response from Green Credit Cell, ICFRE.</p> <p><i>"The Green Credit Programme is currently in its pilot stage, hence at this stage only the PSUs are allowed to participate as entity and State Forest Departments as Implementing Agency. Private entities may be allowed later. We will keep you informed as we progress and expand the program to private entities participation. Your user ID, if created, will be activated accordingly."</i></p> <p>Corresponds with concern authority is attached as Annexure - 6.</p> <p>Once Green Credit Programme is available for participation by private entities, we will initiate for the same and submit our action plan to undertake the Compensatory Mangrove Afforestation over an area of 100 ha to the IRO of MoEF&CC.</p>
1.7	<p>No mangrove shall be cut or affected due to port construction.</p>	<p>Complied.</p> <p>No Mangrove would be cut or affected due to port construction and development of its related infrastructures other than utility corridors proposed in mangrove / mangrove buffer area which will have an overall impact on 0.92 Ha area. For which APSEZ will carry out Compensatory Mangrove afforestation over an area of 100 Ha through Green Credit Programme as mentioned in Point No. 1.6.</p> <p>To enhance the marine biodiversity, till date APSEZ has carried out mangrove afforestation in 4140 ha. area across the coast of Gujarat. Total expenditure for the same till Sep'24 is INR 1592.8 lakh.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		Please refer compliance of Condition No. 1.5 for mangrove conservation in detail.
1.8	<p>Brine reject from desalination plant and cooling water reject from re-gasification unit of LNG will be discharged at the offshore location as identified through scientific study. No Objection Certificate from the concern Gujarat State Pollution Control Board need to be obtained.</p>	<p>Complied.</p> <p>Existing LNG Jetty and terminal has been developed and is being operated by GSPC LNG Limited as per separate permissions obtained and NOC given by APSEZ. Discharge of cooling water reject from re-gasification unit of LNG is being taken care by GSPC only.</p> <p>Development of LNG Jetty and terminal approved as a part of this clearance has not been carried out so far. However, cooling water reject from re-gasification unit of LNG will be discharged at the offshore location as per EIA, once it is developed.</p> <p>At present 47 MLD capacity Desalination plant along with associated Intake and Outfall facility have been developed out of earlier approved 300 MLD capacities in line with permissions granted by competent authorities.</p> <p>However, as a part of WFDP-Expansion project, development of an additional 400 MLD capacity Desalination plant is approved. Out of this APSEZ is in process to develop Desalination plant of 33 MLD capacities for which CtE (ToR to CtE) already been granted by GPCB vide dated 19.05.2020. (Copy attached as Annexure 7).</p> <p>APSEZ will get an amendment in CC&A for operation of additional 33 MLD desalination plant through GPCB once it is ready for commissioning.</p> <p>Balance 367 MLD capacity desalination plant will be developed on modular basis as per business requirement.</p> <p>The existing Intake and Outfall channel is suitable for 300 MLD Desalination capacity. For additional desalination plant capacity will have intake & outfall with pipeline system.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		The desal reject is being discharged into deep sea at identified location through existing outfall channel approved in EC granted in 2009.
1.9	Construction of Utility corridor on stilts is proposed through Gantry Girder Launching technology which does not require construction of road for transporting heavy machineries and therefore ensure minimal/zero footprint on land /mangrove areas. As per CRZ mapping by NCSCM actual damage to mangroves will be limited to only 0.92 ha. PP will carry out 100 ha Compensatory Mangrove afforestation.	<p>Complied.</p> <p>APSEZ ensures minimal/zero footprint on land /mangrove areas by implementing following method during construction:</p> <ul style="list-style-type: none"> ➤ Use of advanced construction techniques, i.e. elevated gantry girder will eliminate the requirement of creation of temporary approach road in the mangrove/creek areas which will impact less or very negligible footprint on the ground. ➤ Use of construction safety nets will be deployed on the working platform of the gantry girder, which will prevent impact due to dropping of construction materials & tools in the creek and mangrove areas. ➤ The temporary stress on the avifauna and mangroves dependent species are limited to short period of time. ➤ Turbidity due to piling in water column is contained since piling activity is carried out within the steel casings. <p>Development of Utility corridor (Conveyor corridor) from West port to SEZ area for transportation of liquid cargo is in progress, which is being passed through CRZ area. For which advance Elevated Gantry Girder Launching construction technology is being used, which has negligible impact on ground.</p> <p>APSEZ will ensure all above mentioned aspects during construction activity of utility corridor in CRZ area.</p> <p>Please Refer Compliance status of Condition no 1.6 for compensatory mangrove afforestation.</p>
1.10	The Environmental Clearance to the project is primarily under provisions of EIA Notification, 2006. It does not tantamount to approvals/consent/permissions etc required to	<p>Point Noted and Complied.</p> <p>All requisite permission from concerned authorities will be obtained under relevant act/rules/regulation.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024																																								
	<p>be obtained under any other Act/Rule/regulation The Project Proponent is under obligation to obtain approvals /clearances under any other Acts/ Regulations or Statutes as applicable to the project.</p>	<p>Requisite permissions from Gujarat Maritime Board (GMB), for carrying out construction activities will be taken from time to time.</p> <p>The project is being developed as per Consent to Establish (CtE) and Consent to Operate (CtO) granted by SPCB. The present in-force CtE & CtO are mentioned below.</p> <table border="1"> <thead> <tr> <th>S. No.</th> <th>Permission</th> <th>Project</th> <th>Ref. No. / Order No.</th> <th>Valid till</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>CtE – Amendment</td> <td>LPG Terminal</td> <td>PC/CCA-KUTCH-1437/PCB ID-53331/473995</td> <td>03.10.25</td> </tr> <tr> <td>2</td> <td>CtE – Amendment</td> <td>LPG Terminal</td> <td>PC/CCA-KUTCH-1437/GPCB ID-53331/587015</td> <td>01.03.26</td> </tr> <tr> <td>3</td> <td>CtE – Amendment</td> <td>WFDP</td> <td>17739 / 15618</td> <td>18.05.27</td> </tr> <tr> <td>4</td> <td>CC&A - Renewal</td> <td>West Port – WFDP</td> <td>AWH-113458</td> <td>01.02.27</td> </tr> <tr> <td>5</td> <td>CC&A – Renewal</td> <td>Mundra Port Terminal</td> <td>AWH-117045</td> <td>20.11.26</td> </tr> <tr> <td>6</td> <td>CC&A - Correction</td> <td>Mundra Port Terminal</td> <td>PC/CCA-KUTCH-39(8)/GPCB ID 17739/592900</td> <td>20.11.26</td> </tr> <tr> <td>7</td> <td>CC&A - Renewal</td> <td>LPG Terminal</td> <td>PC/CCA-KUTCH-1437/PCB ID-53331/816485</td> <td>27.06.29</td> </tr> </tbody> </table> <p>Above mention permission copy from Sr 1 to 7 attached as Annexure 8.</p>	S. No.	Permission	Project	Ref. No. / Order No.	Valid till	1	CtE – Amendment	LPG Terminal	PC/CCA-KUTCH-1437/PCB ID-53331/473995	03.10.25	2	CtE – Amendment	LPG Terminal	PC/CCA-KUTCH-1437/GPCB ID-53331/587015	01.03.26	3	CtE – Amendment	WFDP	17739 / 15618	18.05.27	4	CC&A - Renewal	West Port – WFDP	AWH-113458	01.02.27	5	CC&A – Renewal	Mundra Port Terminal	AWH-117045	20.11.26	6	CC&A - Correction	Mundra Port Terminal	PC/CCA-KUTCH-39(8)/GPCB ID 17739/592900	20.11.26	7	CC&A - Renewal	LPG Terminal	PC/CCA-KUTCH-1437/PCB ID-53331/816485	27.06.29
S. No.	Permission	Project	Ref. No. / Order No.	Valid till																																						
1	CtE – Amendment	LPG Terminal	PC/CCA-KUTCH-1437/PCB ID-53331/473995	03.10.25																																						
2	CtE – Amendment	LPG Terminal	PC/CCA-KUTCH-1437/GPCB ID-53331/587015	01.03.26																																						
3	CtE – Amendment	WFDP	17739 / 15618	18.05.27																																						
4	CC&A - Renewal	West Port – WFDP	AWH-113458	01.02.27																																						
5	CC&A – Renewal	Mundra Port Terminal	AWH-117045	20.11.26																																						
6	CC&A - Correction	Mundra Port Terminal	PC/CCA-KUTCH-39(8)/GPCB ID 17739/592900	20.11.26																																						
7	CC&A - Renewal	LPG Terminal	PC/CCA-KUTCH-1437/PCB ID-53331/816485	27.06.29																																						
1.11	<p>All the recommendations mentioned in the Marine Biology study conducted and validation process by the Gujarat Institute of Desert Ecology (GUIDE) shall be implemented. The compliance to the recommendations shall be submitted along with 6 monthly compliance report to the regional office of MoEFCC.</p>	<p>Point noted and agreed.</p> <p>Compliance to the recommendations mentioned in the Marine Biology study conducted by NABET accredited consultant i.e. M/s Cholamandalam MS Risk Services Ltd. and the same has been validated by M/s Gujarat Institute of Desert Ecology (GUIDE) is attached as Annexure 9.</p>																																								

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024																																																														
1.12	<p>Continuous monitoring of the ecological characteristics of the habitat during and after the construction, to assess the changes in the water quality, coastal hydrology, bottom contamination and diversity & abundance of marine organisms. The report of the monitoring report shall be submitted to the concern IRO, MoEF&CC along with six monthly report.</p>	<p>Complied.</p> <p>To ensure no damage to marine ecology, marine water & sediment monitoring is being carried out once a month by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi as part of regular environment monitoring plan.</p> <p>Summary of the same for duration from Apr'24 to Sep'24 is mentioned below.</p> <p>Total Sampling Locations: 09 Nos.</p> <table border="1"> <thead> <tr> <th rowspan="2">Parameter</th> <th rowspan="2">Unit</th> <th colspan="3">Surface</th> <th colspan="3">Bottom</th> </tr> <tr> <th>Min</th> <th>Max</th> <th>Avg.</th> <th>Min</th> <th>Max</th> <th>Avg.</th> </tr> </thead> <tbody> <tr> <td>pH</td> <td>--</td> <td>7.91</td> <td>8.24</td> <td>8.12</td> <td>7.74</td> <td>8.16</td> <td>7.97</td> </tr> <tr> <td>BOD (3 Days @ 27 °C)</td> <td>mg/L</td> <td>2.2</td> <td>3.4</td> <td>2.89</td> <td>BDL (MDL 1.0)</td> <td>BDL (MDL 1.0)</td> <td>BDL (MDL 1.0)</td> </tr> <tr> <td>TSS</td> <td>mg/L</td> <td>94</td> <td>144</td> <td>127.04</td> <td>76</td> <td>132</td> <td>106.96</td> </tr> <tr> <td>DO</td> <td>mg/L</td> <td>5.73</td> <td>6.69</td> <td>6.23</td> <td>5.48</td> <td>6.49</td> <td>6.04</td> </tr> <tr> <td>Salinity</td> <td>ppt</td> <td>35.31</td> <td>38.82</td> <td>36.07</td> <td>26.76</td> <td>37.54</td> <td>36.86</td> </tr> <tr> <td>TDS</td> <td>mg/L</td> <td>34410</td> <td>36550</td> <td>35858</td> <td>35370</td> <td>37610</td> <td>36873</td> </tr> </tbody> </table> <p style="text-align: right;">*BDL – Below Detection Limit *MDL – Minimum Detection Limit</p> <p>Please refer to Annexure – 10 for detailed analysis reports. Approx. INR 6.11 Lakh is spent for all environmental monitoring activities during the FY 2024-25 (till Sep'24) for overall APSEZ, Mundra. Marine monitoring for west port area including location near existing intake and outfall location is being carried out by M/s. Adani Power (Mundra) Limited (Pre-monsoon & Post-monsoon) through NABL accredited and MoEF&CC authorized agency namely M/s. UniStar Environment & Research Labs Pvt. Ltd. Monitoring reports are also enclosed as Annexure – 10.</p> <p>Summary of ecological parameters of M/s. Adani Power (Mundra) Limited is given below:</p> <p>PHYTOPLANKTON DIVERSITY: Phytoplankton sampling was carried out at 5 stations. At each station, water</p>	Parameter	Unit	Surface			Bottom			Min	Max	Avg.	Min	Max	Avg.	pH	--	7.91	8.24	8.12	7.74	8.16	7.97	BOD (3 Days @ 27 °C)	mg/L	2.2	3.4	2.89	BDL (MDL 1.0)	BDL (MDL 1.0)	BDL (MDL 1.0)	TSS	mg/L	94	144	127.04	76	132	106.96	DO	mg/L	5.73	6.69	6.23	5.48	6.49	6.04	Salinity	ppt	35.31	38.82	36.07	26.76	37.54	36.86	TDS	mg/L	34410	36550	35858	35370	37610	36873
Parameter	Unit	Surface			Bottom																																																											
		Min	Max	Avg.	Min	Max	Avg.																																																									
pH	--	7.91	8.24	8.12	7.74	8.16	7.97																																																									
BOD (3 Days @ 27 °C)	mg/L	2.2	3.4	2.89	BDL (MDL 1.0)	BDL (MDL 1.0)	BDL (MDL 1.0)																																																									
TSS	mg/L	94	144	127.04	76	132	106.96																																																									
DO	mg/L	5.73	6.69	6.23	5.48	6.49	6.04																																																									
Salinity	ppt	35.31	38.82	36.07	26.76	37.54	36.86																																																									
TDS	mg/L	34410	36550	35858	35370	37610	36873																																																									

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		<p>samples were collected from surface and bottom waters. During the sampling period the phytoplankton population in the coastal waters of APL-Mundra, was more diverse during the Pre-monsoon season (April 2024) than Post-monsoon (September 2024). However, the overall phytoplankton abundance was more during post-monsoon than the pre-monsoon season. The detailed species composition reported during both sampling period is given in Annexure I and II. In April 2024, the phytoplankton community was represented with a total of 31 phytoplankton genera belonging to diatoms(26 genera) and dinoflagellates (5 genera). Overall, 31 phytoplankton genera representing diatoms (28 genera) and dinoflagellate (3 genera) reported during September 2024 sampling. Diatoms Species belonged to <i>Amphorprora</i> sp., <i>Asterionella</i> sp., <i>Bacillaria</i> sp., <i>Chaetoceros</i> sp., <i>Corethron</i> sp., <i>Coscinodiscus</i> sp., <i>Cyclotella</i> sp., <i>Cylindrotheca</i> sp., <i>Cymbella</i> sp., <i>Diploneis</i> sp., <i>Guinardia</i> sp., <i>Lauderia</i> sp., <i>Leptocylindrus</i> sp., <i>Licmophora</i> sp., <i>Lithodesmium</i> sp., <i>Navicula</i> sp., <i>Nitzschia</i> sp., <i>Odontella</i> sp., <i>Pinnularia</i> sp., <i>Pleurosigma</i> sp., <i>Pseudonitzschia</i> sp., <i>Rhizosolenia</i> sp., <i>Thalassiosira</i> sp. and <i>Thalassionema</i> sp. were common during both sampling period. Only 3 dinoflagellate genera i.e., <i>Ceratium</i>, <i>Prorocentrum</i> and <i>Protoperdinium</i> were reported during September 2024 as compared to April 2024 (5 genera).</p> <p>The phytoplankton abundance in the study region was higher during the 134 to 218 cells x 10² L⁻¹ during September 2024 as compared to April 2024 (ranged from 87 to 161 cells x 10² L⁻¹). In April 2024, the highest phytoplankton abundance was observed at St-5 in the surface (161 cells x 10² L⁻¹). The lowest phytoplankton abundance (87 cells x 10² L⁻¹) was observed at St-3 in surface water. During September 2024, phytoplankton abundance was higher at St-5 in surface water (218 cells x 10² L⁻¹) and lowest at St-3 bottom water (134 cells x 10² L⁻¹). The diatom genera, <i>Coscinodiscus</i> (up to 42 cells x 10² L⁻¹) during September 2024 (Annexure I), whereas in April 2024, <i>Thalassiosira</i> (up to 22 cells x 10² L⁻¹) was also predominant along with <i>Coscinodiscus</i> (up to 22 cells x 10² L⁻¹) (Annexure II). The study shows that the marine</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		<p>water around was enriched with the diverse phytoplankton population during the same period.</p> <p><u>BENTHIC DIVERSITY:</u></p> <p>Subtidal region: The macrobenthic population study revealed large spatiotemporal variation with the benthic population during the study period. Overall, more macrobenthos abundance and biomass were reported at subtidal stations than at intertidal stations. The macrobenthic abundance and biomass were more during the September 2024 than the April 2024 sampling. In April 2024, the macrobenthos density ranged from 575 no./m² to 860 nos./m² at sampling stations (Table 7). The biomass of the macrobenthic community in the study region was ranged from 0.7 g/ m² to 1.0 g/ m² in the study region. The maximum abundance and biomass of benthic microorganisms was reported at St-4 (860 nos./m² and 2.1 g/m²). During September 2024, the macrobenthos density was ranged from 770 to 1260 nos./m². The macrobenthic biomass was ranged from 0.7 to 1.9 g/ m².</p> <p>In species composition, Polychaete species (Phylum Annelida) belonging to the family Paraonidae, Pilargidae, Capitillidae, Cossuridae, Glyceridae, Ciratullidae, Nephthyida, Nereidae, Lumbriconeridae, Spionidae were abundant contributing ~75% to macrobenthic population during April 2024 (Annexure IV). In September 2024, species belongs to family Spionidae were not reported, whereas polychaete species contributed ~82% to macrobenthic population.</p> <p><u>Intertidal region:</u> The sandy substratum with low organic matter affects the occurrence of the macrobenthic community in the intertidal region. In September 2024, the highest bio mass was measured (0.05 g/m² to 0.2 g/m²) in the intertidal region (Annexure V). The highest density of macrobenthic organisms was reported at station IT-1 (LW) (224 nos./m²), whereas the lowest density was reported at Station IT-2 (HW) (124 nos./m²). During April 2024, the macrobenthic biomass was ranged from (0.08</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		<p>to 0.4 g/m²). At St-1 (LW) the higher macrobenthic population (140 nos./m²) and biomass (0.4 g/m²) was reported. No macrobenthic community was observed at St-3 (HW and LW) may be due to sandy sediment during both sampling periods.</p> <p>If require, APSEZ will increase the no. of marine water monitoring locations if required.</p>
1.13	<p>The Project Proponent shall ensure that no creeks or rivers are blocked due to any activities at the project site and free flow of water is maintained.</p>	<p>Complied.</p> <p>APSEZ has taken following measures for conservation of creeks which is detailed below:</p> <ul style="list-style-type: none"> ➤ The prominent creek system (main creeks and small branches of creeks) in and around APSEZ are: (1) Kotdi (2) Baradimata (3) Navinal (4) Bocha (5) Mundra (Oldest port (Juna Bandar) leading to Bhukhi river). ➤ All above creek mouths are open allowing free flow of water into the creeks and surrounding areas and there is no filling or reclamation of any creek area. ➤ This aspect is also confirmed from the earlier studies of NCSCM in 2017-18, which highlights the bathymetry data of the entire coast around APSEZ. ➤ From the bathymetry data it can be concluded that there are sufficient depths at the creek mouths and all creek mouths are open allowing flushing of water. <p>APSEZ has so far constructed 19 culverts having total length of approx. 1100 m with total cost of INR 20 Crores. Three RCC Bridges have also been constructed over Kotdi creek with total length of 230 m and cost of INR 10 Crores.</p> <p>As per the bathymetry study carried out by NCSCM in 2017-18, it can be concluded that there are sufficient depths at the creek mouths and all creek mouths are open allowing flushing of water.</p> <p>Recently GUIDE has completed the study of Monitoring and Distribution of the Mangroves along the Creeks in and Around APSEZ, Mundra, Kutch, Gujarat for the duration of the year March 2019 to March 2021.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		<p>Photographs of culvert and bridges attached as Annexure 11.</p> <p>However, increase in mangrove cover around the creeks of APSEZ over the period of years also confirms, there is no blockage of any creek or river.</p> <p>APSEZ will also ensure that no creeks or rivers should be blocked due to any port expansion activities and free flow of water should be maintained.</p>
1.14	No underwater blasting is permitted.	<p>Complied.</p> <p>No underwater blasting activity is being carried out or will be carried out as a part of proposed port expansion activities.</p>
1.15	<p>The closed conveyor gallery along with the junction/transfer towers shall be provided with dust suppression systems (DSS). Dust suppression systems with water sprinklers/fogging system shall be provided to prevent the fugitive dust emissions during handling, transfer and storage. Further, the Greenbelts prevent/arrest/controls the fugitive emissions.</p>	<p>Complied.</p> <p>The following safeguard measures are being taken for abatement of dust / fugitive emissions.</p> <ul style="list-style-type: none"> ➤ Regular water sprinkling on road and other open area. ➤ Regular cleaning of roads through mechanized equipment ➤ Dry fog Dust Suppression System (DSS) in hopper, transfer towers and conveyor belts ➤ Use of water mist canon ➤ Closed type conveyor belts ➤ Regular sprinkling on coal heaps with mechanized system ➤ Covering other types of dry bulk cargo heaps ➤ Installation of wind breaking wall ➤ Development of greenbelt along the periphery of the storage yards/back up area ➤ Mechanized handling system for coal and other dry bulk cargo ➤ Wagon loading and truck loading through closed silo ➤ Greenbelt development within plant premises <p>Photographs of safeguard measures implemented for abatement of dust / fugitive emissions at site attached as Annexure 12.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024																																				
		<p>The same practice will also be continued as a part of proposed expansion activities.</p> <p>Ambient Air Quality (twice in a week) monitoring is being carried out by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. Summary of the same for duration from Apr'24 to Sep'24 is mentioned below.</p> <p style="text-align: center;">Total Ambient Air Sampling Locations: 13 Nos.</p> <table border="1"> <thead> <tr> <th>Parameter</th> <th>Unit</th> <th>Min</th> <th>Max</th> <th>Average</th> <th>Perm. Limit[§]</th> </tr> </thead> <tbody> <tr> <td colspan="6" style="text-align: center;">AAQM</td> </tr> <tr> <td>PM₁₀</td> <td>µg/m³</td> <td>36.49</td> <td>87.52</td> <td>64.97</td> <td>100</td> </tr> <tr> <td>PM_{2.5}</td> <td>µg/m³</td> <td>15.47</td> <td>44.72</td> <td>27.90</td> <td>60</td> </tr> <tr> <td>SO₂</td> <td>µg/m³</td> <td>8.65</td> <td>40.42</td> <td>21.54</td> <td>80</td> </tr> <tr> <td>NO₂</td> <td>µg/m³</td> <td>10.68</td> <td>44.27</td> <td>25.22</td> <td>80</td> </tr> </tbody> </table> <p style="text-align: right;">[§] as per NAAQ standards, 2009 * as per CC&A granted by GPCB</p> <p style="text-align: center;">Values recorded confirms to the stipulated standards.</p>	Parameter	Unit	Min	Max	Average	Perm. Limit [§]	AAQM						PM ₁₀	µg/m ³	36.49	87.52	64.97	100	PM _{2.5}	µg/m ³	15.47	44.72	27.90	60	SO ₂	µg/m ³	8.65	40.42	21.54	80	NO ₂	µg/m ³	10.68	44.27	25.22	80
Parameter	Unit	Min	Max	Average	Perm. Limit [§]																																	
AAQM																																						
PM ₁₀	µg/m ³	36.49	87.52	64.97	100																																	
PM _{2.5}	µg/m ³	15.47	44.72	27.90	60																																	
SO ₂	µg/m ³	8.65	40.42	21.54	80																																	
NO ₂	µg/m ³	10.68	44.27	25.22	80																																	
1.16	Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.	<p>Complied.</p> <p>All the waste materials are being handled in line with applicable rules and regulations. APSEZ also ensures no kind of waste materials are being dumped into water bodies or in any open land.</p>																																				
1.17	Spillage of fuel/engine oil and lubricants from the construction site are a source of organic pollution which impacts marine life, particularly benthos. This shall be prevented by suitable precautions and also by providing necessary mechanisms to trap the spillage.	<p>Complied.</p> <p>Utmost care as well as provision of appropriate secondary contamination control is being taken to avoid Spillage of fuel/engine oil and lubricants from the construction site.</p> <p>As well as proper environment awareness training for handling of fuel/engine is being imparted to workers to avoid any spillage and same practice will also be continued as a part of proposed expansion activities.</p>																																				
1.18	Oil spillage prevention and mitigation scheme shall be prepared. In case of oil	Complied.																																				

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	<p>spillage/contamination, action plan shall be prepared to clean the site by adopting proven technology. The recyclable waste (oily sludge) and spent oil shall be disposed of to the authorized recyclers.</p>	<p>Oil spill contingency plan is in place to handle Tier 1 level oil spills considering different accident scenarios, and the vulnerable areas are identified, and mitigation plan is prepared.</p> <p>Based on the oil spill modeling study, it has been observed that crude oil spill of 700 tons (Tier-I) will spread over an area having radius of around 400 m within 4hr. APSEZ already has facilities for combating a Tier-1 spill.</p> <p>Recommendations of Marine EIA by NIO with respect to pollution emergency contingency plan for Multipurpose Terminal, Container, Dry & Break Bulk Terminal as well as associated facilities are addressed in Oil Spill Response Plan.</p> <p>This action plan prepared by APSEZ to combat the oil spill (LOS-DCP) is in accordance with the NOS DCP, International Petroleum Industry Environmental Conservation Association (IPIECA).</p> <p>Waste/Spent Oil/Oily sludge generated would be disposed of through authorized recycler.</p>
1.19	<p>Emergency response system for oil spillage and oil spill contingency plan, any other hazardous material spillages shall be in place at the site level. The mock drill in this regard shall be conducted regularly and the same shall be documented and made available during inspections of local pollution control board, port authorities and MoEF&CC.</p>	<p>Complied.</p> <p>Oil spill contingency response plan is being updated on regular basis and the same was last updated on 30.07.2022 is in place and implemented. The updated Oil spill contingency response plan is attached as Annexure 13.</p> <p>For responding to oil spill, the Indian Coast Guard has developed the National Oil Spill Disaster Contingency Plan NOSDCP which has the approval of the Committee of Secretaries and has been in operation since 1996. Oil Spill Contingency Response Plan (OSCRP) prepared by APSEZ is in accordance with the NOSDCP.</p> <p>Latest Regional Level Pollution Response exercise "SWACHCHH SAMUDRA-NW 2024" was carried out by Indian Coast Guard on 02-03 May 2024 at Mundra,</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		<p>Gujarat. All participants from various Oil Handling Agencies and Stakeholders (IOCLDPA-, HMEL, ICGS and APSEZ, Mundra) participated in this exercise. Details of the same is attached Annexure - 14</p> <p>Mock drills are conducted regularly by APSEZ. Last Oil Spill Mock drill was conducted on 03.05.2024. Oil Spill Mock Drill report is enclosed as Annexure - 14.</p> <p>On Site Emergency Response Plan and Crisis Management Plan is in place and implemented. The updated (Aug'23) Onsite emergency plan attached as Annexure 15.</p> <p>Regular TBT and fire & safety training is being imparted by the fire & safety department.</p> <p>Regular drills are being conducted for the effectiveness of the system. There were 5 drills conducted for various scenarios during compliance period (Apr'24 to Sep'24) as mentioned below.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024			
		Sr. No.	Location	Month	Scenario
		1.	Canteen area, ACMTPL	Sep'24	Assuming that one driver was started vomiting due to food poisoning while taking meal. Canteen supervisor Mr. Kiran Kumar Immediately informed to Admin in charge, OHC and Safety Department
		2.	Encloser – 09, TLF-09, Loading Bay	Sep'24	Chemical Spillage (Methanol around 300 litter) on loading helper due to wrong opening of valve for tanker loading at TLF - 09.
		3.	Liquid Terminal (00 line (In front of FCC))	May'24	isolation of Wagon due to fire catch on wagon during PY Gas Unloading at "00" Line.
		4.	2L20B1 container AICTPL	Sep'24	Scenario was leakage observed in container MEDU4000038 (IMDG class 08, UN 1760) placed at 2L20B1, yard supervisor informed to duty superintendent by means of VHF and Duty superintendent informed to Tower control of AICTPL. Tower control informed to Fire services, OHC, Security, ERT, Terminal head, POC, department regarding emergency
		5.	FB-01 refrigerated storage tank, Mundra LPG Terminal Pvt Ltd	Sep'24	While monitoring the DCS at CCR, CCR operator recognize that Gas Detector #202, activates which resulted in alarm on DCS screen, CCR operator informs shift in charge and asked him to evaluate the situation, where shift in charge confirmed about the leak, CCR immediately informed all the stakeholders and further emergency declared by site incidence controller, fire

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024				
						<p>team started precautionary water spraying by using water monitors further leak was arrested by mechanical team and ensured zero % LEL by safety team along with all the stakeholders. All clear message declared, and emergency scenario communicated to all the employees at assembly point.</p>
1.20	<p>Since liquid/gaseous product handling is involved, complete risk safety assessment including 'BLEVE' study and mitigation measures and safety precautions shall be drawn and implemented along with the Robust safety standards and latest fire detection and prevention techniques. The report shall be submitted along with the 6 monthly compliance report.</p>	<p>Complied.</p> <p>Quantitative Risk Assessment for existing facilities i.e; Tank farms, Jetty Area & Pipelines was conducted in Nov'2016 by M/s TECHNIP INDIA LIMITED to assess the risk levels associated with the facilities to handle liquid/gaseous product; evaluate risks based on the HSE UK Risk Acceptance Criteria, and risks if found are outside the tolerable region, then risk reduction measures shall be proposed to bring the risks into tolerable or As Low As Reasonably Practicable (ALARP) Levels and lower levels and recommendations of the study is being complied with. Copy of QRA report attached as Annexure 17.</p> <p>Risk assessment study for new liquid/gaseous product handling system will be carried out including BLEVE study and its recommendations of the report will be implemented as applicable.</p>				
1.21	<p>The risk assessment and management plan being drawn up with regards to the environmental impacts of natural disasters, oil spills and other waste, dredging and dumping on marine ecology shall scrupulously implemented. It shall be ensured that the marine</p>	<p>Complied.</p> <p>Disaster Management Plan is updated regularly and the updated DMP is attached as Annexure - 18.</p> <p>APSEZ would stringently implement risk assessment and management plan, and few recommendations implemented in past is mentioned below:</p>				

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024									
	<p>ecology in the area of influence shall not affect. The monitoring and compliance status of the marine ecology management plan shall be submitted along with the six monthly EC compliance reports.</p>	<p>Few Marine EIA recommendations:</p> <table border="1"> <tr> <td>Shore based power supply shall be provided to the ships that are berthed to reduce the air emissions.</td> <td> <p>Complied.</p> <p>Power supply from Grid/Solar is being supplied to the vessels berthed to reduce emissions.</p> </td> </tr> <tr> <td>The ballast water or any discharge from the ships shall be prevented by insisting the ships/vessels to follow the MARPOL Convention guidelines.</td> <td> <p>Complied</p> <p>Ships berthing at Mundra Port comply with MARPOL regulations.</p> <p>No discharge such as ballast/bilge wastes, sewage or any other liquid wastewater is allowed into marine environment inside port limits.</p> </td> </tr> <tr> <td>The discharge from the ships, if required, shall be disposed only after proper treatment.</td> <td> <p>APSEZ has adequate Waste Reception facility as per MARPOL and DG Shipping regulations. The port has reception facility for all MARPOL waste streams (Annex-I, Annex-II, Annex-IV & Annex-V) except Annex-VI that is generated from vessels.</p> <p>As a general practice APSEZ provide facility for receiving slop / waste oil from vessels through hose connection with oil tankers. These tankers divert slop / waste oil to Oil water separator system where water and oil particles are separated. Separated oil is being sold to authorized recycler /re-processor. However, no slope / waste oil was received during the compliance period.</p> <p>Regular Marine water and sediments monitoring is being carried out by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. Monitoring reports for the period from Apr'24 to Sep'24 is enclosed as Annexure – 10.</p> </td> </tr> <tr> <td>A risk assessment of the ships and other vessels entering the port shall be carried out to avoid introduction of alien species or pests.</td> <td> <p>Complied</p> <p>No discharge such as ballast/bilge wastes, sewage or any other liquid wastewater is allowed into marine environment inside port limits to avoid</p> </td> </tr> </table>		Shore based power supply shall be provided to the ships that are berthed to reduce the air emissions.	<p>Complied.</p> <p>Power supply from Grid/Solar is being supplied to the vessels berthed to reduce emissions.</p>	The ballast water or any discharge from the ships shall be prevented by insisting the ships/vessels to follow the MARPOL Convention guidelines.	<p>Complied</p> <p>Ships berthing at Mundra Port comply with MARPOL regulations.</p> <p>No discharge such as ballast/bilge wastes, sewage or any other liquid wastewater is allowed into marine environment inside port limits.</p>	The discharge from the ships, if required, shall be disposed only after proper treatment.	<p>APSEZ has adequate Waste Reception facility as per MARPOL and DG Shipping regulations. The port has reception facility for all MARPOL waste streams (Annex-I, Annex-II, Annex-IV & Annex-V) except Annex-VI that is generated from vessels.</p> <p>As a general practice APSEZ provide facility for receiving slop / waste oil from vessels through hose connection with oil tankers. These tankers divert slop / waste oil to Oil water separator system where water and oil particles are separated. Separated oil is being sold to authorized recycler /re-processor. However, no slope / waste oil was received during the compliance period.</p> <p>Regular Marine water and sediments monitoring is being carried out by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. Monitoring reports for the period from Apr'24 to Sep'24 is enclosed as Annexure – 10.</p>	A risk assessment of the ships and other vessels entering the port shall be carried out to avoid introduction of alien species or pests.	<p>Complied</p> <p>No discharge such as ballast/bilge wastes, sewage or any other liquid wastewater is allowed into marine environment inside port limits to avoid</p>
Shore based power supply shall be provided to the ships that are berthed to reduce the air emissions.	<p>Complied.</p> <p>Power supply from Grid/Solar is being supplied to the vessels berthed to reduce emissions.</p>										
The ballast water or any discharge from the ships shall be prevented by insisting the ships/vessels to follow the MARPOL Convention guidelines.	<p>Complied</p> <p>Ships berthing at Mundra Port comply with MARPOL regulations.</p> <p>No discharge such as ballast/bilge wastes, sewage or any other liquid wastewater is allowed into marine environment inside port limits.</p>										
The discharge from the ships, if required, shall be disposed only after proper treatment.	<p>APSEZ has adequate Waste Reception facility as per MARPOL and DG Shipping regulations. The port has reception facility for all MARPOL waste streams (Annex-I, Annex-II, Annex-IV & Annex-V) except Annex-VI that is generated from vessels.</p> <p>As a general practice APSEZ provide facility for receiving slop / waste oil from vessels through hose connection with oil tankers. These tankers divert slop / waste oil to Oil water separator system where water and oil particles are separated. Separated oil is being sold to authorized recycler /re-processor. However, no slope / waste oil was received during the compliance period.</p> <p>Regular Marine water and sediments monitoring is being carried out by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. Monitoring reports for the period from Apr'24 to Sep'24 is enclosed as Annexure – 10.</p>										
A risk assessment of the ships and other vessels entering the port shall be carried out to avoid introduction of alien species or pests.	<p>Complied</p> <p>No discharge such as ballast/bilge wastes, sewage or any other liquid wastewater is allowed into marine environment inside port limits to avoid</p>										

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024	
			introduction of alien species or pests.
		<p>Marine water monitoring for west port area is being carried out by M/s. Adani Power (Mundra) Limited (Pre-monsoon & Post-monsoon) through NABL accredited and MoEF&CC authorized agency namely M/s. UniStar Environment & Research Labs Pvt. Ltd. Monitoring reports are also enclosed as Annexure - 10.</p> <p>Summary of ecological parameters of M/s. Adani Power (Mundra) Limited is given below:</p> <p>PHYTOPLANKTON DIVERSITY: Phytoplankton sampling was carried out at 5 stations. At each station, water samples were collected from surface and bottom waters. During the sampling period the phytoplankton population in the coastal waters of APL-Mundra, was more diverse during the Pre-monsoon season (April 2024) than Post-monsoon (September 2024). However, the overall phytoplankton abundance was more during post-monsoon than the pre-monsoon season. The detailed species composition reported during both sampling period is given in Annexure I and II. In April 2024, the phytoplankton community was represented with a total of 31 phytoplankton genera belonging to diatoms (26 genera) and dinoflagellates (5 genera). Overall, 31 phytoplankton genera representing diatoms (28 genera) and dinoflagellate (3 genera) reported during September 2024 sampling. Diatoms Species belonged to <i>Amphorprora</i> sp., <i>Asterionella</i> sp., <i>Bacillaria</i> sp., <i>Chaetoceros</i> sp. <i>Corethron</i> sp., <i>Coscinodiscus</i> sp., <i>Cyclotella</i> sp., <i>Cylindrotheca</i> sp., <i>Cymbella</i> sp., <i>Diploneis</i> sp., <i>Guinardia</i> sp., <i>Lauderia</i> sp., <i>Leptocylindrus</i> sp., <i>Licmophora</i> sp., <i>Lithodesmium</i> sp., <i>Navicula</i> sp., <i>Nitzschia</i> sp., <i>Odontella</i> sp., <i>Pinnularia</i> sp., <i>Pleurosigma</i> sp., <i>Pseudonitzschia</i> sp., <i>Rhizosolenia</i> sp., <i>Thalassiosira</i> sp. and <i>Thalassionema</i> sp. were common during both sampling period. Only 3 dinoflagellate genera i.e., <i>Ceratium</i>,</p>	

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		<p><i>Prorocentrum</i> and <i>Protopeiridium</i> were reported during September 2024 as compared to April 2024 (5 genera). The phytoplankton abundance in the study region was higher during the 134 to 218 cells x 10² L⁻¹ during September 2024 as compared to April 2024 (ranged from 87 to 161 cells x 10² L⁻¹). In April 2024, the highest phytoplankton abundance was observed at St-5 in the surface (161 cells x 10² L⁻¹). The lowest phytoplankton abundance (87 cells x 10² L⁻¹) was observed at St-3 in surface water. During September 2024, phytoplankton abundance was higher at St-5 in surface water (218 cells x 10² L⁻¹) and lowest at St-3 bottom water (134 cells x 10² L⁻¹). The diatom genera, <i>Coscinodiscus</i> (up to 42 cells x 10² L⁻¹) during September 2024 (Annexure I), whereas in April 2024, <i>Thalassiosira</i> (up to 22 cells x 10² L⁻¹) was also predominant along with <i>Coscinodiscus</i> (up to 22 cells x 10² L⁻¹) (Annexure II). The study shows that the marine water around was enriched with the diverse phytoplankton population during the same period.</p> <p><u>BENTHIC DIVERSITY:</u></p> <p>Subtidal region: The macrobenthic population study revealed large spatiotemporal variation with the benthic population during the study period. Overall, more macrobenthos abundance and biomass were reported at subtidal stations than at intertidal stations. The macrobenthic abundance and biomass were more during the September 2024 than the April 2024 sampling. In April 2024, the macrobenthos density ranged from 575 no./m² to 860 nos./m² at sampling stations (Table 7). The biomass of the macrobenthic community in the study region was ranged from 0.7 g/ m² to 1.0 g/ m² in the study region. The maximum abundance and biomass of benthic microorganisms was reported at St-4 (860 nos./m² and 2.1 g/m²). During September 2024, the macrobenthos density was ranged from 770 to 1260 nos./m². The macrobenthic biomass was ranged from 0.7 to 1.9 g/ m².</p> <p>In species composition, Polychaete species (Phylum Annelida) belonging to the family Paraonidae, Pilargidae, Capitillidae, Cossuridae, Glyceridae, Ciratullidae,</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		<p>Nephthyida, Nereidae, Lumbriconeridae, Spionidae were abundant contributing ~75% to macrobenthic population during April 2024 (Annexure IV). In September 2024, species belongs to family Spionidae were not reported, whereas polychaete species contributed ~82% to macrobenthic population.</p> <p>Overall, the presence of Polychaete, Amphipods, and Nemertean suggest the availability of food organisms for benthic predators in the area. The macrobenthic population reported during both studies reveals that the large spatial-temporal variation with the benthic population could be due to the change in bottom substratum.</p> <p>Intertidal region: The sandy substratum with low organic matter affects the occurrence of the macrobenthic community in the intertidal region. In September 2024, the highest biomass was measured (0.05 g/m² to 0.2 g/m²) in the intertidal region (Annexure V). The highest density of macrobenthic organisms was reported at station IT-1 (LW) (224 nos./m²), whereas the lowest density was reported at Station IT-2 (HW) (124 nos./m²). During April 2024, the macrobenthic biomass was ranged from (0.08 to 0.4 g/m²). At St-1 (LW) the higher macrobenthic population (140 nos./m²) and biomass (0.4 g/m²) was reported. No macrobenthic community was observed at St-3 (HW and LW) may be due to sandy sediment during both sampling periods.</p>
1.22	All the recommendations mentioned in the risk assessment report, disaster management plan and safety guidelines shall be implemented.	<p>Complied.</p> <p>We have commenced port expansion activity after getting EC & CRZ clearance and Consent to Establish from concern regulatory authorities. Hence, all the recommendations suggested in risk assessment report, disaster management plan and safety guidelines are being complied as applicable.</p>
1.23	The project proponent shall install a system to carryout Ambient Air Quality monitoring for common/criterion	<p>Complied.</p> <p>Ambient Air Quality is being carried out by NABL accredited and MoEF&CC authorized agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024																																				
	<p>parameters relevant to the main pollutants released (e.g. PM10 and PM2.5 in reference to PM emission, and SO2 and NOx in reference to SO2 and NOx emissions) within and outside the port area at least at four locations (one within and three outside the port area at an angle of 120°each), covering upwind and downwind directions.</p>	<p>Total number of ambient air monitoring station is 13. Out of which 09 Nos. is within Port & 04 Nos. Outside Port.</p> <p>Locations have been selected considering an angle of 120°each), covering upwind and downwind directions of port operational activities.</p> <p>Summary of the same for duration from Apr'24 to Sep'24 is mentioned below:</p> <p>Air sampling locations & frequency: 13 nos. (twice a week including surrounding villages)</p> <table border="1"> <thead> <tr> <th>Parameter</th> <th>Unit</th> <th>Min</th> <th>Max</th> <th>Average</th> <th>Perm. Limit\$</th> </tr> </thead> <tbody> <tr> <td colspan="6" style="text-align: center;">AAQM</td> </tr> <tr> <td>PM10</td> <td>µg/m3</td> <td>36.49</td> <td>87.52</td> <td>64.97</td> <td>100</td> </tr> <tr> <td>PM2.5</td> <td>µg/m3</td> <td>15.47</td> <td>44.72</td> <td>27.90</td> <td>60</td> </tr> <tr> <td>SO2</td> <td>µg/m3</td> <td>8.65</td> <td>40.42</td> <td>21.54</td> <td>80</td> </tr> <tr> <td>NO2</td> <td>µg/m3</td> <td>10.68</td> <td>44.27</td> <td>25.22</td> <td>80</td> </tr> </tbody> </table> <p style="text-align: right;">\$ as per NAAQ standards, 2009 * as per CC&A granted by GPCB</p> <p style="text-align: center;">Values recorded confirms to the stipulated standards.</p> <p>Please refer Annexure – 10 for detailed analysis reports. Approx. INR 6.11 Lakh is spent for all environmental monitoring activities during the FY 2024-25 (till Sep'24) for overall APSEZ, Mundra.</p> <p>Ambient air quality monitoring in surrounding villages is being carried out by M/s. Adani Power (Mundra) Limited, Mundra through NABL accredited and MoEF&CC authorized agency namely M/s. UniStar Environment & Research Labs Pvt. Ltd. and monitoring reports of the same are also enclosed in Annexure – 10.</p> <p>If required, nos. of Ambient Air Monitoring Locations will also be increased.</p>	Parameter	Unit	Min	Max	Average	Perm. Limit\$	AAQM						PM10	µg/m3	36.49	87.52	64.97	100	PM2.5	µg/m3	15.47	44.72	27.90	60	SO2	µg/m3	8.65	40.42	21.54	80	NO2	µg/m3	10.68	44.27	25.22	80
Parameter	Unit	Min	Max	Average	Perm. Limit\$																																	
AAQM																																						
PM10	µg/m3	36.49	87.52	64.97	100																																	
PM2.5	µg/m3	15.47	44.72	27.90	60																																	
SO2	µg/m3	8.65	40.42	21.54	80																																	
NO2	µg/m3	10.68	44.27	25.22	80																																	

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
1.24	Appropriate Air Pollution Control (APC) system shall be provided for all the dust generating points including fugitive dust from all vulnerable sources, so as to comply prescribed fugitive emission standards.	<p>Complied.</p> <p>For further details regarding the control measures for fugitive emissions, please refer to specific condition no 1.15 of the EC and CRZ clearance.</p>
1.25	Emission and air quality monitoring and results of manual stack monitoring and manual monitoring of air quality /fugitive emissions to Regional Office of MoEF&CC, Zonal office of CPCB and Regional Office of SPCB along with six monthly monitoring report.	<p>Complied.</p> <p>For further details regarding ambient air quality monitoring & results, please refer to specific condition no 1.15 of the EC and CRZ clearance.</p> <p>Stack monitoring (once in six month) is being carried out by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi.</p> <p>Monitoring reports for the period from Apr'24 to Sep'24 is enclosed as Annexure - 10.</p>
1.26	Rain water harvesting for roof run-off and surface run-off, should be implemented. Before recharging the surface run off, pre-treatment must be done to remove suspended matter, oil and grease.	<p>Complied</p> <p>Groundwater recharge cannot be done at the project site since the entire project is in the intertidal / sub tidal areas. Rainwater within project area is managed through storm water drainage.</p> <p>We have installed Rainwater recharge bore well (4 Nos.) within our township to recharge ground water. During FY 2024-25 (till Sep'24) Approx. 7.31 ML of rainwater has been recharged to increase the ground water table.</p> <p>We have also connected roof top rainwater duct of operational building (Tug berth building within MPT) with u/g water tank for utilization of collected rainwater for gardening / horticulture purpose. Details of the same attached as Annexure 19.</p> <p>However, Adani Foundation – CSR arm of Adani Group has carried out rainwater harvesting activities in the nearby villages for benefit of the locals.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024														
		<p>Water conservation Projects i.e. Roof Top Rainwater Harvesting, Desilting of Check dams, Bore Well Recharge and Pond deepening were taken up in past years, review and monitoring of all water harvesting structures had been taken up.</p> <p>To make connections between human actions and the level of biological diversity found within a habitat and/or ecosystem, this year Adani Foundation launch project "Sanrakshan" in coordination with GUIDE and Sahjeevan.</p> <p>Since, 10 years considerable Water Conservation Work carried out in Mundra Taluka. Due to satisfactory rain in current year 1.11 mtr ground water table increased as per increased in coastal belt of Mundra as per Government Figures.</p> <p>Our water conservation work is as below. Below tabulated Water Conservation Projects completed during Compliance period FY 2023-24:</p> <p>Swajal Project:</p> <ul style="list-style-type: none"> ➤ Aim: The Foundation's Water Conservation program, SWAJAL, is aimed at addressing the alarming depletion of groundwater levels and reduction in water sources in various parts of Kutch district. ➤ Water Security Plan: Due to arid climatic characters of the Kutch region, it is essential to plan for water security drinking and livelihood purposes. Considering weather condition, rainfall characters, geohydrological condition and water demand, water security plan has been prepared for the Seven villages. <table border="1"> <thead> <tr> <th>Block Name</th> <th>Water conservation structure</th> <th>Total no. of Structure</th> <th>Total Capacity Created (CUM)</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Mundra</td> <td>Check Dam</td> <td>23</td> <td>6,07,332.80</td> </tr> <tr> <td>Pond Deepening</td> <td>66</td> <td>1,89,121.08</td> </tr> <tr> <td>RRWHS</td> <td>275</td> <td>2750</td> </tr> </tbody> </table>	Block Name	Water conservation structure	Total no. of Structure	Total Capacity Created (CUM)	Mundra	Check Dam	23	6,07,332.80	Pond Deepening	66	1,89,121.08	RRWHS	275	2750
Block Name	Water conservation structure	Total no. of Structure	Total Capacity Created (CUM)													
Mundra	Check Dam	23	6,07,332.80													
	Pond Deepening	66	1,89,121.08													
	RRWHS	275	2750													

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024			
			Recharge Borewell	209	-
			Percolation Well	24	-
		Below tabulated Water Conservation Projects completed during last Compliance period:			
Sr. No.	Project	Unit	Outcome	Impact	
1	Check dam Restrengthening-Nana Kapaya	1	Water Storage Capacity increased by 48000 Cum	60 + farmer's 120+Acre Area of Agri land can be Irrigated	
2	Recharge Borewell	21	Reduce Salinity ingress, and preventing water run	150+ farmer's 260+ Acre Area of Agri land for Irrigated	
3	Pipe Culvert at Checkdam at Bhujpur	1	prevent water runoff into seaside.	35 farmers' 120+Acre Area of Agri land can be Irrigated	
		<p>Earlier Completed Activities/Projects:</p> <ul style="list-style-type: none"> • Large number of water harvesting structure (18 Nos. of check dams in coordination with salinity department) and Augmentation of 3 check dams. • Ground recharge activities (pond deepening work for 61 ponds) individually and 26 ponds under Sujlam Suflam Jal Abhiyan were built leading to a significant increase in water table and higher returns to the farmers. • New Pond Deepening Under Ajadi ka Amrut Mahotsav done in Goyarsama village Approx Deepening Capacity is 12000 Cum. • Roof Top Rainwater Harvesting 145 Nos. (40 Nos. current FY 2022-23) which has 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family. • Recharge Borewell 208 Nos (19 Nos. current FY 2022-23) which is best ever option to direct recharge the soil. • Drip Irrigation approx. 1505 Farmers benefitted in coordination with Gujrat Green Revolution Company till date. 			

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		<ul style="list-style-type: none"> • Bund construction on way of Nagmati River could save more than 575 MCFT water quantity which recharged in ground due to which borewell depth decreased by 50-100 Ft in Zarpara, Bhujpur and Navinal Vadi Vistar. • Pond Pipeline work at Prasla Vistar Zarpara which increase recharge capacity more than 25% in 100 hector area. • Check dam gate valve construction at Bhujpur which controlled more than 350 MCFT water to go into sea and get recharged current year. <p>With the objective of to preserve the rainwater to reduce the impact of salinity and recharge the ground water (the main source of water) to facilitate the Agricultural activities as well as for drinking water.</p> <p>Please refer Annexure – 5 for full details of CSR activities carried out by Adani Foundation in the Kutch region.</p> <p>APSEZ will also explore the possibility of Rainwater harvesting within port premises during port expansion activities through proper collection of rainwater, if feasible.</p>
1.27	Ensure minimum 5% of total electricity requirement be met through installation of solar energy/ green/ non-conventional in the proposed activity area.	<p>Complied.</p> <p>APSEZ has implemented the following for reduction of renewal source of energy consumption.</p> <ul style="list-style-type: none"> ➤ Installed 8.8 MW roof top solar generating plant at various locations and 22.4 MW wind generating plant in SEZ in Mundra. ➤ Development of 1000 MW of solar park at Khavda (under process). ➤ 217 nos. of Electrical truck Vehicle for internal movement of material (E-ITV's). ➤ 10 nos. of Electrical Car for movement of employees and all are working. ➤ Replacement of diesel loco by Electrified railway line of approx. 91 km from West port to Adipur Railway station.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
1.28	<p>All the commitments made as part of EMP with the budget provisions shall be implemented. The compliance to the recommendations shall be submitted along with 6 monthly compliance report to the regional office of MoEFCC.</p>	<p>Complied.</p> <p>All the commitments made as part of EMP with the budget provisions is being implemented gradually and budget allocated for the EMP will be used for the implementation of EMP only and the said will not be diverted to any other specific purpose.</p> <p>Budget for environmental management measures (including horticulture) for the FY 2024-25 is to the tune of INR 1340.21 lakh. Out of which, Approx. INR 365.97 lakh are spent during the year FY 2024-25 (till Sep'24).</p> <p>Detailed breakup of the expenditures for the past 3 years is attached as Annexure – 20.</p>
1.29	<p>As per the Ministry's Office Memorandum F.No.22-65/2017-IA.III dated 30th September 2020, the project proponent shall abide by all the commitments made by them to address the concerns raised during the public consultation. The project proponent shall initiate the activities proposed by them, based on the commitment made in the public hearing, and incorporate in the Environmental Management Plan and submit to the Ministry. All other activities including pollution control, environmental protection and conservation, R&R, wildlife and forest conservation/protection measures including the NPV, Compensatory Afforestation etc, either proposed by the project proponent based on</p>	<p>Point Noted and Agreed.</p> <p>A public hearing for the said project was exempted by MoEF&CC vide Amendment in ToR dated 10th April, 2024.</p> <p>APSEZ is already working in Mundra Since 1995 and people are well aware about the associated environment impacts of the development activities, and how best APSEZ is implementing its Environment Management Plan, through best practices.</p> <p>APSEZ is implementing CSR activity through its CSR arm - Adani Foundation in the following areas</p> <ul style="list-style-type: none"> ✓ Education ✓ Community Health ✓ Sustainable Livelihood Development ✓ Community Infrastructure Development ✓ Skill Development <p>Budget for CSR Activity for the FY 2024-25 is to tune INR 823.58 lakh. Out of which, Approx. INR 309.11 lakh is spent during the FY 2024-25 (till Sep'24).</p> <p>Till Sep'24, Adani Foundation has done total expenditure of INR 175.851 Cr. for CSR activities in Kutch region since its inception.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	the social impact assessment and R&R action plan carried out during the preparation of EIA report or prescribed by EAC, shall also be implemented and become part of EMP.	APSEZ will continue to do the CSR activities. As per O&M dated 30 th September 2020 and 20 th October 2020, CER is not applicable. However, APSEZ has carried out many works inline to Sustainable Environment in the areas surrounding the project, with focus on Resource conservation, Waste Minimization, Biodiversity enhancement and conservation, Water conservation, Wastewater Management etc. Same will also be taken up further, based on the need-based assessment and in consultation with local administration.
1.30	Environmental Clearance is granted subject to final outcome of Hon'ble Supreme Court of India, Hon'ble High Court of Gujarat, and any other court of law, if any, as May be applicable to this project.	Point Noted and Agreed.
1. Statutory Compliance		
1.1	Construction activity shall be carried out strictly according to the provisions of CRZ Notification, 2011 and the State Coastal Zone Management Plan as drawn up by the State Government. No construction work other than those permitted in Coastal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.	Complied. Construction activity would be carried out in accordance with existing rules & regulations of CRZ Notification, 2011 and as amended from time to time after getting requisite permissions from the competent authorities. No construction work/activity other than those permitted in Coastal Regulation Zone Notification will be carried out in CRZ area.
1.2	A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project should be obtained.	Complied. APSEZ's subsidiary unit MUL is supplying power during construction & operation phase, DG sets will only be used for Emergency power shutdown. DG sets used will confirming to CPCB standards.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
1.3	All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Coast Guard, Civil Aviation Department shall be obtained, as applicable by project proponents from the respective competent authorities.	Complied. All statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Coast Guard, Civil Aviation Department has been obtained from concern authorities and same will be continued for proposed expansion also.
2. Air Quality Monitoring and Preservation		
2.1	The project proponent shall install system to carryout Ambient Air Quality monitoring for common/criterion parameters relevant to the main pollutants released (e.g. PM10 and PM2.5 in reference to PM emission, and SO2 and NOx in reference to SO2 and NOx emissions) within and outside the project area at least at four locations, covering upwind and downwind directions.	Complied For further details regarding ambient air quality monitoring & results, please refer to specific condition no 1.23 of the EC and CRZ clearance.
2.2	Appropriate Air Pollution Control (APC) system shall be provided for all the dust generating points including fugitive dust from all vulnerable sources, so as to comply prescribed emission standards	Complied. For further details regarding the control measures for fugitive emissions, please refer specific condition no 1.15 of the EC and CRZ clearance.
2.3	Shrouding shall be carried out in the work site enclosing the dock/proposed facility area.	Complied. Proposed Facilities would be covered on all sides to avoid dust discharge from site.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	<p>This will act as dust curtain as well achieving zero dust discharge from the site. These curtain or shroud will be immensely effective in restricting disturbance from wind in affecting the dry dock operations, preventing waste dispersion, improving working conditions through provision of shade for the workers.</p>	<p>APSEZ had provided provision of hydraulic operated spill plate & wind screen to retain any accidental spill of dry cargo into the sea.</p> <p>Also, administrative control is taken by providing regular training to crane operators to drop the coal from less height to reduce fugitive dust emission.</p> <p>APSEZ also has a dedicated housekeeping staff doing rigorous dry housekeeping with mechanized sweeping machine round the corner.</p> <p>Also rest shelter would be provided at the workplace.</p>
2.4	<p>Dust collectors shall be deployed in all areas where blasting (surface cleaning) and painting operations are to be carried out, supplemented by stacks for effective dispersion.</p>	<p>Point Noted and Will be complied.</p>
2.5	<p>The Vessels shall comply the emission norms prescribed from time to time.</p>	<p>Complied.</p> <p>Ships berthing at Mundra Port complies with MARPOL regulations.</p> <p>No discharge such as bilge wastes, sewage or any other liquid wastewater is allowed into marine environment inside port limits.</p> <p>APSEZ has adequate Waste Reception facility as per MARPOL and DG Shipping regulations. The port has reception facility for all MARPOL waste streams (Annex-I, Annex-II, Annex-IV & Annex-V) except Annex-VI that is generated from vessels.</p> <p>APSEZL has not received any sewage/liquid waste from ships / vessels till date.</p> <p>As a general practice APSEZ provide facility for receiving slop / waste oil from vessels through hose connection with oil tankers. These tankers divert slop / waste oil to Oil water separator system where water and oil particles</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024																																				
		are separated. Separated oil is being sold to authorized recycler /re-processor. However, no slope / waste oil was received during the compliance period.																																				
2.6	Diesel power generating sets proposed as source of backup power should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. Use of low sulphur diesel. The location of the DG sets may be decided with in consultation with State Pollution Control Board.	<p>Complied.</p> <p>MUL is supplying uninterrupted power throughout the year. However, DG sets have been kept as stand-by for Emergency power shutdown. DG sets used is confirming to CPCB standards.</p> <p>Nos. of D.G. Sets: 21 Frequency of Monitoring: Six Monthly</p> <p>Summary of DG stack monitoring is mentioned below: -</p> <table border="1"> <thead> <tr> <th colspan="6">Results of DG Stack Monitoring</th> </tr> <tr> <th colspan="6">Monitoring Period: April - 2024 to September - 2024</th> </tr> <tr> <th>Sr. No.</th> <th>Parameter</th> <th>Unit</th> <th>MIN</th> <th>MAX</th> <th>AVERAGE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Particulate Matter</td> <td>mg/Nm³</td> <td>16.11</td> <td>28.19</td> <td>21.77</td> </tr> <tr> <td>2</td> <td>Sulphur Dioxide</td> <td>ppm</td> <td>7.12</td> <td>16.24</td> <td>10.86</td> </tr> <tr> <td>3</td> <td>Oxide of Nitrogen</td> <td>ppm</td> <td>17.39</td> <td>28.73</td> <td>23.49</td> </tr> </tbody> </table> <p>Six monthly DG stack monitoring reports for duration Apr'24 to Sep'24 attached as Annexure - 10.</p>	Results of DG Stack Monitoring						Monitoring Period: April - 2024 to September - 2024						Sr. No.	Parameter	Unit	MIN	MAX	AVERAGE	1	Particulate Matter	mg/Nm ³	16.11	28.19	21.77	2	Sulphur Dioxide	ppm	7.12	16.24	10.86	3	Oxide of Nitrogen	ppm	17.39	28.73	23.49
Results of DG Stack Monitoring																																						
Monitoring Period: April - 2024 to September - 2024																																						
Sr. No.	Parameter	Unit	MIN	MAX	AVERAGE																																	
1	Particulate Matter	mg/Nm ³	16.11	28.19	21.77																																	
2	Sulphur Dioxide	ppm	7.12	16.24	10.86																																	
3	Oxide of Nitrogen	ppm	17.39	28.73	23.49																																	
2.7	A detailed traffic management and traffic decongestion plan shall be drawn up to ensure that the current level of service of the roads within a 05 kms radius of the project is maintained and improved upon after the implementation of the project. This plan should be based on cumulative impact of all development and increased habitation being	<p>Complied.</p> <p>APSEZ is well connected with a National Highway (NH-8A) and State Highway (SH-6). The National and State highways have connections to other major roads, cities and parts of the country such as the Delhi Mumbai Industrial Corridor, NH-14, SH-48, etc. In addition to them the port has 7 approach roads connecting to state and national highways for easy cargo movement. The port also has a good rail connectivity, and it is the first port in India connected by double stack container rail facility.</p> <p>As part of the traffic assessment, expansion of 8 nos. of roads and laying 9 nos. of internal road connectivity to</p>																																				

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	<p>carried out or proposed to be carried out by the project or other agencies in this 05 Kms radius of the site in different scenarios of space and time and the traffic management plan shall be duly validated and certified by the State Urban Development department and the P.W.D./ competent authority for road augmentation and shall also have their consent to the implementation of components of the plan which involve the participation of these departments.</p>	<p>handle the traffic due to proposed development based on future requirement with obtaining requisite permission from concerned authorities.</p>
3. Water Quality Monitoring And Preservation		
3.1	<p>The Project proponent shall ensure that no creeks or rivers are blocked due to any activities at the project site and free flow of water is maintained.</p>	<p>Complied For further details please refer compliance to specific condition no 1.13 of the EC and CRZ clearance.</p>
3.2	<p>Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality. Silt curtains shall be used to contain the spreading of suspended sediment during dredging within the dredging area.</p>	<p>Complied. During dredging activities all the recommendations such as use of silt curtains, disposing of dredged material at a specific point into offshore location, etc. would be implemented. Entire quantity of dredged material is being used for reclamation activities only; no disposal is carried out in the sea. No capital dredging activities are carried out during the current compliance period.</p>
3.3	<p>No ships docking at the proposed project site will discharge its on-board</p>	<p>Point Noted and Agreed</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	waste water untreated in to the estuary/ channel. All such wastewater load will be diverted to the proposed Effluent Treatment Plant of the project site.	<p>Ships berthing at Mundra Port comply with MARPOL regulations.</p> <p>No discharge such as bilge wastes, sewage or any other liquid wastewater is allowed into marine environment inside port limits.</p> <p>APSEZ has adequate Waste Reception facility as per MARPOL and DG Shipping regulations. The port has reception facility for all MARPOL waste streams (Annex-I, Annex-II, Annex-IV & Annex-V) except Annex-VI that is generated from vessels.</p> <p>APSEZL has not received any sewage/liquid waste from ships / vessels till date.</p> <p>As a general practice APSEZ provide facility for receiving slop / waste oil from vessels through hose connection with oil tankers. These tankers divert slop / waste oil to Oil water separator system where water and oil particles are separated. Separated oil is being sold to authorized recycler /re-processor. However, no slope / waste oil was received during the compliance period.</p>
3.4.	Measures should be taken to contain, control and recover the accidental spills of fuel and cargo handle.	<p>Complied.</p> <p>For further details regarding oil spill contingency plan, please refer specific condition no 1.17 of the EC and CRZ clearance.</p>
3.5	The project proponents will draw up and implement a plan for the management of temperature differences between intake waters and discharge waters.	<p>Complied.</p> <p>Marine monitoring is being carried out by the M/s Adani Power (Mundra) Limited at the marine outfall locations and reports is being submitted to the concerned authorities on regular basis. Monitoring Report attached as Annexure 10.</p>
3.6	Spillage of fuel / engine oil and lubricants from the construction site are a source of organic pollution which impacts marine life. This shall be prevented by suitable precautions and	<p>Complied.</p> <p>For further details regarding oil spill contingency plan, please refer specific condition no 1.18 of the EC and CRZ clearance.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024																								
	also by providing necessary mechanisms to trap the spillage.																									
3.7	Total freshwater use shall not exceed the proposed requirement as provided in the project details. Prior permission from competent authority shall be obtained for use of fresh water.	<p>Complied.</p> <p>APSEZ sources its water for various project activities from the desalination plant of APSEZ and/or water through Gujarat Water Infrastructure Limited (GWIL). Average water consumption for entire APSEZ area is 5.34 MLD during compliance period i.e. Apr'24 to Sep'24.</p> <p>Additional capacity of desalination plant will be developed to fulfill the freshwater requirement of APSEZ in line with expansion activity as well as future business requirement.</p>																								
3.8	Sewage Treatment Plant shall be provided to treat the wastewater generated from the project. Treated water shall be reused for horticulture, flushing, backwash, HVAC purposes and dust suppression.	<p>Point Noted and Agreed</p> <p>Entire quantity of sewage generated is being treated in designated ETP / STP and treated sewage conforming with GPCB standard is fully utilized for Horticulture purposes.</p>																								
3.9	A certificate from the competent authority for discharging treated effluent/ untreated effluents into the public sewer/ disposal/drainage systems along with the final disposal point should be obtained.	<table border="1"> <thead> <tr> <th>Location</th> <th>Capacity</th> <th>Quantity of Treated Water (Avg. from Apr'24 to Sep'24)</th> <th>Type of ETP / STP</th> </tr> </thead> <tbody> <tr> <td>LT</td> <td>265 KLD</td> <td>71.13 KLD</td> <td>Activated Sludge</td> </tr> <tr> <td>West Port</td> <td>55 KLD</td> <td>15.54 KLD</td> <td>FAB</td> </tr> </tbody> </table> <p>Third party analysis of the treated water is being carried out once in a month at ETP & twice in a month at West Port by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. Summary of the same for duration from Apr'24 to Sep'24 is mentioned below.</p> <table border="1"> <thead> <tr> <th>Parameter</th> <th>Unit</th> <th>Min</th> <th>Max</th> <th>Average</th> <th>Perm. Limit^{\$}</th> </tr> </thead> <tbody> <tr> <td colspan="6">Industrial Effluent / Sewage (For ETP)</td> </tr> </tbody> </table>	Location	Capacity	Quantity of Treated Water (Avg. from Apr'24 to Sep'24)	Type of ETP / STP	LT	265 KLD	71.13 KLD	Activated Sludge	West Port	55 KLD	15.54 KLD	FAB	Parameter	Unit	Min	Max	Average	Perm. Limit ^{\$}	Industrial Effluent / Sewage (For ETP)					
Location	Capacity	Quantity of Treated Water (Avg. from Apr'24 to Sep'24)	Type of ETP / STP																							
LT	265 KLD	71.13 KLD	Activated Sludge																							
West Port	55 KLD	15.54 KLD	FAB																							
Parameter	Unit	Min	Max	Average	Perm. Limit ^{\$}																					
Industrial Effluent / Sewage (For ETP)																										

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024					
		pH	--	6.87	7.51	7.13	6.5 – 8.5
		TSS	mg/L	22	46	31	100
		TDS	mg/L	629	1318	914	2100
		COD	mg/L	82.10	92.00	87.58	100
		BOD (3 Days @ 27°C)	mg/L	24	27	25.4	30
		Ammonical Nitrogen as NH ₃ -N	mg/L	15.80	34.40	28.60	50
		Domestic Sewage (For STP)					
		pH	--	7.11	7.88	7.40	6.5 – 8.5
		TSS	mg/L	14.00	28.00	21.00	100
		BOD (3 Days @ 27 °C)	mg/L	9.00	18.00	15.08	30
		Residual Chlorine	ppm	0.59	0.78	0.69	Min. 0.5
		Fecal Coliform	MPN/100 ml	50.00	90.00	70.00	<1000
		⁵ as per CC&A granted by GPCB Values recorded confirms to the stipulated standards.					
		Monitoring and analysis of ETP and STP treated waste is also carried out regularly through in-house laboratory for the parameters such as pH, TDS, TSS, COD, Chlorides, and residual chlorine.					
3.10	No diversion of the natural course of the river shall be made without prior permission from the Ministry of Water resources.	Complied. For further details please refer specific condition no 1.13 of the EC and CRZ clearance.					
3.11	All the erosion control measures shall be taken at water front facilities. Earth protection work shall be carried out to avoid erosion of soil from the shoreline/boundary line from the land area into the marine water body.	Being Complied Shoreline change study was carried out by M/s. Gujarat Institute of Desert Ecology, Bhuj in 2022 as a part of the Environmental Management Plan (EMP) compliance with the CIA study. The cost of said study was INR 17.39 Lacs. In the present study, the rate of shoreline changes statistics on a time series of multiple shoreline positions of a totally 43 km coastline stretches (16 km on the west side and 27 km on the east side of Adani main port) on either side of Adani Ports and Special Economic Zone Ltd (APSEZL) has been taken into account for the calculation					

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024																								
		<p>by using satellite images.</p> <p>As a part of the NGT direction, the shoreline change analysis has been carried out for the years 2015-2022 to study the immediate changes after the commissioning of the port and initiation of the activities (September 2015) for short-term variation for the year 2015-2022 using EPR method has been carried out.</p> <p>The details of the rate of shoreline changes (Short interval time) recorded from 2015 to 2022 are summarized in below table.</p> <table border="1"> <thead> <tr> <th rowspan="2">Period</th> <th rowspan="2">Name of the block</th> <th rowspan="2">Average Shoreline Change (M/Year)</th> <th colspan="2">Shoreline Change(M)</th> </tr> <tr> <th>Maximum Accretion</th> <th>Maximum Erosion</th> </tr> </thead> <tbody> <tr> <td rowspan="2">2015-2022</td> <td>West Port</td> <td>-11.43</td> <td>39.86</td> <td>-78.68</td> </tr> <tr> <td>Eastern side</td> <td>-26.60</td> <td>191.32</td> <td>-165.19</td> </tr> </tbody> </table> <p>The Shoreline Change Assessment Study report of GUIDE is attached as Annexure 21.</p>	Period	Name of the block	Average Shoreline Change (M/Year)	Shoreline Change(M)		Maximum Accretion	Maximum Erosion	2015-2022	West Port	-11.43	39.86	-78.68	Eastern side	-26.60	191.32	-165.19								
Period	Name of the block	Average Shoreline Change (M/Year)				Shoreline Change(M)																				
			Maximum Accretion	Maximum Erosion																						
2015-2022	West Port	-11.43	39.86	-78.68																						
	Eastern side	-26.60	191.32	-165.19																						
4. Noise Monitoring And Prevention																										
4.1	Noise level survey shall be carried as per the prescribed guidelines and report in this regard shall be submitted to Regional Officer of the Ministry as a part of six-monthly compliance report.	<p>Complied.</p> <p>Ambient Noise monitoring is being carried out by NABL accredited and MoEF&CC authorized agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd.,</p> <p>Summary of the same for duration from Apr'24 to Sep'24 is mentioned below:</p> <table border="1"> <thead> <tr> <th colspan="6">Noise sampling locations & frequency: 10 nos. (once in a month)</th> </tr> <tr> <th>Noise</th> <th>Unit</th> <th>Leq Min</th> <th>Leq Max</th> <th>Leq Ave.</th> <th>Leq Perm. Limit*</th> </tr> </thead> <tbody> <tr> <td>Day Time</td> <td>dB(A)</td> <td>57.60</td> <td>68.70</td> <td>64.44</td> <td>75</td> </tr> <tr> <td>Night Time</td> <td>dB(A)</td> <td>57.50</td> <td>64.70</td> <td>61.46</td> <td>70</td> </tr> </tbody> </table> <p style="text-align: right;">\$ as per NAAQ standards, 2009 * as per CC&A granted by GPCB Values recorded confirms to the stipulated standards.</p>	Noise sampling locations & frequency: 10 nos. (once in a month)						Noise	Unit	Leq Min	Leq Max	Leq Ave.	Leq Perm. Limit*	Day Time	dB(A)	57.60	68.70	64.44	75	Night Time	dB(A)	57.50	64.70	61.46	70
Noise sampling locations & frequency: 10 nos. (once in a month)																										
Noise	Unit	Leq Min	Leq Max	Leq Ave.	Leq Perm. Limit*																					
Day Time	dB(A)	57.60	68.70	64.44	75																					
Night Time	dB(A)	57.50	64.70	61.46	70																					

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		<p>Please refer Annexure – 10 for detailed analysis reports. Approx. INR 6.11 Lakh is spent for all environmental monitoring activities during the FY 2024-25 (till Sep'24) for overall APSEZ, Mundra.</p> <p>Ambient noise quality monitoring in surrounding villages is being carried out by M/s. Adani Power (Mundra) Limited, Mundra through NABL accredited and MoEF&CC authorized agency namely M/s. UniStar Environment & Research Labs Pvt. Ltd. and monitoring reports of the same are also enclosed in Annexure – 10.</p>
4.2	<p>Noise from vehicles, power machinery and equipment on-site should not exceed the prescribed limit. Equipment should be regularly serviced. Attention should also be given to muffler maintenance and enclosure of noisy equipment's.</p>	<p>Complied.</p> <p>This reply covers condition no 4.2 and 4.3.</p> <p>For operation phase, following noise control measures are taken:</p> <ul style="list-style-type: none"> • All Emergency DG sets were installed with acoustic enclosures confirming EPA norms. • Proper maintenance of equipment's / plant machineries is being done on regular basis. • Green Belt has been developed at roadsides and operational areas.
4.3	<p>Acoustic enclosures for DG sets, noise barriers for ground-run bays, ear plugs for operating personnel shall be implemented as mitigation measures for noise impact due to ground sources.</p>	<p>Traffic control measures such as signage, speed regulation, traffic guides etc. are in place to reduce the unnecessary honking by cargo vehicles.</p>
4.4	<p>The ambient noise levels should conform to the standards prescribed under E(P)A Rules, 1986 viz. 75 dB(A) during day time and 70 dB(A) during night time.</p>	<p>Complied.</p> <p>Existing D.G. Sets provided conforming to the standards prescribed under E(P)A Rules, 1986 only and the same will be continued during proposed expansion activity also.</p>
<p>5. Energy Conservation Measures</p>		

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
5.1	Provide solar power generation on roof tops of buildings, for solar light system for all common areas, streetlights, parking around project area and maintain the same regularly;	Complied. For further details regarding renewable energy installation and usage, please refer specific condition no 1.27 of the EC and CRZ clearance.
5.2	Provide LED lights in offices and project areas.	Complied. The conventional lights have been Switched over from (HPSV) to Energy Efficient LED lighting with automation motion sensor in APSEZ area which has reduced the energy consumption.
6. Waste Management		
6.1	Dredged material shall be disposed safely in the designated areas.	Complied. For further details regarding disposal of dredged material, please refer compliance of Water Quality Monitoring and Preservation condition no 3.2 of the EC and CRZ clearance.
6.2	Shoreline should not be disturbed due to dumping. Periodical study on shore line changes shall be conducted and mitigation carried out, if necessary. The details shall be submitted along with the six monthly monitoring reports.	Being Complied. For further details regarding shoreline change, please refer Water Quality Monitoring And Preservation condition no 3.11 of the EC and CRZ clearance.
6.3	Necessary arrangements for the treatment of the effluents and solid wastes must be made and it must be ensured that they conform to the standards laid down by the competent authorities including the Central or State Pollution	Complied For further details regarding treatment of effluents, please refer Water Quality Monitoring And Preservation condition no 3.8 & 3.9 of the EC and CRZ clearance.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	Control Board and under the Environment (Protection) Act, 1986.	
6.4	The solid wastes shall be managed and disposed as per the norms of the Solid Waste Management Rules, 2016.	Complied. This reply covers condition no 6.4, 6.5, 6.6 & 6.7.
6.5	Any wastes from construction and demolition activities related thereto shall be managed so as to strictly conform to the Construction and Demolition Waste Management Rules, 2016.	<p>Waste Management – APSEZ has adopted 5R concept for environmentally sound management of different types of solid & liquid wastes. Please refer below details about management of each type of waste.</p> <p>Non-Hazardous Solid Waste: A well-established system for segregation of dry & wet waste is in place. All wet waste (Organic waste) is being segregated & utilized for compost manufacturing and/or biogas generation for cooking purpose. The compost is further used by in house horticulture team for greenbelt development. Whereas dry recyclable waste is being sorted in various categories. Presently manual sorting is being done for sorting of different types of solid waste. Segregated recyclable materials such as Paper, Plastic, Cardboard, PET Bottles, and Glasses, etc. are then sent to respective recycling units, whereas remaining non-recyclable waste is bailed and sent to cement plant (M/s. Ambuja Cement Ltd., Kodinar) for Co-processing as RDF (Refused Derived Fuel).</p>
6.6	A certificate from the competent authority handling municipal solid wastes should be obtained, indicating the existing civic capacities of handling and their adequacy to cater to the M.S.W. generated from project.	<p>APSEZ, Mundra is certified for Zero Waste to Landfill management system (ZWTL MS 2020) by TUV Rheinland India Pvt. Ltd.</p>
6.7	Used CFLs and TFLs should be properly collected and disposed off/sent for recycling as per the prevailing guidelines/ rules of the regulatory authority to avoid mercury contamination.	<p>Hazardous & Other Waste:</p> <ul style="list-style-type: none"> • E – Waste is being sold to GPCB registered recyclers namely M/s. Galaxy Recycling, Rajkot. • Used Batteries are being sold to GPCB registered recyclers namely M/s. Sabnam Enterprise, Kutch and M/s. S K Metal Industries, Rajkot. • Solid Hazardous Waste is being disposed through co-processing / incineration through common facility i.e. M/s. Saurashtra Enviro Projects Pvt. Ltd., Bhachau, Safe Enviro Private Limited, Bharuch and/or cement

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		<p>industries of Ambuja Cement Ltd., Kodinar. Used/Waste Oil is being sold to GPCB authorized recyclers / re-processors namely M/s. Western India Petro Chem Ind - Bhavnagar, Aviation Corporation - Kutch & Aroma Petrochem - Bhavnagar. It is also being reused within organization for lubrication purpose.</p> <ul style="list-style-type: none"> • Discarded drums / barrels are being sold to authorized decontamination facility i.e. M/s. Jawrawala Petroleum, Ahmedabad. It is also being reused within organization for filling hazardous waste. • Solid hazardous waste i.e. Tank bottom sludge was being sold to authorized recycler namely M/s. Mundra Oil Pvt. Ltd., Mundra for recycling. • Expired paint materials was being disposed by incineration through common facility i.e. M/s. Saurashtra Enviro Projects Pvt. Ltd., Bhachau. • Downgrade chemicals generated from cleaning of storage tanks / pipelines were being sold to authorized solvent recovery facilities namely M/s. Acquire Chemicals, Ankleshwar • Slop Oil received from vessels is treated to separate water and oil particles in Oil Water Separator system. Separated oil from the same is being sold to authorized recycler / reprocessor namely M/s. Western India Petro Chem Ind - Bhavnagar, Aviation Corporation - Kutch & Aroma Petrochem – Bhavnagar and water is sent to ETP for further treatment. • However, during the compliance period, there was no generation and disposal of Sludge & Filters contaminated with oil, Tank Bottom sludge, Asbestos Waste, Glass wool Waste (Thermal Insulation Material), Downgrade Chemicals, Waste Oil and Expired Paint Material. • Bio medical waste generated from OHCs and Adani Hospital is being disposed at Common Bio Medical Waste Treatment Facility namely M/s. Distromed Kutch Services Pvt. Ltd., Bhuj. • Horticulture waste is collected from various green belt areas and it is using for making manure and manure is being utilizing in horticulture purpose within plant premises.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024																																											
		<p>Details of permissions / agreements of hazardous waste authorized vendors attached as Annexure 22.</p> <p>The following table summarizes the waste management practice (from Apr'24 to Sep'24) for different types of wastes at APSEZ:</p> <table border="1"> <thead> <tr> <th>Type of Waste</th> <th>Name of Waste</th> <th>Quantity (MT)</th> <th>Disposal Method</th> </tr> </thead> <tbody> <tr> <td rowspan="5">Hazardous Waste</td> <td>Used / Spent / Waste Oil</td> <td>86.88</td> <td>Sell to registered recycler</td> </tr> <tr> <td>Pig Waste</td> <td>5.07</td> <td>Co-processing at cement industries</td> </tr> <tr> <td>Oily Cotton Waste</td> <td>39.8</td> <td>Co-processing at cement industries</td> </tr> <tr> <td>ETP Sludge</td> <td>15.07</td> <td>Co-processing at cement industries</td> </tr> <tr> <td>Discarded Containers / Barrels</td> <td>0.57</td> <td>Sell to registered recycler</td> </tr> <tr> <td rowspan="4">Non-Hazardous Waste</td> <td>Wet Waste (Food waste + Organic waste)</td> <td>537.95</td> <td>Converted to Manure for Horticulture use / Biogas for cooking purpose</td> </tr> <tr> <td>Recyclables Dry Waste / Scrap</td> <td>1938.24</td> <td>After recovery sent for recycling / Reuse within premises</td> </tr> <tr> <td>RDF (Non Recyclable Waste)</td> <td>145.88</td> <td>Co-processing at cement industries</td> </tr> <tr> <td>Horticulture Waste</td> <td>359.15</td> <td>Used for making of manure and utilize for horticulture purpose</td> </tr> <tr> <td rowspan="3">Other Waste</td> <td>E-Waste</td> <td>15.07</td> <td>Sell to registered recycler</td> </tr> <tr> <td>Bio Medical Waste</td> <td>4.807</td> <td>To approved CBWTF Site and registered recyclers</td> </tr> <tr> <td>Battery Waste</td> <td>3.04</td> <td>Sell to registered recycler</td> </tr> </tbody> </table>	Type of Waste	Name of Waste	Quantity (MT)	Disposal Method	Hazardous Waste	Used / Spent / Waste Oil	86.88	Sell to registered recycler	Pig Waste	5.07	Co-processing at cement industries	Oily Cotton Waste	39.8	Co-processing at cement industries	ETP Sludge	15.07	Co-processing at cement industries	Discarded Containers / Barrels	0.57	Sell to registered recycler	Non-Hazardous Waste	Wet Waste (Food waste + Organic waste)	537.95	Converted to Manure for Horticulture use / Biogas for cooking purpose	Recyclables Dry Waste / Scrap	1938.24	After recovery sent for recycling / Reuse within premises	RDF (Non Recyclable Waste)	145.88	Co-processing at cement industries	Horticulture Waste	359.15	Used for making of manure and utilize for horticulture purpose	Other Waste	E-Waste	15.07	Sell to registered recycler	Bio Medical Waste	4.807	To approved CBWTF Site and registered recyclers	Battery Waste	3.04	Sell to registered recycler
Type of Waste	Name of Waste	Quantity (MT)	Disposal Method																																										
Hazardous Waste	Used / Spent / Waste Oil	86.88	Sell to registered recycler																																										
	Pig Waste	5.07	Co-processing at cement industries																																										
	Oily Cotton Waste	39.8	Co-processing at cement industries																																										
	ETP Sludge	15.07	Co-processing at cement industries																																										
	Discarded Containers / Barrels	0.57	Sell to registered recycler																																										
Non-Hazardous Waste	Wet Waste (Food waste + Organic waste)	537.95	Converted to Manure for Horticulture use / Biogas for cooking purpose																																										
	Recyclables Dry Waste / Scrap	1938.24	After recovery sent for recycling / Reuse within premises																																										
	RDF (Non Recyclable Waste)	145.88	Co-processing at cement industries																																										
	Horticulture Waste	359.15	Used for making of manure and utilize for horticulture purpose																																										
Other Waste	E-Waste	15.07	Sell to registered recycler																																										
	Bio Medical Waste	4.807	To approved CBWTF Site and registered recyclers																																										
	Battery Waste	3.04	Sell to registered recycler																																										
6.8	Oil spill contingency plan shall be prepared and part of DMP to tackle emergencies.	Complied.																																											

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	The equipment and recovery of oil from a spill would be assessed. Guidelines given in MARPOL and Shipping Acts for oil spill management would be followed. Mechanism for integration of terminals oil contingency plan with the overall area contingency plan under the co-ordination of Coast should be covered.	For further details regarding oil spill contingency plan, please refer specific condition no 1.18 of the EC and CRZ clearance & regarding MARPOL guideline details please refer to Air Quality Monitoring and Preservation condition 2.5.
7. Green Belt		
7.1	Green belt shall be developed in area as provided in project details with a native tree species in accordance with CPCB guidelines.	Being Complied This reply covers condition no 7.1 and 7.2. APSEZ has developed its own "Dept. of Horticulture" which is taking measures/ steps for terrestrial greening as well as mangrove plantation.
7.2	Topsoil shall be separately stored and used in the development of green belt.	The species such as <i>Ficus Infectoria</i> , <i>Ficus religiosa</i> , <i>Terminalia arjuna</i> , <i>Cocos nucifera</i> , <i>Washingtonia fillifera</i> , <i>Casurina spp.</i> , <i>Azadirachta Indica</i> , <i>Eucalyptus spp.</i> , <i>Jatropha curacus</i> , <i>Ficus bengalensis</i> , <i>Subabool spp.</i> , <i>Casia fistula</i> , <i>Date Palm</i> and <i>Delonix regia</i> are grown within APSEZ area. Within the port areas approx. 189.41 hectare of greenbelt having 461349 trees with the density of 2435 trees per hectare is developed till date within port premises. So, far APSEZ has developed 457.99 ha. area as greenbelt with plantation of more than 9.06 Lacs saplings within the APSEZ area. Please refer Annexure – 23 for further details regarding greenbelt development, mangrove afforestation and updated green belt development plan. The spent budget of Horticulture Department for the period of financial year 2024-25 is INR 831 lacs and 253 lacs of allocated budget has spent (till Sep'24) during the FY 2024-25.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		Additional greenbelt will be developed during proposed expansion activity as approved in EC & CRZ Clearance.
8. Marine Ecology		
8.1	Dredging shall not be carried out during the fish breeding and spawning seasons.	Complied. Dredging activity is being done in non-fish breeding and spawning seasons and dredged material is being disposed-off in line permission granted in EC & CRZ Clearance.
8.2	Dredging, etc shall be carried out in the confined manner to reduce the impacts on marine environment.	Complied. For further details regarding dredging activity control measures, please refer Water Quality Monitoring And Preservation condition no 3.2 of the EC and CRZ clearance.
8.3	The dredging schedule shall be so planned that the turbidity developed is dispersed soon enough to prevent any stress on the fish population.	Point Noted and Agreed
8.4	While carrying out dredging, an independent monitoring shall be carried out through a Government Agency/Institute to assess the impact, and necessary measures shall be taken on priority basis if any adverse impact is observed.	Being Complied All construction and operation activities as well as dredging and reclamation activities would be carried out as per approved permission. Further all the recommendation made in the EIA report would be implemented while carrying out dredging activity. For further details regarding marine ecology monitoring, please refer specific condition no 1.12 of the EC and CRZ clearance.
8.5	A detailed marine biodiversity management plan shall be prepared through the NIO or any other institute of repute on marine, brackish water and fresh water ecology and	Point Noted and Agreed We will comply with all the recommendations suggested in EIA study report prepared by NABET accredited agency and validated by reputed agency i.e. GUIDE, Bhuj.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	<p>biodiversity and submitted to and implemented to the satisfaction of the State Biodiversity Board and the CRZ authority. The report shall be based on a study of the impact of the project activities on the intertidal biotopes, corals and coral communities, molluscs, sea grasses, sea weeds, sub-tidal habitats, fishes, other marine and aquatic micro, macro and mega flora and fauna including benthos, plankton, turtles, birds etc. as also the productivity. The data collection and impact assessment shall be as per standards survey methods and include underwater photography.</p>	<p>However, A reputed organization will be engaged to prepare marine biodiversity management plan. The same will be submitted to State Biodiversity Board and the CRZ authority for their examination and approval also.</p>
8.6	<p>Marine ecology shall be monitored regularly also in terms of sea weeds, sea grasses, mudflats, sand dunes, fisheries, echinoderms, shrimps, turtles, corals, coastal vegetation, mangroves and other marine biodiversity components including all micro, macro and mega floral and faunal components of marine biodiversity.</p>	<p>Complied. For further details regarding marine ecology monitoring, please refer specific condition no 1.12 of the EC and CRZ clearance.</p>
8.7	<p>The project proponent shall ensure that water traffic does not impact the aquatic wildlife sanctuaries that fall along the stretch of the river.</p>	<p>Being Complied. A VTMS service for Gulf of Kutch is operated by Directorate General of Lighthouses and Lightships (DGLL), Govt. of India.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		<p>APSEZ is practicing well defined traffic control procedure. Marine Control of APSEZ provides traffic update to vessels in Mundra Port Limit on VHF Channel-77. Arrival and departure information in Gulf of Kutch is provided to VTMS information cell through an agent or directly by sending an e-mail to vtsmanagergulfofkutch@yahoo.com and vtsgok@yahoo.com.</p> <p>Mundra port has subscribed and taking VTMS feed from Kandla from link www.vts.gov.in.</p>
<p>9. Public Hearing And Human Health Issues</p>		
9.1	<p>The workspace shall be maintained as per international standards for occupational health and safety with provision of fresh air respirators, blowers, and fans to prevent any accumulation and inhalation of undesirable levels of pollutants including VOCs.</p>	<p>Complied.</p> <p>APSEZ has obtained ISO 45001:2018 certification for Occupational health and safety management systems to systematically manage health and safety risks and is fully implemented. Copy of the same attached as Annexure 24.</p> <p>APSEZ has established Occupational Health Center & First Aid facility at different locations within SEZ, which will be utilized during entire construction as well as operation phase of SEZ project. In case of emergency situation requiring higher level of treatment, the facilities at Adani hospital (multi-Specialty) having 110 bedded facilities located with SEZ area can be utilized.</p>
9.2	<p>Workers shall be strictly enforced to wear personal protective equipments like dust mask, earmuffs or ear plugs, whenever and wherever necessary/required. Special visco-elastic gloves will be used by labour exposed to hazards from vibration.</p>	<p>Complied</p> <p>APSEZ has provided job specific safety PPE's to all workers and wearing of safety PPE's is strictly implemented within port premises</p> <p>Further, Safety awareness training is also provided to workers about work related PPE's.</p>
9.3	<p>In case of repair of any old vessels, excessive care shall be taken while handling Asbestos & Freon gas.</p>	<p>Being Complied.</p> <p>No repair activity of any old vessel is being permitted within APSEZ's Port premises.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	Besides, fully enclosed covering should be provided for the temporary storage of asbestos materials at site before disposal to CTSDF.	
9.4	Safety training shall be given to all workers specific to their work area and every worker and employee will be engaged in fire hazard awareness training and mock drills which will be conducted regularly. All standard safety and occupational hazard measures shall be implemented and monitored by the concerned officials to prevent the occurrence of untoward incidents/accidents.	<p>Complied</p> <p>Regular Toolbox Talk (TBT) and fire & safety training is being imparted by the fire & safety department.</p> <p>Regular drills are being conducted for the effectiveness of the system. There were 6 drills conducted for various scenarios during compliance period (Apr'24 to Sep'24) as mentioned below.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024			
		Sr. No.	Location	Month	Scenario
		1.	Canteen area, ACMTPL	Sep'24	Assuming that one driver was started vomiting due to food poisoning while taking meal. Canteen supervisor Mr. Kiran Kumar Immediately informed to Admin in charge, OHC and Safety Department
		2.	Encloser – 09, TLF-09, Loading Bay	Sep'24	Chemical Spillage (Methanol around 300 liter) on loading helper due to wrong opening of valve for tanker loading at TLF - 09.
		3.	Liquid Terminal (00 line (In front of FCC))	May'24	Isolation of Wagon due to fire catch on wagon during PY Gas Unloading at "00" Line.
		4.	2L20B1 container AICTPL	Sep'24	Scenario was leakage observed in container MEDU4000038 (IMDG class 08, UN 1760) placed at 2L20B1, yard supervisor informed to duty superintendent by means of VHF and Duty superintendent informed to Tower control of AICTPL. Tower control informed to Fire services, OHC, Security, ERT, Terminal head, POC, department regarding emergency
		5.	FB-01 refrigerated storage tank, Mundra LPG Terminal Pvt Ltd	Sep'24	While monitoring the DCS at CCR, CCR operator recognize that Gas Detector #202, activates which resulted in alarm on DCS screen, CCR operator informs shift in charge and asked him to evaluate the situation, where shift in charge confirmed about the leak, CCR immediately informed all the stakeholders and further emergency declared by site incidence controller, fire team started precautionary water spraying by using water monitors further leak was arrested by mechanical team and ensured zero % LEL by safety team along with all the stakeholders. All clear message declared, and emergency scenario communicated to all the employees at assembly point.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
		Safety Mock drill report (latest report) conducted during the compliance period is enclosed as Annexure - 16.
9.5	Emergency preparedness plan based on the Hazard identification and Risk Assessment (HIRA) and Disaster Management Plan shall be implemented.	Complied Emergency preparedness plan based on the Hazard identification and Risk Assessment (HIRA) and Disaster Management Plan is being implemented. On site Emergency plan attached as Annexure 15.
9.6	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	Complied Workers engaged in construction activities would be mainly from nearby villages hence there would be no requirement of infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP. Existing facilities for drinking water, toilet & rest shelter would be utilized by workers.
9.7	Occupational health surveillance of the workers shall be done on a regular basis.	Complied. Annual health checkup is being carried out on regular basis and submit as a part of Half yearly EC compliance. Latest health checkup report is attached as Annexure 25.
10. Environment Responsibility		
10.1	The company shall have a well laid down environmental policy duly approved by the Board of Directors. The environmental policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/deviation/violation of the environmental / forest /wildlife norms/	Complied Environment Policy duly approved by the Board of Directors is in place and updated copy of Environment Policy attached as Annexure 26.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	<p>conditions. The company shall have defined system of reporting infringements / deviation / violation of the environmental / forest / wildlife norms / conditions and / or shareholders / stake holders. The copy of the board resolution in this regard shall be submitted to the MoEF&CC as a part of six-monthly report.</p>	
10.2	<p>A separate Environmental Cell both at the project and company head quarter level, with qualified personnel shall be set up under the control of senior Executive, who will directly report to the head of the organization.</p>	<p>Complied</p> <p>APSEZL has a well-structured Environment Management Cell, staffed with qualified manpower for implementation of the Environment Management Plan at site. Site environment head reports to site Chief Executive Officer (CEO) and the CEO directly reports to the top management. The updated Environment Management Cell Organogram is attached as Annexure 27.</p>
10.3	<p>Action plan for implementing EMP and environmental conditions along with responsibility matrix of the company shall be prepared and shall be duly approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/Regional Office along with the Six-Monthly Compliance Report.</p>	<p>Complied</p> <p>Responsibility Matrix for implementation of EMP and Environment conditions has been mentioned in approved EMP and the same would be implemented.</p> <p>Separate budget for the Environment protection measures is earmarked every year. All environment and horticulture activities are considered at corporate level and budget allocation is done accordingly. All the expenses are recorded in advanced accounting system of the organization.</p> <p>Budget for environmental management measures (including horticulture) for the FY 2024-25 is to the tune of INR 1340.21 lakh. Out of which, Approx. INR 365.97 lakh are spent during the year FY 2024-25 (till Sep'24).</p> <p>Detailed breakup of the expenditures for the past 3 years is attached as Annexure - 20.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
10.4	Self-environmental audit shall be conducted annually. Every three years third party environmental audit shall be carried out.	Point Noted and will be complied.
11. Miscellaneous		
11.1	The project proponent shall make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising it at least in two local newspapers of the District or State, of which one shall be in the vernacular language within seven days and in addition this shall also be displayed in the project proponent's website permanently.	Complied. The original copy of the CRZ clearance was obtained on 13.08.2024 and advertisement (containing informing that the EC & CRZ clearance is accorded to the proposed project and a copy of clearance letter is available with the SPCB and may also be seen at the website of MoEF&CC) was given in local Newspaper Kutch Mitra in Gujarati (local) language dated 20.08.2024 & 22.08.2024 and in The Indian Express (English) newspaper dated 20.08.2024. Copy of the newspaper advertisement is attached as ANNEXURE - 28 .
11.2	The copies of the environmental clearance shall be submitted by the project proponents to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt.	Complied The copy of CRZ clearance letter has been submitted to the respective concerned authorities the District Collector Office, Bhuj, District Industries Centre office, Bhuj, GPCB Reginal Office, Gandhidham, GPCB Head Office, Gandhinagar, Sub District Magistrate office, Mundra, Mamlatdar Office, Mundra, and Taluka Vikas Adhikari office, Mundra. with the request for display at least for 30 days. The acknowledgements are attached as ANNEXURE - 29 . A copy of the EC & CRZ Clearance letter is uploaded on APSEZ web site https://www.adaniports.com/ports-downloads .
11.3	The project proponent shall upload the status of compliance of the stipulated environment clearance	Point noted and being complied. As our project for Expansion of Waterfront Development Plan of Mundra Port development work is ongoing as per

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	<p>conditions, including results of monitored data on their website and update the same on half-yearly basis.</p>	<p>business requirement, hence we are submitting first half yearly compliance report to all the concerned authorities for the period Apr'24 to Sep'24 and now onwards we will submit half yearly compliance report on regular basis within defined timeline.</p> <p>Copy of the same will be also uploaded on our web site https://www.adaniports.com/ports-downloads.</p>
11.4	<p>The project proponent shall submit six-monthly reports on the status of the compliance of the stipulated environmental conditions on the website of the ministry of Environment, Forest and Climate Change at environment clearance portal.</p>	<p>Point noted and being complied.</p> <p>As our project for Expansion of Waterfront Development Plan of Mundra Port development work is ongoing as per business requirement, hence we are submitting first half yearly compliance report to all the concerned authorities for the period Apr'24 to Sep'24 and now onwards we will submit half yearly compliance report on regular basis within defined timeline.</p>
11.5	<p>The project proponent shall submit the environmental statement for each financial year in Form-V to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently and put on the website of the company.</p>	<p>Complied.</p> <p>Environmental statement for each financial year is submitted to GPCB. The same for the FY ending 31.03.2024 in Form-V for existing permission is submitted to GPCB vide our letter dated 2nd September, 2024. The acknowledgement copy of the Environmental Statement (Form V) of FY 2023-24 is attached as Annexure - 30. Copy of the submitted Environmental Statement FY 2023-24 is also available on our web site https://www.adaniports.com/ports-downloads.</p>
11.6	<p>The criteria pollutant levels namely; PM2.5, PM10, SO2, NOx (ambient levels) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.</p>	<p>Complied</p> <p>For further details regarding the ambient air monitoring & results, please refer to specific condition no 1.15 of the EC and CRZ clearance.</p> <p>Pollutants levels is being displayed at Main gate of Main Port & West Port on regular basis.</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
11.7	The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board and the State Government.	Point Noted and Agreed
11.8	The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report, commitment made during Public Hearing and also that during their presentation to the Expert Appraisal Committee.	Point Noted and Agreed.
11.9	No further expansion or modifications in the project shall be carried out without prior approval of the Ministry of Environment, Forests and Climate Change (MoEF&CC).	Point Noted and Agreed.
11.10	Concealing factual data or submission of false/fabricated data may result in revocation of this environmental clearance and attract action under the provisions of Environment (Protection) Act, 1986.	Point Noted and Agreed.
11.11	The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory under the provisions of the Environmental (Protection) Act, 1986, to ensure effective implementation of the suggested safeguard	Point Noted and Agreed.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	measures in a time bound and satisfactory manner.	
11.12	The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner shall implement these conditions.	Point Noted and Agreed.
11.13	The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information/monitoring reports.	Point Noted and Agreed.
11.14	The above conditions shall be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991 along with their amendments and Rules and any other orders passed by the Hon'ble Supreme Court of India / High Courts and any other Court of Law relating to the subject matter.	Point Noted and Agreed.
11.15	Any appeal against this EC shall lie with the National	Point Noted and Agreed.

	Adani Ports and Special Economic Zone Limited, Mundra.	From : Apr'24 To : Sep'24
Status of the conditions stipulated in Environment and CRZ Clearance		

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2024
	Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.	
12. Specific Conditions		
12.1	The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.	<p>Complied</p> <p>With respect to onshore facilities tug (Dolphin-11) has a firefighting system of 1200 m³/hr. along with 20-ton lifting "A" frame and diving support facility for support at offshore.</p> <p>With respect to onshore facilities valve station, pumping station and transportation pipeline, foam base fire tender, fire water network is available. Fire-fighting system has been installed and maintained to meet emergency situations. Additionally for emergencies, emergency DG Set is provided for fire water pumps to ensure continuous water supply for firefighting purpose. Detail information on firefighting facility available at APSEZ attached as Annexure 31.</p>

Annexure - A

**ANNEXURE - A
CRZ Recommendation Compliance
Report of WFDP Expansion**

	Adani Ports and Special Economic Zone Limited, Mundra.	From : Apr'24 To : Sep'24
Status of the conditions stipulated in Environment and CRZ Clearance		

Half yearly Compliance report of CRZ recommendation for "Proposed expansion of Waterfront Development Plan of Mundra Port" by M/s. Adani Ports and SEZ Limited, Mundra, Kachchh District, Gujarat" vide Letter No. ENV/10/2024/37/T dated 20th April, 2024.

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024
Specific Conditions		
1	APSEZ shall ensure that all the proposed activities as part of expansion are carried out within the ambit of the earlier approved Waterfront Development Plan and no new additional reclamation will be carried out outside.	<p>Complied.</p> <p>All the proposed activities as part of expansion are being / will be carried out within the ambit of the earlier approved Waterfront Development Plan and no new additional reclamation will be carried out outside the approved area of WFDP EC granted in Jan-2009.</p> <p>Please refer to compliance of EC & CRZ clearance specific condition no 1.1 for further details.</p>
2	APSEZ shall have to comply with all the directions issued by the Ministry of Environment, Forest and Climate Change, Government of India from time to time for APSEZ.	Point Noted and agreed.
3	APSEZ shall carry out 100-Hectare mangroves plantation in consultation with Forest Department.	<p>Point noted & Will be Complied.</p> <p>This reply covers condition no 3 & 4.</p>
4	APSEZ shall participate in Green Credit Programme administrated by the Indian Council of Forestry Research and Education (ICFRE) for carrying out Tree Plantation in 100 Hectare area under this programme. PP shall fund necessary amount for this purpose to Forest Department, GoG.	For further details compensatory plantation, please refer to compliance of specific condition no 1.6 of the EC and CRZ clearance.
5	APSEZ shall ensure that no natural free flow of water or	Being Complied

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024																					
	natural drainage of storm water or creek be disturbed.	For further details regarding status of natural free flow of water, please refer to compliance of specific condition no 1.13 of the EC and CRZ clearance.																					
6	APSEZ shall ensure that no activities are undertaken in violations of any order, if any issued by the Hon'ble NGT/Hon'ble High Court/Hon'ble Supreme Court of India, or any court of laws.	Point Noted and agreed.																					
7	APSEZ shall comply with the conditions stipulated in the recommendation letter GCZMA dated. 13.10.2008 and subsequent environment clearance & CRZ clearance for Waterfront Development Project.	<p>Complied</p> <p>Compliance status of the recommendations letter GCZMA dated. 13.10.2008 and subsequent EC & CRZ clearance granted for WFDP on 12th & 19th Jan, 2009 is being submitted to all the concern authorities on half yearly basis separately.</p> <p>Details regarding the past six compliance report submissions are mentioned below:</p> <table border="1"> <thead> <tr> <th>Sr. no.</th> <th>Compliance period</th> <th>Date of submission</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Apr'21 to Sep'21</td> <td>30.11.2021</td> </tr> <tr> <td>2.</td> <td>Oct'21 to Mar'22</td> <td>30.05.2022</td> </tr> <tr> <td>3.</td> <td>Apr'22 to Sep'22</td> <td>30.11.2022</td> </tr> <tr> <td>4.</td> <td>Oct'22 to Mar'23</td> <td>30.05.2023</td> </tr> <tr> <td>5.</td> <td>Apr'23 to Sep'23</td> <td>29.11.2023</td> </tr> <tr> <td>6.</td> <td>Oct'23 to Mar'24</td> <td>29.05.2024</td> </tr> </tbody> </table> <p>Copy of the same is also available on our web site https://www.adaniports.com/ports-downloads. Please refer below for the details regarding past six compliance submissions.</p>	Sr. no.	Compliance period	Date of submission	1.	Apr'21 to Sep'21	30.11.2021	2.	Oct'21 to Mar'22	30.05.2022	3.	Apr'22 to Sep'22	30.11.2022	4.	Oct'22 to Mar'23	30.05.2023	5.	Apr'23 to Sep'23	29.11.2023	6.	Oct'23 to Mar'24	29.05.2024
Sr. no.	Compliance period	Date of submission																					
1.	Apr'21 to Sep'21	30.11.2021																					
2.	Oct'21 to Mar'22	30.05.2022																					
3.	Apr'22 to Sep'22	30.11.2022																					
4.	Oct'22 to Mar'23	30.05.2023																					
5.	Apr'23 to Sep'23	29.11.2023																					
6.	Oct'23 to Mar'24	29.05.2024																					
8	The provisions of the CRZ notification, 2011 and as amended from time to time shall be strictly adhered to by the PP.	<p>Complied.</p> <p>APSEZ ensures to strictly follow existing rules & regulation of CRZ notification, 2011 and as amended from time to time.</p>																					
9	PP shall obtain all necessary	Complied.																					

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024
	clearances/NOC from concerned competent authorities/ departments before construction and commissioning of the activities.	For further details regarding clearances/permissions, please refer to the compliance of specific condition no 1.10 of the EC and CRZ clearance.
10	All the recommendations and suggestions given in the Environment Impact Assessment Study as well as studies undertaken for the project shall be implemented strictly by PP.	Complied. All recommendations/suggestions given in the Environment Impact Assessment Study as well other technical studies is being complied / will be complied strictly.
11	PP shall obtain consents/ authorization/ permission of the Gujarat Pollution Control Board under applicable Water {Prevention and Control of Pollution} Act, 1974, Air {Prevention and Control of Pollution} Act'1981 and Rules made under Environment (Protection) Act' 1986. Discharge of pollutants shall not exceed the limits prescribed under the environmental Acts/ Rules.	Complied. For further details regarding permissions/consents/ authorization from Gujarat Pollution Control Board; please refer to compliance of specific condition no.1.10 of the EC & CRZ Clearance. For further details regarding quality monitoring of pollutants, please refer Water Quality Monitoring and Preservation compliance of condition no 3.8 & 3.9 of the EC and CRZ clearance.
12	There shall no discharge of any kind of wastewater/ sewage / effluent/ wastes into the creek or sea or in CRZ areas except allowed by this permission.	Complied. No treated/untreated effluent is being discharged into creek or sea or in CRZ area. Entire quantity of effluent generated is being treated in designated ETP / STP and treated sewage is being fully utilized for Horticulture purposes. Please refer to compliance of specific condition no 1.12 of EC & CRZ clearance for detailed information.
13	The groundwater shall not be tapped to meet with the water requirements in any	Complied No groundwater is being tapped to meet water

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024
	case.	requirements. APSEZ sources its water for various project activities from the desalination plant of APSEZ and/or water through Gujarat Water Infrastructure Limited (GWIL). Average water consumption for entire APSEZ area is 5.34 MLD during compliance period i.e. Apr'24 to Sep'24.
14	PP shall ensure that there will not disturbance to nearby Ecologically Sensitive area due to their proposed project activities.	Complied. For further details regarding conservations of nearby Ecologically Sensitive area, please refer to compliance of specific condition no 1.12 of the EC and CRZ clearance.
15	PP shall ensure that the labour construction camps are kept outside the CRZ areas and the construction labour are provided with adequate amenities like drinking water, fuel, sanitation, etc. to ensure that the existing environmental condition is not deteriorated by them.	Complied Workers engaged in construction activities would be mainly from nearby villages hence there would be no requirement of infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP. Existing facilities for drinking water, toilet & rest shelter would be utilized by workers.
16	PP shall adopt the necessary soil conservation measures to prevent any exposed soil from being eroded or blown over.	Being Complied This reply covers condition no 16 & 17.
17	PP shall develop 33% greenbelt within premises and shall maintain greenbelt.	For further details regarding soil conservations & greenbelt development please refer to compliance of Greenbelt condition no 7.1 & 7.2 of the EC and CRZ clearance.
18	Project proponent (PP) shall have to carry out marine water quality environment monitoring regularly on quarterly basis and submit the report to GCZMA, GPCB, IRO & MOEF & CC, GoI.	Complied For further details regarding marine ecology monitoring, please refer to compliance of specific condition no 1.12 of the EC and CRZ clearance.
19	PP shall bear the cost of the external agency that may be appointed by this Department for supervision/	Point noted and agreed

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024				
	monitoring of proposed activities.					
20	PP shall contribute through its CER fund for environmental infrastructure up- gradation, awareness programs etc.	<p>Complied.</p> <p>CER is not applicable for this project. However APSEZ CSR team is actively working with local community around the project area and provides required support for their livelihood and other concerns through the CSR arm – Adani Foundation. Adani Foundation is working in main five persuasions as below.</p> <ul style="list-style-type: none"> ❖ Education ❖ Community Health ❖ Rural Infrastructure ❖ Sustainability Livelihood ❖ Skill Development <p>Brief information about activities in the main five persuasions is mentioned below. Activities carried out for the same are summarized as below.</p> <table border="1"> <thead> <tr> <th>Area</th> <th>Activity</th> </tr> </thead> <tbody> <tr> <td>Community Health</td> <td> <ul style="list-style-type: none"> • Mobile Health Care Units and Rural Clinics • 07 Rural Clinics • 05 villages of Mundra & 02 village Mandvi block has benefited by rural clinic service. • Total 5519 Patients Benefitted FY 24-25 till Sep'24 (direct & indirect) by Mobile van and rural clinic. • 2 financially challenged patients has been supported with Dialysis treatment at 22 Times which added day in their Life. • Provided 27,355 medical health services ❖ Burn & Intensive Care Unit <ul style="list-style-type: none"> • On August 11 (Adani Foundation Day), the foundation stone for the Burn Ward at GK General Hospital, Bhuj, was laid. </td> </tr> </tbody> </table>	Area	Activity	Community Health	<ul style="list-style-type: none"> • Mobile Health Care Units and Rural Clinics • 07 Rural Clinics • 05 villages of Mundra & 02 village Mandvi block has benefited by rural clinic service. • Total 5519 Patients Benefitted FY 24-25 till Sep'24 (direct & indirect) by Mobile van and rural clinic. • 2 financially challenged patients has been supported with Dialysis treatment at 22 Times which added day in their Life. • Provided 27,355 medical health services ❖ Burn & Intensive Care Unit <ul style="list-style-type: none"> • On August 11 (Adani Foundation Day), the foundation stone for the Burn Ward at GK General Hospital, Bhuj, was laid.
Area	Activity					
Community Health	<ul style="list-style-type: none"> • Mobile Health Care Units and Rural Clinics • 07 Rural Clinics • 05 villages of Mundra & 02 village Mandvi block has benefited by rural clinic service. • Total 5519 Patients Benefitted FY 24-25 till Sep'24 (direct & indirect) by Mobile van and rural clinic. • 2 financially challenged patients has been supported with Dialysis treatment at 22 Times which added day in their Life. • Provided 27,355 medical health services ❖ Burn & Intensive Care Unit <ul style="list-style-type: none"> • On August 11 (Adani Foundation Day), the foundation stone for the Burn Ward at GK General Hospital, Bhuj, was laid. 					

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<ul style="list-style-type: none"> • This center will provide comprehensive care for burn victims, from emergency treatment to long-term rehabilitation. It will benefit 22 lakh population of Kutch. ❖ Eye Vision Care: <ul style="list-style-type: none"> • To address these challenges, the Adani Foundation, in collaboration with Vision Spring, is launching a holistic eye care initiative for the community. ❖ This initiative focuses on: <ul style="list-style-type: none"> • Student: See to Learn, SHG Women: See to Earn, Driver of APSEZ: See to be Safe • Total Screening 7476 (Students) + 3958 (Drivers) = 11434 ❖ Vision Aids: 621 (Students) + 1110 (Drivers) = 1731 ❖ Cataract Screening: 366 nos. of peoples ❖ Cataract Surgery: 18 nos. of peoples <p>Medical Services Data April to Sep - 2024:</p> <ul style="list-style-type: none"> • Ayushman Card: 243 beneficiary • Eye Vision Care; 7740 beneficiary • Driver Health Check-up: 2423 beneficiary • Blood Donation Camp: 2902 beneficiary • Specialty Health Camp: 2578 beneficiary • General Health Camp: 1074 beneficiary • Rural Clinic: 5519 beneficiary • Mobile Health Care Unit: 4348 beneficiary • Medical Supports: 1071 beneficiary • Dialysis Support: During this year, 2 patients were supported for

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<p>regular dialysis with 22 Times which added day in their Life.</p> <ul style="list-style-type: none"> 1094 –Economically Challenged patients have been supported for operation, OPD, IPD, Medicines and lab-test. <p>Animal Husbandry:</p> <ul style="list-style-type: none"> Fodder support to 25 villages, benefiting 15005 cattle, Dry Fodder Support - 10,90,875 Kg & Green Fodder Support - 27,64,920 Kg Launched a vaccination camp for 20,000 cattle, in collaboration with the Animal Health Department of Bhuj. 6,200+ cattle have been successfully vaccinated,
	Sustainable Livelihood – Fisher folk, Agriculture & Women		<ul style="list-style-type: none"> ❖ “CHETNA” - initiative with gender diversity <ul style="list-style-type: none"> Adani Foundation, in collaboration with Unnati Portal and Adani Solar, launched an initiative to provide equal opportunities for employment and self-development to women from Kutch. Till Now 167 Female Joined Adani Solar @Pan India, 154 are from Kutch (92.21%) ❖ Saheli Groups: Form 82 Self Help Groups in coordination with National Rural Livelihood Mission (850+ Members). 16 SHG are on pathways of self-reliance their total Corpus Rs. 32,27,100 in 6 months. ❖ 3 women SHGs from Adani Foundation Mundra participated in the prestigious Sathwaro Mela in Ahmedabad, showcasing Mud Art, Bead Art, and Soof Art, along with two artisans specializing in Rabari

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<p>and Doori work, achieving an impressive turnover of Rs.1,30,000/-</p> <p>Empowering Fisherfolk Community:</p> <ul style="list-style-type: none"> • Education Support: Vehicle transportation facilities to 86 fisherfolk students, Education kits Support to 77 students, Scholarship support of Rs. 3,58,765 to 34 students. • Job Support: Facilitated job placements for 75 fisherfolk as RTG operators, in the HR department, professional painting roles and as supervisors in APSEZ companies. <p>Animal Husbandry:</p> <ul style="list-style-type: none"> • Fodder support to 25 villages, benefiting 15005 cattle, Dry Fodder Support - 10,90,875 Kg & Green Fodder Support - 27,64,920 Kg • Launched a vaccination camp for 20,000 cattle, in collaboration with the Animal Health Department of Bhuj. 6,200+ cattle have been successfully vaccinated, <p>Last Year conducted activities:</p> <p>Overall Persistent efforts for Fisherman development:</p> <ul style="list-style-type: none"> • 598 Education Kit Support • 273 Fisherman Shelter Support • 1,247 Vehicle transportation support of Mundra and Mandvi taluka • 106 Cycle Support to high school going students • 613 Scholarship Support • 419 Youth Employment

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<ul style="list-style-type: none"> • 195 Linkages with Fisheries Scheme • 3,534 Ramaotsav Community Engagement • 56,523 Man days Mangroves Plantation <p><u>Empowering Fisherfolk Communities through Education:</u></p> <ul style="list-style-type: none"> • Vehicle Transportation Facilities: 146 Students supported Mundra Taluka and 58 Students supported at Mandvi Taluka during the compliance period • Education Kits Support: Education Kits including notebooks, guides, and bags, to fisherfolk students studying in 9th to 12th standard to enhance their learning experience (57 nos. students benefitted). • Educational Awareness Sessions: Through targeted awareness sessions in Fisherfolk Vasahat, we promote the transformative power of education, with a particular focus on advancing girl-child education. (487 Students motivated for high school Education). • Scholarship Support: Provide scholarship support to 31 deserving students, covering their higher secondary school fees. Emphasizing gender equality, we offer 100% fee support to female candidates and 80% to male candidates. • Cycle Support: Overcoming transportation obstacles, our cycle support initiative enables six 9th standard fisherfolk students from Juna Bandar to continue their education with ease. • Assisting During Emergencies: Fisherfolk Home were significantly

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<p>damaged by the Biporjoy Cyclone. In response to that we provided 2696 cement sheets to 336 fisherfolk households of Juna Bandar, Luni, and Randh Bandar to support their recovery. (336 Fisherfolk house benefited)</p> <ul style="list-style-type: none"> Fostering Youth Employment: At APSEZ Mundra, our mission revolves around providing sustainable employment opportunities for the local fishing community. We serve as a bridge between industries and Fisherfolk youth, facilitating job placements to enhance livelihoods. This year, we have successfully engaged 115+ Fisherfolk youth, paving the way for a brighter future. (115+ Fisherfolk youth employed) Strengthening Fisherfolk women: Through comprehensive health and hygiene initiatives, we empower Fisherfolk women. Our programs include family planning resources, menstrual hygiene workshops, nutrition advocacy, and health awareness sessions covering vaccinations, clean water access, and mental health support. (449 Women benefited) Potable Water Distribution: Providing potable water facilities to 9 Fisherfolk Vasahat daily, either through water tankers or by establishing linkages with the nearest Gram Panchayat. This initiative benefits over 5000 Fisherfolk, significantly improving their health and productivity. (5000+ Population benefited). <p>Sustainable Livelihood - Agriculture: During compliance period This year, the Adani Foundation continued its strong commitment to advancing natural</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<p>farming in Mundra. Through various initiatives and partnerships, we provided crucial support to local farmers, empowering them with knowledge and resources to transition to sustainable practices.</p> <ul style="list-style-type: none"> • 2200+ Farmers educated in natural farming • 800+ Farmers embracing natural farming methods • 200 Farmers got financial assistance of Rs. 10,000 • 3 District level exposure visit • ₹ 36.7 lakh Business done by our benefited Farmers <p>Promoting Natural Farming:</p> <ul style="list-style-type: none"> • Training: Conducted training for 1250 farmers in 16 villages, enlightening them about the harmful effects of chemical fertilizers. Demonstrated how to produce organic fertilizer using household products, emphasizing its benefits and cost-effectiveness. After adopting it, they witnessed its positive effects on their fields. • Kitchen Garden Kit: We have supported vegetable kitchen garden kits to 500 farmers with the aim to enable them to grow fresh and nutritious, chemical-free vegetables. This will enhance their food security and promote self-reliance. • Empowering Farmers: This year, amidst the aftermath of the cyclone, we stood by our farmers and held dedicated meetings with KVK, KCS, and DRC to restore the fallen date trees. Collaboratively, provided JCB, technical support, organic fertilizer etc. Successfully

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<p>restored 615 trees. Each Date trees is projected to yield approximately Rs. 25,000, Total Yield in Next Season: - Rs.1.53 Cr.</p> <ul style="list-style-type: none"> • Financial Assistance: Extend financial support to 200 farmers, each receiving Rs. 10,000, a transaction gracefully facilitated by Mr. R. N. Parmar, virtually transferring funds to their bank accounts, funded by Adani Petrochemicals. This fund will help farmers in planting a total of 53,136 fruit-bearing plants. <p><u>Raj Shakti Prakrutik Kheti Sahkari Mandali:</u></p> <ul style="list-style-type: none"> • Appreciation by Governor: Governor of Gujarat, Shree Acharya Devvratji, encouraged 25 of our farmers practicing natural farming at the Krushi and Dairy Expo event in Bhuj. • Exposure Visits Certification by GOPCA: Our farmers embarked on three eye-opening exposure visits to Gautech-2023, • Certification by GOPCA: We have successfully certified 28 farmers under the Gujarat Organic Products and Certification Agency (GOPCA). <p><u>Kutch Kalptaru FPO (KKPC) and Prakrutik Mandli</u></p> <ul style="list-style-type: none"> • To promote horticulture, the Kutch Kalptaru FPO (KKPC) was established in 2020 by farmers from Mundra Block to address various challenges they faced. With an initial 350 shares held by 280 shareholders, the company is now expanding to include up to 5000 farmers and 537 registered shareholders. (800 Farmers

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<p>benefited and ₹ 33.67 lacs Turn over)</p> <ul style="list-style-type: none"> 19 nos. of Market Linkage for supporting to Green carnival at Samudra Township & Shantivan colony Now 302+ farmers are collaborated with Mandli. Total Green Carnivals 37, Total Sell 8,623 kg and Revenue generated ₹ 30184805. by connecting directly with consumers, they've seen a remarkable 35% increase in their income. Adani Foundation has also provided 14.38 lacs kg Dry Fodder and 45.85 lacs kg Green fodder in 31 villages of Mundra and Anjar Block to support the resource dependent villagers, to avoid their dependency on mangroves. The expenditure for fodder supporting activities was approx. 305.55 Lacs during FY 2023-24. Adani Foundation provides Good Quality dry and green fodder to 24 Villages. Project is covering total 15005 Cattels / 2070 farmers and hence enhancing cattle productivity during FY 2023-24. Grass Land development: AF converted 18 acres of denuded village common pastureland gauchar into fertile and productive grassland in Zarpara, Siracha, Gundala, Kukadsar village to transform into Fodder Sustain village during FY 2023-24. <p>Women Empowerment:</p> <ul style="list-style-type: none"> Self Help Groups (SHGs): Established 82 self-help groups in various rural and urban areas to provide financial and social

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<p>support to women We provided training and capacity building workshops to members of these SHGs to help them develop income generating activities and improve their livelihoods Through this initiative, we have empowered over 850 women to become self-reliant with Savings of more than Rs 35 Lacs.</p> <p>❖ Making SHG Self Reliant:</p> <ul style="list-style-type: none"> ● 16 SHG are on pathways of self-reliance. ● Various handicraft, dry and fresh food making, stitching, tie and die etc. ● 175+ women - Monthly average income @ 7000 of each member over Month. <p>❖ Job Sourcing – Govt:</p> <ul style="list-style-type: none"> ● 11 Women supported for application and process of Gram Rakshak Dal, Bank Sakhi, Bima Sakhi and Professional Resource Person. ● Average income 4200 Per Month. <p>❖ Job Sourcing – Private:</p> <ul style="list-style-type: none"> ● Coordination for Job by Unnati Portal with Adani Group company companies, Britania, B Medical and Emphazer company. ● 398 Women supported till date for job sourcing of more than 18 villages. ● Average income 10200 Per Month. <p>❖ Social Empowerment:</p> <ul style="list-style-type: none"> ● 2 Livelihood Enhancement Training through RSETI. ● Financial support for business set up. ● Legal rights and domestic violence workshops.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<ul style="list-style-type: none"> • Family counselling for Job sourcing. • During FY2023-24 Approx. INR 122.32 lakh were spent for Fisherfolk Amenities work in different core areas. • Till FY 2023-24 Adani Foundation has done total expenditure of INR 1460.50 lakh for Fisherfolk Amenities work in different core areas. • Skill Development and Income Generation –Adani Foundation is working with 82 Self-help group and supporting to develop entrepreneur skills to become self-reliant, sourcing more than 850 women to absorb in various job.
		Education	<p>Key programmatic accomplishments:</p> <ul style="list-style-type: none"> • 69 Primary schools (10452 Students) • 8 High schools (1211 Students) • 12000+ Students • 2371 Progressive learner • 3421 IT on Wheels • 2449 Adani competitive coaching center • 250 Adani Evening Education center • Library Activity: 45000+ Books issued. 300+ Oasis workshop arranged to increase reading habits of students. • Mothers Meet: Mothers' meetings conducted every second Saturday in Utthan schools. 10,000+ mothers have participated. • Vedic maths and Abacus
		Rural Infrastructure & Environmental Sustainability	Adani foundation designed and build various structure and provide service in the Health, Education, agriculture and sustainable livelihood area.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024
		<ul style="list-style-type: none"> ❖ Renovation of Zarpara High School - benefit 450+ students/annually ❖ Construction of Madhav seva trust School at Zarpara - benefit 250+ students/annually ❖ Renovation of AVMB school - benefit 640+ students/annually ❖ Vruksh Se Vikas – Massive Drive <ul style="list-style-type: none"> • In the 6 months we establish 3 Adani Van, planting 22,460 trees in 9.5 acres area in N khakhar, Borana, and Dhrub village. Till Date 8 Adani Van 75,078 Trees @28 acres • Prakrutik Rath: Empowering Communities Through Green Initiatives 7,136 saplings distributed and planted in 6 months. • Total 1.79 Lac tree plantation done till date. ❖ Mangrove Nursery Development with 10,000 seeds. ❖ Coastal Cleanup day: At Kashivishvnath Beach, Mandvi, 200+ students and 80 Utthan Sahayaks cleaned a 1 km stretch, collecting significant plastic waste as part of a coastal cleanup and awareness drive. ❖ Green Schools: Eco-clubs in 77 Utthan Schools and 12000+ students participate in "No Plastic" activities. <p>Last Year Completed Activities/Projects:</p> <p>Water Conservation Projects:</p> <p>Swajal Project:</p>

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024																					
			<p>➤ Aim: The Foundation's Water Conservation program, SWAJAL, is aimed at addressing the alarming depletion of groundwater levels and reduction in water sources in various parts of Kutch district.</p> <p>➤ Water Security Plan: Due to arid climatic characters of the Kutch region, it is essential to plan for water security drinking and livelihood purposes. Considering weather condition, rainfall characters, geohydrological condition and water demand, water security plan has been prepared for the Seven villages.</p> <table border="1"> <thead> <tr> <th>Block Name</th> <th>Water conservation structure</th> <th>Total no. of Structure</th> <th>Total Capacity Created (CUM)</th> </tr> </thead> <tbody> <tr> <td rowspan="5">Mundra</td> <td>Check Dam</td> <td>23</td> <td>6,07,332.80</td> </tr> <tr> <td>Pond Deepening</td> <td>66</td> <td>1,89,121.08</td> </tr> <tr> <td>RRWHS</td> <td>275</td> <td>2750</td> </tr> <tr> <td>Recharge Borewell</td> <td>209</td> <td>-</td> </tr> <tr> <td>Percolation Well</td> <td>24</td> <td>-</td> </tr> </tbody> </table> <p>Soil Conservation:</p> <ul style="list-style-type: none"> • 1250 Farmers Awareness Sessions at Village Level: Spreading awareness on natural farming benefits and address their concerns. • 7 exposure of Hands-On Training & Exposures: Arranged Workshop and training to emphasizing on real-world techniques. • 857 Farmers link with Government Scheme: facilitation of govt. Cow Nurturing scheme to promote eco- friendly farming practices. 	Block Name	Water conservation structure	Total no. of Structure	Total Capacity Created (CUM)	Mundra	Check Dam	23	6,07,332.80	Pond Deepening	66	1,89,121.08	RRWHS	275	2750	Recharge Borewell	209	-	Percolation Well	24	-
Block Name	Water conservation structure	Total no. of Structure	Total Capacity Created (CUM)																				
Mundra	Check Dam	23	6,07,332.80																				
	Pond Deepening	66	1,89,121.08																				
	RRWHS	275	2750																				
	Recharge Borewell	209	-																				
	Percolation Well	24	-																				

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<ul style="list-style-type: none"> • 258 Gobardhan Bio-gas Support: Link with Gov Gobar Dhan Biogas Unit Nutrient-rich slurry serves as an essential organic fertilizer for natural farming. • 35 Farmers Natural Farming Certification Process to obtain natural farming certification through the GOPCA for the 35 Farmers who are Members of Raj shakti Sahakrai Mandali. • Rs.9.88 Lacs RG Marketing Assistance: Provide platforms and resources ensuring fair prices and broader consumer reach.
		Skill Development	<p>Empowering Youth: Impact of ASDC in Mundra and Bhuj Center ASDC has significantly enhanced employability in Mundra and Mandvi. Training programs in digital literacy, RTG crane operation, beauty therapy, and advanced Excel have provided practical skills and certifications. Real-time exposure along with the Entrepreneurship Development Program (EDP), has further empowered youth. Successful placements have resulted in well-paying jobs, contributing to regional economic growth. Overall, ASDC's initiatives have transformed the lives of many individuals, fostering both personal and professional development.</p> <p>ASDC Mundra Center Activities & Achievements:</p> <ul style="list-style-type: none"> • Women Empowerment through Skill Training: Provided Mud work training to 180 women in Mundra taluka villages supported by MPL. • RTG Crane Operator Training: Collaborated with APSEZ HR Team to train 79 students. • Dori Work and Hand Embroidery Training: Benefited 90 women in various Mundra villages supported by MPL.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024	
			<ul style="list-style-type: none"> • Health Awareness and Career Sessions: 108 Ambulance Department enlightened GDA trainees at Adani Institute of Medical Sciences. Guest session on career advancement led by Mr. Kapil Goswami. • Exposure Visit for Women: Women trained in Mud Work, Dori Work, and Hand Embroidery showcased their skills during a visit by foreign delegates to the Solar Plant. • Women's Related Training Seminar: Held at Matravadana College, Bidada, Mandvi. <p><u>ASDC Bhuj Center Activities & Achievements:</u></p> <ul style="list-style-type: none"> • Commendation from Shree Jeet Adani: Received appreciation for supporting the Divyang job fair. • Employee Development Initiatives: Conducted Advanced Excel training for 18 Sumitomo India Ltd employees • Entrepreneurship Development Program: Organized a comprehensive 12- day program with 60 diverse candidates. • New Trainee Orientation: Conducted sessions about SAKSHAM center and LMS registration at the Bhuj Centre. • Civil Defense Training (5 days): Covered essential topics including Disaster Management, First Aid, 181 Mahila Helpline, 108 Emergency Services, and Fire Safety. • F&B & Housekeeping Batch Inauguration: 92 students trained to enhance employability. • Indo-Euro Project Seminar: Arranged at various Nursing Colleges in Kutch District. Focused on German Language training and job placements. • Crucial Meeting with ISAR & UNICEF: Discussed future skill development challenges and transgender equality on 9th December 2023.

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024
21	A Disaster Management Plan to meet with any eventualities that may arise during construction and/or operation phase shall be prepared through an expert agency and shall execute the Plan in co-ordination with concerned district offices including the District Authorities.	Complied. For further details regarding Disaster Management Plan; please refer to specific condition no 1.21 of the EC and CRZ clearance.
22	A separate Environmental Cell with qualified personnel shall be created to implement the Environmental Management Plan and a separate budget shall be provided for this purpose.	Complied For further details regarding Environmental Cell, please refer to compliance of Environment Responsibility condition no 10.2 of the EC and CRZ clearance
23	PP shall implement programs in line with the commitments made in the Environment Management Plan submitted and shall submit the reports to GCZMA periodically.	Complied Compliances to the commitments made in EMP will be submitted as a part of Half yearly EC compliance on regular basis. EMP Compliance attached as Annexure B
24	A separate budget shall be earmarked for environmental management and socio-economic activities and details thereof shall be furnished to this Department. The details with respect to the expenditure from this budget head shall also be furnished.	Complied. For further details regarding expenditure budget, please refer to compliance of Environment Responsibility condition no 10.3 of the EC and CRZ clearance
25	PP shall take up socio-economic upliftment activities in consultation with the District Collector/	Complied. For further details regarding CSR activities, please refer to compliance of specific condition no 1.29 of the EC and

	Adani Ports and Special Economic Zone Limited, Mundra.	From : Apr'24 To : Sep'24
Status of the conditions stipulated in Environment and CRZ Clearance		

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2024
	DDO. A separate budget shall be provided for this purpose.	CRZ clearance
26	PP shall regularly submit the half-yearly compliance report on the conditions stipulated by this Department/GCZMA/ MoEFCC.	<p>Being complied.</p> <p>Presently our project construction work is in progress as per business requirement, hence we are submitting first half yearly compliance report to all the concerned authorities for the period Apr'24 to Sep'24 and now onwards we will submit half yearly compliance report on regular basis within defined timeline.</p>
27	Any additional condition that may be imposed by this department/ GCZMA authority/ Ministry of Environment Forest and Climate Change from time to time shall have to be complied with by PP.	Point Noted and Agreed.

Annexure – B

Compliance Report of EMP & Mitigation Measures

Sr. No.	Suggested Measures	Compliance Status
✗ Construction Phase:		
1	Developments at East Port will be taken up as a future development after obtaining necessary approvals.	Point Noted and agreed
2	The site clearance activities will generate dusts, and this shall be confined within the site by isolating the construction site with fences.	<p>Complied</p> <p>The following control measures for fugitive dust emissions is being adopted/ implemented.</p> <ul style="list-style-type: none"> ➤ Isolated storage areas with wind shield is provided for storage of construction materials. ➤ Sprinkling of water in the construction sites and stored raw materials as well as vehicle movement accesses. ➤ Excavated material/loose material is kept covered with tarpaulin cover. ➤ Accidental spillage is immediately removed from workplace. ➤ Aggregates & raw material is sourced by nearby places & is transported in vehicle covered with tarpaulin. ➤ Dust generating source like batching place is enclosed by all side. ➤ Closed conveyor is being used in batching plant ➤ Air pollution control mechanism (dust collector) is provided in batching plant ➤ Cement is transferred into bulker through closed hopper & from low height. ➤ Periodic maintenance of batching plant & cleaning of dust collector on regular basis. ➤ The speed limit is implemented within port. ➤ Provision of dedicated storm water is there to avoid sludgy formation so that vehicle tyre does not get dusty. ➤ Proper housekeeping is ensured to reduce dust emissions.
3	The vehicles used to carry men and material for transportation during the construction period shall be restricted to certain timings for entry and exit of the port. Since these vehicles are addition to the cargo traffic of the existing infrastructure,	<p>Complied</p> <p>Shift timing is implemented for construction worker to avoid traffic rush.</p> <p>All vehicles used for construction activity conform to Bharat Stage-VI norms laid down by CPCB and are less than 5-year-old in good condition PUC certified.</p>

Sr. No.	Suggested Measures	Compliance Status
	<p>the timings for vehicle movements will help in reducing the increments of SOx and NOx in the air environment. All the vehicles entering the port shall be checked for the Pollution Under Control (PUC) Certificate. The contractors shall be advised to use the vehicles that comply with the Bharat Stage-VI norms laid down by CPCB that are effective from April 2020. The vehicles shall be well maintained and any vehicle which is older than 15 years or those which were found to emit more pollution shall be brought to the notice of the contractor and may be removed from site. The materials for construction shall be sourced from nearby quarries after obtaining necessary approvals from the competent authorities. The construction materials such as sand, cement bags etc which are transported by trucks shall be covered by tarpaulin so as to avoid any air-borne emissions. The non-paved roads used for transportation of vehicles shall be sprinkled with water often to reduce dust emissions.</p>	<p>Regular maintenance of vehicles carrying men and materials is being done on regular interval.</p> <p>Please refer compliance of point no 2 for detailed information on control measures for fugitive dust emissions.</p>
3	<p>The construction materials if stored in open storage shall be covered with tarpaulin and at a minimum height of 3 m so that the wind-borne emissions shall be reduced.</p>	<p>Complied.</p> <p>Construction materials are being stored in covered shed with wind shield having minimum 3-meter height. Required quantity is only taken at site.</p>
4	<p>As per the latest notification of MoEF&CC for the Diesel engine exhaust⁶⁹, the emissions of the DG sets</p>	<p>Complied</p> <p>MUL co-developer entity of Adani group is supplying uninterrupted power during</p>

Sr. No.	Suggested Measures	Compliance Status
	<p>which have the capacity of more than 75 kW and upto 800 kW shall have the emission limits of PM:<0.2 g/kW-hr, CO:<3.5 g/kW-hr and NOx+HC: <4.0 g/kW-hr. The CPCB guidelines states that the old DG sets which doesn't have manufacturer's warranty shall not be used and DG sets manufactured on or after 17th May 2002 shall be discarded after 15 years of operation or 50,000 hours of operation whichever is earlier.</p> <p>DG sets shall be serviced and maintained regularly in such a manner that dust accumulation shall be inspected and cleaned once a week. The contractor shall be advised to use good quality fuel and lubricants for the DG sets.</p>	<p>construction activity. DG set is provided as stand-by and used for emergency backup only. DG set used conforms with standard laid under EPA Act 1986.</p> <p>Low sulphur content diesel is being used and adequate stack height is also provided for proper dispersion of pollutant.</p> <p>APSEZ is also in process to install Retrofitting Emission Control Device (RECD) to D.G. Sets having capacity more than 125 KVA in line with the guidelines issued by CPCB / SPCB.</p>
5	<p>The construction activities shall be carried out at daytime and it shall be suspended at the night time.</p>	<p>Complied</p> <p>Construction activity is being carried out during daytime only.</p>
6	<p>The dredging activity and frequency shall be scheduled to avoid accumulation of high noise levels.</p>	<p>Point noted and agreed.</p> <p>The dredging activity and its frequency has been scheduled to avoid accumulation of high noise levels.</p>
7	<p>The construction materials shall be stored in paved surfaces so that the runoff from storage yards will not affect the underlying soil and groundwater. Any spillage of concrete or any other construction materials on soil shall be cleaned immediately. Bunds shall be provided around the Excavation and reclamation</p>	<p>Complied.</p> <p>All construction materials are being stored in covered shed with paved area only.</p> <p>Accidental spillage is immediately cleared from construction site.</p> <p>Bund will be provided around the excavation and reclamation areas so as to delineate the areas and also to drain the excess water which will reduce the impacts on the surrounding soil environment.</p>

Sr. No.	Suggested Measures	Compliance Status
	<p>areas so as to delineate the areas and also to drain the excess water which will reduce the impacts on the surrounding soil environment.</p>	
8	<p>The dredged soil to be used for reclamation shall be checked for its quality and any contaminated soil shall be removed as it will alter the quality of the underlying soil.</p>	<p>Point noted and agreed.</p> <p>Entire quantity of capital dredging material will be used for reclamation / level raising purpose within approved area only while maintenance dredged material will be disposed off into deep sea at identified locations.</p>
9	<p>The vehicle movements in reclamation sites shall be restricted during the process of compaction of soil. Any spillage of construction materials from the vehicles shall be avoided or cleaned immediately.</p>	<p>Compiled</p> <p>The vehicle movements in reclamation sites is being restricted during the process of compaction of soil. Construction Material is transported in vehicle covered with tarpaulin & accidental spillage is immediately cleaned.</p>
10	<p>Water requirement during the construction phase is less, the existing water source is adequate to meet the water demand during the construction phase of the project. Hence no new water source will be explored.</p>	<p>Compiled</p> <p>The present source of fresh water for APSEZ is sufficient to meet water demand during construction phase. Hence no new water source is required to be explored.</p>
11	<p>The foundations shall be provided with sheet piles so that there is no flooding of water from the surrounding environment. The runoff from the construction activities, domestic use water by labours and storage yards of construction raw materials will be routed to the STP in the existing facility, if any. The washing of construction equipment and vehicles shall be prevented inside the port during the construction period. Any stagnation of water in any place of the port shall be removed or</p>	<p>Compiled</p> <p>The following measures are being taken.</p> <ul style="list-style-type: none"> ✓ Pucca flooring with sheet piles has been provided for construction raw material storage so that there is no flooding of water from the surrounding environment. ✓ Workers engaged in construction activities would be mainly from nearby villages hence there would be no requirement of infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP. ✓ Existing facilities for drinking water, toilets & rest shelter would be utilized by workers. ✓ The washing of construction equipment and vehicles is strictly prevented inside the port during the construction period.

Sr. No.	Suggested Measures	Compliance Status
	pumped to ETP/STP for treatment if available in large quantity.	
12	The dredging and the reclamation activities in the intertidal region shall be carried out with precautions so that the groundwater table shall not be intersected and salinity intrusion can be avoided.	<p>Point noted and being complied</p> <p>Reclamation / level raising activity proposed as part of the expansion plan will occur in the intertidal, offshore area and approved APSEZ area only. Hence, the possibility of salinity ingress in the groundwater aquifer due to reclamation is low.</p> <p>The vehicle movements over the reclaimed soil are avoided during the initial period so that compaction of soil is not affected which in turn will have an effect on the underlying groundwater table.</p>
13	Clear demarcation of construction area to avoid any unintended material storage or waste dumping in the area.	<p>Complied</p> <p>Dedicated area with demarcation is provided for construction area.</p>
14	Proper and responsible handling of construction machinery, materials, waste, etc.	Complied
15	HDD technology will be used for installing underground pipeline/cables for the sections crossing the creek/ mangrove/ mangrove buffer area, with adequate casing and risk mitigation measure causing no impact on the area.	<p>Point noted and agreed.</p> <p>HDD technology or advance gentry girder technology will be used for laying underground pipeline/cables for the sections crossing the creek/ mangrove/ mangrove buffer area, which will have negligible impact on ground.</p>
16	Survival mangrove patches along the bank of the creek at the upstream of the bridge shall be monitored periodically during the operation phase.	<p>Complied</p> <p>Please refer compliance to specific condition no 1.4 of EC & CRZ clearance for detailed information regarding mangrove conservation and monitoring.</p>
17	As an additional measure the possibility of providing fencing for the utility corridor along the creek crossing shall be explored. This will restrict the people's access to the mangrove and creek area and also to avoid	<p>Complied</p> <p>The construction site will be enclosed with barricade/boundary. Provision of security guard is also there for monitoring of unauthorized access to mangroves and CRZ area.</p>

Sr. No.	Suggested Measures	Compliance Status
	the unattended dumping of wastes.	
19	The construction wastes and debris from the construction activities will have to be removed periodically. The wastes that get accumulated to over 20 million tons per day or 300 tons per project in a month have to be disposed as per the Construction and Demolition Rules, 2016.	Point noted and agreed Construction debris and waste materials is being handled in line with C&D Waste Rules – 2016.
20	The solid wastes shall be segregated into biodegradable and non-biodegradable wastes. The biodegradable wastes shall be sent to the existing compost and it can be used as manure for greenbelt. The non-biodegradable wastes shall be managed as per the Hazardous & Other Waste Management rules, 2016, amended till date.	Complied Provision of color code bins is there at site for proper waste segregation. Organic waste is used in biogas for fuel generation & Organic waste convertor for manure generation.
21	The hazardous wastes such as used or spent oil, wastes or residues containing oil, process wastes, residues and sludges, empty containers contaminated with hazardous chemicals/wastes, etc as specified in section 2.2.14.4 during the construction period will have to be dealt in accordance to the Hazardous & Other Waste Management rules, 2016, amended till date.	Complied Hazardous waste generated is being handled in line with H&OW Rules - 2016. Please refer compliance to Waste Management condition no 6.4, 6.5, 6.6 & 6.7 of EC&CRZ clearance for detailed information
22	The site of operation shall be marked with buoys/signboards and the nearby fishing communities shall be intimated before commencement of the construction activities for breakwaters and berths.	Point noted and complied

Sr. No.	Suggested Measures	Compliance Status
23	<p>The construction equipment and pile driving equipment shall be maintained regularly and old machines shall be replaced. The equipment shall be inspected by qualified professionals to check for any leaks from the equipment. The washing of equipment shall not be carried out near the site as the runoff from these will contaminate the water quality. The fueling of the equipment will have to be done onshore at a distance away from the marine waters and there should not be any discharge into the marine environment from this equipment at any point of time. The fuel storage shall not be done at operational site and any required storage of these fuels shall be carried out at a distance away from the site with the lowest possible volumes.</p>	<p>Complied</p> <p>Periodic maintenance is being done of all equipment.</p> <p>Regular inspection of tools & equipment is being carried out by safety team in coordination with project team</p> <p>Washing of vehicles/bulkers/equipment is allowed at designated place only.</p> <p>Fuel is being stored in storage areas far away from marine. Proper care is being taken while refueling and is done at offshore only to avoid accidental spill into marine environment</p>
24	<p>The storage of construction materials should be kept at a distance so that runoff from the storage areas will not affect the marine environment. In case of any spillage of construction materials or concrete, the operation maybe temporarily suspended and restarted only after rectification of the same. In case, concrete is pumped through hoses, the same shall be checked for leaks and spills. During rains and on event of natural/man-made disasters, the construction activities shall be suspended. The raw materials shall be covered</p>	<p>Complied</p> <p>Construction material is stored in covered sheds away from marine environment.</p> <p>Accidental spill is immediately cleared off.</p> <p>Construction activity is restricted during monsoon & raw material at site is covered with tarpaulin.</p>

Sr. No.	Suggested Measures	Compliance Status
	during the rainy season to avoid runoff and in summer season to avoid wind-borne emissions.	
25	The usage of toxic or hazardous materials in construction shall be avoided. Spill response kits shall be made available near the construction sites to contain any spills. The sediment screens shall be deployed in the operational site to limit the spread of plumes by the construction of berths and pile driving activities. Weather forecast shall be checked and construction activities during flood tidal conditions may be avoided or shall be carried out with necessary preventive measures.	<p>Complied.</p> <p>The usage of toxic or hazardous materials in construction is avoided. Spill kit & secondary containment is made available at construction site where fuel is used.</p> <p>All the major construction activities is being undertaken after confirming the weather forecast only.</p> <p>Disaster management plan & onsite emergency plan is in place to rescue with emergency situations occurred due to manmade or natural calamities.</p>
26	The marine water quality in the site of operation as well as in the surrounding environment shall be checked regularly and the important parameters that should be tested are Turbidity and Dissolved Oxygen along with other physic-chemical and biological parameters. Any alarming rate of change in the water quality shall be addressed immediately and the operations may be temporarily suspended.	<p>Point noted and agreed</p> <p>Please refer compliance to specific condition no 1.12 of EC&CRZ clearance for detailed information.</p> <p>Till now such situation has not arisen when marine water quality parameter is disturbed, however if it happens APSEZ ensures that it will temporarily stop its activity until the marine water quality parameter becomes normal.</p>
27	Appropriate noise mitigation measures such as bubble barriers/curtains 71, double pile, filled double pile ⁷² , double walled air filled sleeve around the pile ⁷³ , can be explored to reduce noise generated from piling.	Point noted and agreed

Sr. No.	Suggested Measures	Compliance Status
28	The area of dredging shall be marked and no dredging shall be carried out in areas outside the designated sites. The record of oceanographic information and meteorological information for the operational days of dredging shall be maintained.	Point noted and being complied. Dredging area has already been identified as per location approved in EC&CRZ clearance. Meteorological parameter is being recorded by marine department.
29	The sediment screens shall be provided in the operational sites to contain the sediment suspension due to the dredging activities.	Complied Please refer compliance to Water Quality Monitoring and Preservation condition no 3.2 of EC&CRZ clearance for detailed information
30	The marine water quality, sediment and ecology shall be tested prior to dredging, during the operation and post-dredging.	Complied Please refer compliance to specific condition no 1.12 of EC&CRZ clearance for detailed information.
31	The excavated materials from dredging shall be stored with a minimum height of 5m in order to avoid dust emissions. Before commencement of reclamation, the dredged materials shall be tested for quality and contaminated soils shall be treated properly.	Point noted and will be Complied Please refer compliance to Water Quality Monitoring and Preservation condition no 3.2 of EC&CRZ clearance for detailed information
32	The laying of pipeline and the pile driving activities for SBM/Sea island Jetty shall be carried out in a confined manner by installing sediment screens around the working site.	Point noted and agreed once laying of pipeline and the pile driving activities for SBM/Sea island Jetty undertaken.
33	The subsea pipelines shall be subjected to regular maintenance because any leakages will cause heavy damage to marine environment.	
34	The liquid discharges/waste discharges from the barges shall not be permitted as they will alter the marine water quality.	Complied Please refer compliance to Water Quality Monitoring and Preservation condition no 3.3 of EC&CRZ clearance for detailed information.

Sr. No.	Suggested Measures	Compliance Status
35	The concrete filling/maintenance works/grouting for leakages shall be carried out with containment measures to avoid impacts on the surrounding environment.	Complied Secondary containment is being placed near construction site to reduce impact on the surrounding in case of accidental spillage.
36	Environmental friendly/water based drilling shall be adopted for pile driving activities.	Point Noted and Complied The dredging is being carried out using Trailing Suction Hopper Dredger (TSHD).
37	Care should be taken not to overfill piles with concrete and in case of precast piles, the angles of insertion in the seabed shall be checked so that it will not be misplaced or become unstable over time.	Point noted and agreed
38	There should not be any runoff, discharge or waste dumping in to the marine environment during the construction period.	Complied No waste is being dumped into marine environment. Waste generated is being disposed as per APSEZ waste management policy
39	The intake and outfall structures along with pumping stations shall be installed by taking precautions in not to disturb the surrounding environment by providing sediment screens and confining the areas.	Point noted and complied The existing intake and outfall system is adequate for discharge of reject from 300 MLD capacities Desalination Plant. The requisite measures will be adopted for pipeline system will be provided for additional capacities of desalination plant.
40	The route of the subsea pipelines of the intake and outfall points shall be furnished to Naval Hydrographic Office to include in the Naval Hydrographic Chart as a warning for navigation.	
41	The intake structure shall be provided with fishnets/grits and the velocity at intake point shall be maintained as low as possible to avoid entrapment of the marine organisms into the intake	Complied Fishnet/grit is tied at the inlet intake point to avoid any possibility of marine organism getting trapped into intake pipeline

Sr. No.	Suggested Measures	Compliance Status
	pipeline. The effectiveness of the screens shall be checked regularly and shall be replaced immediately in case of any damage noticed.	
42	The intake and outfall locations shall be marked with buoys so that fishing boats or vessels will not collapse the structures.	Point noted and agreed
43	The intake and outfall structures shall be cleaned regularly to avoid anaerobic decomposition in the pipelines and to remove the waste loads.	Complied Regular cleaning is being carried out to avoid decomposition in the pipelines and any blockages
✎ Operation Phase:		
1	Dust suppression measures as committed (such as at Ship unloader discharging into hoppers, Stockyards, Discharge and feeding points of conveyors, Rapid loading system etc.) shall be implemented.	Complied This reply cover condition no 1, 2 & 3. Please refer compliance to specific condition 1.15 of EC & CRZ clearance for detailed information
2	The vehicles that carry the dry bulk cargo shall be covered with tarpaulin sheets in order to protect the air environment from air-borne emissions during transportation. The vehicles entering and leaving the coal storage facilities shall undergo wheel-washing in order to avoid dust particles being carried by trucks and getting deposited on the way.	
3	The vehicles that enter and exit the port shall be checked for the valid Pollution Under Control (PUC) Certificate.	
4	The ships entering the port shall be checked for the "International Air Pollution Prevention Certificate".	Complied Please refer compliance to Water Quality Monitoring and Preservation condition no 3.3 of

Sr. No.	Suggested Measures	Compliance Status
		EC&CRZ clearance for detailed information
5	The vehicles and machinery shall be maintained under regular maintenance program to ensure that the noise reducing requirements are met.	Complied Periodic maintenance is being carried out to reduce noise emission. Also, acoustic enclosure, barricading is used for reduction in noise level. Earmuff is provided to worker working in high noise area
6	APSEZ and tenant industries/facilities within the APSEZ are required to undertake noise monitoring at their facility demonstrating their compliance to the noise level standards.	Complied This reply covers condition no 6 & 7. Ambient Air Quality (twice in a week) and Noise (once in a month) monitoring are being carried out by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi.
7	Continuous noise recording systems can be installed by APSEZ at facility boundary to address the community grievances, when required.	Please refer specific condition no. xi of the EC & CRZ clearance or further details.
8	The vibration dampers shall be provided around the source of generation.	Complied
9	The storage yards shall be paved.	Complied
10	The dumping of solid and hazardous wastes on soil will also lead to contamination	Complied
11	The rainwater will be collected separately in stormwater drains.	Complied APSEZ has implemented storm water drains in the existing facility taking into account the natural gradient to meet the peak rainfall in the area and avoid flooding in neighboring areas
12	The process water drains shall be maintained separately to collect the wastewater from the port activities. The oil and grease from the wastewater of truck parking, workshop area, cargo storage and cargo handling areas shall be collected separately and treated or disposed under hazardous waste.	Complied Effluent generation from operation is being treated in existing ETP of capacity 265 KLD. An additional 800 KLD ETP proposed for proposed expansion activities. Oil and grease from the wastewater of truck parking, workshop area, cargo storage and cargo handling areas is being collected separately and disposed under hazardous waste through selling to registered recyclers.

Sr. No.	Suggested Measures	Compliance Status
13	The solid wastes from the port operations shall be segregated into bio-degradable and non-biodegradable	Complied APSEZ has existing facility conforming to the CPCB standard for storage of hazardous waste.
14	The hazardous chemicals and cargo shall be stored in designated storage areas with concrete paved surfaces. These shall be as per the prescribed/ approved safety norms.	Please refer compliance to Waste Management condition no 6.4, 6.5, 6.6 & 6.7 of EC&CRZ clearance for detailed information
15	The battery wastes used for the equipment and other port operations shall be separately collected and disposed through authorized vendors as per Battery Waste (Management and Handling) Rules, 2010 and subsequent amendments.	
16	The existing port is utilizing the mechanical handling of cargo and the same shall be followed for the proposed development as well with necessary additional equipment so that there is no spillage in the marine environment.	Point noted and agreed
17	The Ships visiting the port will have to comply with MARPOL convention and avoid any discharges as per the International law. The ballast water discharge is prohibited within the harbor limits.	Complied This reply covers condition no 17 & 18. Please refer compliance to Water Quality Monitoring and Preservation condition no 3.3 of EC&CRZ clearance for detailed information
18	During emergency, provision of reception facilities will be explored to receive the residues and oily mixtures generated from ship operations. These wastes will be collected separately and disposed as per applicable waste management rules and guidelines.	

Sr. No.	Suggested Measures	Compliance Status
19	Any cargo that is spilled shall be retrieved and deposited at the respective storage areas to the maximum extent possible.	Complied. Provision of leak bund is already implemented.
20	Environmental Monitoring Programme comprising of monitoring of marine water quality, marine sediment quality and marine ecology will be initiated 1 week prior to commencement of maintenance dredging and will be carried out during the dredging period.	Point Noted and Agreed Please refer to specific condition no 1.12 of EC & CRZ clearance for detailed information on marine water quality monitoring
21	The wastewater from the port activities will be treated in the ETP and the treated water will be utilized as much as possible within the facility for green belt, dust suppression and excess water from ETP will be disposed as a combined discharge along with desalination plant reject in to the offshore after meeting discharge standards.	Complied Please refer compliance to Water Quality Monitoring And Preservation condition no 3.8 & 3.9 of EC&CRZ clearance for detailed information.
22	Screens/bunds shall be provided around the mangrove area if there is any construction activities to be carried out near the region.	Point noted and agreed
23	The health of the mangroves and benthic habitat shall be monitored for detrimental damage. The remediation measures shall be implemented if the rates are alarming.	Complied Please refer to specific condition no 1.12 of EC & CRZ clearance for detailed information on marine water quality monitoring

Annexure – 1

F.No. 8-2/1999-FC (pt)
Government of India
Ministry of Environment & Forests
(FC Division)

Paryavaran Bhawan,
CGO Complex, Lodi Road,
New Delhi - 1100 03.
Dated: 30th September, 2009

To

The Principal Secretary (Forests)
Revenue and Forests Department,
Government of Gujarat,
Gandhinagar.

Sub: Diversion of 1840 ha and 168.41 ha of reserved forest land for development of port based Special Economic Zone (SEZ) in Mundra & Dhrub villages of Mundra taluka in Kutch East Forest Division in favour of M/s. Mundra Port & Special Economic Zone Limited (MPSEZL) in Kutch district of Gujarat.

Sir,

I am directed to refer to the State Government's letter no. FCA - 1009 - (10 - 13) SF - 2 - k dated 22.01.2009 on the subject mentioned above seeking prior approval of the Central Government under Section-2 of the Forest (Conservation) Act, 1980, and to say that the proposal was examined by the Forest Advisory Committee (FAC) constituted by the Central Government under Section-3 of the said Act.

2. After careful consideration of the proposal of the State Government of Gujarat and on the basis of the recommendations of the Forest Advisory Committee, the Central Government granted in principle for the diversion of 1840 ha and 168.41 ha of reserved forest land for development of port based Special Economic Zone (SEZ) in Mundra & Dhrub villages of Mundra taluka in Kutch East Forest Division in favour of M/s. Mundra Port & Special Economic Zone Limited (MPSEZL) in Kutch district of Gujarat vide this office even No. letter dated 27th February, 2009.

3. Now the Government of Gujarat has submitted the compliance report vide their letter No. FCA-1009(10-14) SF-18-K dated 05.09.2009.

4. The Central Government, therefore, hereby conveys the final approval under Section -2 of the Forest (Conservation) Act, 1980 for diversion of 1840 ha and 168.41 ha of reserved forest land for development of port based Special Economic Zone (SEZ) in Mundra & Dhrub villages of Mundra taluka in Kutch East Forest Division in favour of M/s. Mundra Port & Special Economic Zone Limited (MPSEZL) in Kutch district of Gujarat, subject to following conditions:

1. (i) The Compensatory Afforestation (CA) over equivalent non-forest land i.e. over 2008.41 ha area in village Kaner & Shinapar shall be under taken at the cost of the User Agency.
 - (ii) The identified land for CA shall be acquired and mutated in favour of State Forest Department.
 - (iii) The area identified for Compensatory Afforestation shall be clearly depicted on SOI toposheet of 1:50,000 scale.
 - (iv) The User Agency shall transfer the cost (incorporating the current wage structure) of raising and maintaining Compensatory Afforestation to the State Forest Department.
 - (v) The non-forest land identified for raising Compensatory Afforestation shall be notified by the State Government as RF under Section-4 or PF under Section-29 of the Indian Forest Act, 1927 or under the relevant Section(s) of the local Forest Act, as the case may be, within a period of six months. The Nodal Officer (Forest Conservation) shall report compliance in this regard.
2. The State Government shall charge the Net Present Value of the forest area diverted under this proposal from the User Agency as per the Judgement of the Hon'ble Supreme Court of India dated 28.03.2008 in IA No. 566 in WP (C) No. 202/1995.
 3. The User Agency shall furnish an undertaking to pay the additional NPV, if so determined, as per the final decision of Hon'ble Supreme Court of India.
 4. All the funds received from the User Agency under the project shall be transferred to Ad-hoc CAMPA in account number CA 1583 of Corporation Bank, Block-11, CGO Complex, Phase-1, Lodhi Road, New Delhi - 110 003.
 5. The User Agency will take all necessary precautions in consultation with the State Forest Department regarding the release of effluents in the soil and the sea. The creeks with mangrove should not be affected by the SEZ and there should not be any drainage into the creeks.

6. The Navinadh forests (upland) should be fenced with rubble wall cum wire mesh so that there should not be any biotic interference in this biodiversity hotspot.
7. The railway line of SEZ is being laid on the outer fringe of forests area, two railway crossings at Zapara & Navinadh should be constructed for movement of forests staff and vehicles to mangrove forests.
8. The Compensatory land has been already diverted in Kori-creek but as per the commitment of the company, the wasteland at Abdasa (GEDA plantations) of an area 3770.00 should be transferred to forest department as an habitat of Great India Bustards (GIBs) and other two Bustards i.e. Lesser Florican & Houbara Bustard before recommending to Government of India for diversion of change of use. (Please refer to MoEF's letter of even No. dated 10.07.2009)
9. This area being the outer part of sea, two green belts to be developed as protection measures from the cyclone at the cost of the user agency.
 - (i) A minimum of 200 m wide green belt of mangroves along the sea creeks outside the proposed area for diversion toward Sea.
 - (ii) A minimum of 100 m wide green belt on the outer boundary toward sea in the proposed area for diversion (SEZ area).
10. The area shall be demarcated on ground by erecting 4 feet high RCC Pillars with forward and back bearing and distance from pillar to pillar.
11. Ex-situ conservation of endemic species of flora/fauna lost/disturbed in the process of execution of the project may be ensured by adequate protection measures at the cost of the project.
12. No damage to the flora and fauna of the area shall be caused.
13. Transfer of forest land to user agency should not be affected by the State Government till the final orders are issued by the Central Government.
14. The forest land shall not be used for any purpose other than that specified in the proposal.
15. Environment clearance under Environment (Protection) Act, 1986 and other necessary clearances including CRZ clearances shall be obtained by the User Agency prior to Stage-II approval.
16. Any other condition that the CCF (Central), Regional Office, Bhopal may

impose from time to time for the protection and improvement of flora and fauna in the forest area.

Yours faithfully,

Sd/-

(Umakant)

Assistant Inspector General of Forests

Copy to:

1. The Principal Chief Conservator of Forests, Government of Gujarat, Gandhinagar.
2. The Nodal Officer (FCA), Forest Department, Government of Gujarat, Gandhinagar.
3. The Chief Conservator of Forests (Central), Regional Office, Bhopal.
- ✓ 4. The User Agency.
5. Monitoring Cell, FC Division, MoEF, New Delhi.
6. Guard File.

U/S

(Umakant)

Assistant Inspector General of Forests

Annexure – 2

Final Report

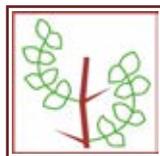
Monitoring and Distribution of the Mangroves Along the Creeks in and Around APSEZ, Mundra, Kachchh, Gujarat



Submitted to:

Adani Ports and Special Economic Zone Ltd. (APSEZL),
Mundra, Kachchh District, Gujarat

Submitted by: -



Gujarat Institute of Desert Ecology
P.O. Box # 83, Opp. Changleshwar Temple,
Mundra Road, Bhuj,
Kachchh-370001, Gujarat

November- 2023

Project Personnel

Project Co-Ordinator

Dr. V. Vijay Kumar, Director

Principal Investigator

Mr. Dayesh Parmar, Project Officer

Co-Principal Investigator

Dr. Kapilkumar Ingle, Project Scientist

Team Member

Mr. Deep Dudiya, JRF

Mr. Raj Joshi

Mr. Arjan Rabari

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1. About Adani Ports and Special Economic Zone Ltd. (APSEZL).....	2
1.2. Origin of the Study	2
1.3. Objectives of the Study.....	5
2. STUDY AREA	6
2.1. Location	6
2.2. Climate.....	8
2.2.1. Tidal Regime.....	8
2.2.2. Currents	8
2.2.3. Salinity.....	9
3. METHODOLOGY AND DATA USED	10
3.1. Methodology.....	10
3.2. Data Used	10
3.2.1. Pre-processing.....	11
3.3. Zonation.....	11
3.4. Mangrove Vegetation.....	12
3.5. Field Work	14
4. RESULTS AND ANALYSIS	20
4.1. Overall APSEZ Mangrove Assessment	20
4.2. Creek Wise Assessment.....	23
4.2.1. Kotadi Creek Area	23
4.2.2. Baradi mata Creek area.....	25
4.2.3. Bocha-Navinal Creek Area	28
4.2.4. Khari Creek	31
4.3. Mangrove Vegetation.....	33
4.3.1.: Diversity	33
4.3.2.: Density	34
4.3.3. Regeneration and Recruitment Class of Mangroves.....	37
5. CONCLUSION	40
5.1. Shoreline and Mangrove Cover Changes	40
5.2. Recommendations	41

LIST OF FIGURES

Figure 2.1: Location Map of The Study Area.....	7
Figure 3.1: Study Area in Four Different Zone.....	12
Figure 3.2: Mangrove Data Collection During Field Visits	14
Figure 3.3: Ground Truthing Data and Mangrove Data Collection Points	15
Figure 3.4: Surveyed and Collected Ground Truthing Data Various Categories of Mangroves.....	19
Figure 4.1: Comparison of Various Categories of Mangroves in APSEZ Between 2019 and 2021	21
Figure 4.2: Distribution of Various Categories of Mangroves in March 2019	22
Figure 4.3: Distribution of Various Categories of Mangroves in March 2021	22
Figure 4.4: Comparison of Various Categories of Mangroves in Kotadi Creek Zone Between 2019 and 2021	23
Figure 4.5: Distribution of Mangroves in 2019 in Kotdi Creek Zone System.	24
Figure 4.6: Distribution of Mangroves in 2021 in Kotdi Creek Zone System.	24
Figure 4.7: Change Analysis from 2019 to 2021 on Categories of Mangroves in Kotadi Creek System.....	25
Figure 4.8: Comparison of Various Categories of Mangroves in Baradi Mata Creek Zone Between 2019 and 2021.....	26
Figure 4.9: Distribution of Mangroves at Baradi Mata Creek Zone in 2019	27
Figure 4.10: Distribution of Mangroves at Baradi mata Creek Zone in 2021.....	27
Figure 4.11: Change Analysis From 2019 To 2021 On Categories of Mangroves in Baradi Mata Creek System.....	28
Figure 4.12: Comparison of Various Categories of Mangroves in Bocha-Navinal Creek Zone Between 2019 and 2021	29
Figure 4.13: Distribution of Various Categories of Mangroves in Bocha- Navinal Creek Zone System for The Year 2019	29
Figure 4.14: Distribution of Various Categories of Mangroves in Bocha -Navinal Creek Zone System for The Year 2021	30
Figure 4.15: Change Analysis From 2019 To 2021 On Categories of Mangroves in Bocha- Navinal Creek System	30
Figure 4.16 : Comparison of Various Categories of Mangroves in Khari Creek Zone Between 2019 and 2021	31
Figure 4.17 : Distribution of Various Categories of Mangroves in Khari Creek Zone System for The Year 2019.....	32
Figure 4.18: Distribution of Various Categories of Mangroves in Khari Creek Zone System for The Year 2021.....	32
Figure 4.19: Change Analysis From 2019 To 2021 On Categories of Mangroves in Khari Creek System.....	33
Figure 4.20 : Diversity of Mangrove Species in APSEZ Area, Mundra	39

LIST OF TABLES

Table 3.1: Satellite Data for Mangrove mapping procured from NRSC	11
Table 4.1: Distribution of Various Categories of Mangroves in APSEZ During 2019 and 2021	21
Table 4.2: Distribution of Various Categories of Mangroves in Kotadi Creek Zone During 2019 and 2021	23
Table 4.3: Distribution of Various Categories of Mangroves in Baradi Mata Zone Creek During 2019 and 2021	26
Table 4.4: Distribution of Various Categories of Mangroves in Bocha- Navinal Creek Zone During 2019 and 2021	29
Table 4.5: Distribution of Various Categories of Mangroves in Khari Creek Zone During 2019 and 2021	31
Table 4.6: Density of Trees in the Kotadi Creek Area	34
Table 4.7: Density of Trees in the Baradi mata Area	35
Table 4.8: Density of Trees in the Bocha-Navinal Creek Area	36
Table 4.9: Density of Trees in the Khari Creek Area	36
Table 4.10: Density of Younger Classes in the Kotadi Area (Plant/Ha)	37
Table 4.11: Density of Younger Classes in the Baradi mata Area (Plant/Ha)	38
Table 4.12: Density of Younger Classes in the Bocha-Navinal Area (Plant/Ha).....	38
Table 4.13: Density of Younger Class in Khari creek	39

1. INTRODUCTION

The Kachchh district of the Gujarat State is located between latitude 23.13°-24.68°N and longitude 68.10°-71.80°E, encompassing an area of 45,612 km². The coastal stretch of the district constitutes the entire northern coast of Gulf of Kachchh (GoK) which is one of the three major Gulf systems in India and is endowed with high biological diversity along with physical and chemical peculiarities. Kachchh coast constitutes about 25.37% and 5.3% of the coastal stretch of Gujarat and India respectively. In spite of its high aridity (4 in a scale of 1- 4) along with scanty and erratic rainfall with an annual average of 520.9 mm (1988-2017). Kachchh coast has diverse ecological habitats and ecosystems like mangroves, sandy coasts, mudflats, creeks and other tidal incursions which enhance manifold its coastal landscape diversity and its natural resources. Besides, extensive mangrove formations and a vast continental shelf of 1,64,000 km² facilitates a rich fishery resource.

Kachchh coast supports the mangrove extent of 798.74 km², constituting 68% of state's mangroves (1175 km²) which is the largest mangrove entity in India's western coast as per Forest Survey of India 2021 (FSI report 2021). Due to the presence of rich natural resources and favourable natural conditions, Kachchh coast has become a zone of intensive industrial development. Since late 1990's, industrial development is being promoted aggressively in view of its very rich mineral deposits, shortest sea route to Gulf countries and easy availability of land which is at premium in other coastal regions of the state. Announcement of tax holidays during the post-earthquake in 2001 by the state government has provided further impetus for coastal industrial development. Many of these developments are beginning to have implications on ecological, social and economic spheres. Kachchh coast faces threats from climate change, pollution and habitat changes which are also important to understand the impacts on the mangroves.



Adani Port is one of the fastest growing and largest private ports in the country and also encompassing a SEZ (Special Economic Zone) area. The port in year 2013-14 has handled >100 million tons of cargo. The port is equipped with road, rail and air connectivity which has attracted few big and many small industries of this area.

On the other hand, the area also harbours a luxuriant mangrove forest which is very close to the Port and SEZ.

1.1. About Adani Ports and Special Economic Zone Ltd. (APSEZL)

The former Gujarat Adani Port Ltd., now named as Adani Ports and Special Economic Zone Ltd. (APSEZL) started its operations in Mundra during the year 1998 with an all-weather, open-sea jetty and port backup at Navinal Island. The Port has since then undergone four expansions, namely a railway line and container terminal in 2000, Single Point Mooring and Pipeline for crude oil terminal in 2004, a Multipurpose wharf Terminal-II in 2007, and a Waterfront development project in 2009 which includes the development of North Port, South Port, East Port & West Port and its associated infrastructure facilities. In addition to these, port-based special economic zone and two thermal power plants exists which form a major industrial cluster of this coast.

1.2. Origin of the Study

The northern Gulf of Kachchh in the western coast of India has extensive formation of mangrove. Ministry of Environment, Forest and Climate Change have accorded Environment and CRZ Clearance (EC) vide Letter No. F.No.10-138/2008-IA.III dt. 15th July, 2014 & 12th February, 2020 to M/s Adani Ports and Special Economic Zone Ltd (APSEZ), to set up a multi-product SEZ at Mundra, Kachchh, Gujarat. The project involves development of SEZ in a notified SEZ area of 8481.2784 ha. Adani Ports and Special Economic Zone Ltd. (APSEZL) covering a total area of 9625 ha, over and above 10,000 ha including port and its back-up area.

While issuing the Environmental Clearance (EC) to the project, the MoEF & CC have stipulated General and Special conditions in their Environment Clearance. Further,



inline to the MoEF&CC final order, vide F.No.10-47/2008-IA.III dated 18th Sept. 2015 which also contained special conditions, two of which (sr. no *iv* and *v* of the order) are as follows:

(iv) A Comprehensive and integrated conservation plan including detailed bathymetry study and protection of creeks/mangrove area including buffer zone, mapping of coordinates, running length, HTL, CRZ boundary will be put in place. The plan will take note of all the conditions of approvals granted to all the project proponents in this area, e.g., the reported case of disappearance of mangroves near Navinal creek. The preservation of the entire area to maintain the fragile ecological condition will be a part of the plan in relation to the creeks, mangrove conservation and conservation of Bocha Island up to Baradi mata and others.

(v) NCSCM will prepare the plan in consultation with NIOT, PP and GCZMA. In recognition of the fact that the existing legal provisions under the E(P) Act 1986 do not provide for any authority to impose ERF by the Government, the plan will be financed by the PP. The implementation will be carried out by GCZMA. The monitoring of the implementation will be carried by NCSCM.

Accordingly, Adani Ports and Special Economic Zone Limited (APSEZ) had requested the National Centre for Sustainable Coastal Management (NCSCM) for preparation of

Comprehensive and Integrated plan for preservation and conservation of mangroves and associated creeks. The components of plan are analysis of mangrove health by comparing the coverage between 2011 and 2016, bathymetry of creeks, socio-economics of villages adjoining creeks of APSEZ. One of the key recommendations is monitoring of coverage of mangrove in the late 2019 and comparing its extent of distribution with the data reported in 2016-17. As per reported in the Conservation plan there has been overall increase in mangrove area by 246 ha in 2016-17 in the creeks in and around APSEZ compared to 2011 indicating existence of near healthy conditions for growth of the mangroves. It was recommended that the trend of mangrove cover needs to be studied in Jan/March



2020 using satellite images of late 2019 and if the trend continues, only monitoring is needed. The Conservation plan was submitted to the Gujarat Coastal Zone Management Authority and in its meeting held in October, 2019, then plan was approved as per their email dt 22nd Sept 2020. The major recommendation relating to mangroves that were specified in the conservation plan are as follows:

2.1. There has been overall increase in mangrove area by 246 ha in 2016-17 in the creeks in and around APSEZ compared to 2011 indicating existence of near healthy conditions for growth of the mangroves. No action is needed at present except at Navinal creek, Bocha island and off Bocha creek. The trend of mangrove cover needs to be studied in Jan/March 2020 using satellite images of late 2019 and if the trend continues, only monitoring needed. The tidal range in the mangroves is also to be observed annually using tide poles to ensure that the flow of tidal water remains same as observed in April 2017 during the field study. If degradation of mangroves to the extent of 10% due to inadequate seawater is observed in Kotdi and Baradimata creeks, initially the mouth areas need to be made free from silt. If tidal flow does not improve after one year and if the extended banks are noticed which might be due to siltation, silt need to be removed on the banks where there are no mangrove roots. If the tidal conditions still do not improve after one year, the interior parts of the creeks need to be dredged in a phased manner from 0.5 m to 1 m. Otherwise, the monitoring of mangrove needs to be carried out once in two years and whenever, degradation is noticed the above strategy needs to be implemented.

2.2. In the Navinal creek, if degradation of mangroves or reduction of mangrove cover by even 10% is noticed in 2020 due to decrease in tide water flow, dredging of Navinal creek from beyond port operation areas up to 4.5 km to increase the depth by 1 m in a phased manner must be taken up to facilitate increased tidal water flow into the mangrove areas of Bocha island. Otherwise, the monitoring of mangrove needs to be carried out once in two years and whenever, degradation is noticed the above strategy needs to be implemented.



In view of the above, Adani Ports and Special Economic Zone Ltd. (APSEZL) has approached M/s. Gujarat Institute of Desert Ecology (GUIDE) to conduct a detailed study of the mangrove coverage using the satellite images of 2021 and also the changes in the mangrove areas of APSEZ between 2019 and 2021. In order to comply with the above recommendations relating to monitoring of mangrove, the plant distribution in the creeks in and around APSEZL, Mundra, Gujarat with the following objectives were formulated.

1.3. Objectives of the Study

1. To map the current extent of mangrove cover and its changes in comparison to 2021 data, through GIS and RS in the APSEZ area.
2. To assess and monitor the changes in the mangrove cover between 2019 and 2021 by using RS and GIS in the APSEZ area.
3. LISS-IV (MSS) ortho rectified imagery data will be used for the mangrove mapping study.
4. Monitoring of mangrove density in the APSEZ area at Mundra through assessment of the vegetation cover in the area.
5. Formulating an appropriate management plan based on the results for the sustained well being and conservation of mangroves in APSEZ area, Mundra.



2. STUDY AREA

2.1. Location

Kachchh coast constitutes the entire northern shore of the Gulf of Kachchh marked by narrow beaches and wide mudflats. The Mangrove cover of the Mundra taluka is about 19.1 km² distributed mostly along the creek systems. The coastal stretch of Mundra is dissected by extensive mudflats and creek systems, many of which harbour good mangrove formations. Major creek systems in the area are Navinal, Bocha, Baradi mata and Kotadi creeks. These creeks again divide into minor creek complexes. Many of these creeks support mangrove stands, especially along the eastern and western side of the waterfront area of APSEZ. Koylavalu creek is luxuriantly lined by mangrove patches, predominantly with the species, *Avicennia marina*. The Adani Port and Special Economic Zone Ltd.-APSEZ is located at about 3 km from Bacha mouth towards eastern extension. The present study was focused towards the mangrove stand at Bocha / Navinal creek, Kotdi creek, Baradi Mata creek and Khari creek adjoining to the waterfront area of APSEZ which falls within the conservation zone of APSEZ (Figure 2.1) that earmarked as conservation zone.

Bocha/Navinal and East of Bocha Mangrove Stand

Bocha Island is a finger like projection surrounded by the Bocha creek on the west and Navinal creek on the eastern part. The Adani/MICT container terminal is located right across the Bocha Island at a distance of 100m. The island supports mature and healthy mangrove stands.

Kotadi and Baradi mata

Kotadi and Baradi mata creek systems on the western part of APSEZL area include luxuriant mangrove patches. These two creeks bifurcate further at their tail end into several minor creeks forming a complex water way with many small Islands. Many of these Islands harbour healthy mangrove stands.



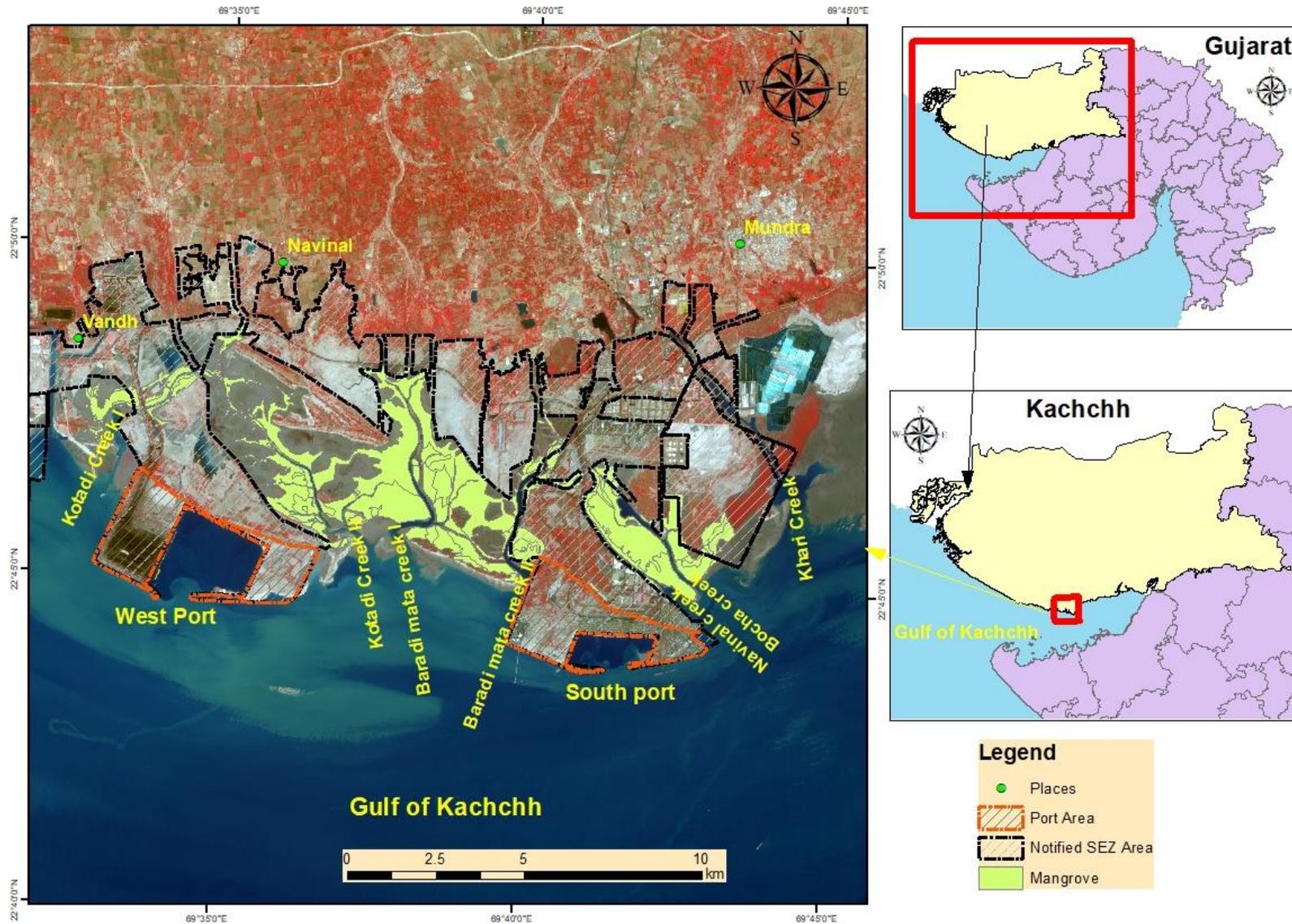


Figure 2.1: Location Map of The Study Area



2.2. Climate

As per the Indian Meteorological Department, Govt. of India, the highest monthly mean of daily maximum temperature of the study area is 36⁰C. The dry bulb temperature goes up to 47.8⁰C, considering max Humidity of 95%. The wind is predominantly from the south-west as well as from the west to some extent. The wind velocity is 65 km/hr.

Due to its arid nature, annual rainfall in Kachchh is generally poor, ranging from 250-350 mm which is often irregular. However, the mean annual rainfall during 1932 to 2021 was higher at Mundra (407 mm) comparing to other coastal talukas of Kachchh district due to good rainfall during the last 3-4 years. Rain during monsoon is confined to only 12-16 days and occurs as an instant downpour. Freshwater input into the near coastal waters is quite meagre and appears to influence the coastal erosion. Annual temperature fluctuation in the district is extreme, ranging from 7- 47 ⁰C with a yearly average humidity of 60% which increases to 80% during the southwest monsoon and decreases to 50% during November-December. The phenomenon of drought is common, with 2 drought years in a cycle of 5 years (Thivakaran *et al.*, 2015).

2.2.1. Tidal Regime

Tides at Mundra are the mixed type, predominantly semi-diurnal type with a Mean High-Water Spring (MHWS) of 6.66 m and Mean High water Neap (MHWN) of 5.17 m. The phase difference is not uniform for successive tides in the Gulf and it varies as per tidal conditions ((ICMAM, 2004).

2.2.2. Currents

The currents in the Gulf and associated creeks are largely tide induced and oscillations are mostly bimodal reversing in direction with the change in the tidal phase. The influence of wind on variations in current is minor. The current reversals are quite sharp occurring within 30 - 60 min. The maximum current



speed varied from 0.5 to 1.2 m/s. The predominant direction of the current is 45° during flood and 220° during ebb.

The circulation is generally elliptical with the major axis in the east-west direction. These trajectories suggest that the excursion lengths are in the range of 10 to 15 km depending on the tidal phase (neap or spring)(NIO, 2009).

2.2.3. Salinity

Salinity is an indicator of freshwater intrusion in nearshore coastal waters as well as the excursion of salinity in inland water bodies such as estuaries, creeks, and bays. Normally seawater salinity is 35.5 ppt but may vary depending on evaporation, precipitation, and freshwater addition. Salinity largely influences several processes such as dissolution, dispersion, dilution, etc. in seawater due to high dissolved salt content and hence high density. In the absence or minimum of freshwater inflow, the salinity varies from 35.9 to 38.0 ppt.

Due to its arid nature, annual rainfall in Kachchh is generally poor, ranging from 250-350 mm which is often irregular. However, mean rainfall (1932 to 2001) was higher at Mundra (407 mm) due to very good rainfall during the last 3-4 years. Except very good rainfall years, freshwater input into the near coastal waters is quite low and appears to influence coastal flora like mangroves explaining poor floral diversity. Annual temperature fluctuation in the district is extreme, ranging from 7- 47°C with a yearly average humidity of 60% which increases to 80% during south-west monsoon and decreases to 50% during November-December. The phenomenon of drought is common, with 2 drought years in a cycle of 5 years.



3. METHODOLOGY AND DATA USED

Basic approach for the present exercise was identification of the threats and pressures on the mangrove ecosystem.

3.1. Methodology

Satellite imageries were procured from National Remote Sensing Centre (NRSC) who are the only authorized distributor of satellite images in India, for availability of high-resolution satellite imagery especially multi-spectral images similar to the images used to study the mangrove distribution. The present report on mangrove distribution is based on LISS IV satellite images of March 2019 and March 2021, as cloud free images. The details of the satellite imagery used for the present study are given below (Table 3.1). The methodology adopted to map the distribution of mangroves is by NDVI method using ERDAS Software by using satellite images which delineate vegetation and non -vegetation data. Further, based on the Ground truthing, colour and tone of satellite data of the mangrove and other vegetation are delineated by using manually digitizing on the computer screen. Further, it has limitations as it is not a direct digital data and the mangroves details are obtained from satellite images by directly digitizing from the computer screen.

The categories of mangrove cover as dense, sparse and scattered area evaluated based on the percentage of mangrove cover in the study area. The percentages used for different classes are dense mangrove (40-70% cover), sparse mangrove (10-40% cover) and scattered mangrove (< 10% cover) (Kathiresan, K. (2022). There could be a possible error of less than 10 % in mangrove categorization (as dense, sparse and scatter) and also extent of total coverage in terms of hectare.

3.2. Data Used

The Multi-date satellite LISS-IV imageries, were procured from NRSC, Hyderabad, was used for the analysis of the present study.



Table 3.1: Satellite Data for Mangrove mapping procured from NRSC

Satellite	Date	Sensor	Resolution (m)
IRS-R2	23 March 2019	LISS -IV	5.8
IRS-R2A	19 March 2021	LISS -IV	5.8

3.2.1. Pre-processing

Pre-processing of satellite data includes correction of geometric, atmospheric, and radiometric aspects and clipping of the area to obtain the exact imagery of the project sites. The rectification operation aims to correct distorted images to create a more correct representation of the original scene. It typically involves the initial processing of raw image data to correct geometric distortions.

Radiometric Correction: The Radiometric correction addresses variations in the pixel intensities (DNs) that have not been caused by the object or scene scanned. These variations include differing sensitivities or malfunctioning of the detectors, topographic effects and atmospheric effects.

Geometric Correction: The Geometric correction addresses errors in the relative positions of pixels. These errors are induced by the sensor viewing the geometry or terrain variations. A geometric correction was done based on Ground Control Points (GCPs) and the image was re-sampled using the nearest neighbourhood interpolation method.

3.3. Zonation

Zoning of the Study Area: Considering the extent of the area, the whole Mundra mangrove formation was divided into smaller zones in order to facilitate better evaluation and understanding of the ecosystem. Moreover, this kind of zoning helps to analyse the root cause of the issues, enabling better understanding of the ecosystem level problems. Accordingly, Mundra coast was divided into four zones as indicated below for the purpose of this study;



- Zone 1: Bocha-Navinal creek Zone (The Island proper and areas in and around Adani house and between Bocha and Navinal creek)
- Zone 2: Baradi mata creek zone (Creek’s west of south port to surrounding to Baradi mata temple)
- Zone 3: Kotadi creek Zone (Creeks surrounding to West Port)
- Zone 4: Khari creek Zone (Area both the side of Khari creek)

Representative study points covering all the zones were studied on ground and documented for status, Figure 3.1 shows the earmarked zones in the study area.

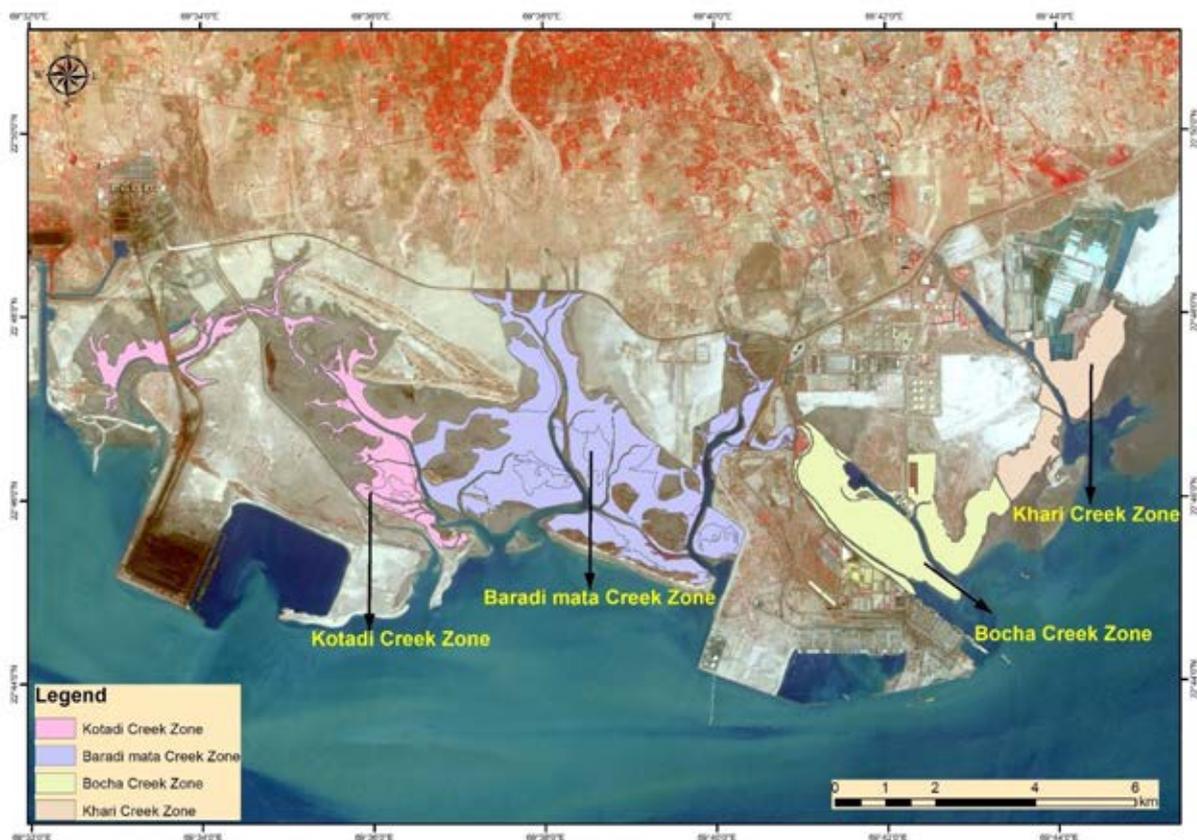


Figure 3.1: Study Area in Four Different Zone

3.4. Mangrove Vegetation

The survey area of APSEZ was divided in the three zones for the survey. During the survey of the mangroves in these three areas, the density and diversity of mangroves in prefixed sites was carried out. The selected sites were located in the intertidal belts and the adjacent estuarine environment of APSEZ area. The major part of assessment was done during low tide of the project sites. The density of the



tree class along with the regeneration and recruitment classes were recorded from the study area. In general, plants or seedlings with a height <50 cm were considered as regeneration class and those are in between 50 cm to 100 cm as recruitment class. For regeneration class, 1 m × 1 m and for recruitment class plants, 2 m x 2 m quadrates were used randomly for the measurement. For mature plants, 10 m x 10 m quadrates were used at the selected sites. The mature plants with height more than 100 cm and girth more than 7 cm were considered as trees. The equipments utilized in this study were user-friendly and easy to carry such as ranging rods, pipes, measuring tape, rope, etc.





Figure 3.2: Mangrove Data Collection During Field Visits

3.5. Field Work

Field investigation is a vital part of the project. Fieldwork helps to check and collect most of the ground information required for mangrove mapping. The reconnaissance field survey had been undertaken to get acquainted with the general patterns of vegetation of the area. The variation and tonal patterns had been observed on existing images. Traverses along all dense mangrove, sparse mangrove, scatter mangrove and major creeks have been noticed and were considered for collecting ground truth data between maps/images and on the ground. The fieldwork was conducted during the period between 03rd to 07th July 2023; 11th to 16th September 2023 and 16th to 20th October 2023 for collecting ground truthing data to cover the entire APSEZ area.



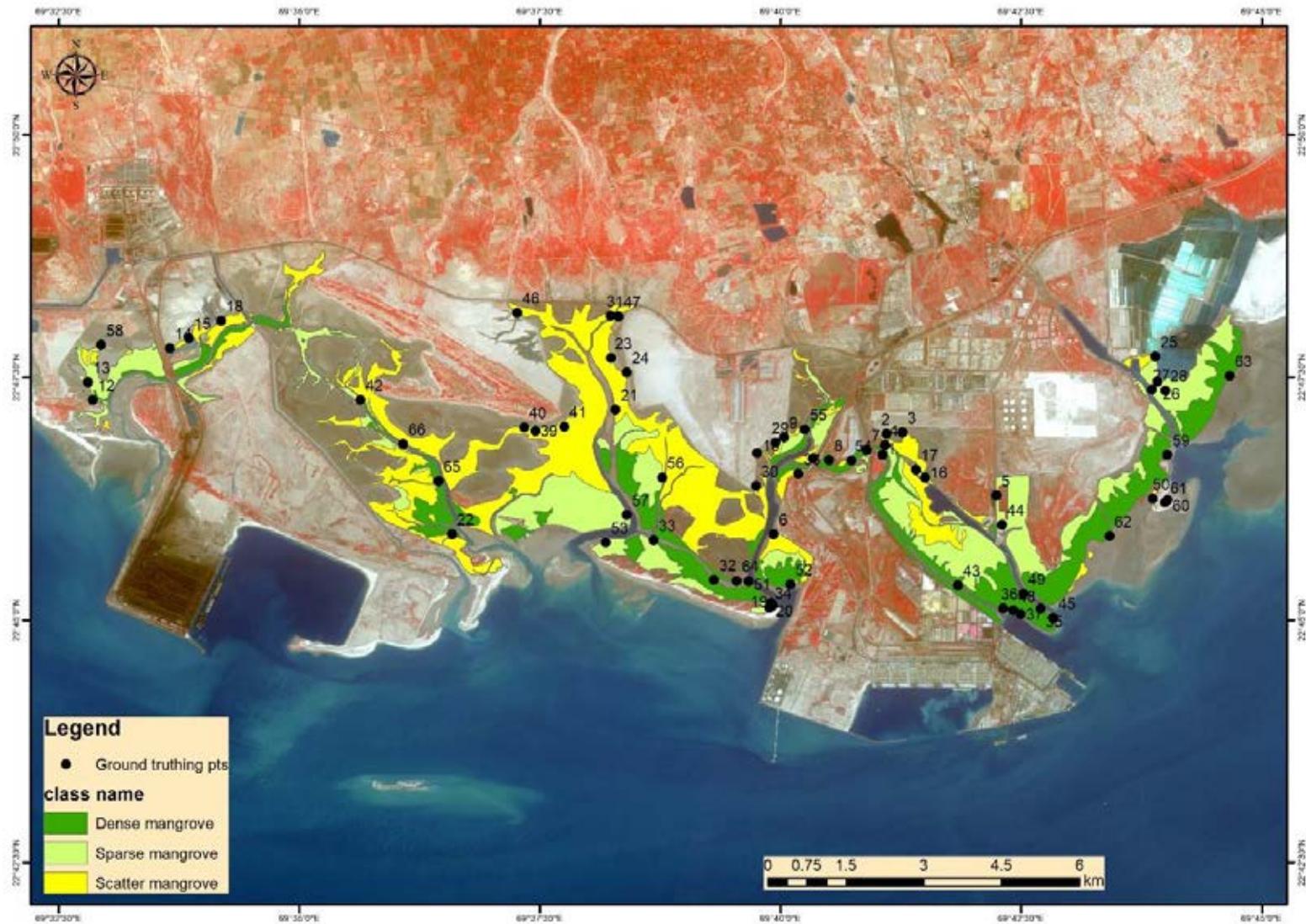
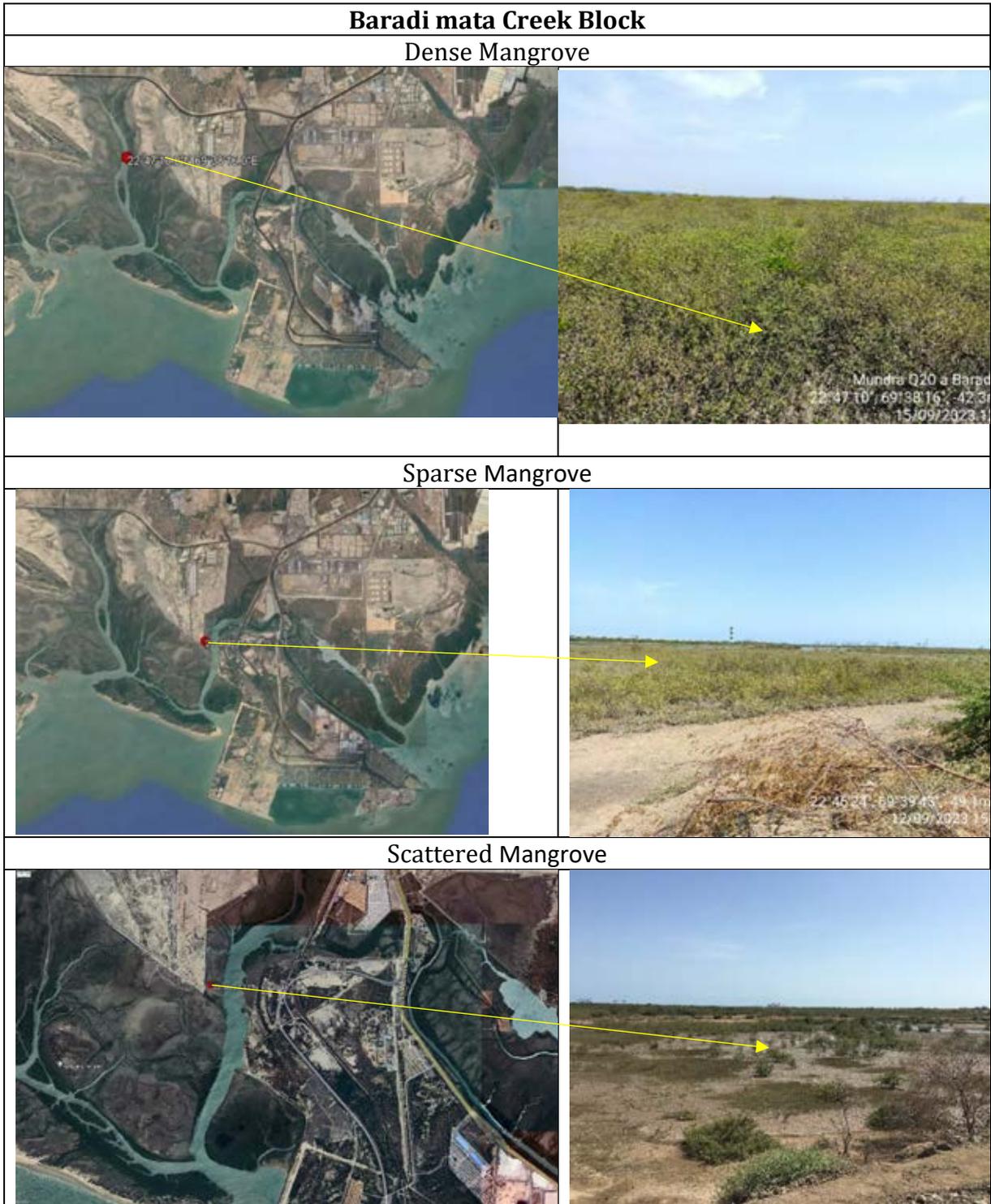


Figure 3.3: Ground Truthing Data and Mangrove Data Collection Points



Kotadi Creek Block	
Dense Mangrove	
	
Sparse Mangrove	
	
Scattered Mangrove	
	





Bocha-Navinal Creek Block	
Dense Mangrove	
	
Sparse Mangrove	
	
Scattered Mangrove	
	



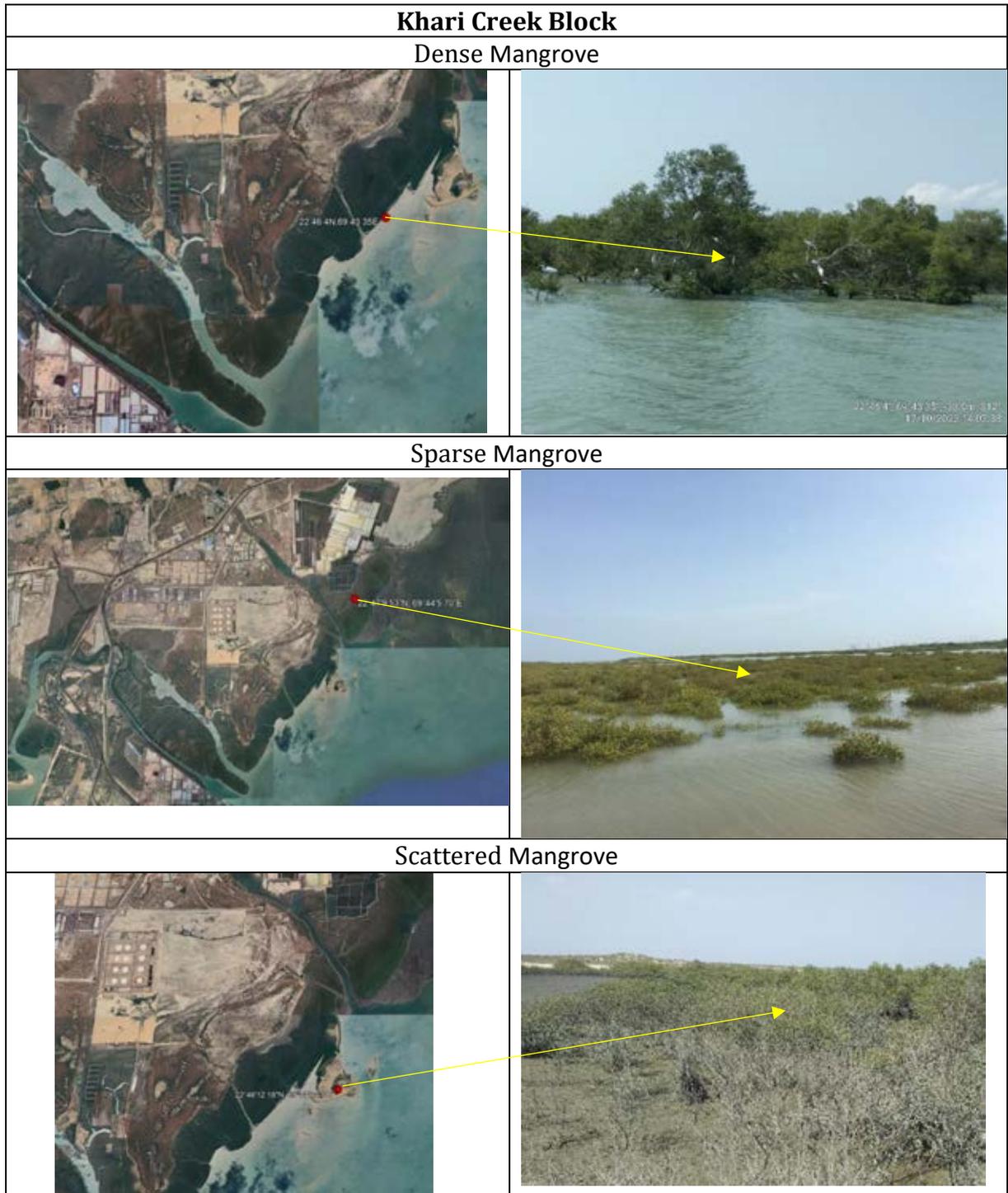


Figure 3.4: Surveyed and Collected Ground Truthing Data Various Categories of Mangroves



4. RESULTS AND ANALYSIS

The Kotadi, Baradi mata, Navinal, Bocha-Navinal and Khari creeks experience high tidal ranges up to 6m and with average tidal range of 2 to 4.5m which varies annually. The creeks have mangrove formation due to muddy substratum and the mangroves are tide fed and tidal flow into the mangroves occurs only during high tide. This makes the mangroves as intertidal one and any change of tidal conditions in the creeks affect the growth and distribution of mangroves. Distribution of mangroves in Kotadi, Baradi mata, Navinal, Bocha and Khari creeks as well as in the Bocha island was studied using LISS IV satellite images (2019 March and 2021 March).

4.1. Overall APSEZ Mangrove Assessment

Mangrove areas are known to vary over time and may be mixed with associate vegetation. However, by analysing the colour and tone of multi-spectral high-resolution LISS IV (5.8 m spatial resolution) satellite data and extensive ground truthing survey data in each block of the study area, mangrove coverage could be more accurately estimated. The mangrove cover in the creeks in and around APSEZ showed a positive trend from March 2019 to March 2021, with an overall increase of 52.79 ha (1.9%) compared to the cover during the year 2019. The total mangrove cover during 2019 was 2670.08 ha which has increased to 2722.87 ha during the year 2021 (Table 4.1). This indicates that the mangrove and the tidal system in the creeks were not adversely affected by any anthropogenic or natural disturbances during this period. The analysis of the data revealed that the dense mangrove category has increased by 3.01 ha (0.11%) due to sparse mangrove converted to dense mangrove, while sparse mangrove category has increased by 45.90 ha (1.7%) which is mainly due to the conversion of scattered mangroves into sparse mangroves. The scattered mangrove category has also showed an increase by 3.88 ha (0.14%), which is suggesting the recruitments and regeneration of mangroves in the area. The changes in the mangrove cover are summarized in Table 4.1 and Figure 4.3.



Table 4.1: Distribution of Various Categories of Mangroves in APSEZ During 2019 and 2021

Class	Area (ha)		
	2019	2021	Change
Dense Mangrove	706.02	709.03	3.01
Sparse Mangrove	927.31	973.22	45.90
Scattered Mangrove	1036.74	1040.62	3.88
Total	2670.08	2722.87	52.79

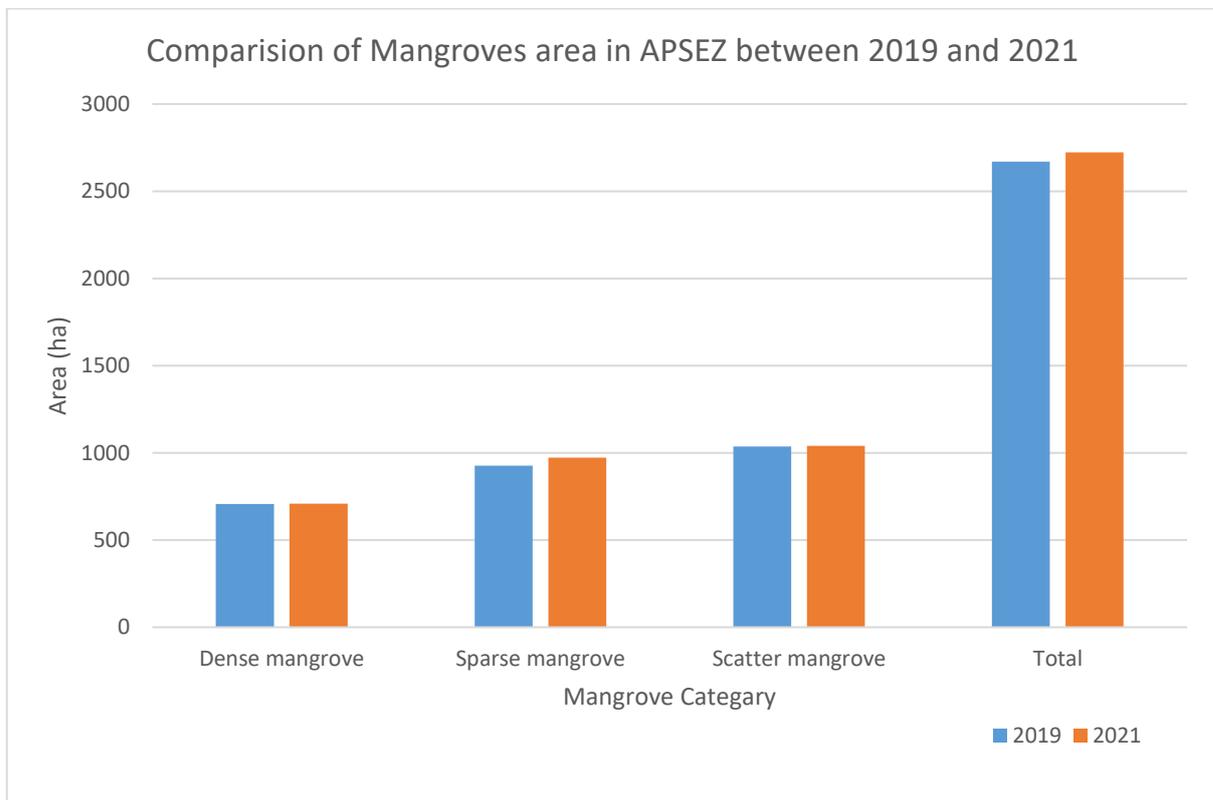


Figure 4.1: Comparison of Various Categories of Mangroves in APSEZ Between 2019 and 2021



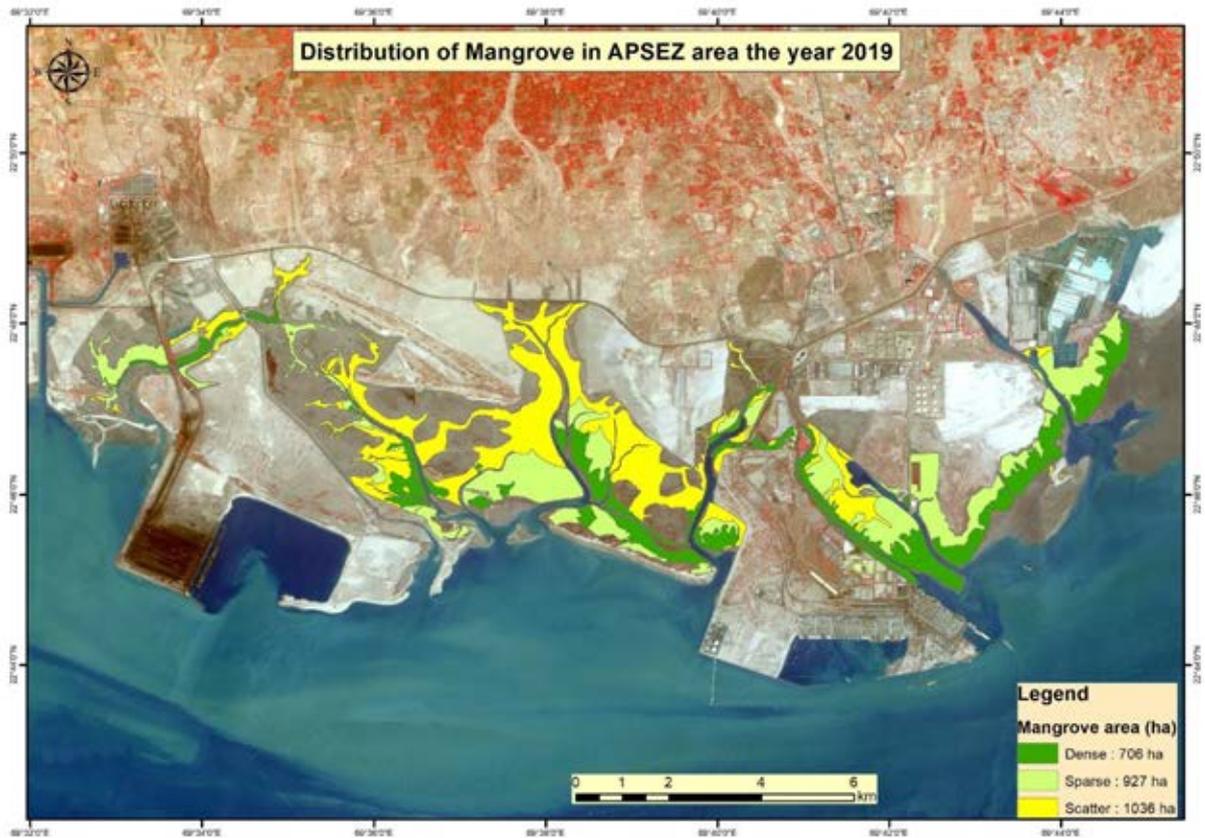


Figure 4.2: Distribution of Various Categories of Mangroves in March 2019

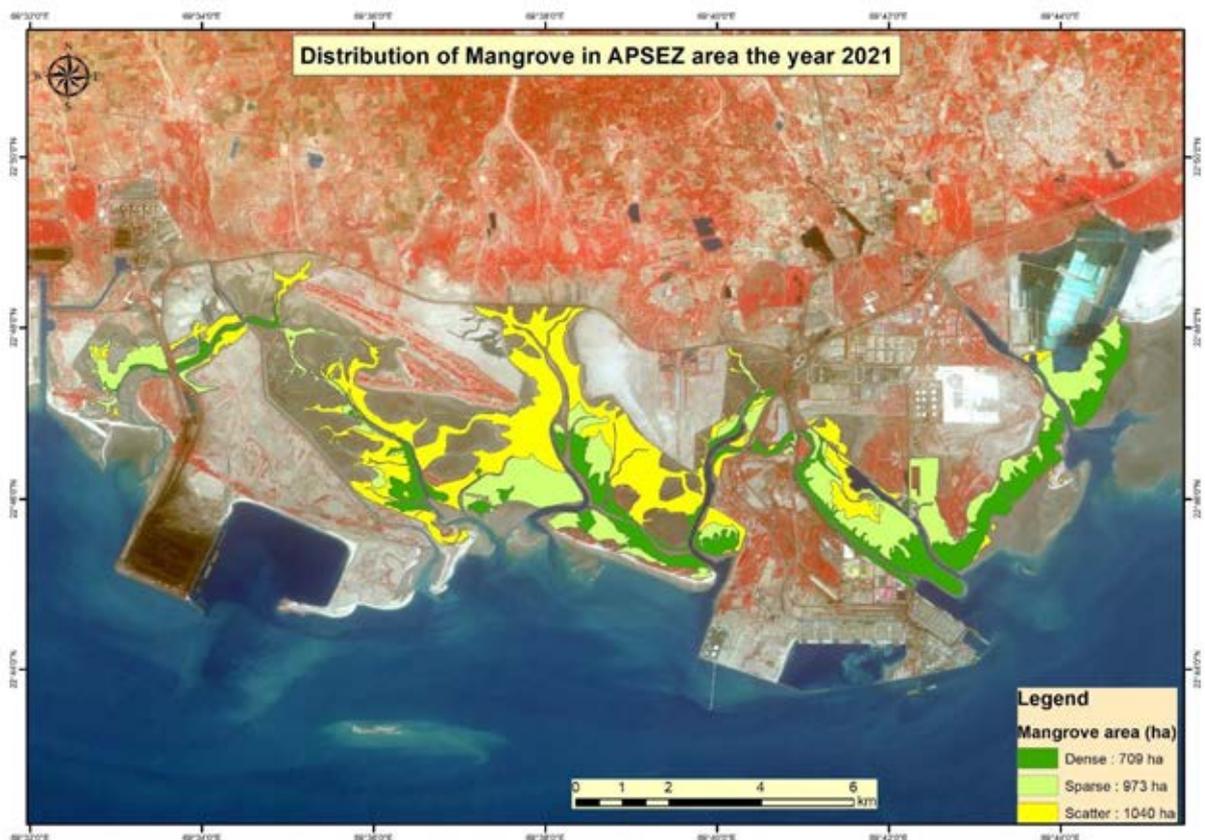


Figure 4.3: Distribution of Various Categories of Mangroves in March 2021



4.2. Creek Wise Assessment

4.2.1. Kotadi Creek Area

The study site Kotadi creek, which has two mouths: Kotadi-I on the western end of west port of Adani and Kotadi-II located east of Kotdi-I. The tidal flow reaches up to 4.5 km in Kotadi-I and up to 7.4 km in Kotadi-II during high tide periods. The mangrove cover at these sites were compared for the period, during March 2019 and March 2021 using satellite images and field surveys. There are three categories: dense, sparse, and scattered mangroves and it was found that the total mangrove area increased by 21.43 ha (4.1%) from 2019 to 2021 (Table 4.2). The dense category increased by 0.3% (1.78 ha), while the sparse category increased by 39.71 ha and the area of scattered category decreased by 20 ha (Figure 4.4 to Figure 4.7) from the 2019 imagery. These results indicate that the mangroves in Kotadi creek are healthy and benefited from the regular tidal flow. The decrease in the area of the of scattered category and increase of sparse are due to natural transitions in mangrove growth stages, from scattered to sparse category.

Table 4.2: Distribution of Various Categories of Mangroves in Kotadi Creek Zone During 2019 and 2021

Class Name	Area(ha)		
	2019	2021	Change
Dense Mangrove	98.12	99.89	1.78
Sparse Mangrove	166.21	205.92	39.71
Scattered Mangrove	255.01	234.96	-20.05
Total	519.34	540.77	21.43

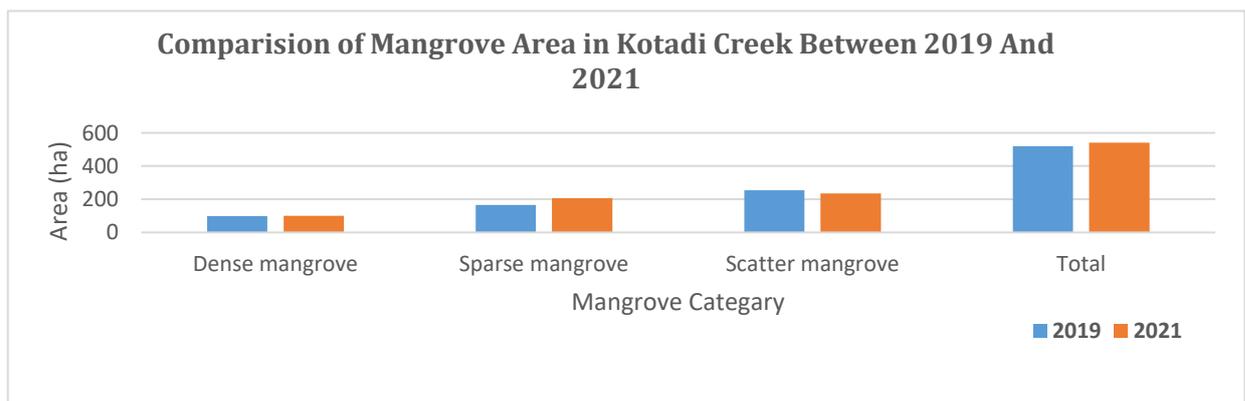


Figure 4.4: Comparison of Various Categories of Mangroves in Kotadi Creek Zone Between 2019 and 2021



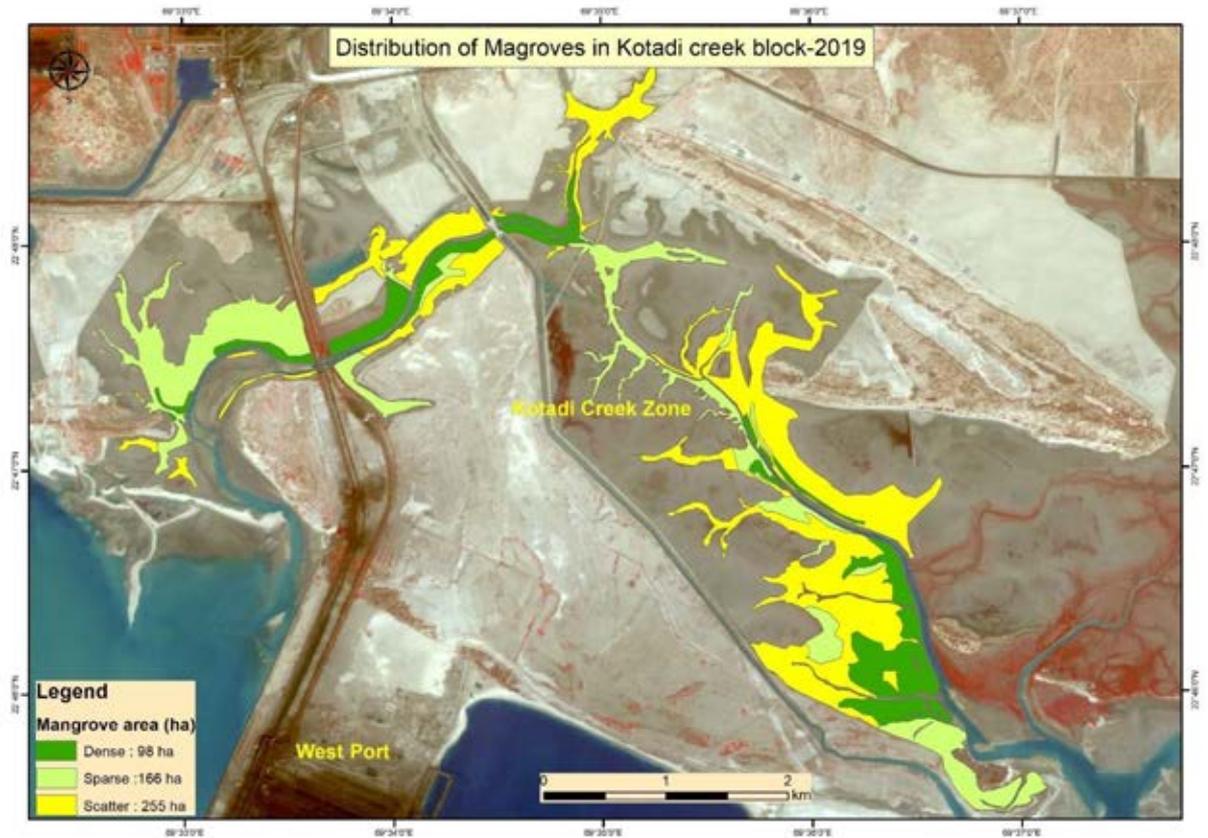


Figure 4.5: Distribution of Mangroves in 2019 in Kotadi Creek Zone System.

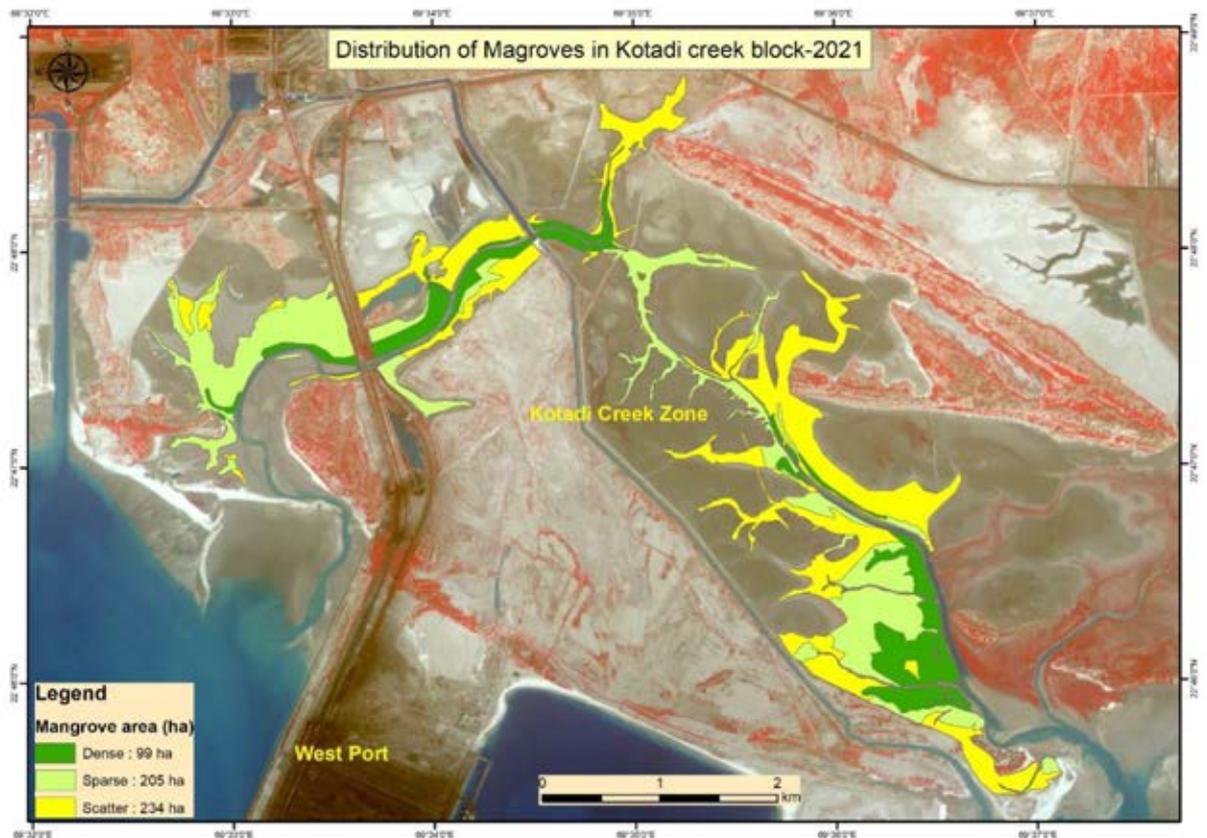


Figure 4.6: Distribution of Mangroves in 2021 in Kotadi Creek Zone System.



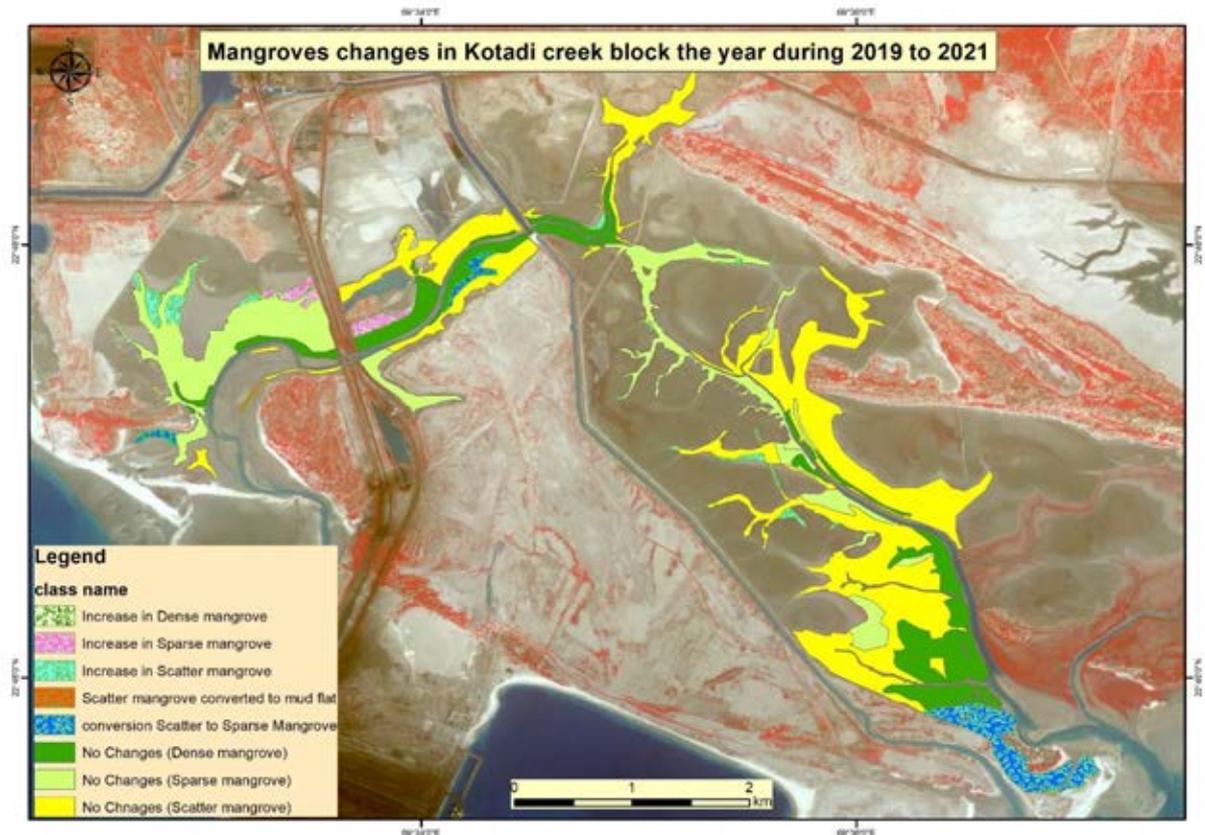


Figure 4.7: Change Analysis from 2019 to 2021 on Categories of Mangroves in Kotadi Creek System

4.2.2. Baradi mata Creek area

This creek remains uninfluenced by human interventions except for navigation by the fishing community from the nearby villages. The status (growth cover) of the mangroves was assessed between 2019 and 2021 and the results are shown in (Table 4.3 and to Figure 4.11). The comparative study of the images revealed the overall improvement in mangrove coverage to the extent of 15.91 ha (1.2% increase) mostly with formation of new mangroves in the form of scattered mangroves with minor inter-conversion in categories of sparse to dense, The data on mangrove distribution has showed an increase from 2019 to 2021 especially improvement to higher categories (i.e., from scattered to sparse and further to dense) and also the formation of new mangroves was also significant. These results lead to infer that the mangroves in the creek are in a healthy condition with normal regular tidal flow.



Table 4.3: Distribution of Various Categories of Mangroves in Baradi Mata Zone Creek During 2019 and 2021

Class Name	Area (Ha)		
	2019	2021	Change
Dense Mangrove	245.22	245.94	0.72
Sparse Mangrove	344.83	345.92	1.09
Scatter Mangrove	683.76	697.86	14.10
Total	1273.81	1289.72	15.91

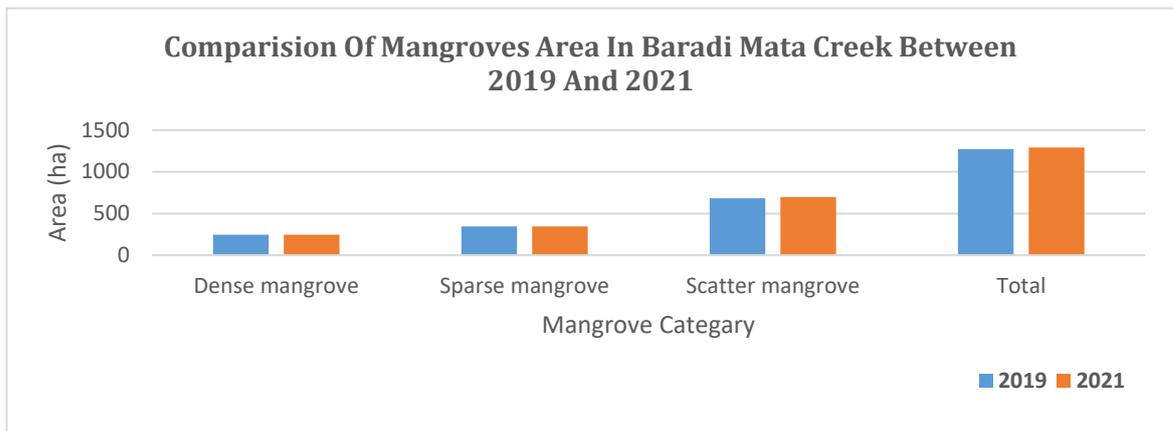


Figure 4.8: Comparison of Various Categories of Mangroves in Baradi Mata Creek Zone Between 2019 and 2021



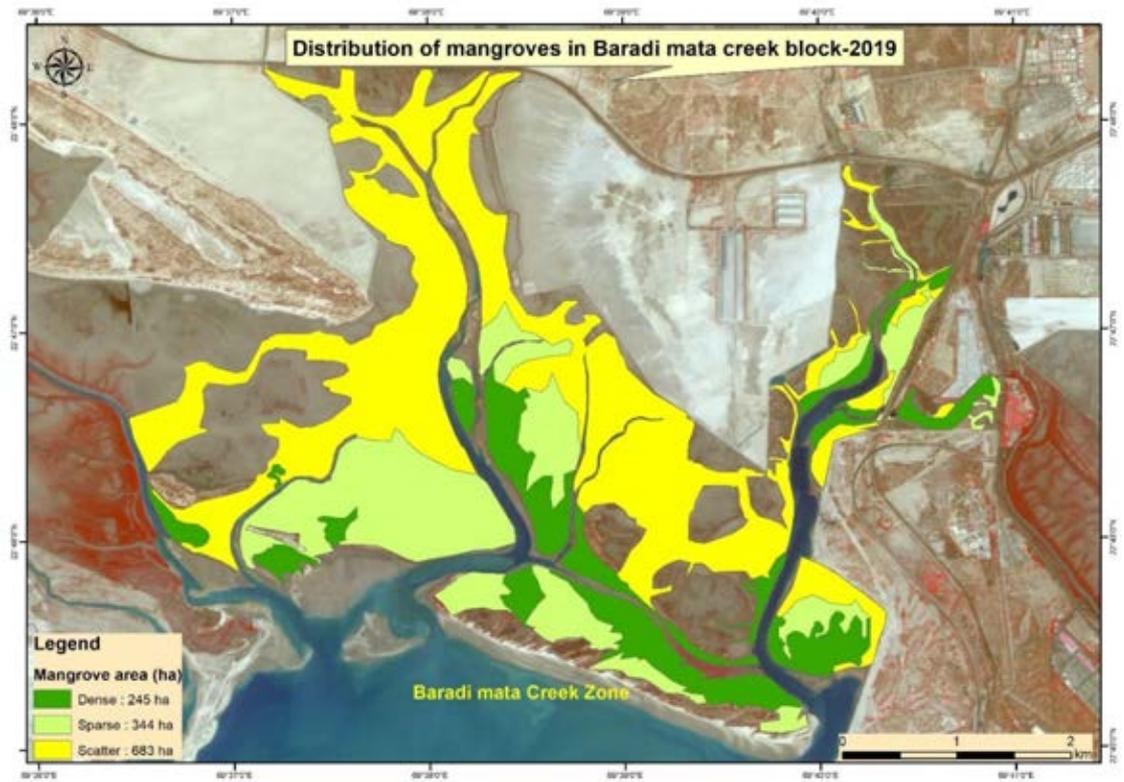


Figure 4.9: Distribution of Mangroves at Baradi Mata Creek Zone in 2019

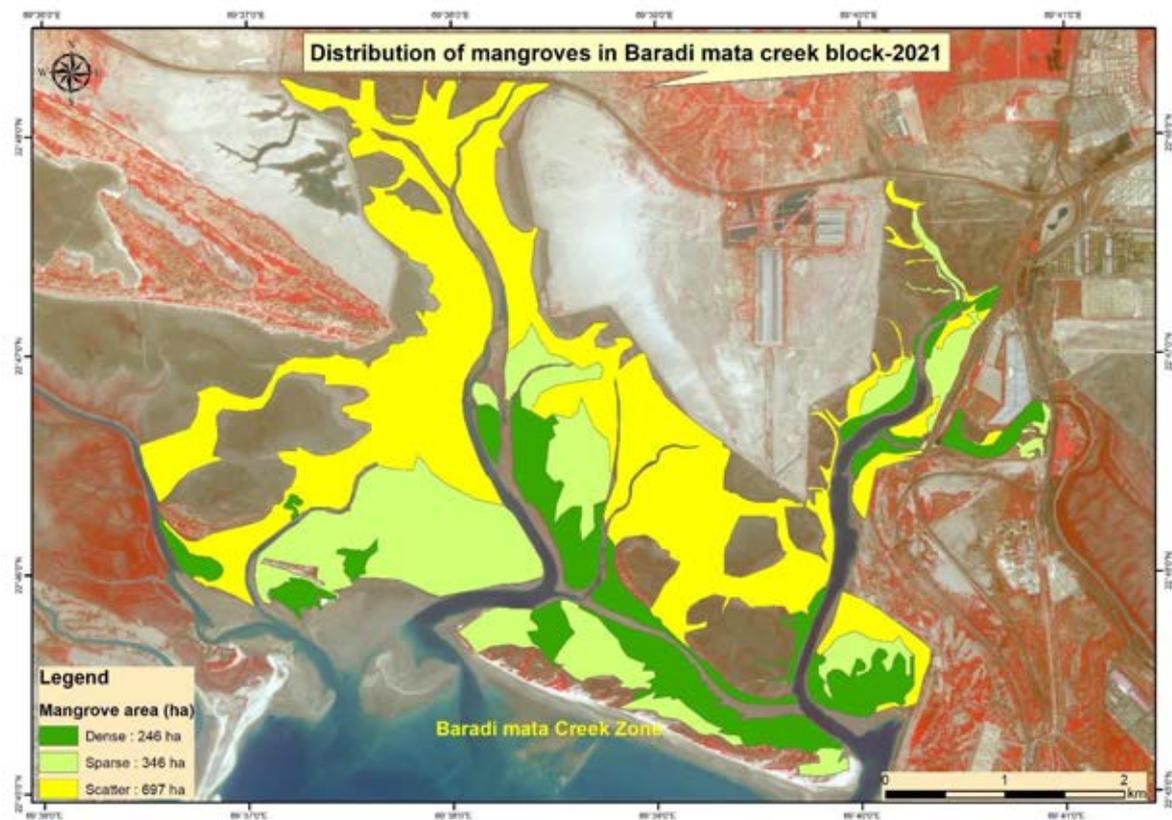


Figure 4.10: Distribution of Mangroves at Baradi mata Creek Zone in 2021



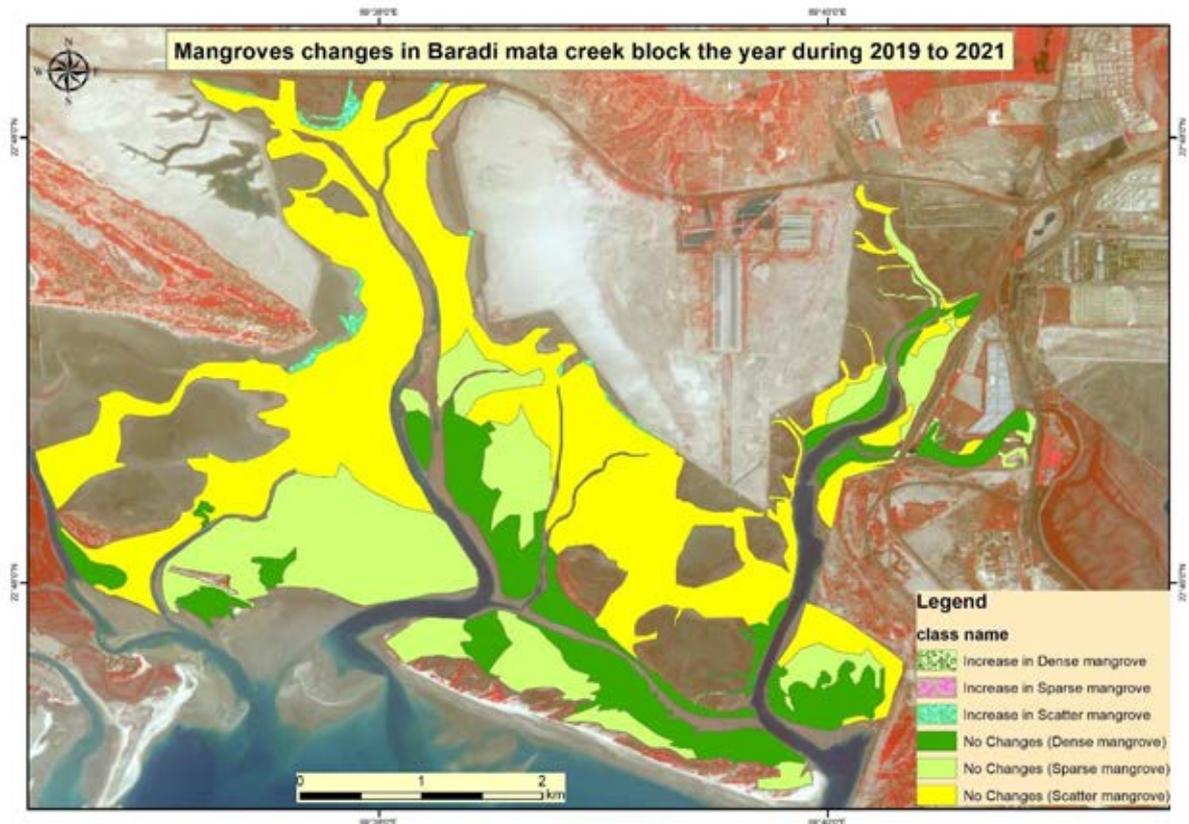


Figure 4.11: Change Analysis From 2019 To 2021 On Categories of Mangroves in Baradi Mata Creek System

4.2.3. Bocha-Navinal Creek Area

The study area comprises two creeks, Navinal creek, Bocha creek, and bocha island, thus form a complex of creek system. The Navinal creek is adjacent to Adani Port and joins the Bocha creek in the north, forming Bocha island that has dense mangroves. The mouth of Navinal creek is also known as the entrance to the Port and receives good tidal inflow. The Navinal creek narrows down as it flows northward and eastward to merge with Bocha creek (Figure 2.1). The banks of all the two creeks have fair to good mangrove growth, with dense mangroves particularly along the border of the Bocha island and the nearby minor creeks (Figure 4.12 to Figure 4.15). For the comparative study, the satellite images and field survey results on the mangrove cover for the period March 2019 and March 2021 were considered. The three classes of the mangrove types: dense, sparse, and scattered were observed. The total mangrove area has increased by 7.74 ha (1.3%) from 2019 to 2021 data (Table 4.4). These results suggest that the mangroves in



Bocha -Navinal, creek and Bocha island system are healthy and influenced by the normal regular tidal flow.

Table 4.4: Distribution of Various Categories of Mangroves in Bocha- Navinal Creek Zone During 2019 and 2021

Class Name	Area (ha)		
	2019	2021	Changes
Dense Mangrove	207.42	206.30	-1.13
Sparse Mangrove	269.44	271.43	1.98
Scatter Mangrove	89.17	96.06	6.89
Total	566.04	573.78	7.74

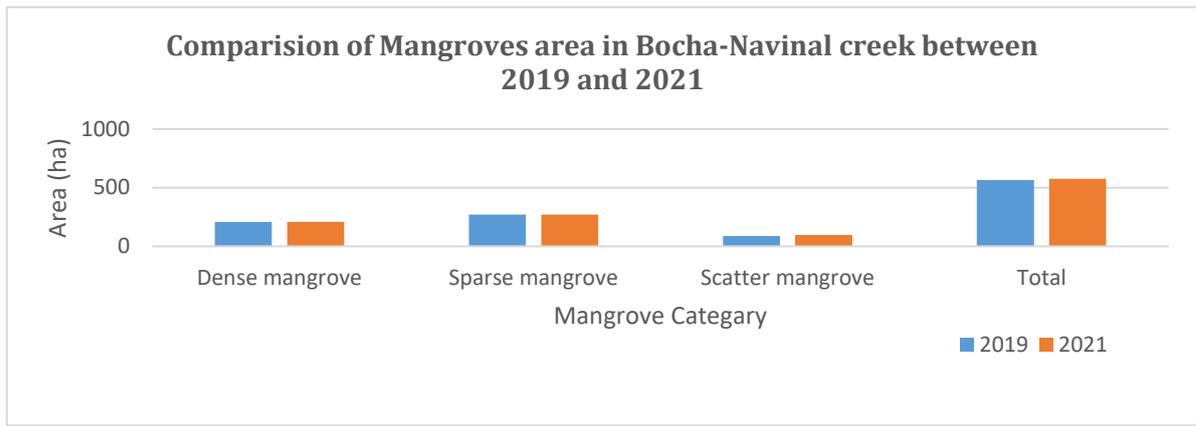


Figure 4.12: Comparison of Various Categories of Mangroves in Bocha-Navinal Creek Zone Between 2019 and 2021

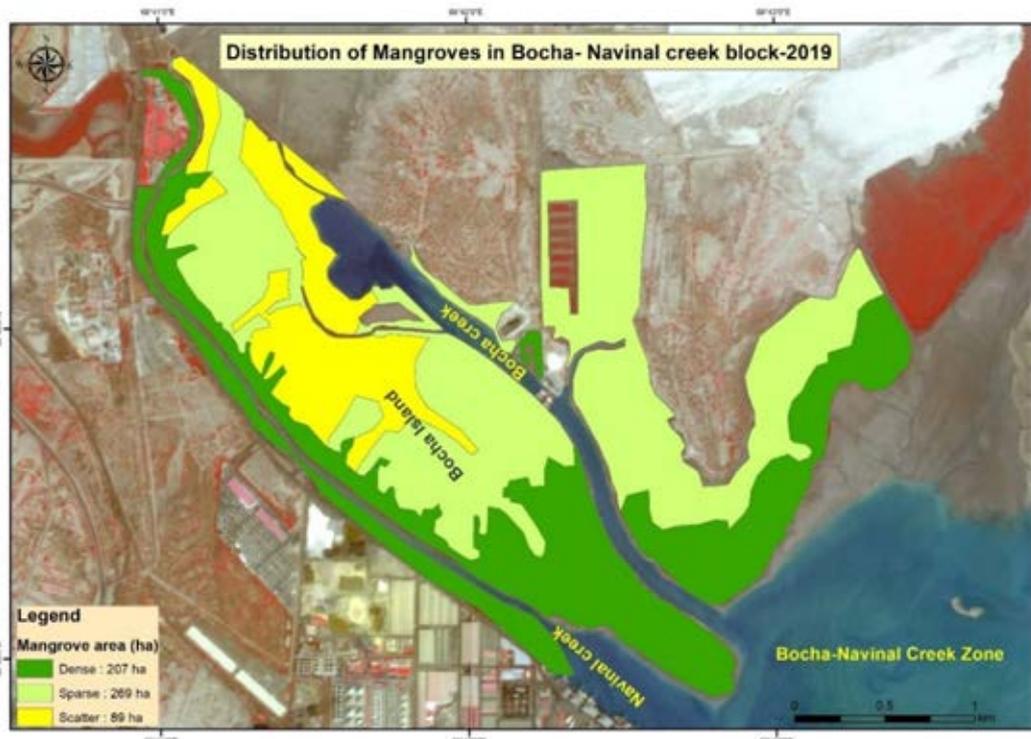


Figure 4.13: Distribution of Various Categories of Mangroves in Bocha- Navinal Creek Zone System for The Year 2019



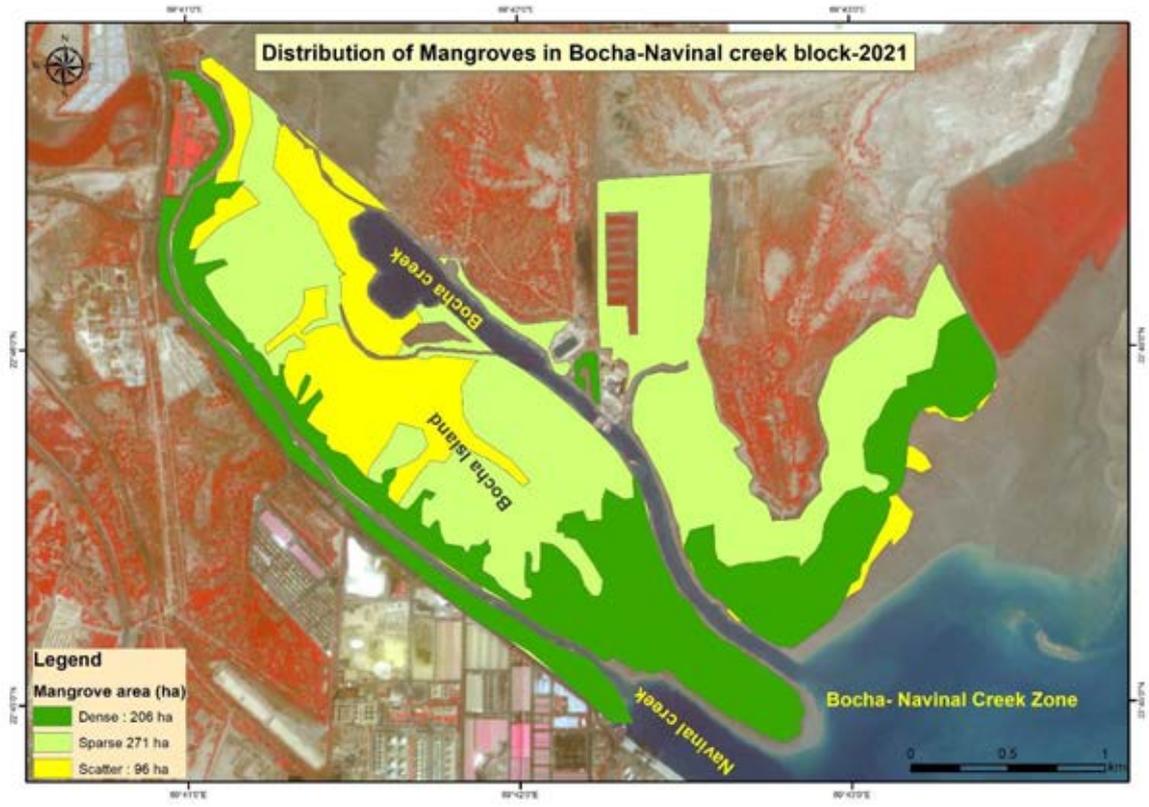


Figure 4.14: Distribution of Various Categories of Mangroves in Bocha - Navinal Creek Zone System for The Year 2021

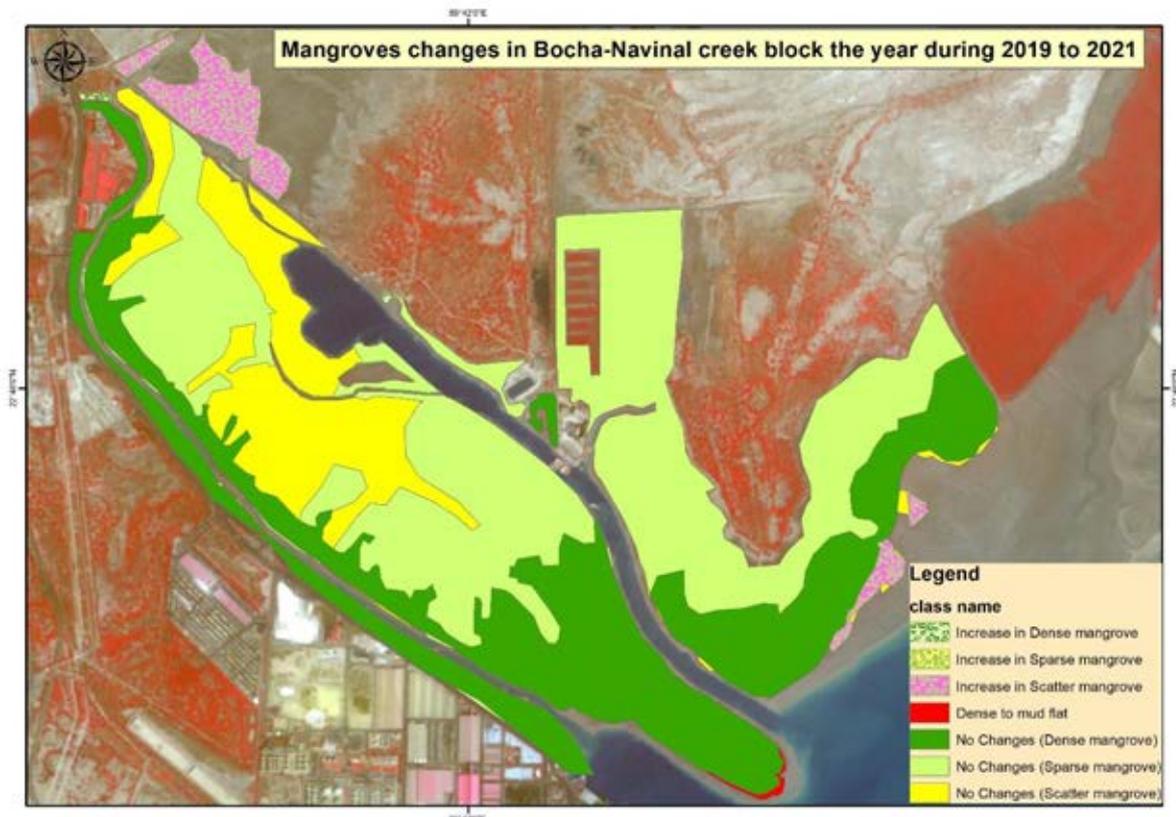


Figure 4.15: Change Analysis From 2019 To 2021 On Categories of Mangroves in Bocha- Navinal Creek System



4.2.4. Khari Creek

The creek experiences normal tidal flow with settlements located in the northern part of the creek (Junabunder village). Study is to assess the changes in mangrove distribution and density in Khari creek (Junabunder) between March 2019 and March 2021, using satellite imagery and field surveys and the data is given in Table 4.5 and Figure 4.16. and categories of mangroves are indicated in Figure 4.17 to Figure 4.19. The data indicates that there is a marginal increase of mangroves to the extent of 7.71 ha which is 2.47% compared to 2019 level. Dense mangrove is marginally increased mostly due to conversion of sparse mangrove to dense mangrove. Sparse mangrove has been increasing due to transformation of scatter to sparse category. The minor increase in scatter category is due to regeneration and recruitment class. Overall, mangrove is healthy in this block due to the favourable tidal regime and the low human pressure in the creek. the mangrove density has increased mainly due to the conversion of sparse and scatter mangroves to dense mangroves, indicating an improvement in mangrove quality.

Table 4.5: Distribution of Various Categories of Mangroves in Khari Creek Zone During 2019 and 2021

Class Name	Area (ha)		
	2019	2021	Changes
Dense Mangrove	155.26	156.90	1.64
Sparse Mangrove	146.84	149.95	3.11
Scatter Mangrove	8.80	11.75	2.95
Total	310.90	318.60	7.71

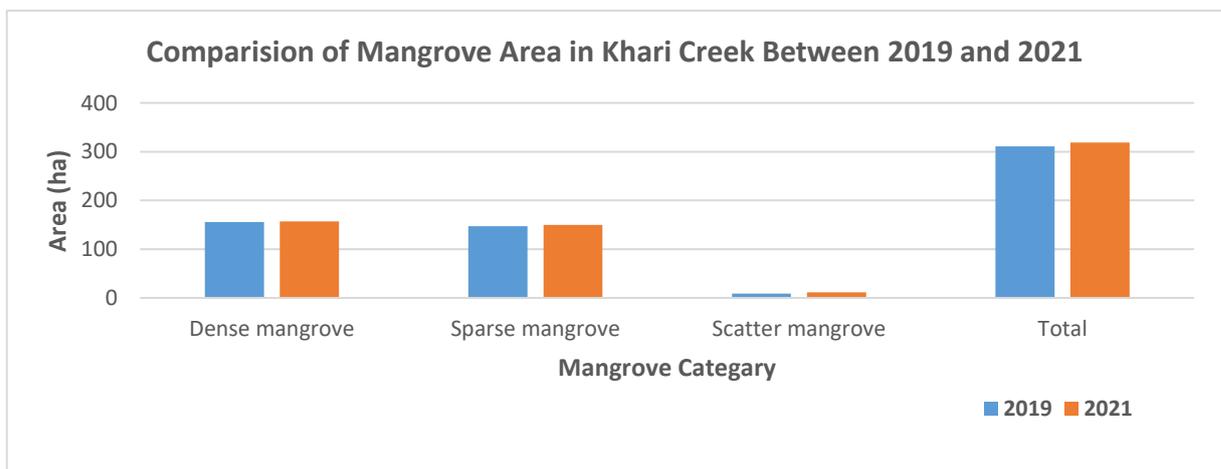


Figure 4.16 : Comparison of Various Categories of Mangroves in Khari Creek Zone Between 2019 and 2021



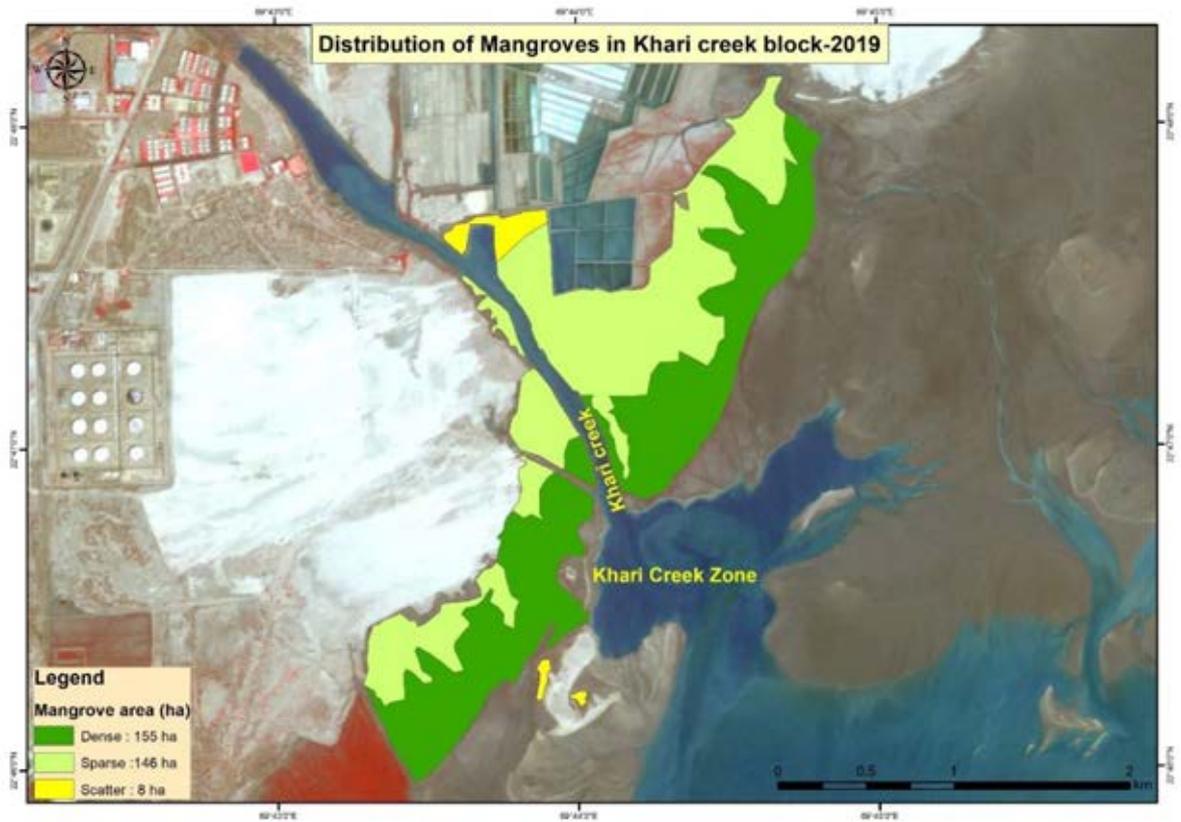


Figure 4.17 : Distribution of Various Categories of Mangroves in Khari Creek Zone System for The Year 2019



Figure 4.18: Distribution of Various Categories of Mangroves in Khari Creek Zone System for The Year 2021



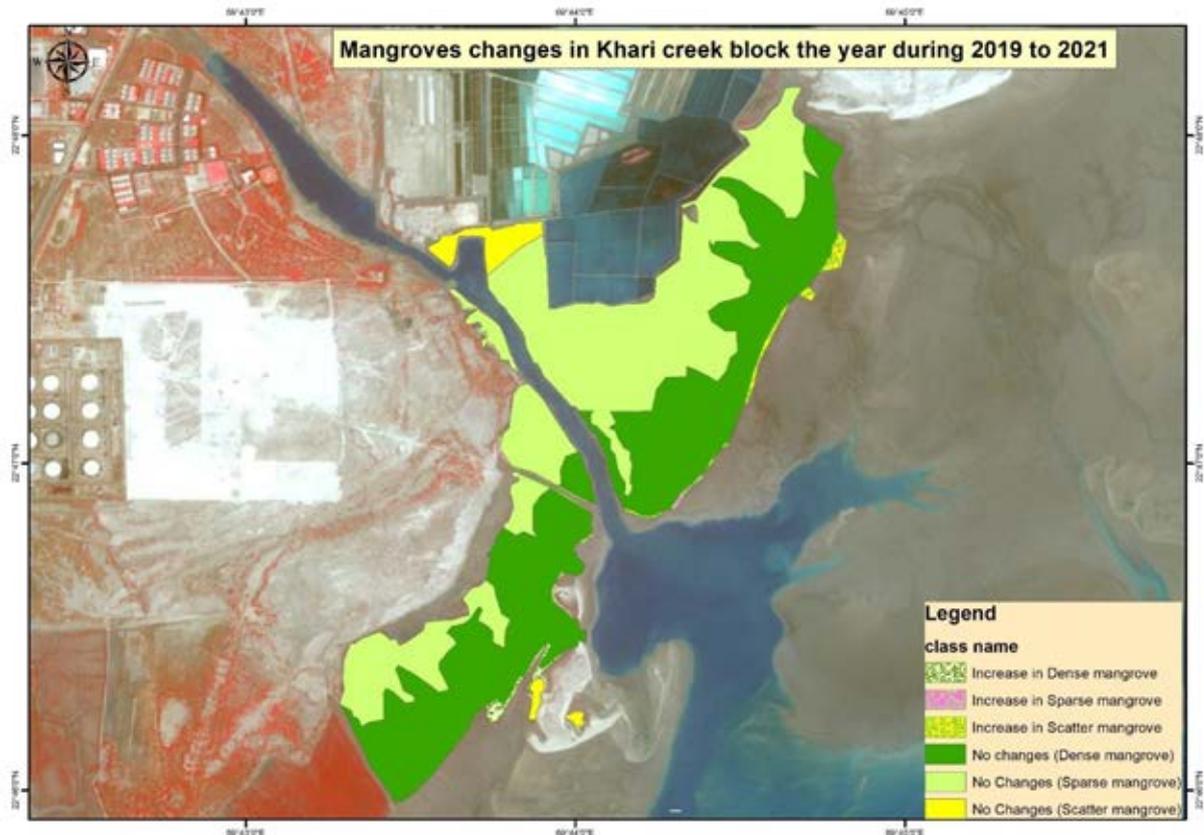


Figure 4.19: Change Analysis From 2019 To 2021 On Categories of Mangroves in Khari Creek System

4.3. Mangrove Vegetation

In India, the state of Gujarat encompasses the longest coastline (1650 km) and largest coastal area (28,000 km²), which supports the second largest mangrove cover of the country, which is almost 23 % of the Indian mangrove cover (Devi and Pathak, 2016). Gujarat mangrove cover is divided in three parts, Kachchh and Gulf of Kachchh (GOK), Saurashtra, and Gulf of Khambhat and South Gujarat.

4.3.1. : Diversity

In Gujarat a total of 15 species of mangrove have been recognized as true mangroves (Ragavan *et al.*, 2016), but this diversity is very less compared to the other Indian states. The diversity of mangroves in Gujarat is concentrated mainly in the Gulf of Khambhat and South Gujarat regions. The availability of freshwater inflow into this area resulted in the highest floristic diversity of mangroves than the other parts of the state. In general, the Gujarat mangrove cover is fully dominated by single mangrove species (Mono-floral) which is *Avicennia marina*



specifically along the coastal belt of the the Gulf of Kachchh. The extreme tolerance to low rainfall, higher salinity, evapo-transpiration and temperature, etc. of this species made it successful in the Gujarat coasts. A few true mangroves species can be found in the Gulf of Kachchh sporadically. The distribution of the other halophytes such as *Suaeda*, *Salvadora*, *Salicornia*, etc. and mangrove associate plants was also recorded. At the survey sites, two more true mangrove species which are *Rhizophora mucronata* and *Cerops tagal* plants were also found however, they are very less in number and present in small patches.

4.3.2. : Density

The overall average mature tree density (>100 cm) recorded was 1471 trees/ha (Ranging from 1120 to 1944 trees/ha) in the entire study area of APSEZ. The area wise density recorded was higher in Khari creek area (1944 trees/ ha) followed by Baradi mata area (1565 trees/ ha) and Bocha/Navinal creeks (1256 trees/ha). Among the study locations, lowest tree density was observed in the Kotadi creek area which was 1120 trees/ha. Further, major part of Bocha Island and surrounding areas supports good population of well matured and grown-up trees of *A. marina*, along with the presence of a few well matured trees of *Rhizophora mucranata* and *Cerops tagal*.

Table 4.6: Density of Trees in the Kotadi Creek Area

Q. Number	Latitude	Longitude	No of Tree Per Ha
12	22° 47' 16"	69° 32' 51"	1100
13	22° 47' 27"	69° 32' 48"	1100
14	22° 47' 48"	69° 33' 39"	500
15	22° 47' 54"	69° 33' 51"	600
18	22° 48' 5"	69° 34' 11"	0
22	22° 45' 53"	69° 36' 35"	2500
42	22° 47' 16"	69° 35' 38"	700
58	22° 47' 50"	69° 32' 56"	400
65	22° 46' 25"	69° 36' 32"	2500
66	22° 46' 49"	69° 36' 5"	1800
Average			1120



Table 4.7: Density of Trees in the Baradi mata Area

Q. Number	Latitude	Longitude	No of Tree per Ha
6	22° 45' 53"	69° 39' 56"	1200
7	22° 46' 45"	69° 40' 54"	1700
8	22° 46' 39"	69° 40' 30"	1200
9	22° 46' 53"	69° 40' 2"	1800
10	22° 46' 43"	69° 39' 45"	1200
11	22° 46' 40"	69° 40' 20"	600
19	22° 45' 9"	69° 39' 55"	2000
20	22° 45' 11"	69° 39' 54"	600
21	22° 47' 10"	69° 38' 17"	400
23	22° 47' 42"	69° 38' 14"	2400
24	22° 47' 33"	69° 38' 24"	3300
29	22° 46' 50"	69° 39' 57"	600
30	22° 46' 23"	69° 39' 45"	800
31	22° 48' 8"	69° 38' 14"	1300
32	22° 45' 25"	69° 39' 18"	1700
33	22° 45' 49"	69° 38' 41"	2300
34	22° 45' 8"	69° 39' 53"	1600
38	22° 46' 30"	69° 40' 11"	1200
39	22° 46' 57"	69° 37' 27"	2100
40	22° 46' 59"	69° 37' 20"	1400
41	22° 46' 60"	69° 37' 45"	1700
46	22° 48' 10"	69° 37' 16"	800
47	22° 48' 8"	69° 38' 19"	300
51	22° 45' 24"	69° 39' 40"	2900
52	22° 45' 22"	69° 40' 6"	2800
53	22° 45' 48"	69° 38' 11"	1900
54	22° 46' 39"	69° 40' 44"	4400
55	22° 46' 58"	69° 40' 15"	700
56	22° 46' 28"	69° 38' 46"	900
57	22° 46' 5"	69° 38' 24"	700
64	22° 45' 24"	69° 39' 33"	2000
Average			1565



Table 4.8: Density of Trees in the Bocha-Navinal Creek Area

Q. Number	Latitude	Longitude	No of Tree per Ha
1	22° 46' 42"	69° 41' 3"	200
2	22° 46' 55"	69° 41' 6"	200
3	22° 46' 56"	69° 41' 16"	1000
4	22° 46' 48"	69° 41' 5"	2100
5	22° 46' 17"	69° 42' 15"	2600
16	22° 46' 28"	69° 41' 30"	1500
17	22° 46' 33"	69° 41' 24"	1200
35	22° 45' 7"	69° 42' 42"	1800
36	22° 45' 7"	69° 42' 19"	1500
37	22° 45' 4"	69° 42' 30"	1500
43	22° 45' 21"	69° 41' 51"	1800
44	22° 45' 59"	69° 42' 18"	1100
45	22° 45' 1"	69° 42' 50"	1200
48	22° 45' 6"	69° 42' 25"	900
49	22° 45' 16"	69° 42' 31"	700
62	22° 45' 52"	69° 43' 25"	800
Average			1256

Table 4.9: Density of Trees in the Khari Creek Area

Q. Number	Latitude	Longitude	No of Tree per Ha
25	22° 47' 43"	69° 43' 54"	1800
26	22° 47' 28"	69° 43' 55"	3500
27	22° 47' 23"	69° 43' 52"	1700
28	22° 47' 22"	69° 43' 60"	1200
50	22° 46' 15"	69° 43' 52"	1800
59	22° 46' 42"	69° 44' 1"	1600
60	22° 46' 14"	69° 44' 1"	2200
61	22° 46' 13"	69° 43' 60"	2500
63	22° 47' 31"	69° 44' 40"	1200
Average			1944



4.3.3. Regeneration and Recruitment Class of Mangroves

The average density of the regeneration class of mangroves in the sampling site (saplings with a height of <50 cm) was recorded at 62,727 plants/ha (Ranging from 22,500 to 96,250 plants/ha) and for recruitment class mangrove, the overall average was recorded as 10,455 plants/ha (Ranging from 8,125 to 14,167 plants/ha) during the study. The highest regeneration class (96,250 plants/ha) was recorded in Bocha/Navinal and is followed by Kotadi creeks (78,889 plants/ha) and this creek system also supports highest density of recruitment class (14,167 plants/ ha) in the entire study area. Although, the density of trees is comparatively less in this area, it is favourable for the dispersal of seeds and germination for younger classes. This can further be representing that ecosystem is favourable for younger class mangrove formation. The lowest regeneration (22,500 plants/ ha) and recruitment (8,125 plants/ha) class was recorded in the Khari creek area; however, the mature tree density was highest in this area (1944 trees/ha. The ratio of recruitments to tree is 1:7 and regeneration to recruitment is 42:7 in the study area. The density of mature trees and younger classes (recruitment and regeneration) in the APSEZ showed that this area supports healthy mangrove ecosystem and that the mangrove area as well as the density will increase significantly in the near future.

Table 4.10: Density of Younger Classes in the Kotadi Area (Plant/Ha)

Sr No	Q. Number	Latitude	Longitude	Regeneration	Recruitment
1	12	22° 47' 16"	69° 32' 51"	10000	0
2	13	22° 47' 27"	69° 32' 48"	40000	10000
3	14	22° 47' 48"	69° 33' 39"	350000	10000
4	15	22° 47' 54"	69° 33' 51"	60000	15000
5	18	22° 48' 5"	69° 34' 11"	90000	17500
6	42	22° 47' 16"	69° 35' 38"	100000	32500
7	58	22° 47' 50"	69° 32' 56"	30000	10000
8	65	22° 46' 25"	69° 36' 32"	30000	15000
9	66	22° 46' 49"	69° 36' 5"	0	17500
Average				78,889	14167



Table 4.11: Density of Younger Classes in the Baradi mata Area (Plant/Ha)

Sr No	Q. Number	Latitude	Longitude	Regeneration	Recruitment
1	6	22° 45' 53"	69° 39' 56"	170000	7500
2	7	22° 46' 45"	69° 40' 54"	30000	10000
3	8	22° 46' 39"	69° 40' 30"	60000	20000
4	9	22° 46' 53"	69° 40' 2"	140000	10000
5	10	22° 46' 43"	69° 39' 45"	80000	0
6	11	22° 46' 40"	69° 40' 20"	40000	5000
7	19	22° 45' 9"	69° 39' 55"	0	7500
8	21	22° 47' 10"	69° 38' 17"	60000	17500
9	29	22° 46' 50"	69° 39' 57"	30000	2500
10	30	22° 46' 23"	69° 39' 45"	90000	12500
11	31	22° 48' 8"	69° 38' 14"	30000	10000
12	39	22° 46' 57"	69° 37' 27"	30000	5000
13	40	22° 46' 59"	69° 37' 20"	50000	7500
14	41	22° 46' 60"	69° 37' 45"	20000	7500
15	46	22° 48' 10"	69° 37' 16"	30000	20000
16	47	22° 48' 8"	69° 38' 19"	40000	37500
17	52	22° 45' 22"	69° 40' 6"	10000	0
18	53	22° 45' 48"	69° 38' 11"	20000	7500
19	54	22° 46' 39"	69° 40' 44"	10000	0
20	55	22° 46' 58"	69° 40' 15"	40000	5000
21	56	22° 46' 28"	69° 38' 46"	60000	7500
22	57	22° 46' 5"	69° 38' 24"	100000	10000
23	64	22° 45' 24"	69° 39' 33"	50000	7500
Average				49,583	9,063

Table 4.12: Density of Younger Classes in the Bocha-Navinal Area (Plant/Ha)

Sr No	Q. Number	Latitude	Longitude	Regeneration	Recruitment
1	1	22° 46' 42"	69° 41' 3"	10000	5000
2	2	22° 46' 55"	69° 41' 6"	20000	7500
3	3	22° 46' 56"	69° 41' 16"	110000	10000
4	4	22° 46' 48"	69° 41' 5"	140000	12500
5	5	22° 46' 17"	69° 42' 15"	260000	5000
6	16	22° 46' 28"	69° 41' 30"	140000	10000
7	17	22° 46' 33"	69° 41' 24"	50000	17500
8	43	22° 45' 21"	69° 41' 51"	40000	15000
				96,250	10,313



Table 4.13: Density of Younger Class in Khari creek

Sr No	Q. Number	Latitude	Longitude	Regeneration	Recruitment
9	50	22° 46' 15"	69° 43' 52"	20000	2500
10	59	22° 46' 42"	69° 44' 1"	20000	10000
11	60	22° 46' 14"	69° 44' 1"	20000	0
12	61	22° 46' 13"	69° 43' 60"	30000	20000
Average				22,500	8,125



Figure 4.20 : Diversity of Mangrove Species in APSEZ Area, Mundra



5. CONCLUSION

5.1. Shoreline and Mangrove Cover Changes

The distribution of mangroves in the creeks in and around APSEZ was analysed using satellite images from March 2019 and March 2021. The major findings are:

- ✓ The mangrove cover in the study area has increased by 52.79 ha from 2019 to 2021, indicating that the mangrove ecosystem and the tidal regime were not adversely affected during this period.
- ✓ The tide levels in the creeks were observed to be normal and adequate for the growth of mangroves.
- ✓ The dense mangrove cover has showed an increase in Kotadi creek, Khari Creek and Baradi mata creeks while it was not much changed in Bocha/Navinal creek system.
- ✓ Further Kotadi creek showed highest increase of sparse mangrove area (39.71ha) while Baradi mata creeks (14.10ha) and Bocha/Navinal creek system (6.89ha) showed an increase in scattered mangrove areas.
- ✓ Nevertheless, overall, an increase in all three categories of mangroves in the study area between 2019 and 2021, indicating a healthy status of mangroves.
- ✓ The study measured the density of mature trees, recruitments (young trees), and regeneration (seedlings) in different locations. Mangrove tree density is influenced by many factors like salinity, tidal inundation, fresh water flow, sediment characterises, etc. The ratio between mature tree density and recruitment class among all the stands (1:7) indicating good entrance of recruitment classes into mature tree category. A conducive physical milieu with favourable tidal range and less anthropogenic pressure seems to favour the present mangrove strands in a healthy state.
- ✓ The conservation and management and recommendation plan are indicated below:



5.2. Recommendations

- ❖ The mangrove cover in the APSEZ area was found in healthy condition with dense, sparse and scattered mangroves, which has overall increase of 52.79 ha between 2019 and 2021, indicating that the mangrove ecosystem and the tidal regime were not adversely affected during this period. Therefore, future attempt should be restoration of sparse and scattered mangrove areas and convert it into dense patches. This could be restored to dense formation through physical amendment measures *viz.*, canal digging, removing blockage in natural canal systems, and by other physical means.
- ❖ The Mundra coastal scenario supports *A. marina* which is predominant, due to lack of continuous fresh water source which is atypical in this part. Nevertheless, presence of other mangrove species though sporadically recorded, *viz.*, *R. mucronate* and *C. tagal*, which gives a confidence for plantation in the sparse and scattered mangrove areas following zonation techniques. Plantation of these species is expected to create a seed bank in due course of time which would eventually convert single species stand of *A. marina* into multi species formation which in turn enhance the marine biodiversity of the area.
- ❖ Kotadi creek area has highest recruitment class mangroves while highest regeneration class was recorded from Bocha/Navinal creeks. Promoting natural regeneration where the mangrove stand has got the capacity to self-renewal will ensure sustained well-being on the stand and its succession. Natural regeneration capacity of the stand is based on the extent of entrance of younger classes such as saplings into mature tree category. The observation that natural seedling recruitment is occurring normally will indicate that the system is functioning normally. The present study shows that natural regeneration in the studied mangrove formations is normal as indicated by the entrance of younger classes into adult categories. Continued observation of this natural succession in regular mangrove monitoring studies is necessary to assess and ascertain that the natural procession of succession is maintained.



- ❖ Plantation of suitable saline tolerant plant species (shrubs and trees) also helps in controlling the soil erosion along the coastal area.
- ❖ The establishment of facilities and the expansion of infrastructure over the coming years will bring about notable changes in the landscape and seascape in and around the Adani Ports and Special Economic Zone Ltd (APSEZL). Long-term human-centred/induced activity of this magnitude in any coastal belt will have repercussions on its natural resources and ecosystems. As mangroves, mudflats and tidal creeks are the major ecological entities within the Adani Ports and Special Economic Zone Ltd (APSEZL), their conservation and management warrants priority and calls for a holistic approach. Thus, measures should be taken to conserve and preserve the mudflats and mangroves within the Adani Ports and Special Economic Zone Ltd (APSEZL) to retain their tangible and intangible ecological benefits. The conservation and management plan presented in the proceeding section has the following broad aspects and different activities under each aspect are dealt with.
- ❖ The creation of baseline information to track subsequent changes in natural shoreline formation within the Adani Ports and Special Economic Zone Ltd (APSEZL) observations through GIS and RS tools have to be adopted. The GIS maps may be utilized for the purpose and could serve as a base map. Changes in creek systems, shoreline configuration and other land use categories could be monitored through this exercise once in three years.
- ❖ Periodical monitoring, preferably once in 2 years, and comparison of results with baseline data to underline changes will pave way for the formulation of mitigation and conservation efforts.
- ❖ Mudflats and mangrove conservation and restoration measures could subsequently be undertaken based on the results of the monitoring programs.
- ❖ Research needs to be undertaken to assess the economic and ecological benefits of sustainable development of shoreline configuration.



- ❖ Awareness should be generated among local people about the shoreline configuration changes in the surrounding areas and the consequences, particularly to the fishermen community.



References:

- G.A.Thivakaran, Pranav J. Pandya, G.Thirumaran, and Devi Velusamy. 2015. "Conservation and Monitoring for Natural Mangrove Stands at Mundra."
- Himmelstoss, Emily A., Rachel E. Henderson, Meredith G. Kratzmann, and Amy S. Farris. 2018. "Digital Shoreline Analysis System (DSAS) Version 5.0 User Guide." Report 2018-1179. Open-File Report. Reston, VA. USGS Publications Warehouse. <https://doi.org/10.3133/ofr20181179>.
- Hitesh B Patel, Subhash Bhandari. 2018. "Shoreline Change Analysis along Eastern Part of Kachchh Coast, Western India." *International Journal of Creative Research Thoughts(IJCRT)* 6 (1). <https://doi.org/January 2018>.
- ICMAM. 2004. "Model Integrated Coastal and Marine Area Management Plan for Gulf of Kachchh." Department of Ocean Development, Ministry of Earth Sciences, ICMAM Project Directorate, Chennai, Government of India.
- Jodhani, Keval, Pulkit Bansal, and Priyadarshna Jain. 2020. "Shoreline Change Observations in Gulf of Khambhat Using Satellite Images." *Available at SSRN 3552461*.
- Kannan, Jayakumar, and S. Malarvannan. 2016. "Assessment of Shoreline Changes over the Northern Tamil Nadu Coast, South India Using WebGIS Techniques." *Journal of Coastal Conservation* 20 (December). <https://doi.org/10.1007/s11852-016-0461-9>.
- Kathiresan, K. (2022). Mangrove Forests of India: An Overview. In: Das, S.C., Pullaiah, Ashton, E.C. (eds) *Mangroves: Biodiversity, Livelihoods and Conservation*. Springer, Singapore. https://doi.org/10.1007/978-981-19-0519-3_11
- Misra, Ankita, and Balaji Ramakrishnan. 2015. "A Study on the Shoreline Changes and LAND-Use/ Land-Cover along the South Gujarat Coastline." *Procedia Engineering* 116 (December): 381-89. <https://doi.org/10.1016/j.proeng.2015.08.311>.
- NIO. 2009. "Marine Environmental Impact Assessment for Discharge Channel of 4000 MW Ultra Mega Power Project Near Mundra, Gulf of Kachchh." National Institute of Oceanography.
- Sutikno, Sigit, Ari Sandhyavitri, Muhammad Haidar, and Koichi Yamamoto. 2017. "Shoreline Change Analysis of Peat Soil Beach in Bengkalis Island Based on GIS and RS." *International Journal of Engineering and Technology* 9 (January): 233-38. <https://doi.org/10.7763/IJET.2017.V9.976>.
- Sweet, William (William VanderVeer), Robert Kopp E., Christopher P. Weaver, J. T. B. Obeysekera, Radley M. Horton, E. Robert (Edward Robert) Thieler 1965-, and Chris Eugene Zervas 1957-. 2017. "Global and Regional Sea Level Rise Scenarios for the United States." Edited by Center for Operational Oceanographic Products and Services (U.S.), NOAA technical report NOS CO-OPS; 83, . <https://doi.org/10.7289/v5/tr-nos-coops-083>.
- Tamassoki, E, H Amiri, and Z Soleymani. 2014. "Monitoring of Shoreline Changes Using Remote Sensing (Case Study: Coastal City of Bandar Abbas)." *IOP Conference Series: Earth and Environmental Science* 20 (June): 012023. <https://doi.org/10.1088/1755-1315/20/1/012023>.



Annexure – 3

ALGAL REMOVAL WORK FROM MANGROVE AREAS

Creek area is regularly observed for checking algal encrustations. On the mangrove recruits & where the algal encrustation is found to be substantial, it is removed manually by deployment of required manpower. This operation is performed during the low tide conditions. The main object is to provide better growing condition for the growth of mangroves. Periodically, spread of *Prosopis* sp towards the mangrove areas is also observed as this species will compete with mangrove plants for growth.

Photographs of removal of algal encrustations:



Annexure – 4

Report on World Mangroves Day Celebration by Adani Foundation

Mundra, July 24-26, 2024 - Adani Foundation organized a three-day celebration for World Mangroves Day, focusing on raising awareness about the conservation and maintenance of mangroves. The Adani Foundation has been actively working towards community support and development, with key areas including health, education, rural infrastructure, and agriculture and animal husbandry. The Adani Foundation has been actively involved in the conservation and restoration of mangroves, recognizing their crucial role in maintaining coastal ecosystems.

Day 1: Awareness Lecture at Adani Vidya Mandir, Bhadreswar

On July 24, an awareness lecture was conducted by Dr. Mansi Goswami, Biodiversity expert, for the students of Adani Vidya Mandir, Bhadreswar. The lecture aimed to educate the students about the significance of mangroves, their environmental benefits, medicinal properties, and natural resources. Through interactive quizzes and presentations, **more than 50 students** were made aware of the ecological importance of mangroves and their role in maintaining environmental balance.



Awareness Lecture at Adani Vidhya Mandir- Bhadreswar

Day 2: Mangrove Nursery Preparation at Luni Site

On July 25, a nursery for **10,000 mangrove seeds** was established at the Luni site with the active participation of local fishermen. The fishermen were trained in proper planting techniques and the care of mangrove saplings. This initiative aimed to enhance local biodiversity, provide employment opportunities for fishermen, and stabilize coastal areas. The nursery project also served to raise awareness among fishermen about the importance of mangroves and encouraged their active involvement in conservation efforts.



Mangrove Nursery Preparation and training at Luni Coast

Day 3: Workshop on Mangrove Ecosystem

On July 26, a one-day workshop was held at Adani House, involving students from various departments of Kutch University and Government Science College, Mandvi. The workshop aimed to educate students about mangrove ecosystems and conservation strategies. **More than 100 students** were participated in the workshop from different educational institutions.

Key speakers included Dr. Paurav Mehta, Principal of Government Science College, Mandvi, and Dr. Mansi Goswami, Biodiversity Expert at Adani Foundation. Dr. Mehta provided detailed information on the adaptations, characteristics, and

conservation of mangroves, while Dr. Goswami discussed mangrove habitats, their status in India and Gujarat, and their global significance.

The workshop included a quiz competition for students, with prizes awarded to the winners. Additionally, group discussions, project planning, and networking opportunities for future conservation projects were provided. Each student received a certificate of participation.

Through these programs, Adani Foundation - Mundra aimed to foster greater understanding and commitment to mangrove conservation among community members. The foundation has planted mangrove trees over 162 hectares, significantly contributing to marine environmental protection. Such awareness programs by Adani Foundation inspire hope and active participation among various communities, including school children, fishermen, and subject-specific students.

The celebration of World Mangroves Day by Adani Foundation underscores their commitment to environmental conservation and community development, fostering a sustainable future for all.



Mangrove Day Celebration with Subjective students of Kutch University and Government colleges

Annexure – 5



Mundra

Half Yearly update: Apr – Sept 2024

Utilization status

Rs. in Lakhs

Site name: Mundra

Adani Foundation - Mundra Budget Tracking CSR Budget-AF-Mundra_F.Y.-2024-25											
(Amount in Lakhs)											
Sr No	Particulars	Proposed Budget			Salary & Admin Not Req.NFA	NFA Planned	NFA	PR	PO	Utilization	Percentage
		CAPEX	OPEX	Total							
A.	General Management and Administration	1.30	87.61	88.91	41.12	47.79	47.44	39.77	39.50	40.08	45.08%
B.	Education		45.26	45.26	28.66	16.60	16.04	15.69	11.65	27.43	60.60%
B1	Utthan-Education -Mundra		39.26	39.26	28.66	10.60	10.04	9.10	5.36	22.67	57.74%
B2	Utthan : Fisherfolk		6.00	6.00	-	6.00	6.00	6.59	6.29	4.76	79.29%
C.	Community Health		82.22	82.22	53.37	28.85	28.85	33.71	33.21	44.82	54.51%
D.	Sustainable Livelihood		162.68	162.68	37.68	125.00	125.01	124.25	5.49	43.49	26.74%
E.	Climate Action		10.00	10.00	-	10.00	10.00	9.65	7.50	3.92	39.22%
F.	Community Development		42.85	42.85	9.41	33.44	32.94	32.94	12.80	9.59	22.39%
G	EDM Recommended Projects		100.00	100.00	-	100.00	61.94	52.32	37.59	30.79	30.79%
	Total AF CSR Budget :	1.30	530.62	531.92	170.24	361.68	322.21	308.33	147.75	200.13	37.62%
							89.09%	95.69%	47.92%	37.62%	
Fodder Support- 1 Cr +										56.42%	

Key programmatic accomplishments

Community Health

Education

Sustainable Livelihoods

Community Infrastructure

Stakeholder engagement

Medical Services Data April to Sep - 2024



Key programmatic accomplishments

Community Health

Education

Sustainable Livelihoods

Community Infrastructure

Stakeholder engagement

❖ **Burn & Intensive Care Unit**

- On August 11 (Adani Foundation Day), the foundation stone for the Burn Ward at GK General Hospital, Bhuj, was laid.
- This center will provide comprehensive care for burn victims, from emergency treatment to long-term rehabilitation. **It will benefit 22 lakh population of Kutch..**

❖ **Eye Vision Care:**

- To address these challenges, the Adani Foundation, in collaboration with Vision Spring, is launching a holistic eye care initiative for the community.

❖ **This initiative focuses on:**

- Student: See to Learn , SHG Women: See to Earn, Driver of APSEZ: See to be Safe

❖ **Total Screening 7476 (Studnets) + 3958 (Drivers) = 11434**

❖ **Vision Aids 621 (Students) + 1110 (Drivers) = 1731**

❖ **Cataract Screening 366**

❖ **Cataract Surgery 18**

Highlights: Community Health



Eye Vision Care



Cataract Surgery



Nutritional kits to 153 children with thalassemia

Key programmatic accomplishments

Community Health

Education

Sustainable Livelihoods

Community Infrastructure

Stakeholder engagement

- 69 Primary schools (10452 Students)
- 8 High schools (1211 Students)
- 12000+ Students
- 2371 Progressive learner
- 3421 IT on Wheels
- 2449 Adani competitive coaching center
- 250 Adani Evening Education center
- Library Activity: 45000+ Books issued. 300+ Oasis workshop arranged to increase reading habits of students.
- Mothers Meet: Mothers' meetings conducted every second Saturday in Utthan schools. 10,000+ mothers have participated.
- Vedic maths and Abacus

Highlights: Education



Abacus Mathematics

Eye Vision Care in Utthan School



Green School Initiative – plastic collection

Key programmatic accomplishments

Community Health

Education

Sustainable Livelihoods

Community Infrastructure

Stakeholder engagement

- ❖ **"CHETNA"** - initiative with gender diversity
 - Adani Foundation, in collaboration with Unnati Portal and Adani Solar, launched an initiative to provide equal opportunities for employment and self-development to women from Kutch.
 - Till Now 167 Female Joined Adani Solar @Pan India, 154 are from Kutch (92.21%)
- ❖ **Saheli Groups:** Form 82 Self Help Groups in coordination with National Rural Livelihood Mission (850+ Members). 16 SHG are on pathways of self-reliance their total Corpus Rs. 32,27,100 in 6 months.
- ❖ 3 women SHGs from Adani Foundation Mundra participated in the prestigious Sathwaro Mela in Ahmedabad, showcasing Mud Art, Bead Art, and Soof Art, along with two artisans specializing in Rabari and Doori work, achieving an impressive turnover of Rs.1,30,000/-

Key programmatic accomplishments

Community Health

Education

Sustainable Livelihoods

Community Infrastructure

Stakeholder engagement

Empowering Fisherfolk Community:

- Education Support: Vehicle transportation facilities to 86 fisherfolk students, Education kits Support to 77 students, Scholarship support of Rs. 3,58,765 to 34 students.
- Job Support: Facilitated job placements for 75 fisherfolk as RTG operators, in the HR department, professional painting roles and as supervisors in APSEZ companies.

Animal Husbandry:

- Fodder support to 25 villages, benefiting 15005 cattle, Dry Fodder Support - 10,90,875 Kg & Green Fodder Support - 27,64,920 Kg
- Launched a vaccination camp for **20,000 cattle**, in collaboration with the Animal Health Department of Bhuj. 6,200+ cattle have been successfully vaccinated,

Highlights: Sustainable Livelihood



Local women of Kutch confidently working in Adani Solar



SHGs participating in SATHWARO'24 Powering Art, Empowering Artisans



Educational and Job Support to Fisherfolk youth

Key programmatic accomplishments

Community Health

Education

Sustainable Livelihoods

Community Development

Stakeholder engagement

- ❖ Renovation of Zarpaar High School - benefit 450+ students/annually
- ❖ Construction of Madhav seva trust School at Zararpa - benefit 250+ students/annually
- ❖ Renovation of AVMB school - benefit 640+ students/annually



Key programmatic accomplishments

Community Health

Education

Sustainable Livelihoods

Community Infrastructure

Climate Action

❖ **Vruksh Se Vikas – Massive Drive**

- In the 6 months we establish 3 Adani Van, planting 22,460 trees in 9.5 acres area in N khakhar, Borana, and Dhruh village. Till Date 8 Adani Van 75,078 Trees @28 acres
- Prakrutik Rath: Empowering Communities Through Green Initiatives 7,136 saplings distributed and planted in 6 months.
- **Total 1.79 Lac tree plantation done till date.**

❖ **Mangrove Nursery Development with 10,000 seeds.**

- ❖ **Costal Clean up day:** At Kashivishvnath Beach, Mandvi, 200+ students and 80 Utthan Sahayaks cleaned a 1 km stretch, collecting significant plastic waste as part of a coastal cleanup and awareness drive.

- ❖ **Green Schools:** Eco-clubs in 77 Utthan Schools and 12000+ students participate in “No Plastic” activities.

Highlights: Vruksh Se Vikas



Vruksh Se Vikas – Massive Drive: Adani van & Prakrutik Rath

Costal cleanup Day

Adani skill development center

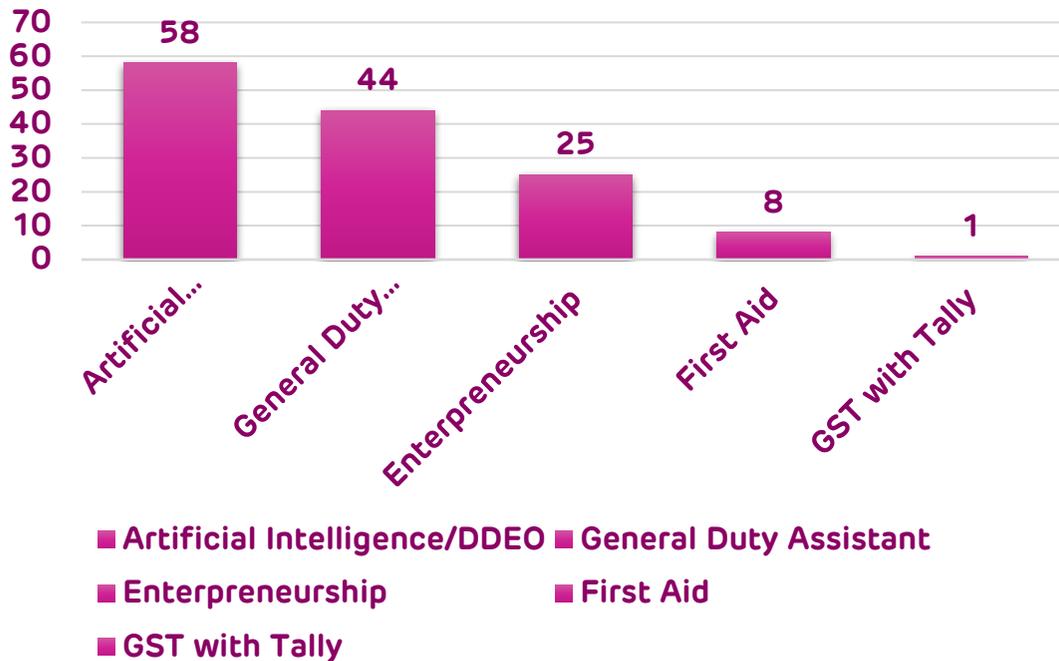


Adani Skill Development Centre (ASDC) plays a pivotal role in empowering individuals through skill enhancement. By offering a wide range of training programs, ASDC aims to bridge the gap between industry requirements and workforce capabilities. This initiative not only helps individuals stay adaptable in a rapidly evolving job market but also opens up opportunities for career advancement and higher productivity. In rural areas, many youth possess degrees but lack the practical skills needed for employment; ASDC addresses this gap by providing targeted training to enhance their employability. Through continuous learning and development, participants can achieve greater job satisfaction and personal fulfillment. On a broader scale, ASDC contributes to economic growth by fostering a skilled workforce that drives innovation and provides businesses with a competitive edge. Ultimately, the Adani Skill Development Centre is dedicated to building a future-ready workforce that supports the overall progress of society.

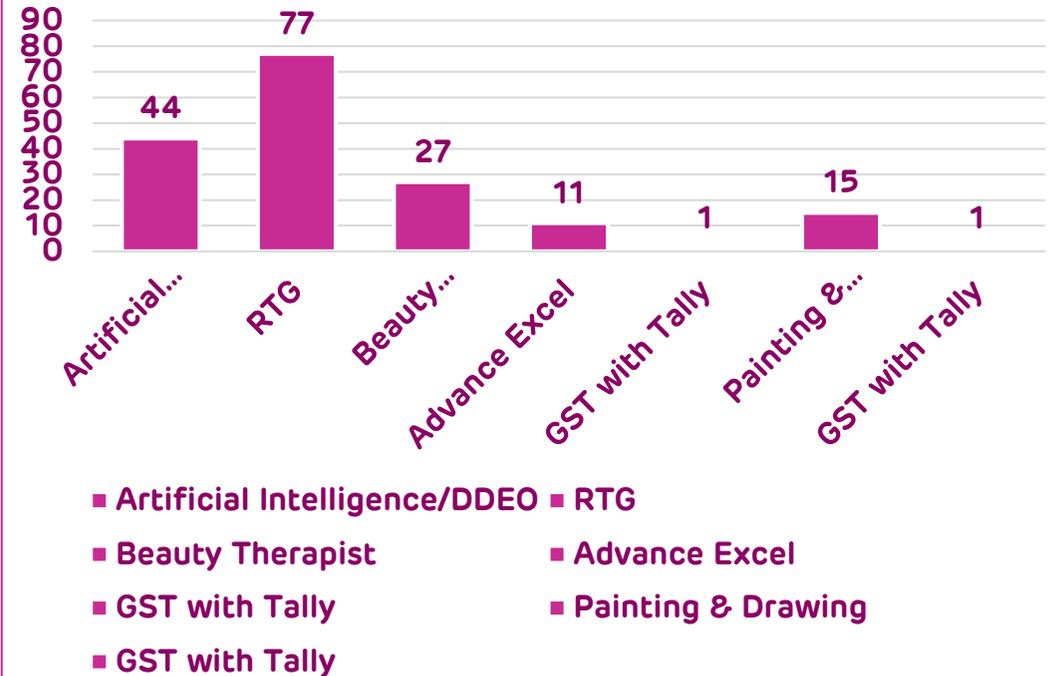
Empowering Youth : Impact of ASDC in Mundra and Bhuj Center

ASDC has significantly enhanced employability in Mundra and Mandvi. Training programs in digital literacy, RTG crane operation, beauty therapy, and advanced Excel have provided practical skills and certifications. Real-time exposure along with the Entrepreneurship Development Program (EDP), has further empowered youth. Successful placements have resulted in well-paying jobs, contributing to regional economic growth. Overall, ASDC's initiatives have transformed the lives of many individuals, fostering both personal and professional development.

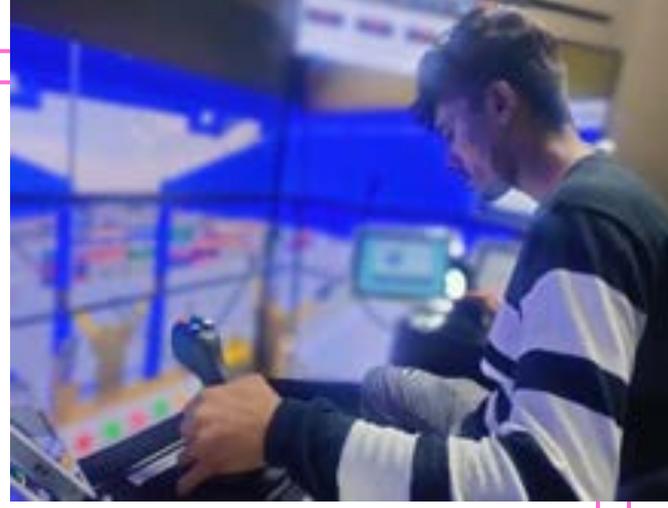
Percentage of Students in course, Bhuj



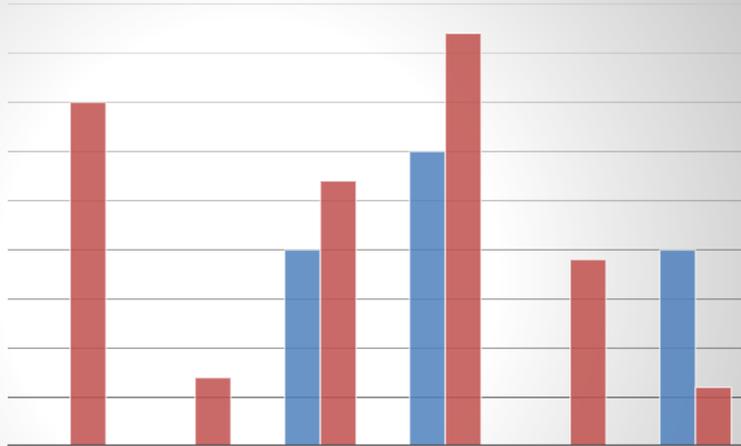
Percentage of Students in course, Mundra



Some glimpse of ASDC Mundra and Bhuj



Half Yearly Target Vs Achievement Bhuj



■ Target

■ Achivement

Apr May Jun Jul Aug Sep

0 0 20 30 0 20

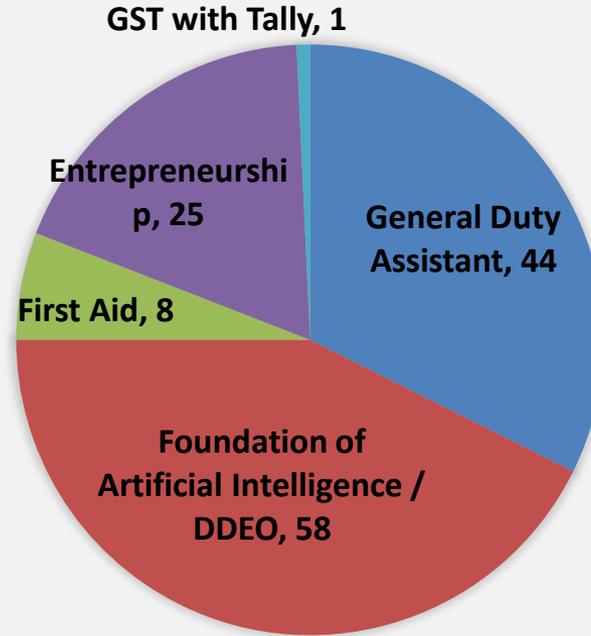
35 7 27 42 19 6

Half Yearly Target Vs Achievement



■ Total Half Yearly Target ■ Total Half Yearly Achivement

JOB ROLE WISE STUDENTS DETAILS, BHUJ



Total Students = 136

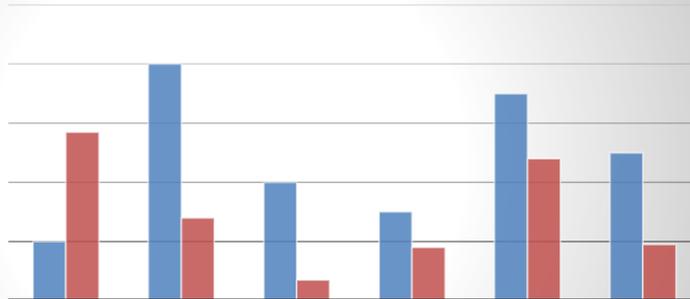
Revenue Generation Bhuj _Centre & Tie Up

Job Role	Student Paid	Tie Ups	Any other	Total Income
General Duty Assistant	284500	0	0	284500
Foundation of Artificial Intelligence / DDEO	177000	0	0	177000
First Aid	4792	0	0	4792
Tally with GST	8000	0	0	8000
Total	4,74,292	0	0	4,74,292

Bhuj Center Activities Photos



Half Yearly Target Vs Achievement Mundra



■ Target

■ Achivement

Apr May Jun Jul Aug Sep

20 80 40 30 70 50

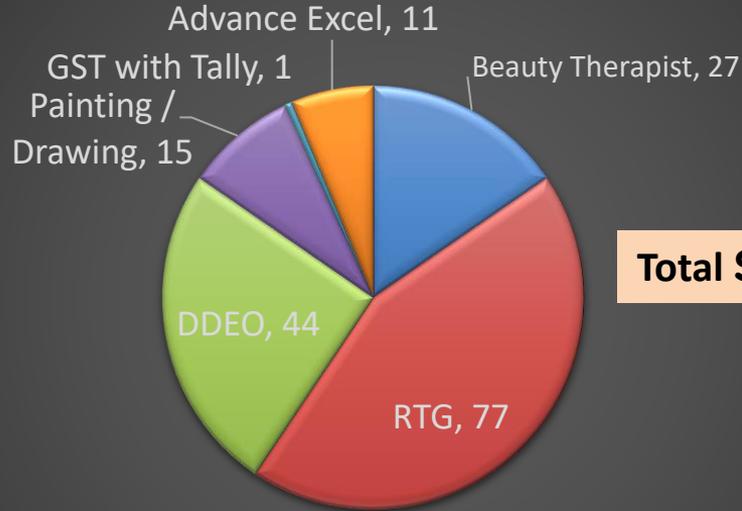
57 28 7 18 48 19

Yearly Target Vs Achievement Mundra



■ Total Half Yearly Target ■ Total Half Yearly Achivement

Job Role Wise Details Mundra



Total Students = 177

- Beauty Therapist
- RTG
- DDEO
- Painting / Drawing
- GST with Tally
- Advance Excel

Revenue Generation Mundra _Centre & Tie Up

Job Role	Student Paid	Tie Ups	Any other	Total Income
RTG	0	756000	0	756000
German Language Training	10000	0	0	10000
Beauty Therapist	54000	0	0	54000
DDEO	28000	0	0	28000
Tally with GST	3000	0	0	3000
Drawing/ Painting	18000	0	0	18000
Total	1,13,000	7,56,000	0	8,69,000

Mundra Center Activities Photos



Mundra Center Press note

મુન્દ્રામાં યુવાનો કેન ઓપરેટરની તાલીમ પ્રાપ્ત કરી રોજગાર મેળવવા બન્યા સુસજ્જ અદાણી કૌશલ્ય વિકાસ કેન્દ્ર દ્વારા સફળ તાલીમાર્થીને પ્રમાણપત્રનું કરાયું વિતરણ

ભાસ્કર ન્યૂઝ | મુન્દ્રા

તાજેતરમાં મુન્દ્રા ખાતે અદાણી સ્કીલ ડેવલોપમેન્ટ સેન્ટર દ્વારા નવી બેચના ઉદ્ઘાટન સાથે તાલીમાર્થીઓને આરટીકે કેન ઓપરેટર પ્રમાણપત્રો વિતરિત કરવામાં આવ્યા હતા. આમ સફળતા પૂર્વક તાલીમ પ્રાપ્ત કરનાર યુવાઓ હવે રોજગાર મેળવવા સુસજ્જ બન્યા છે.

એ સી ડી એસ યુવાઓને આત્મનિર્ભર બનાવવાના ઉદ્દેશ્ય સાથે ધોરણ દસ બાદ આઈટીઆઈ અથવા ધોરણ બાર ઉત્તીર્ણ વિદ્યાર્થીઓને તાલીમ આપી રોજગાર અર્થે સક્ષમ બનાવવામાં આવે છે. એસી ડી એસ દ્વારા છેલ્લા બે વર્ષમાં કેન ઓપરેશન ટ્રેડમાં 120 છાત્રોને સફળતાપૂર્વક ટ્રેનિંગ



અપાઈ છે. જેમાંથી 80 ઉમેદવારો અદાણી પોર્ટ પર જ નોકરી મેળવી આત્મનિર્ભર બન્યા છે. નવી બેચમાં 70 ટકા ઉમેદવારો કચ્છ જિલ્લાના અને અન્ય 30 ટકા પ્રમાણપત્ર વિતરણ સમારંભ માં ઉપસ્થિત ખાસ મહેમાનોને પણ સન્માનિત કરવામાં આવ્યા હતા. મુખ્ય અતિથી તરીકે એપીસીકો ના એચ આર હેડ રનેહાશીષ ભટ્ટાચાર્યએ કેન ઓપરેટર ની ભૂમિકા અંગે વિસ્તૃત માહિતી આપી હતી. અને તાલીમાર્થીઓને અદ્યતન ટેકનોલોજી સાથે અપડેટ રહેવા અને સતત નવું શીખતું રહેવા પ્રોત્સાહિત કર્યા હતા. રાષ્ટ્ર નિર્માણમાં યોગદાનના ઉદ્દેશ્ય થી ભારતના યુવાધન ને સક્ષમ બનાવવા અદાણી કૌશલ્ય વિકાસ કેન્દ્ર ની સ્થાપના 16 મેં 2016 ન રોજ કરવામાં આવી હતી. અને હવે તે વર્ટિકલ ભવિષ્ય માટે તૈયાર વ્યાવસાયિકો અન્યાયુનિક ટેકનોલોજી નો ઉપયોગ કરી તાલીમ આપવાના મિશન ને સતત આગળ ધપાવી રહ્યું છે.

અદાણી કૌશલ્ય વિકાસ કેન્દ્ર દ્વારા સફળ તાલીમાર્થીઓને પ્રમાણપત્ર વિતરણ કરાયા એએસડીસી યુવાઓને આત્મનિર્ભર બનાવવાની દિશામાં અગ્રેસર

લોકમાન્ય મુન્દ્રા: અદાણી કૌન્ટરેશન યુવા રોજગારીને પ્રાથમ આપતા અનેક કાર્યક્રમોમાં પ્રવૃત્ત છે. તાજેતરમાં અદાણી સ્કિલ ડેવલપમેન્ટ સેન્ટર મુન્દ્રા દ્વારા નવી બેચના ઉદ્ઘાટન સાથે તાલીમાર્થીઓને આરટીકે કેન ઓપરેટર પ્રમાણપત્રો વિતરિત કરવામાં આવ્યા હતા. એ ઓપરેટરની તાલીમ સફળતાપૂર્વક પૂર્ણ કરનાર યુવાઓ આત્મનિર્ભર બની સમાજમાં તેમની આગવી ઓળખ ઉભી કરશે.



અદાણી સ્કીલ ડેવલપમેન્ટ સેન્ટરનું મુખ્ય પુરાવોને રોજગારમાં પ્રવિશ્લિષ્ટ આપી તેમની કૌશલ્ય વિકાસમાં

મુખ્ય આત્મનિર્ભર બન્યા છે. નવી બેચમાં 80 ટકા ઉમેદવારો કચ્છ જિલ્લાના અને અન્ય ૩૦ ટકા વિવિધ સ્થળેએવી લેવામાં આવશે. સક્ષમ પ્રમાણપત્ર વિતરણ કાર્યક્રમમાં ઉપસ્થિત ખાસ મહેમાનોને પણ સન્માનિત કરવામાં આવ્યા હતા, જેમાં અદાણી કૌશલ્ય વિકાસ કેન્દ્રના સ્વરૂપ હેડ, અદાણી પોર્ટ પર અને સંવિધ્ય ડેવલપમેન્ટ ઝોન અને રવેલેસ કંપનીના ઉપચીફ ઈસીઓનો સમાવેશ થાય છે. મુખ્ય અતિથિ તરીકે અદાણી પોર્ટ સેક્ટના એચઆર હેડ રનેહાશીષ ભટ્ટાચાર્યએ અદાણી પોર્ટ ખાતે આરટીકે કેન ઓપરેટરની ભૂમિકા વિશે

સંવિધ્ય માહિતી આપી હતી. તેમણે તાલીમાર્થીઓને અદ્યતન ટેકનોલોજી સાથે અપડેટ રહેવાના અને સતત નવું શીખતું રહેવા માટે પ્રોત્સાહિત કર્યા હતા. રાષ્ટ્રનિર્માણમાં યોગદાનના દિશાથી ભારતના યુવાધનને સક્ષમ બનાવવા અદાણી કૌશલ્ય વિકાસ કેન્દ્રની સ્થાપના 1૬ મે, ૨૦1૬ના રોજ કરવામાં આવી હતી. એએસડીસી વર્ટિકલ ભવિષ્ય માટે તૈયાર વ્યાવસાયિકોને અન્યાયુનિક ટેકનોલોજીનો ઉપયોગ કરી તાલીમ આપવાના મિશનને સતત આગળ ધપાવી રહ્યું છે.

અદાણી કૌશલ્ય વિકાસ કેન્દ્ર દ્વારા કેન ટ્રેડની ૧૨૦ ઉમેદવારને તાલીમ

મુન્દ્રા, તા. ૧૮ : અદાણી કૌન્ટરેશન યુવા રોજગારીને પ્રાથમ આપતા અનેક કાર્યક્રમોમાં પ્રવૃત્ત છે. તાજેતરમાં અદાણી સ્કિલ ડેવલપમેન્ટ સેન્ટર (એએસડીસી) મુન્દ્રા દ્વારા નવી બેચના ઉદ્ઘાટન સાથે તાલીમાર્થીઓને આરટીકે કેન ઓપરેટર પ્રમાણપત્રો વિતરિત કરવામાં આવ્યા હતા. આ તાલીમ સફળતાપૂર્વક પૂર્ણ કરનારા યુવાઓ આત્મનિર્ભર બની સમાજમાં તેમની આગવી ઓળખ ઉભી કરશે.

એએસડીસી દ્વારા છેલ્લા ૨ વર્ષમાં આરટીકે કેન ઓપરેશન ટ્રેડમાં ૧૨૦ ઉમેદવારોને સફળતાપૂર્વક તાલીમ આપવામાં આવી છે, જેમાંથી ૮૦ ઉમેદવારો અદાણી પોર્ટ પર જ નોકરીઓ મેળવી આત્મનિર્ભર બન્યા છે. નવી બેચમાં ૭૦ ટકા ઉમેદવારો કચ્છ જિલ્લાના અને અન્ય ૩૦ ટકા વિવિધ સ્થળેએવી લેવામાં આવશે.

સક્ષમ પ્રમાણપત્ર વિતરણ કાર્યક્રમમાં ઉપસ્થિત ખાસ મહેમાનોને પણ સન્માનિત કરવામાં આવ્યા હતા, જેમાં અદાણી કૌશલ્ય વિકાસ કેન્દ્રના

સ્વરૂપ હેડ, અદાણી પોર્ટ અને સેક્ટના એચઆર હેડ રનેહાશીષ ભટ્ટાચાર્યએ અદાણી પોર્ટ ખાતે આરટીકે કેન ઓપરેટરની ભૂમિકા વિશે સંવિધ્ય માહિતી આપી હતી. તેમણે તાલીમાર્થીઓને અદ્યતન ટેકનોલોજી સાથે અપડેટ રહેવાના અને સતત નવું શીખતું રહેવા માટે પ્રોત્સાહિત કર્યા હતા.

મુખ્ય અતિથિ તરીકે અદાણી પોર્ટ એન્ડ સેક્ટના એચઆર હેડ રનેહાશીષ ભટ્ટાચાર્યએ અદાણી પોર્ટ ખાતે આરટીકે કેન ઓપરેટરની ભૂમિકા વિશે સંવિધ્ય માહિતી આપી હતી. તેમણે તાલીમાર્થીઓને અદ્યતન ટેકનોલોજી સાથે અપડેટ રહેવાના અને સતત નવું શીખતું રહેવા માટે પ્રોત્સાહિત કર્યા હતા.

આ ભારતના યુવાધનને સક્ષમ બનાવવા અદાણી કૌશલ્ય વિકાસ કેન્દ્રની સ્થાપના ૧૬ મે, ૨૦૧૬ના કરવામાં આવી હતી, જે વ્યાવસાયિકોને અન્યાયુનિક ટેકનોલોજીનો ઉપયોગ કરી તાલીમ આપવાના મિશનને સતત આગળ ધપાવી રહ્યું છે.



અદાણી કૌશલ્ય વિકાસ કેન્દ્ર દ્વારા તાલીમાર્થીઓને પ્રમાણપત્ર વિતરણ કાર્યક્રમનું દર્શન.

Annexure – 6

Radheshyam Singh

From: Chiragsing Rajput
Sent: Wednesday, October 16, 2024 11:45 AM
To: Bhagwat Swaroop Sharma; Radheshyam Singh
Cc: Anil Trivedi
Subject: FW: User is not active - GCP-usq79i

FYIP.....

-----Original Message-----

From: query_gcp@icfre.org <query_gcp@icfre.org>
Sent: Wednesday, October 16, 2024 11:40 AM
To: Chiragsing Rajput <Chiragsing.Rajput@adani.com>
Cc: Anil Trivedi <Anil.Trivedi@adani.com>
Subject: RE: User is not active - GCP-usq79i

Some people who received this message don't often get email from query_gcp@icfre.org. Learn why this is important <<https://aka.ms/LearnAboutSenderIdentification>>

CAUTION: This mail has originated from outside Adani. Please exercise caution with links and attachments.

Dear sir,

The Green Credit Programme is currently in its pilot stage, hence at this stage only the PSUs are allowed to participate as entity and State Forest Departments as Implementing Agency. Private entities may be allowed later. We will keep you informed as we progress and expand the program to private entities participation. Your user ID, if created, will be activated accordingly.

Thank you for your understanding and enthusiasm towards Green Credit Programme.

With Regards,

Green Credit Cell, ICFRE

-----"Chiragsing Rajput" <Chiragsing.Rajput@adani.com <mailto:Chiragsing.Rajput@adani.com> > wrote: -----
To: "query_gcp@icfre.gov.in <mailto:query_gcp@icfre.gov.in> " <query_gcp@icfre.gov.in <mailto:query_gcp@icfre.gov.in> >
From: "Chiragsing Rajput" <Chiragsing.Rajput@adani.com <mailto:Chiragsing.Rajput@adani.com> >
Date: 10/10/2024 11:35AM
Cc: "Anil Trivedi" <Anil.Trivedi@adani.com <mailto:Anil.Trivedi@adani.com> >
Subject: RE: User is not active - GCP-usq79i

Dear Sir,

In line with the discussion held with Dr. Sanjay Singh (Administrator) yesterday, we came to know that, at present the Green Credit Programme scheme is live for Government institutes/ agencies only.

As of now the said scheme is not in existence for private agencies / industrial sectors.

We are requesting you to please let us know, as and when this scheme become live for private agencies / industrial sectors.

Thanks & Regards,

Chiragsing Rajput

Environment Department | Adani Ports & Special Economic Zone Ltd.

Mob +91 9687678443 | Ext. 59523 | chiragsing.rajput@adani.com <mailto:chiragsing.rajput@adani.com> |
<https://ind01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.adani.com%2F&data=05%7C02%7CRadheshyam.Singh%40adani.com%7C72bfc9adf9974f3291aa08dceda9ee79%7C04c72f56184846a281678e5d36510cbc%7C0%7C0%7C638646561300812058%7CUnknown%7CTWFpbGZsb3d8eyJWljiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikk1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=EIOZFQINHkoroKEz0GVODayPoCVRthplcssbqKzxyd4%3D&reserved=0>
<<https://ind01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.adani.com%2F&data=05%7C02%7CRadheshyam.Singh%40adani.com%7C72bfc9adf9974f3291aa08dceda9ee79%7C04c72f56184846a281678e5d36510cbc%7C0%7C0%7C638646561300838414%7CUnknown%7CTWFpbGZsb3d8eyJWljiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikk1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=n65wMOZpDNPmORhkemAHeqJfjOaK8gGa%2BiNLHGXEa2Y%3D&reserved=0>>

Adani Corporate House, 3rd Floor, North Wing, Shantigram, Ahmedabad - 382421, Gujarat, India.

From: Chiragsing Rajput
Sent: Friday, September 27, 2024 12:16 PM
To: query_gcp@icfre.gov.in <mailto:query_gcp@icfre.gov.in>
Cc: Anil Trivedi <Anil.Trivedi@adani.com <mailto:Anil.Trivedi@adani.com> >
Subject: RE: User is not active - GCP-usq79i

Dear Sir / Madam,

Kindly do the needful to resolve the query as per trailing mail.

Regards,

Chiragsing Rajput

From: Chiragsing Rajput

Sent: Tuesday, September 17, 2024 2:16 PM
To: 'query_gcp@icfre.gov.in' <mailto:'query_gcp@icfre.gov.in'> <query_gcp@icfre.gov.in
<mailto:query_gcp@icfre.gov.in> >
Cc: Anil Trivedi <Anil.Trivedi@adani.com <mailto:Anil.Trivedi@adani.com> >
Subject: RE: User is not active - GCP-usq79i

Dear Sir / Madam,

Kindly do the needful to resolve the query as per trailing mail.

Regards,

Chiragsing Rajput

From: Chiragsing Rajput
Sent: Wednesday, September 11, 2024 10:41 AM
To: query_gcp@icfre.gov.in <mailto:query_gcp@icfre.gov.in>
Cc: Anil Trivedi <Anil.Trivedi@adani.com <mailto:Anil.Trivedi@adani.com> >
Subject: RE: User is not active - GCP-usq79i

Dear Sir / Madam,

Kindly do the needful to resolve the query as per trailing mail.

Regards,

Chiragsing Rajput

From: Chiragsing Rajput
Sent: Friday, September 6, 2024 1:59 PM
To: query_gcp@icfre.gov.in <mailto:query_gcp@icfre.gov.in>
Cc: Anil Trivedi <Anil.Trivedi@adani.com <mailto:Anil.Trivedi@adani.com> >
Subject: User is not active - GCP-usq79i

Dear Sir / Madam,

We have registered under Green Credit Programme and user id generated as GCP-usq79i.

However, while trying to login, the error is showing that user is not active. Kindly do the needful to resolve the same.

Thanks & Regards,

Chiragsing Rajput

Environment Department | Adani Ports & Special Economic Zone Ltd.

Mob +91 9687678443 | Ext. 59523 | chiragsing.rajput@adani.com <mailto:chiragsing.rajput@adani.com> |
<https://ind01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.adani.com%2F&data=05%7C02%7CRadheshyam.Singh%40adani.com%7C72bfc9adf9974f3291aa08dceda9ee79%7C04c72f56184846a281678e5d36510cbc%7C0%7C0%7C638646561300851437%7CUnknown%7CTWFpbGZsb3d8eyJWljojMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6IjE6IWhaWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=12%2B%2FMcKOAwwV1GXt3YBpZvXVgXfSv8xd24YqMT4Zghno%3D&reserved=0>
<<https://ind01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.adani.com%2F&data=05%7C02%7CRadheshyam.Singh%40adani.com%7C72bfc9adf9974f3291aa08dceda9ee79%7C04c72f56184846a281678e5d36510cbc%7C0%7C0%7C638646561300862286%7CUnknown%7CTWFpbGZsb3d8eyJWljojMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6IjE6IWhaWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=H4ym2LhBE0ZVY1oidXJSjOjepcx3ODxTbi%2BbR%2Bigzdl%3D&reserved=0>>

Adani Corporate House, 3rd Floor, North Wing, Shantigram, Ahmedabad - 382421, Gujarat, India.

DISCLAIMER: The information contained in this electronic message and any other attachment to this message are intended solely for the addressee and may contain information that is confidential, privileged and exempt from disclosure under applicable law. If you are not the intended recipient, you are hereby formally notified that any use, copying or distribution of this e-mail, in whole or in part, is strictly prohibited. Please immediately notify the sender by return e-mail and delete all copies of this e-mail and any attachments from your system. Any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the company.

WARNING: Computer viruses can be transmitted via email. The recipient should check this email and any attachments for the presence of viruses. Adani Group accepts no liability for any damage caused by any virus transmitted by this email.

Disclaimer: Please do not print this email unless it is absolutely necessary.

This email is exclusively intended for the addressee(s) and may contain proprietary, confidential or privileged information. If you are not the intended recipient, you should not disseminate, distribute or copy this e-mail. Please notify the sender immediately and destroy all copies of this message and any attachments.

Warning: Computer viruses can be transmitted via email. The recipient should check this email and any attachments for the presence of viruses. ICFRE accepts no liability for any damage caused by any virus transmitted by this email.

<https://ind01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.icfre.gov.in%2F&data=05%7C02%7CRadheshyam.Singh%40adani.com%7C72bfc9adf9974f3291aa08dceda9ee79%7C04c72f56184846a281678e5d3651>

0cbc%7C0%7C0%7C638646561300872978%7CUnknown%7CTWFpbGZsb3d8eyJWlloiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6IjEkaWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=7app9BpEJ9muZlhnYgYvOU3JwQOMHT0Kecp9SS%2BncPo%3D&reserved=0

Annexure – 7



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar 382010

Phone : (079) 23222425

(079) 23222152

Fax : (079) 23232156

Website : www.gpcb.gov.in

Application For CTE After TOR

File No : GPCB/ (PCB ID. - 17739)

To,
M/s. Adani Ports & Special Economic Zone Ltd.,
169/P, AT-NAVINAL ISLAND, MUNDRA, KUTCH,
City :Mundra ,
Dist : Kutch East ,
Taluka : Mundra

Sub: Consent to Establish (After obtaining Terms Of Rrference For Environment Clearance) under Section 25 of Water Act 1974 and Section 21 of Air Act 1981.

Ref: (1) Your online application No. 175853 dated 27/04/2020

(2) TOR issued by Central Authority vide their letter no. 10-24/2019-IA-III Dated 17/05/2019

Sir,

Without prejudice to the powers of this Board under the Water (Prevention and Control of Pollution) Act-1974, the Air Act-1981 and the Environment (Protection) Act-1986 and without reducing your responsibilities under the said Acts in any way, this is to inform you that this Board grants **Consent to Establish (After obtaining Terms Of Rrference For Environment Clearance) under Section 25 of Water Act 1974 and Section 21 of Air Act 1981** for manufacturing of products as mentioned into the application of Environment Clearance (EC) for which TOR is granted vide letter under reference no (2) above.

Consent To Establish Is Granted Subject To The Following Conditions: -

- 1) The validity period of this CTE shall be Seven Years from the issue of this order.
- 2) Applicant shall strictly comply with all conditions stipulated by competent authority in the order of Environment Clearance to be issued in reference to TOR issued vide letter under reference No. : 2 above.
- 3) The applicant shall however , not without the prior concern of the Board. Bring into use any new or altered outlet for the discharge of effluent or gaseous emission or sewage waste from the proposed industrial plant. The applicant is required to make applications to this Board for this purpose in the prescribed forms under the provisions of the water Act - 1974, the Air - 1981 and the Environment (Protection) Act - 1986.

For and on behalf of
Gujarat Pollution Control Board

K. B. Chaudhary
ROH - Kutch East

- This order is issued to 169/P, AT-NAVINAL ISLAND, MUNDRA, KUTCH, City :Mundra, Dist : Kutch East, Taluka : Mundra (17739) for CTE amendment after obtaining EC.

Forwarding & Undertaking Letter from Industry

Application for consent for establishing / operation the industrial plant / plants under Section 21 of the Air (prevention & Control of Pollution) Act, 1981

Important This Document or its copy does "NOT" serve as a Supporting Document Proof of Industry's Submission of an
Note : Application for a NOC / Consent. This Letter does "NOT" ensure that the Application FEES has been paid.

Application Purpose : To Consider EC as CTE We are applying for ToR to CTE for Water Front Development Project - Expansion as per ToR received from MOEF&CC, New Delhi. This application three XGN IDs will be linked 1. APSEZ (Mundra Port Terminal) – ID: 17739, 2. APSEZ (WFDP – West Port) – ID: 35427, 3. APSEZ (SPM & Pipeline for crude oil terminal) – ID: 37436. However as per GPCB application procedure we can apply under one XGN ID only and hence we are applying for ToR to CTE under GPCB – XGN ID: 17739 but this application and Cte permission will also be linked with other GPCB-XGN IDs as mentioned above. After granting of this Cte, we will apply for CtO-amendment in any of the above mentioned GPCB-XGN IDs as per the requirement by considering the same Cte. Details of ToR to Cte has been uploaded in Tag eia.EIA PDF.

From : Adani Ports & Special Economic Zone Ltd., Category: RED / LARGE
PLOT NO: 169/P,
at-navinal island, mundra, kutch,
Mundra - 370421
Contact Person: Chirag Rajput, Mob:9687678443, Ph:02838255187
DIST: Kutch East, TAL: Mundra, SIDC: MPSEZ

Print Date: 27/04/2020

PCB-ID : 17739
INWARD : 175853
Dt:27/04/2020

To,
 The Member Secretary,
 Gujarat Pollution Control Board
 Paryavaran Bhavan, Sector-10/A,
 Gandhinagar - 382010

Scrutinized By:

I / We here by Submitting application for CCA ,Inward No : 175853 ,Date : 27/04/2020 for ECC(Environment Clearance).

Applying For : EC Validity : Years Grant By : ROH

Air Sector : Water Consumption : klpd

Haz Sector : No of Plants : 1 Incenerator : 0

<u>Investment</u>	<u>Air</u>	<u>Water</u>	<u>Hazardous</u>
57594.00 Crs			+
1000000 Rs	0 Years	0 Years	0 Years

Payable Fees : Air : 0, Water : 0, Haz : 0

Paid Amount : 1000000, DD No : SAXC8736414213, Dt: 4/24/2020, at AXC , ***

Query / Reply:

Application copy received during the inspection on 06.05.2020

(Signature)

	I / We have Uploaded the following PDFs	Date	# Files	Size(kb)	#Page
1	EIA - Executive Summary Statement	22/04/20	1	41910	195
2	000 - Any Specific Information Called for [in SCRUTINY]	27/09/19	1	174244	875
3	ENV - Environment Statement , Form-V	25/09/19	1	4248	14
4	ANN - Annual Return : Form 4	25/09/19	1	3132	10
5	SHT - Storage Handling & Transportation Plan	30/08/19	1	6022	36
6	CER - Compliances for Reconsideration of Rejected-NOC	29/05/18	1	6698	35
7	C&A - Previous Consent-Reject / CCA Order / NOC Order	26/03/18	1	20175	136
8	APC - Air Pollution Control Measures-Details	21/03/18	1	2156	24
9	SSI - SSI-IEM-C.A Certi / Investment Proofs	30/12/16	1	1375	8
10	CMP - Compliance of earlier CCAs - (ONLY Renewal cases)	22/09/16	1	22695	157
11	PLI - PLI Policy	10/06/16	1	564	8
12	PLL - Plan LayOut + Site Plan	17/03/15	1	2221	3
13	INV - *** Pls ADD this file in SSI tag- Previous Cases	10/11/08	1	221	1
14	WAT - *** BreakUp of Water Uses & balance	10/11/08	1	231	2
15	PHT - *** Photos of Haz Waste Storage Facilities	06/09/08	1	91	2
16	HW3 - *** N.A Now !!! (Details of HW - 2008 rules)	06/09/08	1	1239	4
17	RAW - *** Raw materials / Products with QTY-Month	06/09/08	1	11	1
18	EAR - Env. Audit Compliance/Auditor Recommendations,3Pgs		0	0	0

Company s SEAL

1 (Through XGN)

N I C



NET Payment Receipt

PCB ID: 17739-Adani Ports & Special Economic Zone Ltd.

Address : 169/P, AT-NAVINAL ISLAND, MUNDRA, KUTCH, Mundra, Kutch East Pin : 370421

Application: 175853(ECC)-dd/MM/yyyy

Payment Id **263363**
Payment Date **24/04/2020**
Paid Amount **1000000**
Bank Details **AXC-*****
Transaction No **SAXC8736414213**
Status **Success**
Remarks **Transaction Successful**
Referance No **175853 (Environment Clearance)**
Type **ECC-ECC-CCA**
MIS Date -

Date : 25/04/2020

APSEZ has applied for EC & CRZ Clearance for WFDP – Expansion to the MoEF&CC, New Delhi and chronology of the application and subsequent proceedings are as below.

Sr. No.	Dated	Remarks
1.	09.03.2019	Application for EC & CRZ Clearance vide proposal no. IA/GJ/MIS/98592/2019
2.	23.04.2019	Hearing against EAC for seeking Terms of Reference (ToR)
3.	17.05.2019	MoEF&CC issued ToR for expansion of WFDP
4.	02.07.2019	Application for amendment in ToR
5.	27.09.2019	MoEF&CC issued ToR – Amendment for expansion of WFDP
6.	13.12.2019	Application for amendment in ToR
7.	10.04.2020	MoEF&CC issued ToR – Amendment for expansion of WFDP

The proposed expansion plan will comprise of the multi-purpose cargo and Liquid/Gas/cryogenic cargo handling quay development and associated facilities are given in the table below:

S. No	Description	Approved	Already developed	Proposed Expansion	Total Capacity	Remarks
1	Cargo Handling (MMTPA)	225	140	385	610	There will be optimization of layout and Multipurpose berth operation concept will be adopted, which will increase the cargo handling capacity.
2	Quay Length (m)	22000	7870	14470	22340	The increase in quay length is envisaged due to optimization of layout for Multipurpose cargo handling
3	Dredging (MCuM)	210	123	350	350	Due to optimization of layout within the existing approved water front area additional dredging quantity is envisaged
4	ETP (KLD)	265	265	1000	1265	Based on the future requirement, ~1000 KLD is proposed to be developed on Modular basis.
5	STP (KLD)	50000	55	50000	50055	Based on the future requirement 50 MLD will be developed in Modular basis
6	Desalination Plant (MLD)	300	47	400	447	Based on the future requirement additional units will be developed in Modular basis
7	SPM's / SBM's	2	2	2	4	To handle Petroleum products, as part of multipurpose (including liquid) cargoes, as already proposed

S. No	Description	Approved	Already developed	Proposed Expansion	Total Capacity	Remarks
8	Sea Island Jetty	0	0	1	1	To handle Petroleum products, as part of multipurpose (including liquid) cargoes, as already proposed

- As a part of proposed expansion plan, it is also proposed to develop remaining extension of 500 m on each side of eastern and western breakwater to prepare a round head in the south port which has been approved earlier as per the accorded EC of WFDP.
- West side breakwater of west port has already been developed. However eastern side breakwater of length 5000m is approved but yet not developed. The same is proposed to be developed as a part of proposed expansion.

Along with berths, backup facilities and independent port craft facilities, waste reception facilities, conveyor systems, drainage, water supply, electrical works, internal roads, railway works and other utilities, amenities and bunkering will be developed to accommodate all multipurpose cargo such as Liquid, Bulk, Break Bulk, Project Cargo, General Cargo, Dry Cargo, Container, Ro – Ro & Automobiles and any other non-hazardous cargo and Liquid /Gas/ Cryogenic cargo.

The cargo mix that has been revised as per the proposed development is represented in the below table.

Cargo Mix for Revised Master Plan development

S. No.	Cargo Type	Cargo Mix
1.	Multipurpose (Including Liquid)	Coal / Iron ore / limestone / Mines & Minerals & other dry bulk/Fertilizers and raw materials for manufacture of fertilizer / food grains / sugar / clinker / cement / Project cargo / timber & wood / machines/ Iron steel products / Break Bulk etc./Container, Ro – Ro & Automobiles and any other non-hazardous cargo. All Class A, B, C petroleum products, excluded petroleum products including Petrochemical products, Hazardous, Toxic and Non Hazardous chemicals/Liquids and other Liquid cargoes Tentative list of hazardous liquid cargo but not limited to are as follows: Ethylene, Propylene (Propene), Butadiene, Pentane, Ethyl Mercaptan Motor Spirit, Propylene Oxide, Hexane, Naphtha, Acetone, Methyl Chloride / Chloro Methane, Cyclohexane, Benzene, Ethyl Acetate, Acrylonitrile Acetonitrile, Methyl Methacrylate, Methacrylonitrile, Methanol (Methyl Alcohol), Isopropyl Alcohol, Ethyl Alcohol (Ethanol), Ethylene di chloride, Methyl Isobutyl Ketone, Ethyl Benzene, N-Butyl

S. No.	Cargo Type	Cargo Mix
		Acetate, Isobutyl Alcohol (Iso Butanol), N-Butyl Alcohol (NButanol), Epichlorohydrine, Styrene, O-Xylene, High Speed Diesel, Cumene, Crude Oil, PoL Aviation Fuel, Kerosene, Acetic Acid, Acetic Anhydride, Non-edible/Mentha Oil Low Sulphur Heavy Stock/ Furnace oil, Carbon Black Feedstock (CBFS), Aniline, Methyl Ethyl Ketone Peroxide, Ethyl Hexanol-2, Vinyl Chloride, Phenol, Naphthalene, Ethylene Glycol, Mono Ethylene Glycol, Toluene 2.4 -di isocyanate, Diphenyl Methane Di-Isocynate, Edible oil/Palm Oil, Paraffin, Bitumen, Sulphur, Lube oil, Asphalt, Coal, CNG, NG, Ammonia (NH3), Diammonium Phosphate, Muriate of Potash (MOP), Soda Ash (Sodium Carbonate), Urea, Limestone, Caustic Soda, Sulphuric acid, Phosphoric acid, Piperine/ Piperidine, Chloroform, Hydrochloric Acid (HCL), Ethylene diamine (EDA), CMDI etc.
2.	Gas/Cryogenics/Liquid	LNG, Propane, Butane, LPG, CNG, NG and All Class A, B, C petroleum products, excluded petroleum products Including Petrochemical products, Hazardous, Toxic and Non Hazardous chemicals/Liquids and other Liquid cargos.

Total Project Cost: 57594 Cr.

Note:

As per the EC & CTE under WFDP, we have been granted Consent to Operate (CTO / CC&A) by Gujarat Pollution control board in below 3 different XGN IDs as per project locations.

1. APSEZ (Mundra Port Terminal) – ID: 17739
2. APSEZ (WFDP – West Port) – ID: 35427
3. APSEZ (SPM & Pipeline for crude oil terminal) – ID: 37436

However as per GPCB application procedure we can apply under one XGN ID only and hence we are applying for ToR to CtE under GPCB – XGN ID: 17739 but this application will also be linked with other GPCB-XGN IDs as mentioned above.

After granting of this CtE, we will apply for CtO-amendment in any of the above mentioned GPCB-XGN IDs as per the requirement by considering the same CtE.

Technical details as per ToR to CtE Application:

S. No.	Particular	Capacity	Remarks
1	Water Consumption	400 MLD (Industrial + Domestic)	Based on the requirement, desalination plant of 400 MLD capacities will be developed in Modular basis
2	Wastewater Generation	Industrial: 1000 KLD Domestic: 50000 KLD Total: 51000 KLD	Based on the requirement, ETBs of 1 MLD & STPs of 50 MLD will be developed in Modular basis
3	Mode of Disposal of Treated Water		Domestic Treated Water: Utilization on land for horticulture purpose within APSEZ premises Industrial Treated Water: Utilization for industrial application as per requirement and/or sea disposal at identified location as per modeling studies
4	R.O. Reject from desalination plant	1100 MLD	The reject outfall quantity from desalination plant will be disposed at marine disposal location, identified as per modelling studies.
5	D.G. Sets (Stand-by)	Up to 50 MVA	Based on the requirement, D.G. Sets will be installed in Modular basis. D.G. Sets will be kept as stand-by and used in case of main power failure only
6	Fuel consumption	HSD: 400 Litre/Hr./D.G. Set	--

Cargo Handling Details as per ToR to CtE Application:

Cargo	Existing (MMTPA)	Approved	Proposed (MMTPA)	Total (MMTPA)
Multipurpose (Including Liquids)	210		360	570
Liquid/Gas/Cryogenic	15		25	40
			TOTAL	610

F.No.10-24/2019-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA.III Section)

Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi - 3

Date: 17th May, 2019

To,

Shri Shalin, Head Environment
M/s Adani Ports and Special Economic Zone Limited
Adani House, Shani gram, S G Highway
Ahmedabad- 382421, Gujarat
E Mail: azharuddin.kazi@adani.com

Subject: Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat by M/s Adani Ports and Special Economic Zone Limited - Terms of Reference - reg.

Sir,

This has reference to your proposal No. IA/GJ/MIS/98592/2019 dated 9th March, 2019, submitted to this Ministry for seeking Terms of Reference (ToR) in terms of the provisions of the Environment Impact Assessment (EIA) Notification, 2006 under the Environment (Protection) Act, 1986.

2. The proposal for grant of Terms of Reference (ToR) to the project "Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat by M/s Adani Ports and Special Economic Zone Limited was considered by the Expert Appraisal Committee (Infra-2) in its 40th meeting held on 23rd April, 2019.

3. The details of the project, as per the documents submitted by the project proponent, and also as informed during the above said meeting are as under:-

- (i) The waterfront development has been accorded Environmental and CRZ clearance as per the EIA Notification, 2006 and Coastal Regulation Zone Notification, 2011 vide letter No. 10-47/2008-IA.III dated 12th January 2009 and addendum was issued vide F.No. 10-47/2008-IA.III dated 19th January, 2009. The extension of validity for Environmental and CRZ clearance has been given vide letter F.No. 10-47/2008-IA.III dated 7th October, 2015 with validity up to 11th January, 2019.
- (ii) Since all the activities in-line to existing Environment & CRZ Clearance was not completed, it is utmost importance to restore the current Environment & CRZ Clearance. Further, based on the growth of business and cargo ramp up, the need of development of the remaining components with minor modification as per the business needs and other technical suitability in the approved Water front development plan is required. Hence proposal for Environment & CRZ clearance for the optimization/expansion of Water front development plan has been prepared. All the activities proposed as part of the current expansion will be within the boundary of Waterfront Development Plan (WFDP).
- (iii) For the expansion of WFDP, it is important to utilize the maximum marine development potential. Therefore, based on the future Cargo projections and business requirement of the hinterland, it is proposed to develop the port with the flexibility to handle various cargos. Type of berth and type of cargo is a commercial and business requirement. Hence, expansion plan will be developed with those flexibilities to accommodate berths and storage facilities as multi-purpose. The

expansion plan will consist of berths at various locations, material handling area, cargo storage area, operational and utility area, internal connectivity, drainage, greenbelt and various utilities, amenities and bunkering facilities.

- (iv) Along with berths, backup facilities and independent port craft facilities, waste reception facilities, conveyor systems, drainage, water supply, electrical works, internal roads, railway works and other utilities, amenities and bunkering will be developed to accommodate all multipurpose cargo such as Liquid, Bulk, Break Bulk, Project Cargo, General Cargo, Dry Cargo, Container, Ro-Ro & Automobiles and any other non-hazardous cargo and Liquid /Gas/ Cryogenic cargo (up to -162 degree Celsius, Pressurized Gases). Area outside the CRZ will be utilized for development of Industries. Necessary approvals for the same will be obtained, if required
- (v) The cumulative configuration of the waterfront development facility includes the following
- (vi) The entire expansion activities will be undertaken within the approved area of 5170 Ha of WFDP.
- (vii) About 385 MMTPA of multi-purpose/liquid/gas/cryogenic cargo will be handled in addition to the existing approved capacity of 225 MMTPA.

S. No.	Description	Approved	Already developed	Proposed Expansion
1.	Quay Length (m)	22000	7870	14470
2.	Dredging (MCuM)	210	123	350
3.	ETP (KLD)	265	265	1000
4.	STP (KLD)	50000	55	50000
5.	Desalination Plant (MLD)	300	47	400

- (viii) The entire existing and proposed quay length will be used for handling multi-purpose/liquid/gas/cryogenic cargo.
- (ix) Necessary augmentation of the existing quay length and backup facilities will be undertaken for handling multi-purpose/liquid/gas/cryogenic cargo.
- (x) As a part of proposed expansion plan, it is proposed to develop remaining extension of 500 m on each side of eastern and western breakwater to prepare a round head in the south port which has been approved earlier as per the accorded EC of WFDP.
- (xi) West side breakwater of west port has already been developed. However, eastern side breakwater of length 5000 m is approved but yet not developed. The same is proposed to be developed as a part of proposed expansion.
- (xii) All associated facilities for development of above configuration, is also being proposed as a part of expansion plan.
- (xiii) The maximum water withdrawal from intake will be in the range of 1500 MLD for desalination plant of capacity 400 MLD. The reject outfall quantity from desalination plant will be approximate 1100 MLD, which will be disposed at marine disposal location, identified through modelling studies.
- (xiv) Electricity requirement during operation phase will be in the range of 19,00,000 to 20,00,000 kWh/day. It will also be sourced from GEB. During operation phase, power back up in form of DG sets will be available to the tune of 40 MVA to 50 MVA. Diesel consumption for the same will be to the tune of 400 Lit/hr.

- (xv) The estimated quantity of MSW generated will be about 1- 1.2 TPD of which 60% will be biodegradable and 40% non-biodegradable during Revised Master Plan. Municipal wastes generated will be handled as per prevailing norms. The hazardous waste such as used oil, spent oil, Wastes/Residue containing oil, Pig wastes, Oil soaked rags, Cotton waste, discarded containers, barrels & Used Battery and Sludge from ETP will be handled as per Hazardous Waste Management Rules (as amended). Hazardous wastes will be disposed through approved SPCB/CPCB vendors.
- (xvi) Total capital cost for the proposed expansion plan is estimated to be approximate Rs. 57594 Crore.
- (xvii) The project when fully operational also brings in direct employment potential of about 1200 nos. hereby opening up employment opportunities for the youth in the catchment region. Additionally, the induced development due to the Port Expansion can bring indirect employment about 3600 people.
- (xviii) Baseline Environmental Monitoring has been completed for the period December, 2018 to March, 2019.

4. The project/activity is covered under category 'A' of item 7 (e) i.e. 'Ports, harbours, break waters, dredging' of the schedule to the EIA Notification, 2006 and its subsequent amendments, and requires appraisal at Central level by sectoral EAC.

5. It was informed that the waterfront development has been accorded Environmental and CRZ clearance as per the EIA Notification, 2006 and Coastal Regulation Zone Notification, 2011 vide letter F.No.10-47/2008-IA.III dated 12th January, 2009 and addendum was issued vide F.No.10-47/2008-IA.III dated 19th January, 2009. The extension of validity for Environmental and CRZ clearance has been given vide letter F.No.10-47/2008-IA.III dated 7th October, 2015 with validity up to 11th January, 2019. Since all the activities in-line to existing EC & CRZ Clearance was not completed, it is utmost importance to restore the current EC & CRZ Clearance. Further, based on the growth of business and cargo ramp up, the need of development of the remaining components with minor modification as per the business needs and other technical suitability in the approved Water front development plan is required. Hence proposal for EC& CRZ clearance for the optimization/expansion of Water front development plan has been prepared. All the activities proposed as part of the current expansion will be within the boundary of WFDP. The Additional 385 MMTPA of multi-purpose/Liquid/gas/cryogenic cargo will be handled in addition to the existing approved capacity of 225 MMTPA.

6. The EAC, in its 40th meeting held during 23rd April, 2019, after detailed deliberations, recommended the project for grant of ToR as specified by the Ministry as Standard ToR in April, 2015 for the said project/activity and the following ToR in addition to Standard ToR for preparation of EIA-EMP report. As per the recommendation of the EAC, the Ministry of Environment, Forest and Climate Change hereby accords ToR to the project "Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat by M/s Adani Ports and Special Economic Zone Limited for preparation of the Environmental Impact Assessment (EIA) Report and Environmental Management Plan (EMP) with the following specific and general conditions in addition to Standard ToR provided at **Annexure -1**:

- (i) Importance and benefits of the project.
- (ii) Submit a copy of layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale.
- (iii) Recommendation of the SCZMA.

- (iv) Submit superimposing of latest CZMP as per CRZ (2011) on the CRZ map.
- (v) Submit a complete set of documents required as per para 4.2 (i) of CRZ Notification, 2011.
- (vi) Certified Compliance Report issued by the MoEF&CC, Regional Office or concerned Regional Office of Central Pollution Control Board or the Member Secretary of the respective State Pollution Control Board for the conditions stipulated in the earlier environmental clearances issued to the project along with an action taken report on issues which have been stated to be partially complied or non/not complied.
- (vii) Compliance to the conditions of the consent to operate and authorization for the existing facilities. The EIA will discuss the compliance to the Pollution Control Laws and the notifications under the E.P. Act 1986 and get a certified report from the Pollution Control Board.
- (viii) Hydrodynamics study on impact of jetty/dredging on flow characteristics.
- (ix) Flooding and related impact on creek and control area during the cyclonic storm should be studied.
- (x) Ship navigational studies for the entrance channel should be carried out.
- (xi) The project proponents shall satisfactorily address to all the complaints/suggestions that have been received against the project till the date of submission of proposals for Appraisal.
- (xii) Various Dock and shipbuilding facilities with capacities for existing and proposed project.
- (xiii) The EIA would give a detailed analysis of the Impacts of storage and handling and the management plan of each cargo type along with the proposed compliance to the Hazardous Chemicals Storage rules.
- (xiv) Study the impact of dredging on the shore line and protection of northern coast by beach nourishment.
- (xv) Study the impact of dredging and dumping on marine ecology and draw up a management plan through the NIO or any other institute specializing in marine ecology.
- (xvi) A detailed analysis of the physico-chemical and biotic components in the highly turbid waters round the project site (as exhibited in the Google map shown during the presentation), compare it with the physico-chemical and biotic components in the adjacent clearer (blue) waters both in terms of baseline and impact assessment and draw up a management plan.
- (xvii) Details of Emission, effluents, solid waste and hazardous waste generation and their management in the existing and proposed facilities.
- (xviii) The sampling locations of the baseline should be collocated with ongoing sampling locations.
- (xix) Area of dredging or land reclamation should be clearly defined.
- (xx) Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract).
- (xxi) Permission from CGWA in case of groundwater use being proposed for the project.
- (xxii) Wastewater Management Plan.



- (xxiii) Details of Environmental Monitoring Plan.
- (xxiv) To prepare a detailed biodiversity impact assessment report and management plan through the NIO or any other institute of repute on marine, brackish water and fresh water ecology and biodiversity. The report shall study the impact on the rivers, estuary and the sea and include the intertidal biotopes, corals and coral communities, molluscs, sea grasses, sea weeds, subtidal habitats, fishes, other marine and aquatic micro, macro and mega flora and fauna including benthos, plankton, turtles, birds etc. as also the productivity. The data collection and impact assessment shall be as per standard survey methods.
- (xxv) A certificate from the competent authority for discharging treated effluent/ untreated effluents into the Public sewer/ disposal/drainage systems along with the final disposal point.
- (xxvi) A certificate from the local body supplying water, specifying the total annual water availability with the local authority, the quantity of water already committed, the quantity of water allotted to the project under consideration and the balance water available. This should be specified separately for ground water and surface water sources, ensuring that there is no impact on other users.
- (xxvii) A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project.
- (xxviii) A certificate from the competent authority handling municipal solid wastes, indicating the existing civic capacities of handling and their adequacy to cater to the M.S.W. generated from project.
- (xxix) The Air Quality Index shall be calculated for base level air quality.
- (xxx) The EIA would study the impact of dewatering and draw up an action plan for disposal of the excess water.
- (xxxi) The EIA would study the impact of Demolition and conformance to the Construction and Demolition Rules under the E.P. Act 1986.
- (xxxii) An assessment of the cumulative impact of all development and increased inhabitation being carried out or proposed to be carried out by the project or other agencies in the core area, shall be made for traffic densities and parking capabilities in a 05 kms radius from the site. A detailed traffic management and a traffic decongestion plan drawn up through an organization of repute and specializing in Transport Planning shall be submitted with the EIA. The Plan to be implemented to the satisfaction of the State Urban Development and Transport Departments shall also include the consent of all the concerned implementing agencies.
- (xxxiii) Disaster Management Plan for the above terminal.
- (xxxiv) Layout plan of existing and proposed Greenbelt.
- (xxxv) Status of court case pending against the project.
- (xxxvi) Public hearing to be conducted and issues raised and commitments made by the project proponent on the same should be included in EIA/EMP Report in the form of tabular chart with financial budget for complying with the commitments made.
- (xxxvii) Plan for Corporate Environment Responsibility (CER) as specified under Ministry's Office Memorandum vide F.No. 22-65/2017-IA.III dated 1st May, 2018 shall be prepared and submitted along with EIA Report.
- (xxxviii) A tabular chart with index for point wise compliance of above ToRs.

General Guidelines

- (i) The EIA document shall be printed on both sides, as far as possible.
- (ii) All documents should be properly indexed, page numbered.
- (iii) Period/date of data collection should be clearly indicated.
- (iv) Authenticated English translation of all material provided in Regional languages.
- (v) The letter/application for EC should quote the MoEF&CC File No. and also attach a copy of the letter prescribing the ToR.
- (vi) The copy of the letter received from the Ministry on the ToR prescribed for the project should be attached as an annexure to the final EIA-EMP Report.
- (vii) The final EIA-EMP report submitted to the Ministry must incorporate the issues mentioned in ToR and that raised in Public Hearing. The index of the final EIA-EMP report, must indicate the specific chapter and page no. of the EIA-EMP Report where the specific ToR prescribed by the Ministry and the issue raised in the Public Hearing have been incorporated. Questionnaire related to the project (posted on MoEF&CC website) with all sections duly filled in shall also be submitted at the time of applying for EC.
- (viii) Grant of ToR does not mean grant of EC.
- (ix) The status of accreditation of the EIA consultant with NABET/QCI shall be specifically mentioned. The consultant shall certify that his accreditation is for the sector for which this EIA is prepared.
- (x) On the front page of EIA/EMP reports, the name of the consultant/consultancy firm along with their complete details including their accreditation, if any shall be indicated. The consultant while submitting the EIA/EMP report shall give an undertaking to the effect that the prescribed ToRs (ToR proposed by the project proponent and additional ToR given by the MoEF&CC) have been complied with and the data submitted is factually correct (Refer MoEF&CC Office memorandum dated 4th August, 2009).
- (xi) While submitting the EIA/EMP reports, the name of the experts associated with/involved in the preparation of these reports and the laboratories through which the samples have been got analysed should be stated in the report. It shall clearly be indicated whether these laboratories are approved under the Environment (Protection) Act, 1986 and the rules made there under (Please refer MoEF&CC Office Memorandum dated 4th August, 2009). The project leader of the EIA study shall also be mentioned.
- (xii) All the ToR points as presented before the Expert Appraisal Committee (EAC) shall be covered.

7. The above ToR should be considered for the project 'Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat by M/s Adani Ports and Special Economic Zone Limited, in addition to all the relevant information as per the 'Generic Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006.

8. The project proponent shall submit the detailed final EIA/EMP prepared as per ToR along with public hearing to the Ministry for considering the proposal for environmental clearance within 3 years as per the MoEF&CC O.M. No.J-11013/41/2006-IA-II(I) (P) dated 08.10.2014.

9. The consultants involved in preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other Organization(s)/ Laboratories including their status of approvals etc. vide Notification of the MoEF&CC dated 19.07.2013.

10. The prescribed ToR would be valid for a period of three years for submission of the EIA/EMP Reports.

11. This issues with approval of the Competent Authority.


(Kushal Vashist)
Director

Copy to:

The Member Secretary, Gujarat Pollution Control Board, Paryavaran Bhavan, Sector-10A, Gandhinagar-382010, Gujarat.

7(e): STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR PORTS, HARBOURS AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

- i. Reasons for selecting the site with details of alternate sites examined/rejected/selected on merit with comparative statement and reason/basis for selection. The examination should justify site suitability in terms of environmental angle, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site.
- ii. Details of the land use break-up for the proposed project. Details of land use around 10 km radius of the project site. Examine and submit detail of land use around 10 km radius of the project site and map of the project area and 10 km area from boundary of the proposed/existing project area, delineating project areas notified under the wild life (Protection) Act, 1972/critically polluted areas as identified by the CPCB from time to time/notified eco-sensitive areas/interstate boundaries and international boundaries. Analysis should be made based on latest satellite imagery for land use with raw images.
- iii. Submit the present land use and permission required for any conversion such as forest, agriculture etc. land acquisition status, rehabilitation of communities/villages and present status of such activities.
- iv. Examine and submit the water bodies including the seasonal ones within the corridor of impacts along with their status, volumetric capacity, quality likely impacts on them due to the project.
- v. Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area.
- vi. Submit the details of terrain, level with respect to MSL, filling required, source of filling materials and transportation details etc.
- vii. Examine road/rail connectivity to the project site and impact on the existing traffic network due to the proposed project/activities. A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.
- viii. Submit details regarding R&R involved in the project.
- ix. Submit a copy of layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale along with the recommendation of the SCZMA.
- x. Submit the status of shore line change at the project site
- xi. Details of the layout plan including details of channel, breakwaters, dredging, disposal and reclamation.
- xii. Details of handling of each cargo, storage, transport along with spillage control, dust preventive measures. In case of coal, mineral cargo, details of storage and closed conveyance, dust suppression and prevention filters.
- xiii. Submit the details of fishing activity and likely impacts on the fishing activity due to the project. Specific study on effects of construction activity and pile driving on marine life.
- xiv. Details of oil spill contingency plan.



- xv. Details of bathymetry study.
- xvi. Details of ship tranquillity study.
- xvii. Examine the details of water requirement, impact on competitive user, treatment details, use of treated waste water. Prepare a water balance chart.
- xviii. Details of rainwater harvesting and utilization of rain water.
- xix. Examine details of Solid waste generation treatment and its disposal.
- xx. Details of desalination plant and the study for outfall and intake.
- xxi. Examine baseline environmental quality along with projected incremental load due to the proposed project/activities.
- xxii. The air quality monitoring should be carried out according to the notification issued on 16th November, 2009.
- xxiii. Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.
- xxiv. Submit details of a comprehensive Risk Assessment and Disaster Management Plan including emergency evacuation during natural and man-made disasters
- xxv. Submit details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measures taken to reduce the number of the trees to be removed should be explained in detail. Submit the details of compensatory plantation. Explore the possibilities of relocating the existing trees.
- xxvi. Examine the details of afforestation measures indicating land and financial outlay. Landscape plan, green belts and open spaces may be described. A thick green belt should be planned all around the nearest settlement to mitigate noise and vibrations. The identification of species/ plants should be made based on the botanical studies.
- xxvii. The Public Hearing should be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the web-site.
- xxviii. A detailed draft EIA/EMP report should be prepared in accordance with the above additional TOR and should be submitted to the Ministry in accordance with the Notification.
- xxix. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
- xxx. The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
- xxxi. Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "<http://moef.nic.in/Manual/Port and harbour>".



F.No.10-24/2019-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA.III Section)

Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi - 3

Date: 17th May, 2019

To,

Shri Shalin, Head Environment
M/s Adani Ports and Special Economic Zone Limited
Adani House, Shani gram, S G Highway
Ahmedabad- 382421, Gujarat
E Mail: azharuddin.kazi@adani.com

Subject: Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat by M/s Adani Ports and Special Economic Zone Limited - Terms of Reference - reg.

Sir,

This has reference to your proposal No. IA/GJ/MIS/98592/2019 dated 9th March, 2019, submitted to this Ministry for seeking Terms of Reference (ToR) in terms of the provisions of the Environment Impact Assessment (EIA) Notification, 2006 under the Environment (Protection) Act, 1986.

2. The proposal for grant of Terms of Reference (ToR) to the project "Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat by M/s Adani Ports and Special Economic Zone Limited was considered by the Expert Appraisal Committee (Infra-2) in its 40th meeting held on 23rd April, 2019.

3. The details of the project, as per the documents submitted by the project proponent, and also as informed during the above said meeting are as under:-

- (i) The waterfront development has been accorded Environmental and CRZ clearance as per the EIA Notification, 2006 and Costal Regulation Zone Notification, 2011 vide letter No. 10-47/2008-IA.III dated 12th January 2009 and addendum was issued vide F.No. 10-47/2008-IA.III dated 19th January, 2009. The extension of validity for Environmental and CRZ clearance has been given vide letter F.No. 10-47/2008-IA.III dated 7th October, 2015 with validity up to 11th January, 2019.
- (ii) Since all the activities in-line to existing Environment & CRZ Clearance was not completed, it is utmost importance to restore the current Environment & CRZ Clearance. Further, based on the growth of business and cargo ramp up, the need of development of the remaining components with minor modification as per the business needs and other technical suitability in the approved Water front development plan is required. Hence proposal for Environment & CRZ clearance for the optimization/expansion of Water front development plan has been prepared. All the activities proposed as part of the current expansion will be within the boundary of Waterfront Development Plan (WFDP).
- (iii) For the expansion of WFDP, it is important to utilize the maximum marine development potential. Therefore, based on the future Cargo projections and business requirement of the hinterland, it is proposed to develop the port with the flexibility to handle various cargos. Type of berth and type of cargo is a commercial and business requirement. Hence, expansion plan will be developed with those flexibilities to accommodate berths and storage facilities as multi-purpose. The

expansion plan will consist of berths at various locations, material handling area, cargo storage area, operational and utility area, internal connectivity, drainage, greenbelt and various utilities, amenities and bunkering facilities.

- (iv) Along with berths, backup facilities and independent port craft facilities, waste reception facilities, conveyor systems, drainage, water supply, electrical works, internal roads, railway works and other utilities, amenities and bunkering will be developed to accommodate all multipurpose cargo such as Liquid, Bulk, Break Bulk, Project Cargo, General Cargo, Dry Cargo, Container, Ro-Ro & Automobiles and any other non-hazardous cargo and Liquid /Gas/ Cryogenic cargo (up to -162 degree Celsius, Pressurized Gases). Area outside the CRZ will be utilized for development of Industries. Necessary approvals for the same will be obtained, if required
- (v) The cumulative configuration of the waterfront development facility includes the following
- (vi) The entire expansion activities will be undertaken within the approved area of 5170 Ha of WFDP.
- (vii) About 385 MMTPA of multi-purpose/liquid/gas/cryogenic cargo will be handled in addition to the existing approved capacity of 225 MMTPA.

S. No.	Description	Approved	Already developed	Proposed Expansion
1.	Quay Length (m)	22000	7870	14470
2.	Dredging (MCuM)	210	123	350
3.	ETP (KLD)	265	265	1000
4.	STP (KLD)	50000	55	50000
5.	Desalination Plant (MLD)	300	47	400

- (viii) The entire existing and proposed quay length will be used for handling multi-purpose/liquid/gas/cryogenic cargo.
- (ix) Necessary augmentation of the existing quay length and backup facilities will be undertaken for handling multi-purpose/liquid/gas/cryogenic cargo.
- (x) As a part of proposed expansion plan, it is proposed to develop remaining extension of 500 m on each side of eastern and western breakwater to prepare a round head in the south port which has been approved earlier as per the accorded EC of WFDP.
- (xi) West side breakwater of west port has already been developed. However, eastern side breakwater of length 5000 m is approved but yet not developed. The same is proposed to be developed as a part of proposed expansion.
- (xii) All associated facilities for development of above configuration, is also being proposed as a part of expansion plan.
- (xiii) The maximum water withdrawal from intake will be in the range of 1500 MLD for desalination plant of capacity 400 MLD. The reject outfall quantity from desalination plant will be approximate 1100 MLD, which will be disposed at marine disposal location, identified through modelling studies.
- (xiv) Electricity requirement during operation phase will be in the range of 19,00,000 to 20,00,000 kWh/day. It will also be sourced from GEB. During operation phase, power back up in form of DG sets will be available to the tune of 40 MVA to 50 MVA. Diesel consumption for the same will be to the tune of 400 Lit/hr.

- (xv) The estimated quantity of MSW generated will be about 1- 1.2 TPD of which 60% will be biodegradable and 40% non-biodegradable during Revised Master Plan. Municipal wastes generated will be handled as per prevailing norms. The hazardous waste such as used oil, spent oil, Wastes/Residue containing oil, Pig wastes, Oil soaked rags, Cotton waste, discarded containers, barrels & Used Battery and Sludge from ETP will be handled as per Hazardous Waste Management Rules (as amended). Hazardous wastes will be disposed through approved SPCB/CPCB vendors.
- (xvi) Total capital cost for the proposed expansion plan is estimated to be approximate Rs. 57594 Crore.
- (xvii) The project when fully operational also brings in direct employment potential of about 1200 nos. hereby opening up employment opportunities for the youth in the catchment region. Additionally, the induced development due to the Port Expansion can bring indirect employment about 3600 people.
- (xviii) Baseline Environmental Monitoring has been completed for the period December, 2018 to March, 2019.

4. The project/activity is covered under category 'A' of item 7 (e) i.e. 'Ports, harbours, break waters, dredging' of the schedule to the EIA Notification, 2006 and its subsequent amendments, and requires appraisal at Central level by sectoral EAC.

5. It was informed that the waterfront development has been accorded Environmental and CRZ clearance as per the EIA Notification, 2006 and Coastal Regulation Zone Notification, 2011 vide letter F.No.10-47/2008-IA.III dated 12th January, 2009 and addendum was issued vide F.No.10-47/2008-IA.III dated 19th January, 2009. The extension of validity for Environmental and CRZ clearance has been given vide letter F.No.10-47/2008-IA.III dated 7th October, 2015 with validity up to 11th January, 2019. Since all the activities in-line to existing EC & CRZ Clearance was not completed, it is utmost importance to restore the current EC & CRZ Clearance. Further, based on the growth of business and cargo ramp up, the need of development of the remaining components with minor modification as per the business needs and other technical suitability in the approved Water front development plan is required. Hence proposal for EC& CRZ clearance for the optimization/expansion of Water front development plan has been prepared. All the activities proposed as part of the current expansion will be within the boundary of WFDP. The Additional 385 MMTPA of multi-purpose/Liquid/gas/cryogenic cargo will be handled in addition to the existing approved capacity of 225 MMTPA.

6. The EAC, in its 40th meeting held during 23rd April, 2019, after detailed deliberations, recommended the project for grant of ToR as specified by the Ministry as Standard ToR in April, 2015 for the said project/activity and the following ToR in addition to Standard ToR for preparation of EIA-EMP report. As per the recommendation of the EAC, the Ministry of Environment, Forest and Climate Change hereby accords ToR to the project "Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat by M/s Adani Ports and Special Economic Zone Limited for preparation of the Environmental Impact Assessment (EIA) Report and Environmental Management Plan (EMP) with the following specific and general conditions in addition to Standard ToR provided at **Annexure -1**:

- (i) Importance and benefits of the project.
- (ii) Submit a copy of layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale.
- (iii) Recommendation of the SCZMA.

- (iv) Submit superimposing of latest CZMP as per CRZ (2011) on the CRZ map.
- (v) Submit a complete set of documents required as per para 4.2 (i) of CRZ Notification, 2011.
- (vi) Certified Compliance Report issued by the MoEF&CC, Regional Office or concerned Regional Office of Central Pollution Control Board or the Member Secretary of the respective State Pollution Control Board for the conditions stipulated in the earlier environmental clearances issued to the project along with an action taken report on issues which have been stated to be partially complied or non/not complied.
- (vii) Compliance to the conditions of the consent to operate and authorization for the existing facilities. The EIA will discuss the compliance to the Pollution Control Laws and the notifications under the E.P. Act 1986 and get a certified report from the Pollution Control Board.
- (viii) Hydrodynamics study on impact of jetty/dredging on flow characteristics.
- (ix) Flooding and related impact on creek and control area during the cyclonic storm should be studied.
- (x) Ship navigational studies for the entrance channel should be carried out.
- (xi) The project proponents shall satisfactorily address to all the complaints/suggestions that have been received against the project till the date of submission of proposals for Appraisal.
- (xii) Various Dock and shipbuilding facilities with capacities for existing and proposed project.
- (xiii) The EIA would give a detailed analysis of the Impacts of storage and handling and the management plan of each cargo type along with the proposed compliance to the Hazardous Chemicals Storage rules.
- (xiv) Study the impact of dredging on the shore line and protection of northern coast by beach nourishment.
- (xv) Study the impact of dredging and dumping on marine ecology and draw up a management plan through the NIO or any other institute specializing in marine ecology.
- (xvi) A detailed analysis of the physico-chemical and biotic components in the highly turbid waters round the project site (as exhibited in the Google map shown during the presentation), compare it with the physico-chemical and biotic components in the adjacent clearer (blue) waters both in terms of baseline and impact assessment and draw up a management plan.
- (xvii) Details of Emission, effluents, solid waste and hazardous waste generation and their management in the existing and proposed facilities.
- (xviii) The sampling locations of the baseline should be collocated with ongoing sampling locations.
- (xix) Area of dredging or land reclamation should be clearly defined.
- (xx) Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract).
- (xxi) Permission from CGWA in case of groundwater use being proposed for the project.
- (xxii) Wastewater Management Plan.



- (xxiii) Details of Environmental Monitoring Plan.
- (xxiv) To prepare a detailed biodiversity impact assessment report and management plan through the NIO or any other institute of repute on marine, brackish water and fresh water ecology and biodiversity. The report shall study the impact on the rivers, estuary and the sea and include the intertidal biotopes, corals and coral communities, molluscs, sea grasses, sea weeds, subtidal habitats, fishes, other marine and aquatic micro, macro and mega flora and fauna including benthos, plankton, turtles, birds etc. as also the productivity. The data collection and impact assessment shall be as per standard survey methods.
- (xxv) A certificate from the competent authority for discharging treated effluent/ untreated effluents into the Public sewer/ disposal/drainage systems along with the final disposal point.
- (xxvi) A certificate from the local body supplying water, specifying the total annual water availability with the local authority, the quantity of water already committed, the quantity of water allotted to the project under consideration and the balance water available. This should be specified separately for ground water and surface water sources, ensuring that there is no impact on other users.
- (xxvii) A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project.
- (xxviii) A certificate from the competent authority handling municipal solid wastes, indicating the existing civic capacities of handling and their adequacy to cater to the M.S.W. generated from project.
- (xxix) The Air Quality Index shall be calculated for base level air quality.
- (xxx) The EIA would study the impact of dewatering and draw up an action plan for disposal of the excess water.
- (xxxi) The EIA would study the impact of Demolition and conformance to the Construction and Demolition Rules under the E.P. Act 1986.
- (xxxii) An assessment of the cumulative impact of all development and increased inhabitation being carried out or proposed to be carried out by the project or other agencies in the core area, shall be made for traffic densities and parking capabilities in a 05 kms radius from the site. A detailed traffic management and a traffic decongestion plan drawn up through an organization of repute and specializing in Transport Planning shall be submitted with the EIA. The Plan to be implemented to the satisfaction of the State Urban Development and Transport Departments shall also include the consent of all the concerned implementing agencies.
- (xxxiii) Disaster Management Plan for the above terminal.
- (xxxiv) Layout plan of existing and proposed Greenbelt.
- (xxxv) Status of court case pending against the project.
- (xxxvi) Public hearing to be conducted and issues raised and commitments made by the project proponent on the same should be included in EIA/EMP Report in the form of tabular chart with financial budget for complying with the commitments made.
- (xxxvii) Plan for Corporate Environment Responsibility (CER) as specified under Ministry's Office Memorandum vide F.No. 22-65/2017-IA.III dated 1st May, 2018 shall be prepared and submitted along with EIA Report.
- (xxxviii) A tabular chart with index for point wise compliance of above ToRs.

General Guidelines

- (i) The EIA document shall be printed on both sides, as far as possible.
- (ii) All documents should be properly indexed, page numbered.
- (iii) Period/date of data collection should be clearly indicated.
- (iv) Authenticated English translation of all material provided in Regional languages.
- (v) The letter/application for EC should quote the MoEF&CC File No. and also attach a copy of the letter prescribing the ToR.
- (vi) The copy of the letter received from the Ministry on the ToR prescribed for the project should be attached as an annexure to the final EIA-EMP Report.
- (vii) The final EIA-EMP report submitted to the Ministry must incorporate the issues mentioned in ToR and that raised in Public Hearing. The index of the final EIA-EMP report, must indicate the specific chapter and page no. of the EIA-EMP Report where the specific ToR prescribed by the Ministry and the issue raised in the Public Hearing have been incorporated. Questionnaire related to the project (posted on MoEF&CC website) with all sections duly filled in shall also be submitted at the time of applying for EC.
- (viii) Grant of ToR does not mean grant of EC.
- (ix) The status of accreditation of the EIA consultant with NABET/QCI shall be specifically mentioned. The consultant shall certify that his accreditation is for the sector for which this EIA is prepared.
- (x) On the front page of EIA/EMP reports, the name of the consultant/consultancy firm along with their complete details including their accreditation, if any shall be indicated. The consultant while submitting the EIA/EMP report shall give an undertaking to the effect that the prescribed ToRs (ToR proposed by the project proponent and additional ToR given by the MoEF&CC) have been complied with and the data submitted is factually correct (Refer MoEF&CC Office memorandum dated 4th August, 2009).
- (xi) While submitting the EIA/EMP reports, the name of the experts associated with/involved in the preparation of these reports and the laboratories through which the samples have been got analysed should be stated in the report. It shall clearly be indicated whether these laboratories are approved under the Environment (Protection) Act, 1986 and the rules made there under (Please refer MoEF&CC Office Memorandum dated 4th August, 2009). The project leader of the EIA study shall also be mentioned.
- (xii) All the ToR points as presented before the Expert Appraisal Committee (EAC) shall be covered.

7. The above ToR should be considered for the project 'Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat by M/s Adani Ports and Special Economic Zone Limited, in addition to all the relevant information as per the 'Generic Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006.

8. The project proponent shall submit the detailed final EIA/EMP prepared as per ToR along with public hearing to the Ministry for considering the proposal for environmental clearance within 3 years as per the MoEF&CC O.M. No.J-11013/41/2006-IA-II(I) (P) dated 08.10.2014.

9. The consultants involved in preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other Organization(s)/ Laboratories including their status of approvals etc. vide Notification of the MoEF&CC dated 19.07.2013.

10. The prescribed ToR would be valid for a period of three years for submission of the EIA/EMP Reports.

11. This issues with approval of the Competent Authority.


(Kushal Vashist)
Director

Copy to:

The Member Secretary, Gujarat Pollution Control Board, Paryavaran Bhavan, Sector-10A, Gandhinagar-382010, Gujarat.

7(e): STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR PORTS, HARBOURS AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

- i. Reasons for selecting the site with details of alternate sites examined/rejected/selected on merit with comparative statement and reason/basis for selection. The examination should justify site suitability in terms of environmental angle, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site.
- ii. Details of the land use break-up for the proposed project. Details of land use around 10 km radius of the project site. Examine and submit detail of land use around 10 km radius of the project site and map of the project area and 10 km area from boundary of the proposed/existing project area, delineating project areas notified under the wild life (Protection) Act, 1972/critically polluted areas as identified by the CPCB from time to time/notified eco-sensitive areas/interstate boundaries and international boundaries. Analysis should be made based on latest satellite imagery for land use with raw images.
- iii. Submit the present land use and permission required for any conversion such as forest, agriculture etc. land acquisition status, rehabilitation of communities/villages and present status of such activities.
- iv. Examine and submit the water bodies including the seasonal ones within the corridor of impacts along with their status, volumetric capacity, quality likely impacts on them due to the project.
- v. Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area.
- vi. Submit the details of terrain, level with respect to MSL, filling required, source of filling materials and transportation details etc.
- vii. Examine road/rail connectivity to the project site and impact on the existing traffic network due to the proposed project/activities. A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.
- viii. Submit details regarding R&R involved in the project.
- ix. Submit a copy of layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale along with the recommendation of the SCZMA.
- x. Submit the status of shore line change at the project site
- xi. Details of the layout plan including details of channel, breakwaters, dredging, disposal and reclamation.
- xii. Details of handling of each cargo, storage, transport along with spillage control, dust preventive measures. In case of coal, mineral cargo, details of storage and closed conveyance, dust suppression and prevention filters.
- xiii. Submit the details of fishing activity and likely impacts on the fishing activity due to the project. Specific study on effects of construction activity and pile driving on marine life.
- xiv. Details of oil spill contingency plan.



- xv. Details of bathymetry study.
- xvi. Details of ship tranquillity study.
- xvii. Examine the details of water requirement, impact on competitive user, treatment details, use of treated waste water. Prepare a water balance chart.
- xviii. Details of rainwater harvesting and utilization of rain water.
- xix. Examine details of Solid waste generation treatment and its disposal.
- xx. Details of desalination plant and the study for outfall and intake.
- xxi. Examine baseline environmental quality along with projected incremental load due to the proposed project/activities.
- xxii. The air quality monitoring should be carried out according to the notification issued on 16th November, 2009.
- xxiii. Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.
- xxiv. Submit details of a comprehensive Risk Assessment and Disaster Management Plan including emergency evacuation during natural and man-made disasters
- xxv. Submit details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measures taken to reduce the number of the trees to be removed should be explained in detail. Submit the details of compensatory plantation. Explore the possibilities of relocating the existing trees.
- xxvi. Examine the details of afforestation measures indicating land and financial outlay. Landscape plan, green belts and open spaces may be described. A thick green belt should be planned all around the nearest settlement to mitigate noise and vibrations. The identification of species/ plants should be made based on the botanical studies.
- xxvii. The Public Hearing should be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the web-site.
- xxviii. A detailed draft EIA/EMP report should be prepared in accordance with the above additional TOR and should be submitted to the Ministry in accordance with the Notification.
- xxix. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
- xxx. The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
- xxxi. Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "<http://moef.nic.in/Manual/Port and harbour>".



F. No. 10-24/2019-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA.III Section)

Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi - 3

Date: 27th September, 2019

To,

M/s Adani Ports and Special Economic Zone Limited
Adani House, Shani gram, S G Highway
Ahmedabad - 382421, Gujarat
E Mail: azharuddin.kazi@adani.com

Subject: Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat by M/s Adani Ports and Special Economic Zone Limited - Amendment in Terms of Reference - reg.

Sir,

This has reference to your proposal No. IA/GJ/MIS/108648/2019 dated 2nd July, 2019, submitted to this Ministry for seeking Amendment in Terms of Reference (ToR) in terms of the provisions of the Environment Impact Assessment (EIA) Notification, 2006 under the Environment (Protection) Act, 1986.

2. The proposal for grant of amendment in Terms of Reference (ToR) to the project 'Expansion of Waterfront Development Plan for Mundra Port' by APSEZ, Mundra, Gujarat by M/s Adani Ports and Special Economic Zone Limited was considered by the Expert Appraisal Committee (Infra-2) in its 43rd meeting held during 20-22 August, 2019.

3. The details of the project, as per the documents submitted by the project proponent, and also as informed during the above said meeting, are as under:-

- (i) The waterfront development has been accorded Environmental and CRZ clearance as per EIA Notification, 2006 and Costal Regulation Zone Notification, 2011 vide letter No: 10-47/2008-IA.III dated 12th January, 2009 and amendment dated 19th January, 2009. The extension of validity for Environmental and CRZ clearance was granted vide letter No. 10-47/2008-IA.III dated 7th October, 2015 with validity up to 11th January, 2019.
- (ii) Proposal for expansion of waterfront development project (WFDP) was prepared and submitted to MoEF&CC for obtaining ToR which was granted by MoEFCC vide letter F.No. 10-24/2019-IA-III dated 17th May, 2019.
- (iii) Now, as per the business needs and requirements, project proponent proposed to develop "1 nos. Sea Island Jetty" & "2 nos. Single Point Moorings (SPM)/Single Buoy Mooring (SBM)" in the sea, as a part of expansion of WFDP to handle Petroleum products, as part of multipurpose (including liquid) cargoes, as already proposed. There will not be changes in any of the project components, including total cargo quantity, submitted as a part of earlier ToR application.

4. The project/activity is covered under category 'A' of item 7 (e) i.e. 'Ports, harbours, break waters, dredging' of the schedule to the EIA Notification, 2006 and its subsequent amendments, and requires appraisal at Central level by sectoral EAC.

5. The EAC noted that ToR was granted by MoEFCC vide letter F.No.10-24/2019-IA-III dated 17th May, 2019. Now the project proponent has proposed to develop "1 nos. Sea Island Jetty" & "2 nos. Single Point Moorings (SPM)" in the sea, as a part of expansion of

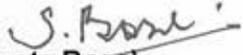
S. K. Rose

WFDP to handle Petroleum products, as part of multipurpose (including liquid) cargoes in addition to the component already proposed in ToR dated 17.05.2019. The Committee after detailed deliberation on the proposal recommended to amend the Terms of Reference granted by MoEFCC vide letter F.No.10-24/2019-IA-III dated 17th May, 2019. Based on the recommendations of EAC, the Ministry hereby accord the following amendment to the ToR letter F.No. 10-24/2019-IA-III dated 17th May, 2019.

Following activities shall be added in addition to the component already proposed in ToR dated 17.05.2019:

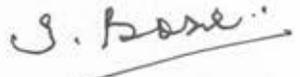
"1 nos. Sea Island Jetty" & "2 nos. Single Point Moorings (SPM)" in the sea, as a part of expansion of WFDP will be included in the project.

6. All the other conditions contained in the MoEF&CC ToR letter F.No.10-24/2019-IA-III dated 17th May, 2019 shall remains the same.


(Dr. Subrata Bose)
Scientist F

Copy to:

The Member Secretary, Gujarat Pollution Control Board, Paryavaran Bhavan, Sector-10A, Gandhinagar-382010, Gujarat.



F.No. 10-24/2019-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA.III Section)

Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi - 3

Date: 10th April, 2020

To,

M/s Adani Ports and Special Economic Zone Limited

Adani House, Shani gram, S G Highway
Ahmedabad - 382421, Gujarat
E Mail: azharuddin.kazi@adani.com

Subject: Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat by M/s Adani Ports and Special Economic Zone Limited - Amendment in Terms of Reference - reg.

Sir,

This has reference to your proposal No. IA/GJ/MIS/131179/2019 dated 13.12.2019, submitted the above proposal to this Ministry for seeking Amendment in Terms of Reference (ToR) in terms of the provisions of the Environment Impact Assessment (EIA) Notification, 2006 under the Environment (Protection) Act, 1986.

2. The proposal for grant of amendment in Terms of Reference (ToR) accorded to the project 'Expansion of Waterfront Development Plan for Mundra Port' by APSEZ, Mundra, Gujarat in favour of M/s Adani Ports and Special Economic Zone Limited vide letter of even No. dated 17.05.2019 and subsequent amendment dated 27.09.2019 was considered by the Expert Appraisal Committee (Infra-2) in its 48th meeting held during 28-29 January, 2020.

3. The details of the project, as per the documents submitted by the project proponent, and also as informed during the above said meeting, are under:-

- (i) The waterfront development has been accorded Environmental and CRZ clearance as per EIA Notification, 2006 and Costal Regulation Zone Notification, 2011 vide letter No: 10-47/2008-IA.III dated 12.01.2009 and addendum letter No. 10-47/2008-IA.III dated 19.01.2009. The extension of validity for Environmental and CRZ clearance has been given vide letter F.No. 10-47/2008-IA.III dated 07.10.2015 with validity up to 11.01.2019.
- (ii) Since all the activities in-line to existing Environment & CRZ Clearance was not completed, it was utmost importance to restore the current Environment & CRZ Clearance. Hence, proposal for expansion of WFDP with minor modification as per business requirement was prepared and submitted to MoEF&CC for obtaining ToR.
- (iii) MoEFCC has granted Terms of Reference to the project vide letter F.No.10-24/2019-IA-III dated 17.05.2019 and subsequent amendment dated 27.09.2019.
- (iv) Further, APSEZ requested for amendment in ToR for public hearing exemption considering the following facts:
 - The current expansion will be taken up within the existing approved area. No additional land will be acquired. Hence No R&R involved.
 - No additional coastal land will be developed beyond the earlier approved master plan and hence no impact on local fishing activity.
 - APSEZ has already undertaken various Public hearings, inline to the EIA Notification, 2006 in the Mundra region since 2008 and have addressed the public views and commitments effectively.
 - Public hearings that has been conducted in the region are as follows:
 - ❖ Waterfront Development Plan in Mundra, Kutch district, Gujarat in Year 2008.
 - ❖ Development of Multiproduct Special Economic Zone in Mundra, Kutch district, Gujarat in Year 2010.



- ❖ Development of Ship breaking facility near Mundra West Port, Mundra, Kutch district, Gujarat in Year 2013.
 - ❖ Development of a Commercial Airport at Mundra, Kutch district, Gujarat in Year 2018.
- (v) All the issues raised by people during various Public Hearings have been implemented by APSEZ and as part of expansion proposal all the issues have been addressed.
- (vi) There is no change in any of the components/configuration of the project that has been accorded ToR on 17.05.2019 & amended vide letter dated 27.09.2019.

4. The project/activity is covered under category 'A' of item 7 (e) i.e. 'Ports, harbours, break waters, dredging' of the schedule to the EIA Notification, 2006 and its subsequent amendments, and requires appraisal at Central level by sectoral EAC.

5. The project proponent informed the EAC that the entire port limit is part of notified SEZ as per Ministry of commerce & industry Notification. As per Para 7.III.(i).(b) of EIA Notification 2006 and its subsequent amendment, PH is exempted for all projects or activities located within industrial estates or parks (item 7(c) of the schedule) approved by the concerned authorities.

There is no additional hydrodynamic impacts are envisaged, all the impacts are predicted & management plan are arrived as a part of CIA. Over all there is positive impact in mangroves (as per NCSCM study), increase mangrove cover – 246 Ha (2011-2017). Overall 4 Public Hearings are conducted in the region. All the issues raised by people during various Public Hearings have been implemented by APSEZ and as part of expansion proposal all the issues have been addressed. All the impacts are predicted & managements plan are arrived. No new impacts are envisaged. Effectively implemented Environmental Management Plan and regularly carrying out Environmental Monitoring

APSEZ has carried out Cumulative Impact Assessment Study (CIA) for Master plan of Port & SEZ for 2030 (including all approved & existing project - 10 km). Cumulative Impact Assessment study was carried out by NABET accredited Environmental Consultant covering baseline data collection, mathematical modelling and other technical studies to identify the potential impacts and develop macro level management plan, which will be jointly implemented in consultation with concerned authorities. APSEZ has made detailed presentation on CIA to EAC committee during 45th EAC meeting, held on 18.10.2019. APSEZ has effectively implemented Environmental Management Plan and has been regularly carrying out Environmental Monitoring for various environmental aspects. Half yearly Compliance reports are regularly submitted to the concerned authorities. Regional office of MoEF&CC has carried out inspection of the entire waterfront Development number of times and there were no non-compliance observed. Last Inspection was carried out on 04.09.2019 (No non-compliance as per RO-MoEF&CC report).

6. The Committee after detailed deliberation on the proposal recommended to exempt Public Hearing as per para 7(ii) of EIA Notification, 2006 and its subsequent amendments for preparation of EIA/EMP report. Based on the recommendations of EAC, the Ministry hereby exempt Public Hearing as per para 7(ii) of EIA Notification, 2006 and its subsequent amendments for preparation of EIA/EMP report for the project Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat.

7. All the other conditions contained in the MoEF&CC ToR letter F.No.10-24/2019-IA-III dated 17.05.2019 and Amendment in ToR dated 27.09.2019 shall remains the same.


 (Dr. Vinod K. Singh)
 Scientist E

Copy to:

The Member Secretary, Gujarat Pollution Control Board, Paryavaran Bhavan, Sector-10A, Gandhinagar - 382010, Gujarat.

No.10-47/2008-IA-III
Government of India
Ministry of Environment and Forests
(IA-III Division)

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110003

Dated the 12th January, 2009

Sub: Coastal Regulation Zone clearance for proposed waterfront development project at Mundra District Kachchh, Gujarat of M/s Mundra Port and SEZ Limited – Environmental clearance – regarding.

Reference is invited to the letter No.ENV-10-2008-843-P, dated 13.10.2008 from Forest and Environment Department, Government of Gujarat and letters No.MPSEZ/Ping/WDP/EC/MoEF01, dated 29.3.2008, No.MPSEZ/Ping/waterfrontdevelopment/MoEF01, dated 10.4.2008, No.MPSEZL/WFDP/MoEF08, dated 7.11.2008, No.MPSEZL/WFDP/MoEF08, dated 18.11.2008 and No.MPSEZ/PLNG/EC/CRZ/WFDP12, dated 16.12.2008 from M/s Mundra Port and Special Economic Zone Limited and letter No.GPCB/PH/2008-09/Kutch-19/26769, dated 18.11.2008 from Gujarat State Pollution Control Board regarding the subject mentioned above.

2. The project is for developing waterfront development which includes North Port, South Port, West Port and East at Port. Mundra District Kachchh, Gujarat. The North Port, approach channel will be dredged to a uniform depth of -17.5m CD. The proposed expansion of the existing channel affecting mangroves has been dropped. Further, two turning circles of diameter about 550m at 17.5m below CD. Five container berths, Ro-Ro terminal (600m wide), railway line, backup area of 350 ha, back up facilities like rail sidings, rail truck loading facility, open paved areas, associated buildings, utilities, amenities etc. and connectivity to rail and road corridor are proposed. With regard to the East Port channel will be channel dredged to a uniform depth of -17.5m CD. For the project three turning circles of diameter about 800m dredged and maintained at -17.5m below CD, further two container terminals of total cumulative quay length of 2000m, light and heavy engineering berth-2, liquid berth-1, multipurpose berth-2, back up area 640 ha, backup facilities like rail sidings, rail and truck loading facility, open paved areas and associated buildings, utilities, amenities etc., and connectivity to the rail and road corridor are proposed. Two potential sites have been identified for shipyard development (one on eastern end and other on western end of the existing port). Both the shipyards are identical. Major facilities to be developed are, two drydocks with single position intermediate gate, block assembly area at the head of both docks for final blocking of ship sections, commissioning and outfitting quay and associated facilities. The West port shipyard area will be 281 ha and East yard shipyard area will be 320 ha. Total dredging involved for the project is 210MM³. Dredged spoil is suitable for reclamation. Dredging, reclamation and level raising activities will be carried out. Seawater intake channel is planned for Power plants, desalination plant and other industrial requirements. Further, Bocha Island (88ha), East of Bocha Island (155ha), Kotdi Mouth (981ha), Mouth of Baradimata (30ha) have been identified for conservation as a potential mangrove area, which is to be maintained by the Horticulture Department of Mundra Port. The project proponent have already undertaken 1000 ha of mangrove afforestation along the coastal areas of Gujarat and have committed a additional afforestation of 200 ha of mangroves in the coastal areas of Gujarat. Creeks will be kept open to maintain the hydrology of the region.

3. The project was considered in the Expert Committee meeting held on 23rd & 24th April, 2008, 25th & 26th November, 2008 and 19th & 20th December, 2008 and recommended the project. Keeping in view the above facts, the proposal has been examined in the Ministry of Environment & Forests and environmental clearance from Environmental Impact Assessment Notification, 2006 and Coastal Regulation Zone Notification, 1991 is hereby accorded to this project subject to effective implementation of the following conditions:-

(A) Specific Conditions:

- i) No existing mangroves shall be destroyed during construction/operation of the project.
- ii) There shall be no filling up of the creek and reclamation of the creeks.

- iii) The project proponent shall comply with all the Orders/directions of the Hon'ble High Court of Gujarat and Supreme Court in the matter.
- iv) Adequate safety measures for the offshore structure and ship navigation shall be taken in view of the high current in the area.
- v) The shore line changes in the area shall be monitored periodically and the report submitted every 6 months to Regional Office Bhopal.
- vi) The recommendations of the risk assessment shall be implemented. Any change in the design the project shall come before the committee for seeking necessary approval.
- vii) Mangrove plantation of 200 ha to be done in consultations with the GEER/GEC of Forest Department, a detailed plan shall be submitted within six months from the date of receipt of this letter.
- viii) It shall be ensured that during construction and post construction of the proposed jetty the movement fishermen vessels of the local communities are not interfered with.
- ix) Relocation of the fishermen community if any, shall be done strictly in accordance with the norms prescribed by the State Government.
- x) Marine ecology monitoring shall be done regularly during construction of Breakwater and dredging/disposal operation.
- xi) Regular monitoring of air quality shall be done in the settlement areas around the project site and appropriate safeguard measures shall be taken.
- xii) Sewage arising in the port area shall be disposed off after adequate treatment to conform to the standards stipulated by Gujarat State Pollution Control Board and shall be utilized/re-cycled for gardening, plantation and irrigation.
- xiii) Adequate plantation shall be carried out along the roads of the Port premises and a green belt shall be developed.
- xiv) There shall be no withdrawal of ground water in CRZ area for this project.
- xv) Specific arrangements for rain water harvesting shall be made in the project design and the rain water so harvested shall be optimally utilised. Details in this regard shall be furnished to this Ministry's Regional Office at Bhopal within 3 months.
- xvi) Land reclamation shall be carried out only to the extent that it is essential for this project.
- xvii) No product other than those permissible in the Coastal Regulation Zone Notification, 1991 shall be stored in the Coastal Regulation Zone area.

B. General Conditions:

- (i) Construction of the proposed structures, if any in the Coastal Regulation Zone area shall be undertaken meticulously conforming to the existing Central/local rules and regulations including Coastal Regulation Zone Notification 1991 & its amendments. All the construction designs / drawings relating to the proposed construction activities must have approvals of the concerned State Government Departments / Agencies.
- (ii) Adequate provisions for infrastructure facilities such as water supply, fuel, sanitation etc. shall be ensured for construction workers during the construction phase of the project so as to avoid felling of trees/mangroves and pollution of water and the surroundings.

- (iii) The project authorities must make necessary arrangements for disposal of solid wastes and for the treatment of effluents by providing a proper wastewater treatment plant outside the CRZ area. The quality of treated effluents, solid wastes and noise level etc. must conform to the standards laid down by the competent authorities including the Central/State Pollution Control Board and the Union Ministry of Environment and Forests under the Environment (Protection) Act, 1986, whichever are more stringent.
- (iv) The proponent shall obtain the requisite consents for discharge of effluents and emissions under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (prevention and Control of Pollution) Act, 1981 from the Gujarat Pollution Control Board before commissioning of the project and a copy of each of these shall be sent to this Ministry.
- (v) The sand dunes, corals and mangroves, if any, on the site shall not be disturbed in any way.
- (vi) A copy of the clearance letter will be marked to the concerned Panchayat/local NGO, if any, from whom any suggestion/representation has been received while processing the proposal.
- (vii) The funds earmarked for environment protection measures shall be maintained, in a separate account and there shall be no diversion of these funds for any other purpose. A year-wise expenditure on environmental safeguards shall be reported to this Ministry's Regional Office at Bhopal and the State Pollution Control Board.
- (viii) Full support shall be extended to the officers of this Ministry's Regional Office at Bhopal and the officers of the Central and State Pollution Control Boards by the project proponents during their inspection for monitoring purposes, by furnishing full details and action plans including the action taken reports in respect of mitigative measures and other environmental protection activities.
- (ix) In case of deviation or alteration in the project including the implementing agency, a fresh reference shall be made to this Ministry for modification in the clearance conditions or imposition of new ones for ensuring environmental protection.
- (x) This Ministry reserve the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry.
- (xi) This Ministry or any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environmental protection, which shall be complied with.
- (xii) The project proponent shall advertise at least in two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned informing that the project has been accorded environmental clearance and copies of clearance letters are available with the State Pollution Control Board and may also be seen at Website of the Ministry of Environment & Forests at <http://www.envfor.nic.in>. The advertisement shall be made within 7 days from the date of issue of the clearance letter and a copy of the same shall be forwarded to the Regional Office of this Ministry at Bhopal.
- (xiii) The Project proponents shall inform the Regional Office at Bhopal as well as the Ministry the date of financial closure and final approval of the project by the concerned authorities and the date of start of Land Development Work.
- (xiv) Any appeal against this environmental clearance shall lie with the National Environment Appellate Authority, if preferred, within a period of 30 days as prescribed under Section 11 of the National Environment Appellate Act, 1997.

4. The above mentioned stipulations will be enforced among others under the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981, the Environment (protection) Act, 1986, the Hazardous Chemicals (Manufacture, Storage and Import) Rules, 1989, the Coastal Regulation Zone Notification, 1991 and its subsequent amendments and the Public Liability Insurance Act, 1991 and the Rules

made thereunder from time to time. The project proponents shall also ensure that the proposal complies with the provisions of the approved Coastal Zone Management Plan of Gujarat State and the Supreme Court's order dated 18th April, 1996 in the Writ Petition No.664 of 1993 to the extent the same are applicable to this proposal.


(Dr. A. Senthil Vel)
Additional Director

To

Director (Environment),
Forests & Environment Department,
Government of Gujarat, Block No.14,
8th Floor, Sachivalaya, Gandhinagar – 382 010.

Copy to:

1. The Chief Conservator of Forests, Ministry of Environment & Forests, Ministry of Environment & Forests, Regional Office (Western Region), Kendriya Paryavaran Bhavan, Link Road No.3, Ravi Shankar Nagar, Bhopal – 4620 16.
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, Delhi – 110032.
3. The Chairman, Gujarat State Pollution Control Board, Paryavaran Bhavan, Sector 10-A, Gandhinagar – 382 010, Gujarat.
4. M/s Mundra Port and Special Economic Zone Limited, "Adani House", C-105, Anand Niketan, New Delhi - 110021.
5. DIG (SU), Regional Office Cell, Ministry of Environment & Forests, New Delhi.
6. Guard File.
7. Monitoring Cell.
8. Direct (EI), Ministry of Environment & Forests, New Delhi.


(Dr. A. Senthil Vel)
Additional Director

No.10-47/2008-IA-III
Government of India
Ministry of Environment and Forests
(IA-III Division)

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110003

Dated the 19th January, 2009

ADDENDUM

Sub: Coastal Regulation Zone clearance for proposed waterfront development project at Mundra District Kachchh, Gujarat of M/s Mundra Port and SEZ Limited – Environmental clearance – regarding.

The Ministry had earlier accorded clearance to the above project vide Ministry's letter of even number dated 12.1.2009 under the provisions of Coastal Regulation Zone Notification, 1991 and Environment Impact Assessment Notification, 2006 for undertaking the above activity. Now, vide letter No.Nil, dated 14.1.2009 from M/s Mundra Port and SEZ Limited, the project proponent have requested for inclusion of the description of South Port and West Port which has not been spell out in the above environmental clearance dated 12.1.2009.

South Port is located to the south of the exiting port. An artificially created basin of approximately 505 ha area, dredged to a uniform depth of -17.5m CD with a turning basin of diameter about 700m dredged and maintained at 17.5m below CD. Two breakwaters, one on the west side and another on east and three container terminals having total length of 2680m approximately, multi purpose terminal having total quay length of 550m, liquid berths, Ro-Ro cum service terminal, port crafts terminal of approximately 350m, two deep water berths of LNG terminal with storage facilities, back up facilities like container yard, rail slidings, rail and truck loading facility, open paved areas and associated buildings, utilities, amenities etc. (approx. 700ha) is proposed. West Port is being design to handle vessel of 275,000 DWT, which requires draft of -23m CD. Six berths with mechanized handling of coal and iron ore, five berths for dry bulk cargo, six berths for liquid cargo, approach channel of 500m width, western breakwater (4.91km), eastern breakwater (4.4km), backup area (920ha) and back-up infrastructure facilities (920ha) is proposed. The project also involves laying of intake and outfall system for the thermal power plant, desalination plant and other treated effluents which is located outside the Coastal Regulation Zone area. Further, a 300 MLD desalination plant is also proposed to meet the water requirement.

All other conditions shall remain unchanged.


(Dr. A. Senthil Vel)
Additional Director

To

Director (Environment),
Forests & Environment Department,
Government of Gujarat, Block No.14,
8th Floor, Sachivalaya, Gandhinagar – 382 010.

Copy to:

1. The Chief Conservator of Forests, Ministry of Environment & Forests, Ministry of Environment & Forests, Regional Office (Western Region), Kendriya Paryavaran Bhavan, Link Road No.3, Ravi Shankar Nagar, Bhopal – 4620 16.
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, Delhi – 110032.
3. The Chairman, Gujarat State Pollution Control Board, Paryavaran Bhavan, Sector 10-A, Gandhinagar – 382 010, Gujarat.
4. M/s Mundra Port and Special Economic Zone Limited, "Adani House", C-105, Anand Niketan, New Delhi -110021.
5. DIG (SU), Regional Office Cell, Ministry of Environment & Forests, New Delhi.
6. Guard File.
7. Monitoring Cell.
8. Direct (EI), Ministry of Environment & Forests, New Delhi.

(Dr. A. Senthil Vel)
Additional Director

F. No. 10-47/2008-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA-III Section)

Indira Paryavaran Bhawan
Jor Bagh Road, Aliganj
New Delhi - 110 003

Dated: 7th October, 2015

To,

The Head (Environment),
M/s Adani Port and SEZ Limited,
Adani House, Nr. Mithakhali Circle,
Navrangpura,
Ahmedabad - 380 009 (Gujarat)

**Sub: Waterfront development at Mundra in District Kachchh (Gujarat)
by M/s Adani Port & SEZ Limited - Extension of validity of
Clearance dated 12.01.2009- reg.**

This has reference to your letter dated 24.01.2014 seeking extension of validity of clearance granted vide letter No. 10-47/2008-IA-III dated 12.01.2009 and as amended vide letter dated 19.01.2009. The issue was discussed by the EAC in its 130th meeting held during 22nd – 24th January, 2014. The Committee has recommended the project for grant of extension of validity of the clearance dated 12.01.2009 for a further period of five years with any existing qualification in respect of North Port.

2. The recommendations of EAC and those of Ms. Sunita Narain Committee on cancellation of clearance for North Port, have been examined, and an appropriate order dated 18.09.2015 has been passed by the Ministry in the subject matter. It has been decided that the proposal for extension of validity of clearance for North Port granted under Environment Impact Assessment (EIA) Notification, 2006 and Coastal Regulation Zone (CRZ) Notification, 1991 vide the above mentioned letter dated 12.01.2009 would be considered separately at a later stage.

3. As per the recommendation of EAC, the extension of validity of the clearance granted under EIA Notification, 2006 and CRZ Notification, 1991 vide the above mentioned letter dated 12.01.2009 and addendum dated 19.01.2009, excluding the clearance for all developmental activities at North Port, is hereby extended upto 11.01.2019. The extension of validity of clearance for all developmental activities at North Port will be considered at a later stage.

SKJ

4. The extension of the validity of the aforesaid clearance is subject to the directions contained in this Ministry's order of even number dated 18.09.2015 (copy enclosed). The Project Proponent shall submit the compliance report, including compliance to the directions contained in this order, to concerned Regional Office of the Ministry at Bhopal and Gujarat State Coastal Zone Management Authority. All other conditions stipulated in the above mentioned letter granting clearance dated 12.01.2009 shall remain unchanged.


7/10/2015
(S.K. Srivastava)
Scientist E

Encl.: as above

Copy to:

1. The Principal Secretary, Department of Forest & Environment and Chairman, GCZMA, Govt. of Gujarat, Sachivalaya, Gandhinagar, Gujarat.
2. The Chairman, Central Pollution Control Board (CPCB), Parivesh Bhawan, CBD-Cum-Office Complex, East Arjun Nagar, Delhi- 32.
3. The Director, Forests & Environment Department, Govt. of Gujarat, Block No. 14, 8th Floor, Sachivalaya, Gandhinagar- 382 010.
4. The Chairman, Gujarat State Pollution Control Board, Paryavaran Bhawan, Sector 10A, Gandhinagar- 382 010.
5. Additional Principal Chief Conservator of Forests (C), Ministry of Environment, Forest and Climate Change, Regional Office (WZ), E-5, Kendriya Paryavaran Bhawan, E-5 Arera Colony, Link Road-3, Ravishankar Nagar, Bhopal - 462016



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector 10-A, Gandhinagar 382010

Phone : (079) 23226295

Fax : (079) 23232156

website : www.gpcb.gov.in

BY R.P.A.D

NO: PC/CCA-KUTCH-582(3)/GPCB ID: 35427/ 70294

Date: - 04-01-2014

To,
M/S MUNDRA PORT AND SEZ LIMITED (WFDP-WEST PORT)
ADANI HOUSE, MITHAKALI CIRCLE,
NAVARANGPURA,
DIST: AHMEDABAD - 380 009

SUB: Amendment in **Consent to Establishment (NOC)** under Section 25 of Water Act 1974 and Section 21 of Air Act 1981.

- REF: 1. CTE Order issued vide letter PC/NOC/CCA-KUTCH-582/16783 dated 01-08-2009 by this board.
2. Your letter with reference NIL dated 24/10/2013

Sir,

Without prejudice to the powers of this Board under the Water (Prevention and Control of Pollution) Act-1974, the Air Act-1981 and the Environment (Protection) Act-1986 and without reducing your responsibilities under the said Acts in any way, this is to inform you that this Board amend earlier **Consent to Establish (NOC)** for validity extension of an industrial plant/activities located at **LANDS OF SURVEY. NO. 169 OF DHURB AND TRAVERSE SURVEY NO. 141 OF 141 VILL. MUNDRA & PORT LAND OF TR. SURVEY NO.141 OF MUNDRA ,NAVINAL ISLAND LAND , AREA BETWEEN DHURB VILL. & OLD BHARAT SALT AND CHEMICAL LTD LAND HAVING AREA OF 2200.37 ACRES, 1004 ACRES & 200 ACRES RESPECTIVELY AT NAVINAL ISLAND, TA: MUNDRA .DIST: KUTCH - 370 421**

1. The validity of the Consent Order issued vide letter PC/NOC/CCA-KUTCH-582/16783 dated 01-08-2009 shall be extended for further five years vide this letter and it shall be valid up to 01/07/2018 instead of 01/07/2013.
2. The other terms and conditions of Consent Order issued vide letter PC/NOC/CCA-KUTCH-582/16783 dated 01-08-2009 shall remain unchanged.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD


(V.R. GHADGE) 1/1/14
SENIOR ENVIRONMENTAL ENGINEER

Clean Gujarat Green Gujarat

ISO - 9001 - 2008 & ISO - 14001 - 2004 Certified Organisation



GUJARAT POLLUTION CONTROL BOARD

Paryavaran Bhavan

Sector-10-A, Gandhinagar - 382 010.

Fax : (079) 23232156

Website : www.gpcb.gov.in

CONSENT TO ESTABLISHMENT

NO: PC/NOC/CCA-Kutch-582/ 16783

1 AUG 2009

To,
M/s. MUNDRA PORT AND SEZ LIMITED.

Adani House , Mithakhali circle.

Navrangpura, Ahmedabad -38009.

TA: MUNDRA .

DIST: KUTCH.

SUB: - Consent to Establishment (NOC) under Section- 25
of Water Act - 1974 and Section 21 of Air Act 1981.

REF: - Your letter No. nil, dated: 02-07-2008 & details and requisite
letter submitted vide letter dated 24-12-2009.

Sir,

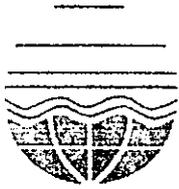
Without prejudice to the powers of this Board under the Water (Prevention and Control of Pollution) Act-1974, the Air Act-1981 and the Environment (Protection) Act-1986 and without reducing your responsibilities under the said Acts in any way, this is to inform you that this Board grants **Consent to Establish (NOC)** for setting up and operate FOR "**WATERFRONT DEVELOPMENT PLAN**" which includes four Port Clusters, ship yard, Desalination plant, intake and outfall facility and associated area development As At: village Lands of survey . no. 169 of dhurb and Traverse Survey no. 141 of 141 vill. Mundra & Port land of Tr. Survey no.141 of Mundra ,Navinnal Island land , Area between Dhurb vill. & Old Bharat Salt and chemical ltd land having area of 2200.37 Acres, 1004 Acres & 200 Acres respectively. TA: MUNDRA .DIST: KUTCH. Total nos. of plot to be allotted having area 3403.37 acres.

The total cost of the project is 27422 Crore. The validity period of the order will be Five years. [i.e. valid up to 01-07-2013]

Specific conditions:

- Unit shall comply the stipulated Specific & general conditions of obtained EC from MOEF, New Delhi vide letter bearing no. 10-47/2008-IA-III dt. 12-01-2009.
- No ground water shall be used for the project coming under:
- The project proponent shall comply with all the Orders/Directions of the Hon'ble High Court of Gujarat and Supreme court in the matter.
- The project proponent shall comply with all the Orders/Directions of the National Environment Appellate Authority, New Delhi. Dt. 20-07-2009.

1



GUJARAT POLLUTION CONTROL BOARD

Paryavaran Bhavan

Sector-10-A, Gandhinagar - 382 010.

Fax : (079) 23232156

Website : www.gpcb.gov.in

CONDITIONS UNDER WATER ACT 1974:

1. The quantity of inds effluent shall be Nil.
2. The quantity of the domestic waste water shall not exceed 50 MLD.
3. Unit shall install the STP consist units are as :

Sr. no.	Name of the STP Unit	Nos.	Size of the unit in Metres.
1	Screen /Grit Chamber	1	1x1x0.4
2	Oil & Grease Trap	1	2.5x1x0.5
3	Collection cum eqln. Tank	1	5.75x5.75x[3+0.5]
4	Aeration Tank	1	6x5x[3+0.5]
5	Secondary Clarifier	1	3.5x3.5x[2.2+1.7+0.5]
6	PSF	1	1 daix2
7	ACF	1	1 daix2
8	Guard Pond	1	5.75x5.75x[3+0.5]

Domestic effluent shall be treated in STP to conform to the following standards and shall be disposed on land within the premises for gardening / plantation purpose after treatment:

PARAMETERS	PERMISSIBLE LIMIT
BOD (5 days at 20° C)	Less than 20 mg/l
Suspended solids	Less than 30 mg/l
Residual Chlorine	Minimum 0.5 mg/l

4. Sewage shall be disposed on land within the premises for gardening / plantation purpose after treatment.
5. The unit shall install meters for measuring category wise (Category as given in water-Cess Act-1977 schedule II) consumption of water.

CONDITIONS UNDER AIR ACT 1981:

6. The following shall be used as fuel in the D.G Sets as following rates:

Sr. no.	Equipment	Capacity	Name of Fuel	Quantity
1.	D.G.Set	---	HSD	80 Lits / Hour

7. There shall be no process emission from the manufacturing process as well as other ancillary industrial operation.



GUJARAT POLLUTION CONTROL BOARD

Paryavaran Bhavan

Sector-10-A, Gandhinagar - 382 010.

Fax : (079) 23232156

Website : www.gpcb.gov.in

5. The applicant also comply with the General conditions as per Annexure - I attached herewith (No.1 to 38) (whichever applicable).
6. The concentration of Noise in ambient air within the premises of industrial unit shall not exceed following levels:

Between 6 A.M. and 10 P.M.: 75 dB (A)
Between 10 P.M. and 6 A.M.: 70 dB (A)
7. Applicant is required to comply with the manufacturing, Storage and Import of Hazardous Chemicals Rules-1989 framed under the Environment (Protection) Act-1986.
8. If it is established by any competent authority that the damage is caused due to their industrial activities to any person or his property in that case they are obliged to pay the compensation as determined by the competent authority.
9. Applicant shall have to comply with all the guidelines/Directive issued/ being issued by MoEF/CPCB/DoEF from time to time.
10. Applicant shall not use/withdraw ground water either during construction and /or operation phase.
11. Environmental cell shall be setup and shall be responsible for the total Environmental management.
12. Monitoring in respect to Air, Water, Noise level shall be carried out and results shall be submitted to this Board on quarterly basis.
13. Applicant shall have to obtain the permission from this concern department/Authority for storage and handling of Hazardous substances.
14. Applicant shall have to comply with the Risk assessment and Disaster management plan.
15. Applicant shall have to comply with and submit periodical compliance report for CREP action points.
16. Applicant shall have to comply with the Environmental Audit scheme introduce by Honorable High Court and shall submit the Environmental Audit report every Year in accordance with direction given in the High Court Order dtd.16-09-1999. In Environmental audit Scheme.
17. Applicant shall have to comply with fly Ash Notification all Environmental Acts/Rules/Notifications along with the amendments from time to time and other guidelines issued /being issued by MoEF/CPCB/DoEF from time to time.
18. Applicant shall have to comply with all the suggestions / Recommendation of the Environmental Public Hearing, enumerated in REIA report, enumerated in marine EIA.



GUJARAT POLLUTION CONTROL BOARD

Paryavaran Bhavan

Sector-10-A, Gandhinagar - 382 010.

Fax : (079) 23232156

Website : www.gpcb.gov.in

8. Ambient air quality within the premises at 3 meters from the source shall conform to the following standards: -

PARAMETERS	PERMISSIBLE LIMIT
Suspended Particulate Matter	200 Microgram/M3
RSPM	100 Microgram/M3
SO ₂	80 Microgram/M3
NO _x	80 Microgram/M3

CONDITIONS UNDER HAZARDOUS WASTE:

9. The applicant shall provide temporary storage facilities for each type of Haz Waste as per Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008 as amended from time to time.
10. The applicant shall obtain membership of common TSDF site for disposal Haz. Waste as categorized in Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008 as amended from time to time.
11. The applicant shall obtain membership of common Haz Waste incinerator for disposal of incinerable waste.
12. The applicant shall give/sold contaminated discarded containers to registered decontamination facilities for decontamination, if not, decontaminate at their own site as per GPCB circular No: GPCB/HAZ/Gen – 264/ 13223/2009 dated 29/06/2009.
13. The applicant shall have to comply with the protocol for the TSDF and shall also have to comply with the honorable Supreme Court's Order in WP No.657 of 1995 dt. 14th oct. 2003 .Hon'ble supreme Courts monitoring committee's directives issued from time to time and Hazardous Waste (Management & Handling) Rules, 1989 as amended . up to 2003 with regard to the haz waste management.

GENERAL CONDITION:

1. Adequate plantation shall be carried out all along the periphery of the industrial premises in such a way that the density of plantation is atleast 1000 trees per acre of land and a green belt of 10 meters width is developed.
2. The applicant shall have to submit the returns in prescribed form regarding water consumption and shall have to make payment of water cess to the Board under the Water Cess Act- 1977.
3. In case of change of ownership/management the name and address of the new owners/partners/directors/proprietor should immediately be intimated to the Board.
4. The applicant shall however, not without the prior consent of the Board bring into use any new or altered outlet for the discharge of effluent or gaseous emission or sewage waste from the proposed industrial plant. The applicant is required to make applications to this Board for this purpose in the prescribed forms under the provisions of the Water Act-1974, the Air Act-1981 and the Environment (Protection) Act-1986.



GUJARAT POLLUTION CONTROL BOARD

Paryavaran Bhavan

Sector-10-A, Gandhinagar - 382 010.

Fax : (079) 23232156

Website : www.gpcb.gov.in

19. Applicant shall have to submit copy of approval of chief Controller of Explosives for storage and handling, if applicable, up dated disaster management plan along with on site and off site emergency plan and other guidelines issued / being issued by MoEF/CPCB/DoEF from time to time.
20. Applicant shall have to carry out mock drill both on site and off site for all the possible eventualities at a regular interval off time. For any of the disastrous situations, escape route shall have to be predefined, properly marked and shall be brought to the knowledge of the concerned.
21. Applicant shall have to obtain the ISO 14001 & OSHAS 18000 certification and shall have to implement the suggestion / recommendations of the same.
22. Applicant shall have to implement EMP as stated in the REIA Report before the commencement of the production.
23. Applicant shall comply with the Forest (conservation) act 1980 and Rules 1981, CRZ notification and all Environmental Acts/Rules/Notifications and their amendments from time to time which ever each applicable.
24. G.P.C.B. reserves the right to stipulate additional condition if found necessary. The Company will implement these conditions in a time bound manner.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD

(V.C.SHAH)
ENVIRONMENTAL ENGINEER

GUJARAT POLLUTION CONTROL BOARD
GENERAL CONDITIONS (NOC - 1 TO 38)

- 01 In case of any change either in products, its capacity or manufacturing process, the applicant shall have to obtain prior permission of this Board. The applicant shall not commence the production until consent under Water (Prevention and Control of Pollution) Act-1974, Air (Prevention and Control of Pollution) Act-1981 and Authorisation under the Hazardous Waste (Management and Handling) Rules-1989 is obtained.
- 02 If the products, process falls in SCHEDULE-I or II of the Environmental Audit Scheme , as specified in the order dated 13/03/97 of Hon. High Court in MCA No.326/97 in SCA No.770/95, the applicant shall also abide by the said scheme.
- 03 The applicant shall have to register the unit under the provisions of the Factories Act-1948 and shall obtain the necessary factory license.
- 04 The Environmental Management unit/Cell shall be set up to ensure implementation and monitoring of environmental safeguards and other conditions stipulated by statutory authorities. The Environmental Cell / unit shall directly report to the Chief Executive of the organization and shall work as a focal point for internalizing environmental issues. These cells / units shall also co-ordinate the exercise of environmental audit and preparation of environmental Statements.
- 05 The applicant shall have to obtain P.L.I. Policy as per P.L.I. Act-1991 and submit the copy of the same to the G.P.C.B.
- 06 The concentration of Noise on ambient air within the factory premises shall not exceed the following limit :
Between 6 AM to 10 PM : 75 dB (A)
Between 10 PM to 6 AM : 70 dB (A)
- 07 The unit shall, on establishing this plant.
 - a). Put up at the entrance and prominent places boards prominently displaying the name of the unit, particulars of the products / process and the names of the Proprietor / Partners/Directors of the unit, the electricity consumer number and the name of the electricity consumer as on the record of the GEB.
 - b). Make adequate lighting arrangements all around the Effluent Treatment Plants Pollution Control Measures and also above the boards mentioned in the above clause.
08. The Environmental Audit shall be carried out yearly and the environmental statements pertaining to previous year shall be submitted to this Board latest by 30th September every year.
- 09 The unit shall have and use only one outlet for the discharge of its effluent and no effluent shall be discharged without requisite treatment and without meeting with the GPCB norms. Such outlet shall be near the front gate/ entrance of the unit. The unit shall not keep any bypass line or system or loose or flexible pipe for discharging effluent outside or even for transporting treated or untreated effluent within the factory premises, within effluent treatment plants or in the compound of the unit.
- 10 "Magnetic Flow Meters" should be installed at inlet and outlet of Effluent Treatment Plant (ETP thereafter)
11. All the chemicals and nutrients which are required to be added / dosed any where in the ETP should be so added by using " Metering Pumps" only.
12. The pipeline connecting various equipments or sumps of tanks of ETP should be minimum in number. Loose connections of hose pipes or temporary connections will not be permitted.
13. In case of incinerators the unit shall provide the flow measuring devices for mother liquor , light diesel oil, air used for combustion and temperature measuring devices within incinerators at different points scrubber , outside the incinerator should be provided . The temperatures as well as flow should be recorded , every day.
14. In case of plants involving Bio-mass Treatment. For each addition of bio-mass time and quantity , should be recorded . The uptake rate of oxygen of the bio-mass in the aeration basis and other parameters of biological system should be recorded every day.
15. The printed log books shall be maintained and get it certified for :
 - a. Energy / fuel consumption / Raw material Consumption and quantity of products manufactured.

- b. Waste water / gaseous flow at inlet & outlet of ETP and Air Pollution Control Measures.
 - c. Quantity of sludge generated.
 - d. Laboratory analysis / reports for each of the specified parameters of liquid effluents, gaseous discharge and soil sludge samples.
16. The unit shall operate full and efficiently all its effluent treatment plant/s and shall close down all its manufacturing processing activities whenever the effluent treatment plant/s or any part thereof are fully or partly non-operational for any reason whatsoever (Whether maintenance/ repairs/electricity failure or otherwise) and shall not restart such activities unless and until all the effluent treatment plants of the unit are fully operational.
 17. The unit shall have and operate all the requisite equipments/ facilities for prevention and control of air pollution and shall operate the same. The unit shall also have stack monitoring facilities. Whenever the equipments/facilities for prevention and control of air pollution are fully or partly nonfunctional , the unit shall close down all its manufacturing / processing activities and shall not restart its manufacturing/ processing activities unless and until all its air pollution protection and control equipments and facilities including stack monitoring facilities are fully operational.
 18. The unit shall submit, before commencing the production to the GPCB any committee appointed by the court, the site plan of the unit indicating the location of manufacturing / processing plant as also the effluent treatment plants and also separate plan indicating the channel through which water / effluent passes from different stages of manufacturing / processing and the effluent treatment process right upto the stage of its final outlet. Such plans shall also be displayed by the unit on a Board of adequate size within its compound and near its effluent treatment plant/s.
 19. The unit shall supply to the GPCB the figures of production and consumption of electricity and water for each day during the period of production, though such figures shall be supplied on weekly basis. The unit shall supply separate figures for consumption of electricity for running the effluent treatment plants by having a separate meter / sub meter for such effluent treatment plants. The number of units consumed by operating the diesel generating sets, if any, shall also be supplied to the GPCB on weekly basis.
 20. The unit shall also supply to the GPCB , within 1 week from the date of the starting production , the documents regarding monthly production and consumption of electricity.
 21. The unit shall permit the officers/employees of the GPCB/ Government Members of the committee of the court, Members of the Monitoring Committee of the Association of the Industries to enter the factory premises and to inspect and take samples from the unit at any time without any prior intimation. Any delay in giving any of the above persons entry into the factory premises or any plant thereof on effluent treatment plants shall entail closure of the unit. All the watchmen / security personnel of the unit shall be immediately appraised of the above.
 22. It shall be open to the GPCB through general instruction of circulars and to the GPCB officers inspecting the unit to give all the support instructions regarding location of the outlet and / or any other appropriate directions regarding effluent treatment plants, their operation and processes and disposal channel and disposal system. The unit shall comply with all such instructions whether general or special.
 23. When electricity supply or water supply is disconnected in future on account of non - compliance with the GPCB norms or on account of the closure order, which may be passed by the court or by the Govt. / GPCB under any statutory provisions relating to environmental protection and prevention and control of pollution.
 - a. The unit shall not use any diesel generating set or any other alternative source of energy or water tankers from outside.
 - b. The unit shall pay wages to its workers regularly every month or at such shorter intervals as per the Central/Practice followed so far.
 24. Adequate number of influent and effluent quality monitoring stations should be set up in consultation with the Gujarat Pollution Control Board . Regular Effluent Quality monitoring should be carried out for relevant parameters and the monitored data alongwith the statistical analysis and interpretation should be submitted to the Gujarat Pollution Control Board on monthly basis.
 25. Guards ponds of sufficient holding capacity should be provided to cope with the effluent discharge during the process disturbances. In the event of failure or non functioning of the ETP , the

- respective units should be immediately put out of operation and should not be restarted until the control measures are rectified to achieve the desired efficiency. Guard pond should be provided with impervious lining and stability of the ponds with respect to leakages/cracks and other factors should be ensured.
26. The ground water quality around the guard ponds and landfill site should be monitored on a regular basis. The monitored data should be submitted to this Board once in six months.
 27. The gaseous emission from the various process units should adhere to the air emission standards specified in this order. At no time the emission should go beyond the prescribed standards. In the event of failure of any pollution control system adopted by the unit, the respective unit should be immediately put out of operation and should not be restarted until the control measures are rectified to achieve the desired efficiency.
 28. a). Ambient air quality monitoring station should be set up in the downwind direction as well as at locations where maximum ground level concentrations are anticipated . These locations should be fixed in consultation with the GPCB. The number of air quality monitoring stations and frequency of monitoring should be selected on the basis of mathematical modeling to represent short term ground level concentrations, human settlements, sensitive targets etc...
 - b). Stack emissions from the boiler and heater should be monitored for SO₂ NO_x , Hydro Carbon and SPM and record maintained . On line continuous stack monitoring equipments should be provided for measurement of SO₂ and NO_x .
 - c). Data on ambient air quality and stack emission from boiler and heater should be submitted to this Board once in a month alongwith the statistical analysis and interpretation.
 - d). Fugitive emissions should be controlled , regularly monitored and data recorded. The monitored data should be submitted to this Board once in a month.
 29. Low NO_x burners should be provided to avoid excessive formulation of NO_x . Only LSH will be used a fuel during the critical month to ensure that SO levels in the ambient air is within the norm specified.
 30. The unit shall make all the requisite arrangements for the safe storage and handling of solid waste including impervious flooring and leachate collection and the unit shall store and handle solid waste in accordance with the provisions of the relevant rules in their behalf.
 31. A secured double lined landfill should be developed within the plant premises for disposal of solid waste by providing impervious liner and leachate collection system . The leachate shall be taken to the treatment plant for further treatment. In case of specified items or Napthalene based product and in the case of Pesticides waste, the leachate shall be totally incinerated after neutralization and / or after detoxification treatment. The design of the landfill site should be submitted before commencing the production to this Board and Government.
 32. Handling manufacturing , storage and transport of hazardous chemicals should be in accordance with the Manufacture, Storage and Import of Hazardous Chemicals Rules-1989.
 33. The hazardous wastes should be handled as per the Hazardous Waste (Management and Handling) Rules of the Environment (Protection) Act-1986.
 34. On-site and off-site Emergency Plan as required under the Rules 13 and 14 of the Handling, Manufacture, Storage and Import of the Hazardous Chemicals Rules-1989 should be prepared and approval from the Board should be obtained.
 35. A community welfare scheme for improving the socio-economic environment should be worked out and report submitted to the Board and Government for review.
 36. Periodical medical check up of the workers should be done and records maintained as a measures to provide occupational health service to the workers.
 37. The project authorities should set up laboratory facilities for collection, analysis of samples under the supervision of competent technical personnel who will report to the Chief Executive.
 38. The funds earmarked for the Environmental Protection Measures should not be diverted for any other purpose and year wise expenditure should be reported to this Board and to the Government.

Annexure – 8



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN
Sector-10-A, Gandhinagar 382 010
Phone : (079) 23222425
(079) 23232152
Fax : (079) 23232156
Website : www.gpcb.gov.in

By R.P.A.D

Amendment to Consent to Establish (NOC)
CTE -96327

No. PC/CCA-KUTCH-1437/GPCB ID-53331/

Date:

To,
Mundra Lpg Terminal Pvt. Limited,
Near Plot No.:169/P,Navinal Island, Mundra,
Tal.:Mundra,
Dist.:Kutch

Subject : Amendment to Consent to Establish (CTE).

Reference : 1. CTE of the Board issued to your unit vide letter no PC/CCA-KUTCH-1437/GPCB ID-53331/424230, dated: 27/09/2017.
2. Your CTE Amendment Application Inward ID No. 141916, dated 03/08/2018.

Sir,

In exercise of the power conferred under section-27 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 6(2) of the Hazardous & Other Waste (Management & Transboundary Movement) Rules-2016 & as amended framed under the Environmental (Protection) Act-1986 and without reducing your responsibility under the said Acts/Rules in anyway; this Board is empowered to amend consent order conditions. Accordingly, the Consent to Establish issued vide letter no. PC/CCA-KUTCH-1437/GPCB ID-53331/424230, dated: 27/09/2017 under reference (1)stands amended in respect of the following conditions;

1. The validity period of the order shall be up to dated 03/10/2025
2. There shall be no increase in production capacity and Air details due to propose expansion.
3. **CONDITIONS UNDER WATER ACT 1974 AMENDED AS FOLLOWS:**
 - The condition 2.1 shall be read as;
 - 2.1(a) The domestic water consumption shall not exceed 80 KL/day and industrial water consumption shall not exceed 460.1 KL/day.
 - 2.1(b) The industrial waste water generation shall not exceed 217.6KL/day and generated effluent shall be send to neutralization tank for PH correction. The treated waste water shall be stored in 1500 KL/Day tank and it shall be utilized on land for Horticulture purpose in APSEZ premises. (GPCB ID 17739)

Clean Gujarat Green Gujarat
ISO-9001-2008 & ISO-14001 - 2004 Certified Organisation

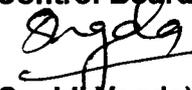
- The condition no. 2.5 shall be read as,
2.5(a) The quantity of the domestic waste water (Sewage) shall not exceed 64 KL/day.
2.5(b) The quality of sewage shall conform to following standards;

Parameter	GPCB Norms
pH	6.5 to 9.0
BOD (3 days at 27 ^o C)	30 mg/L
Total Suspended Solids (TSS)	100 mg/L
Fecal Coliform (FC)	1000 MPN/100 ml

2.5 (C) The treated sewage confirming to above standards shall be utilized for gardening and plantation purpose within APSEZ premises.

4. The other terms and conditions of CTE issued vide letter No.PC/CCA-KUTCH-1437/GPCB ID 53331/424230, Date:27/09/2017 shall remain unchanged.

For and on behalf of
Gujarat Pollution Control Board


(Sushil Vegda)

Senior Environment Engineer

Outward No:473995,29/10/2018



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

Website : www.gpcb.gov.in

**"Consent to Establish-Amendment"
(CTE-111751)**

No. PC/CCA-KUTCH-1437/GPCB ID-53331 / 587015

Date: 26/03/2021

To,
M/s. Mundra LPG Terminal Pvt Ltd.,
Near survey No.169/P,
Navinal Island, Mundra,
Tal: Mundra
Dist: Kutch - 370 421

Sub: Consent to Establish (NOC)-Amendment under Section 25 of Water Act 1974 and Section 21 of Air Act 1981

Ref: Your application for CTE-Amendment no. 185368 dated 24/12/2020.

Without prejudice to the powers of this Board under the Water (Prevention and Control of Pollution) Act-1974, the Air Act-1981 and the Environment (Protection) Act-1986 and without reducing your responsibilities under the said Acts in any way, this is to inform you that this Board grants **Consent to Establish- Amendment for addition of 1 no. of LPG fired boiler of capacity 12 TPH boiler with consumption of fuel increase from 474 Kg/Hr to 2000 Kg/hr in existing plant located at Near survey no.169/P, Navinal Island, Mundra, Tal: Mundra, Dist: Kutch.**

SUBJECT TO THE FOLLOWING CONDITIONS:

1. The validity of this order will be up to 01/03/2026.
2. There shall be no change in existing LPG storage handling & distribution and using existing tank capacity (Cap: 50,000 for storage of LPG), due to CTE- amendment.
3. There shall be no change in water consumption, waste water generation and its mode of disposal due to CTE-amendment.
4. Industry shall not carry out any activity which attracts provisions of EIA Notification-2006 as amended.
5. Industry shall manage Solid Wastes generated from industrial activities as per Solid Waste Management Rules-2016 (solid waste as defined in Rule-3(46)).
6. Industry shall comply with Plastic Waste Management Rules- 2016 and amendments made therein.
7. Industry shall get notify the site as per MSHC Rules-1989 & submit a copy of the same to this office.
8. Industry shall submit safety audit report & onsite emergency plan time to time.
9. Industry shall renew Public Liability Insurance Policy time to time & submit a copy of the same to this office.

Clean Gujarat Green Gujarat

Page 1 of 2

ISO - 9001 - 2008 & ISO - 14001 - 2004 Certified Organisation

Outward No: 587077, 30/03/2021

CONDITIONS UNDER AIR ACT 1981:

1. The following shall be used as fuel in Steam Boilers and D.G. Set respectively;

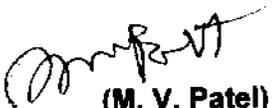
Sr. No.	Utility	Fuel	Quantity	
			Existing	Total after expansion
1.	Steam Boilers (12 TPH) (1Nos. existing & 1 nos. New) (total no. 2) & (14 TPH (1 Nos.) (existing))	LPG	474 Kg/Hr	2000 Kg/Hr
2.	D.G. Set (2000 KVA)	HSD	390 Liter/Hr	390 Liter/Hr

2. The flue gas emission through stack attached to Steam Boilers and D.G. Set shall conform to the following standards

Sr. No	Stack attached to	Stack height in Meters	APCM	Parameter	Permissible limit
1.	Steam Boilers (Total 2 Nos.) (12 TPH (1Nos.) & 14 TPH (1 Nos.)) (Existing)	35 Common Stack	Adequate Stack height	PM SO ₂ NO _x	150 mg/Nm ³ 100 ppm 50 ppm
2.	Steam Boiler (12 TPH) (1 Nos.) (New)		Adequate Stack height	PM SO ₂ NO _x	150 mg/Nm ³ 100 ppm 50 ppm
3.	D.G. Set (1 nos.) (2000 KVA) (Existing)	11	Adequate Stack height	PM SO ₂ NO _x	150 mg/Nm ³ 100 ppm 50 ppm

3. There shall be no change in rest of other conditions of CTE order no. 88079 issued vide order no. GPCB/CCA-Kutch- 1437-ID 53331/424230 dated 27/09/2017 & CTE-Amendment order no. 96327 issued vide order no. GPCB/CCA-Kutch- 1437-ID 53331/473995 dated 29/10/2018 shall remain unchanged. Industry shall comply with the same judiciously.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD


(M. V. Patel)
Environment Engineer



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar 382010

Phone : (079) 23222425

(079) 23222152

Fax : (079) 23232156

Website : www.gpcb.gov.in

Application For CTE After TOR

File No : GPCB/ (PCB ID. - 17739)

To,
M/s. Adani Ports & Special Economic Zone Ltd.,
169/P, AT-NAVINAL ISLAND, MUNDRA, KUTCH,
City :Mundra ,
Dist : Kutch East ,
Taluka : Mundra

Sub: Consent to Establish (After obtaining Terms Of Rrference For Environment Clearance) under Section 25 of Water Act 1974 and Section 21 of Air Act 1981.

Ref: (1) Your online application No. 175853 dated 27/04/2020

(2) TOR issued by Central Authority vide their letter no. 10-24/2019-IA-III Dated 17/05/2019

Sir,

Without prejudice to the powers of this Board under the Water (Prevention and Control of Pollution) Act-1974, the Air Act-1981 and the Environment (Protection) Act-1986 and without reducing your responsibilities under the said Acts in any way, this is to inform you that this Board grants **Consent to Establish (After obtaining Terms Of Rrference For Environment Clearance) under Section 25 of Water Act 1974 and Section 21 of Air Act 1981** for manufacturing of products as mentioned into the application of Environment Clearance (EC) for which TOR is granted vide letter under reference no (2) above.

Consent To Establish Is Granted Subject To The Following Conditions: -

- 1) The validity period of this CTE shall be Seven Years from the issue of this order.
- 2) Applicant shall strictly comply with all conditions stipulated by competent authority in the order of Environment Clearance to be issued in reference to TOR issued vide letter under reference No. : 2 above.
- 3) The applicant shall however , not without the prior concern of the Board. Bring into use any new or altered outlet for the discharge of effluent or gaseous emission or sewage waste from the proposed industrial plant. The applicant is required to make applications to this Board for this purpose in the prescribed forms under the provisions of the water Act - 1974, the Air - 1981 and the Environment (Protection) Act - 1986.

For and on behalf of
Gujarat Pollution Control Board

K. B. Chaudhary
ROH - Kutch East

- This order is issued to 169/P, AT-NAVINAL ISLAND, MUNDRA, KUTCH, City :Mundra, Dist : Kutch East, Taluka : Mundra (17739) for CTE amendment after obtaining EC.

8. Industry shall renew PLI Policy time to time & submit a copy of the same to this office.

3. CONDITIONS UNDER WATER ACT 1974:

- 3.1 Source of Water: -GWIL
- 3.2 The quantity of the fresh water consumption for industrial purpose shall not exceed 6000 KLD. Industrial water mainly uses for sprinkling, dust suppression etc.
- 3.3 The quantity of the fresh water consumption for domestic purpose shall not exceed 60 KLD.
- 3.4 There shall be no generation of industrial effluent from the manufacturing process and other ancillary industrial operations.
- 3.5 The quantity of the domestic waste water (Sewage) shall not exceed 50 KL/Day.
- 3.6 Industry shall operate Sewage Treatment Plant (STP) adequately so that treated domestic effluent shall conform to the following norms:

PARAMETERS	PRESCRIBED LIMITS
pH	6.5 to 9.0
BOD (5 days at 20° C)	30 mg/L
Suspended Solid	100 mg/L
Fecal Coliform	<1000 MPN /100 ml

- 3.7 Treated sewage conforming to above standard shall be discharge on land for gardening and plantation within premises only.
- 3.8 Industry shall provide fixed pipeline network with flow meter for even distribution of sewage and maintain its record.
- 3.9 Disposal system for storm water shall be provided separately. In no circumstances storm water shall be mixed with the other effluent.

4. CONDITIONS UNDER AIR ACT 1981:

4.1 The following shall be used as fuel in the D.G Sets

Sr. no.	Name of Fuel	Quantity
1.	HSD	159 Liter/Hour

4.2 The applicant shall install & operate air pollution control system in order to achieve flue gas emission norms as prescribed below.

Sr. no.	Stack attached to	Stack height in meters	Parameter	Permissible limit
1.	D.G. Sets (2 Nos.) (1500 KVA each) (stand by)	20 (each)	PM SO ₂ NO _x	150 mg/Nm ³ 100 ppm 50 ppm

4.3 There shall be no process gas emission from manufacturing activities and other ancillary operations.

Outward No: 59523/16/11/2021



GPCB

GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

Website : www.gpcb.gov.in

4.4 Industry shall comply with coal handling guideline of this Board.

- A. Dust containment cum suppression system for the coal stack, loading and unloading.
- B. Construction of effective wind breaking wall suitable to local condition to prevent the suspension of particles from the heaps.
- C. Construction of metal road & RCC Pacca flooring in the plot area/ godown etc.
- D. System for regular cleaning and wetting of the floor area within the premises.
- E. Entire coal storage area/ godown should be covered with permanent weather shed roofing and side walls i.e., in closed shed, in case of crushing/ sieving/ grading activity is carried out (i.e. G. I. Sheet) along with adequate additional APCM should be installed.

4.5 The concentration of the following parameters in the ambient air within the premises of the industry and a distance of 10 meters from the source) other than the stack/vent) shall not exceed the following levels.

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient air in $\mu\text{g}/\text{M}^3$
1.	Sulphur Dioxide (SO_2)	Annual	50
		24 Hours	80
2.	Nitrogen Dioxide (NO_2)	Annual	40
		24 Hours	80
3.	Particulate Matter (Size less than $10 \mu\text{m}$) or PM_{10}	Annual	60
		24 Hours	100
4.	Particulate Matter (Size less than $2.5 \mu\text{m}$) or $\text{PM}_{2.5}$	Annual	40
		24 Hours	60

4.6 The applicant shall provide portholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection to/and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/displayed to facilitate identification.

4.7 The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75dB(A) during day time and 70 dB (A) during night time. Daytime is reckoned in between 6a.m. and 10 p.m. and nighttime is reckoned between 10 p.m. and 6 a.m.

4.8 D.G. Sets Conditions

The D.G. Set shall have acoustic enclosure and shall comply with the standards specified at Sr. no. 95 of Schedule-I of the rule-3 of E.P. Rules -1986 and Noise pollution level as per the Air Act-1981

Clean Gujarat Green Gujarat

Page 3 of 7

D.G. Sets standards:-

The flue gas emission through stack attached to D.G. Sets shall conform to the following standards.

- a) The minimum height of stack to be provided with each of the generator set shall be $H=h + 0.2 (KVA)^{1/2}$. where H= Total stack height in meter, h= height of the building in meters where or by the side of which the generator set is installed.
- b) Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the users end.
- c) The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/ acoustic treatment. Such circumstances the performance may be checked for noise reduction up to actual ambient noise level, preferably, in the night time) The measurement for insertion loss may be done at different points at 0.5 m from the acoustic enclosure/room, and the averaged.
- d) The D.G. Set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).
- e) All efforts shall be made to bring down the noise level due to the D.G. Set, outside the premises, within the ambient noise requirements by proper siting and control measures. Installation of a D.G. Sets must be strictly in compliance with the recommendations of the D.G. Set manufacturer.
- f) A proper routine and preventive maintenance procedure for the D.G. Set should be set and followed in consultation with the DG Set manufacture which would help prevent noise levels of the DG Set from deteriorating with use.

5. Authorization under Hazardous & Other Waste [Management&Transboundary Movement] Rules, 2016 & amended.

5.1 Authorization order no:-AWH-113458 Date of issue: 28/06/2021.

5.2 **M/s. Adani Ports & Special Economic Zone Ltd.** is hereby granted an authorization to operate facility for following hazardous wastes on the premises situated at Plot No. Navinal Island, Vill: Mundra, Tal- Mundra, Dist-Kutch.

Sr. No.	Waste	Quantity per Annum	Category	Facility
1.	Used Spent Oil	238 MT	5.1	Collection, storage, Transportation, Disposal by selling out to registered recyclers/re-processor
2.	Contaminated cotton rags or other cleaning materials	31 MT	33.2	Collection, storage, Transportation, Disposal by co-processing at cement plant or CHWIF.





GPCB

GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

Website : www.gpcb.gov.in

3.	Discarded Container	26 MT	33.1	Collection, storage, Transportation & Disposal by selling out to registered decontamination facility.
----	---------------------	-------	------	---

5.3 The authorization shall be valid up to 01/02/2027.

5.4 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.

5.5 The authorization is granted to operate a facility for collection, storage within factory premises transportation and ultimate disposal of Hazardous wastes as per condition no 5.2 to the industry having valid CCA of this Board.

5.6 TERMS AND CONDITIONS OF AUTHORISATION

1. The applicant shall comply with the provisions of the Environment (Protection) Act-1986 and the rules made there under.
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board.
3. The persons authorized shall not rent, lend, sell, and transfer or otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.
4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a breach of this authorization.
5. The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;
6. The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Wastes and Penalty"
7. It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.
8. An application for the renewal of an authorization shall be made as laid down in rules 6(2) under Hazardous and Other Waste Rules, 2016.
9. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
10. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
11. The hazardous and other wastes which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.
12. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.

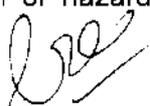
Clean Gujarat Green Gujarat

Page 5 of 7

14. The waste generator shall be totally responsible for (i.e. collection, storage, transportation and ultimate disposal) the wastes generated
15. Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form-4 by 30th day of June of every year for the preceding period April to March.
16. In case of any accident, details of the same shall be submitted on Form-11 to Gujarat Pollution Control Board.
17. As per "Public Liability Insurance Act-91" company shall get Insurance Policy, if applicable.
18. Empty drums and containers of toxic and hazard material shall be treated as per guideline published for "Management & Handling of discarded containers". Records of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.
19. In case of transport of hazardous wastes to a facility for (i.e. treatment, storage and disposal) existing in a State other than the State where hazardous wastes are generated, the occupier shall obtain 'No Objection Certificate' from the State Pollution Control Board or Committee of the concerned State of Union Territory Administration where the facility exists.
20. Unit shall take all concrete measures to show tangible results in waste generation, reduction, avoidance, reuse and recycle. Actions taken in this regard shall be submitted within three months and also along with Form-4.
21. Industry shall have to display the relevant information with regards to hazardous waste as indicated in the Hon. Supreme Court's Order in W.P. No.657 of 1995 dated 14th October, 2003.
22. Industry shall have to display on-line data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including wastewater and air emissions and solid hazardous wastes generated within the factory premises.

6. **SPECIFIC CONDITIONS:-**

- 6.1 The authorized actual user of hazardous and other wastes shall maintain records of hazardous and other wastes purchased in a passbook issued by the State Pollution Control Board along with the authorization.
- 6.2 Handling over of the hazardous and other wastes to the authorized actual user shall be only after making the entry in the passbook of the actual user.
- 6.3 In case of renewal of authorization, a self-certified compliance report in respect of effluent, emission standards and the conditions specified in the authorization for hazardous and other wastes shall be submitted to SPCB.
- 6.4 The occupier of the facility shall comply Standard operating procedure/guidelines published by MOEF&CC or CPCB or GPCB from time to time
- 6.5 Unit shall comply provisions of E-Waste Management Rules-2016
- 6.6 The disposal of Hazardous Waste shall be carried out as per the waste Management hierarchy.
- 6.7 The occupiers of facilities shall not store the hazardous and other wastes for a period not exceeding **ninety days**. Prior permission of the Board shall be obtained for extension of the storage period.
- 6.8 The occupier shall maintain the records of generation, sale, storage, transport, recycling, co processing and disposal of hazardous waste and make available during the inspection.





GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

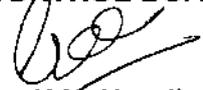
Website : www.gpcb.gov.in

6.9 The transportation of the hazardous waste shall be carried out in GPS mounted dedicated vehicles.

7. GENERAL CONDITIONS: -

- 7.1 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.
- 7.2 Applicant shall also comply with the general conditions given in annexure I.
- 7.3 Whenever due to accident or other unforeseen act or ever, such emissions occur or is apprehended to occur in excess of standards laid down such information shall be forthwith reported to Board, concerned Police Station Office of Directorate of Health Service, Department of Explosives, Inspectorate of Factories and local body.
- 7.4 In case of failure of pollution control equipments, the production process connected to it shall be stopped. Remedial actions/measures shall be implemented immediately to bring entire situation normal.
- 7.5 The Environmental Management Unit/Cell shall be setup to ensure implementation on and monitoring of environmental safeguards and other conditions stipulated by statutory authorities. The Environmental Management Cell/Unit shall directly report to the Chief Executive of the organization and shall work as a focal point for internalizing environmental issues. These cells/units also coordinate the exercise of environmental audit and preparation of environmental statements.
- 7.6 The Environmental audit shall be carried out yearly and the environmental statements pertaining to the previous year shall be submitting to this State Board latest by 30th September every year.
- 7.7 The Board reserves the right to review and/or revoke the consent and/or make variations in the conditions, which the Board deems, fit in accordance with Section 27 of the Act.
- 7.8 In case of change of ownership/management the name and address of the new owners/ partners/directors/proprietor should immediately be intimated to the Board.
- 7.9 Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon. Supreme order in w.p. no. 657 of 1995 dated 14th October 2003.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD


(Smt. U.K. Upadhyay)

Senior Environment Engineer

NO: PC/ CCA- KUTCH- 582(4)/ ID 35427/Date:

ISSUED TO:

M/s. Adani Ports & Special Economic Zone Ltd,(WFDP- West Port),

Plot No: Navinal Island,

Vill: Mundra,

Tal- Bhuj,

Dist-Kutch. 370421.

Clean Gujarat Green Gujarat

ISO - 9001 - 2008 & ISO - 14001 - 2004 Certified Organisation

Page 7 of 7



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

Website : www.gpcb.gov.in

By R.P.A.D

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 6(2) of the Hazardous and Other Waste (Management and Transboundary) Rules, 2016 framed under the Environmental (Protection) Act-1986.

And whereas Board has received consolidated consent application inward No. 202362 dated 19/09/2021 for the **Renewal of Consolidated Consent and Authorization (CC&A)** of this Board under the provisions / rules of the aforesaid Acts. Consents & Authorization are hereby granted as under:

CONSENTS AND AUTHORISATION:

(Under the provisions /rules of the aforesaid environmental acts)

To,

M/s. Adani Ports & Special Economic Zone,

Plot no. 169/P, At Navinal Island,

Tal: Mundra,

Dist: Kutch - 370 421

1. Consent Order No. AWH-117045 Date of issue: 14/02/2022.

2. The consents shall be valid upto 20/11/2026 for the use of outlet for the discharge of trade effluent and emission due to operation of industrial plant for storage & handling of the following items/ products:

Sr. No	Product/Services	Capacity
1	General Cargo Handling	112.8 MMTPA
2.	Dry Cargo Handling	
3.	Liquid Cargo (Chemical/ POC Products)	5 MMTPA.
4.	Import, Storage and Distribution of Edible Oil	2.20 MMTPA
5.	Storage and Distribution of Bitumen	0.30 MMTPA
6.	Container Terminal Handling Operation	5.7 Million TEUs/ Annum
7.	Waste Destruction system for decomposition/ destruction of municipal solid waste	3.5 Cubic Meter (MSW Destruction Capacity @ 500 kg/day)
8.	Oil water separate (Flame Proof) to remove oil portion from slope oil received from vessels/ ships	25 M ³ /Hr

Subject to specific condition:

1. Industry shall comply with conditions of CRZ Clearance issued by MoEF vide order no. 10-47/200/-IA-III dated 12/01/2009 & its amendment.
2. Industry shall comply with conditions of Environment Clearance and CRZ Clearance issued by MoEF vide order no. F. no. 10-138/2008-IA-III dated 15/07/2014.

Clean Gujarat Green Gujarat

3. Industry shall comply with this office circular dated 27/08/2021 regarding retrofitting of emission control/ equipment in D.G. Set of capacity 125 KVA and above at the earliest and submit compliance.
4. Industry shall comply with Manufacture, Storage and Import of Hazardous Chemicals Rules-1989 (MSIHC) as amended time to time.
5. Industry shall ensure that all storage terminal located within DPT area shall strictly comply with MSIHC Rules including site notification & submit details periodically to board with relevant details.
6. Industry shall renew Public Liability Insurance time to time & submit a copy to this Board.
7. Industry shall notify site under MSIHC Rule-1989 from competent authority as mentioned in schedule-5 of MSIHC Notifications.
8. Industry shall not withdraw groundwater without prior NOC from CGWA as per Hon. National Green Tribunal order.
9. Industry shall manage Solid Wastes generated from industrial activities as per Solid Waste Management Rules-2016 (solid waste as defined in Rule-3(46)).
10. Industry shall comply with Plastic Waste Management Rules– 2016 and amendments made therein.
11. Industry shall strictly comply with coal handling guideline of this board.
12. Industry shall provide dedicated storage facility for dry cargos & ensure to take adequate measures to prevent dusting.
13. Industry shall ensure that there shall be no damage to the existing mangrove patches near site and also ensure the free flow of water to avoid damage to the mangroves.
14. Industry shall ensure as per EC condition that no creeks or rivers are blocked due to any activities at the site and free flow of water is maintained.
15. Industry shall provide proper system for collection, storage & treatment & disposal of waste water generated by vessel as per MARPOL & maintain records.
16. Industry shall install storm drainage catch basin to avoid directly discharge into surface water.
17. Waste effluent accumulated with port activities including storm water & sewage from port operation including sewage ballast water, bilge water & clean waste water from ships shall be as per MARPOL norms.
18. Industry shall make separate records regarding generation, collection, transportation & disposal of waste generation from ship & maintain its records.
19. Industry shall made necessary arrangement for the plastic Waste, Solid Waste or other waste generation due to port activities & for facilitation of reception facilities under MARPOL & Environment (Protection) Act-1986 rules etc.
20. Ports shall obtain approval of their oil spill contingency plan (OSCP) as required under national oil spill disaster contingency plan (NOS-DCP) of coast guard, ministry of defence, govt. of India.
21. Best environmental practices by ports maybe uploaded on "Indian ports Association" as well as the same maybe linked to websites of CPCB and respective SPCBs.



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

Website : www.gpcb.gov.in

22. Manually handling of cargo should be converted into mechanized system, in time bound manner.

3. Conditions under the Water act-1974:

3.1 Source of Water: - Narmada Water from GWIL/ Sea water from APSEZ/ Desalination Plant.

3.2 The quantity of the fresh water consumption for industrial purpose shall not exceed 1304.1 KL/Day.

3.3 The quantity of the fresh water consumption for domestic purpose shall not exceed 370 KLD.

3.4 The quantity of the industrial effluent to be generated from the manufacturing process and other ancillary industrial operations shall not exceed 90.31 KL/Day.

3.5 The quantity of domestic waste water shall not exceed 248 KLD.

3.6 Domestic waste water shall be treated in ETP along with industrial effluent.

3.7 Industry shall operate Effluent Treatment Plant (ETP) adequately so that treated effluent shall comply with following norms:

PARAMETERS	PRESCRIBED LIMITS
pH	6.5 to 8.5
Temperature	40°C
Colour (Pt.Co. scale) in units	100 units
Total Suspended Solids	100 mg/L
Oil and Grease	10 mg/L
Ammonical Nitrogen	50 mg/L
BOD (3 days at 27o C)	30 mg/L
COD	100 mg/L
Chlorides	600 mg/L
Sulphates	1000 mg/L
Total dissolved solids	2100 mg/L
Percent Sodium	60 %
Sulphides	5.0 mg/L
Sodium Absorption Ratio	26

3.8 Treated effluent, conforming to above norms shall be discharged on land for gardening and plantation purpose within premises only having area 175 hectare. In no case effluent shall be discharged outside premises.

3.9 Industry shall provide fixed pipeline network with flow meter for even distribution of treated effluent and maintain its record.

3.10 Disposal system for storm water shall be provided separately. In no case storm water & sewage from port facility shall not be discharge into surface water.

Clean Gujarat Green Gujarat

4. Conditions under the Air Act-1981:

4.1. The following shall be used as a fuel in Hot Water Generator, Fuel Heater and D.G. Sets respectively:

Sr. No.	Utility	Fuel	Quantity
1	Hot Water Generator & Fuel Heater	LDO/ HSD	975 Lit/Hr
2	D.G. Sets	HSD	100 Ltr/Hr

4.2. The applicant shall install & operate air pollution control system efficiently in order to achieve prescribed norms.

4.3. The flue gas emission through stack attached to Hot Water Generator, Fuel Heater and D.G. Sets shall conform to the following standards

Sr. No.	Stack attached to	Stack height in Meter	APCM	Parameter	Permissible Limit
1	Hot Water Generator-1	35		PM SO ₂ NO _x	150 mg/NM ³ 100 ppm 50 ppm
2	Hot Water Generator-2	35			
3	Fuel Heater (Thermic) (2 nos.)	35		PM SO ₂ NO _x	150 mg/NM ³ 100 ppm 50 ppm
4	D.G. Set (9 nos.) (500 KVA) (Stand by)	9 meter each	Adequate Stack Height		
5	D.G. Set (3 nos.) (1250 KVA) (Stand by)	30 common stack	Adequate Stack Height		
6	D.G. Set (6 nos.) (1500 KVA) (Stand by)	30 meter each	Adequate Stack Height		

4.4. The Process gas emission through stack attached to Waste Destruction System with auxiliary heater shall conform to the following standards.

Sr. No.	Stack attached to	Stack height in Meter	APCM	Parameter	Permissible Limit
1	Waste Destruction System with auxiliary heater	10	Ventury Scrubber	SO ₂ NO _x	40 mg/NM ³ 25 mg/NM ³

4.5. The concentration of the following parameters in the ambient air within the premises of the industry shall not exceed the limits specified hereunder as per National Ambient Air Quality Standards issued by MoEF & CC dated 18th November-2009. In addition to following parameters Industry shall also carry out AAQ monitoring of all



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

Website : www.gpcb.gov.in

other applicable parameter as per MoEF notification dated 18/11/2009 and submit the report to the Board.

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient air in $\mu\text{g}/\text{M}^3$
1.	Sulphur Dioxide (SO_2)	Annual 24 Hours	50 80
2.	Nitrogen Dioxide (NO_2)	Annual 24 Hours	40 80
3.	Particulate Matter (Size less than $10 \mu\text{m}$) or PM_{10}	Annual 24 Hours	60 100
4.	Particulate Matter (Size less than $2.5 \mu\text{m}$) or $\text{PM}_{2.5}$	Annual 24 Hours	40 60

- 4.6. The applicant shall provide portholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection to/and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/displayed to facilitate identification.
- 4.7. The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75dB(A) during day time and 70 dB (A) during night time. Daytime is reckoned in between 6a.m. and 10 p.m. and nighttime is reckoned between 10 p.m. and 6 a.m.

5. AUTHORIZATION as per HAZARDOUS AND OTHER WASTE (MANAGEMENT AND TRANSBOUNDARY) RULES, 2016 Form-2 [See rule 6 (2)]

Form for grant of authorization for occupier or operator handling Hazardous waste

5.1 Authorization order no:-AWH-117045 Date of issue: 14/02/2022.

5.2 **M/s. Adani Ports & Special Economic Zone** is hereby granted an authorization to operate facility for following hazardous wastes on the premises situated at Plot no. 169/P, At Navinal Island, Tal: Mundra, Dist : Kutch.

Sr. No.	Waste	Quantity/ Year	Schedule & Category	Facility
1	Used/ Spent Oil	300 MT	I- 5.1	Collection, storage, Transportation,, Disposal by selling out to registered recyclers/ reprocessor
2	ETP Sludge	109.5 MT	I-34.3	Collection, storage, Transportation & disposal at TSDF site of SEPPL.
3	Sludge & filters contaminated with oil	5 MT	I-3.3	Collection, storage, Transportation, Disposal by co-processing at cement industries, and/or CHWIF site

Clean Gujarat Green Gujarat

4	Waste Residue containing Oil/oily rags	150 MT	I-33.2	Collection, storage at designated place, Transportation, Disposal at TSDf Site.
5	Pig Waste	24 MT	I-3.1	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or CHWIF site
6	Tank Bottom sludge	Whatever Quantity generated	I-3.2	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or CHWIF site/ or recycling to registered recycler.
7	Discard containers/ barrels	16 MT	I-33.3	Collection, storage, Transportation, Disposal by reuse within premises and / or selling out to registered decontamination.
8	Asbestos Waste	Whatever Quantity generated	I-15.1	Collection, storage, Transportation, Disposal at CHWIF site.
9	Glass Wood Waste	Whatever Quantity generated	II-9	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or incineration at CHWIF site and / or recycling through registered recycler.
10	Downgrade Chemical	Whatever Quantity generated	I-20.2	Collection, storage, Transportation, Disposal by reuse within premises and / or selling out to authorized solvent recover.
11	Waste Oil	0.18 MT	I-5.2	Collection, storage, Transportation,, Disposal by selling out to registered recyclers
12	Expired Paint Material	10 MT	I-21.1	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or CHWIF site



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

Website : www.gpcb.gov.in

- 5.3 The authorization shall be valid up to **20/11/2026**.
- 5.4 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.
- 5.5 The authorization is granted to operate a facility for collection, storage within factory premises transportation and ultimate disposal of Hazardous wastes as per condition no 5.2 to the industry having valid CCA of this Board.

5.6 TERMS AND CONDITIONS OF AUTHORISATION

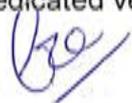
1. The applicant shall comply with the provisions of the Environment (Protection) Act-1986 and the rules made there under.
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board.
3. The persons authorized shall not rent, lend, sell, and transfer or otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.
4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a breach of this authorization.
5. The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;
6. The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Wastes and Penalty"
7. It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.
8. An application for the renewal of an authorization shall be made as laid down in rules 6(2) under Hazardous and Other Waste Rules, 2016.
9. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
10. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
11. The hazardous and other wastes which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.
12. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
14. The waste generator shall be totally responsible for (i.e. collection, storage, transportation and ultimate disposal) the wastes generated.
15. Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form-4 by 30th day of June of every year for the preceding period April to March.

Clean Gujarat Green Gujarat

16. In case of any accident, details of the same shall be submitted on Form-11 to Gujarat Pollution Control Board.
17. As per "Public Liability Insurance Act-91" company shall get Insurance Policy, if applicable.
18. Empty drums and containers of toxic and hazard material shall be treated as per guideline published for "Management & Handling of discarded containers". Records of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.
19. In case of transport of hazardous wastes to a facility for (i.e. treatment, storage and disposal) existing in a State other than the State where hazardous wastes are generated, the occupier shall obtain 'No Objection Certificate' from the State Pollution Control Board or Committee of the concerned State of Union Territory Administration where the facility exists.
20. Unit shall take all concrete measures to show tangible results in waste generation, reduction, avoidance, reuse and recycle. Actions taken in this regard shall be submitted within three months and also along with Form-4.
21. Industry shall have to display the relevant information with regards to hazardous waste as indicated in the Hon. Supreme Court's Order in W.P. No.657 of 1995 dated 14th October, 2003.
22. Industry shall have to display on-line data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including wastewater and air emissions and solid hazardous wastes generated within the factory premises.

6. **SPECIFIC CONDITIONS:-**

- 6.1 The authorized actual user of hazardous and other wastes shall maintain records of hazardous and other wastes purchased in a passbook issued by the State Pollution Control Board along with the authorization.
- 6.2 Handling over of the hazardous and other wastes to the authorized actual user shall be only after making the entry in the passbook of the actual user.
- 6.3 In case of renewal of authorization, a self-certified compliance report in respect of effluent, emission standards and the conditions specified in the authorization for hazardous and other wastes shall be submitted to SPCB.
- 6.4 The occupier of the facility shall comply Standard operating procedure/guidelines published by MOEF&CC or CPCB or GPCB from time to time.
- 6.5 Unit shall comply provisions of E-Waste Management Rules-2016.
- 6.6 The disposal of Hazardous Waste shall be carried out as per the waste Management hierarchy.
- 6.7 The occupiers of facilities shall not store the hazardous and other wastes for a period not exceeding **ninety days**. Prior permission of the Board shall be obtained for extension of the storage period.
- 6.8 The occupier shall maintain the records of generation, sale, storage, transport, recycling, co processing and disposal of hazardous waste and make available during the inspection.
- 6.9 The transportation of the hazardous waste shall be carried out in GPS mounted dedicated vehicles.





GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

Website : www.gpcb.gov.in

7. GENERAL CONDITIONS: -

- 7.1 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.
- 7.2 Applicant shall also comply with the general conditions given in annexure I.
- 7.3 Whenever due to accident or other unforeseen act or ever, such emissions occur or is apprehended to occur in excess of standards laid down such information shall be forthwith reported to Board, concerned Police Station Office of Directorate of Health Service, Department of Explosives, Inspectorate of Factories and local body.
- 7.4 In case of failure of pollution control equipments, the production process connected to it shall be stopped. Remedial actions/measures shall be implemented immediately to bring entire situation normal.
- 7.5 The Environmental Management Unit/Cell shall be setup to ensure implementation on and monitoring of environmental safeguards and other conditions stipulated by statutory authorities. The Environmental Management Cell/Unit shall directly report to the Chief Executive of the organization and shall work as a focal point for internalizing environmental issues. These cells/units also coordinate the exercise of environmental audit and preparation of environmental statements.
- 7.6 The Environmental audit shall be carried out yearly and the environmental statements pertaining to the previous year shall be submitting to this State Board latest by 30th September every year.
- 7.7 The Board reserves the right to review and/or revoke the consent and/or make variations in the conditions, which the Board deems, fit in accordance with Section 27 of the Act.
- 7.8 In case of change of ownership/management the name and address of the new owners/ partners/directors/proprietor should immediately be intimated to the Board.
- 7.9 Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon. Supreme order in w.p. no. 657 of 1995 dated 14th October 2003.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD

(Smt. U.K. Upadhyay)

Senior Environment Engineer

Date:- 9/3/2022

NO: GPCB/CCA-Kutch-39(7)/ID-17739/ 625051

Issued to:

M/s. Adani Ports & Special Economic Zone,

Plot no. 169/P, At Navinal Island,

Tal: Mundra,

Dist: Kutch - 370 421

Clean Gujarat Green Gujarat

ISO - 9001 - 2008 & ISO - 14001 - 2004 Certified Organisation Page 9 of 9



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN, SECTOR 10-A,
GANDHINAGAR - 382010,
(T) 079-23232152

By R.P.A.D.

NO: PC/ CCA- KUTCH-39(8)/ GPCB ID: 17739/74&148

Date: -18/07/2023

Correction in Consolidated Consent & Authorization order no AWH-117045 date of issue 09/03/2022 (Under the provisions/rules of Environmental acts)

To,
M/s. Adani Ports & Special Economic Zone Limited,
Plot no. 169/P, At Navinal Island,
Tal: Mundra,
Dist: Kutch - 370 421.

Subject : Correction of Consolidated Consent and Authorization of this Board.

Reference : 1. This office has issued CCA order no. **AWH—117045** issued vide order no. GPCB/CCA-KUTCH-39(7)/ ID-17739/625051 dated 09/03/2022.
2. Your application CTN inward ID 7001067 dated 30/03/2022.

In exercise of the power conferred under section-27 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 6(2) of the Hazardous & Other Waste (Management & Transboundary Movement) Rules-2016 & as amended framed under the Environmental (Protection) Act-1986 and without reducing your responsibility under the said Acts/Rules in anyway. The Board had granted CCA vide order no. **AWH – 117045** issued vide letter no. GPCB/CCA-KUTCH-39(7)/ ID-17739/625051 dated 09/03/2022.

And whereas Board is empowered to amended/ corrected consent order conditions. Accordingly, considering your request for correction in the said CCA order vide CTN inward ID 7001067 dated 30/03/2022, the said CCA order no. AWH-117045 is hereby corrected/ amended as below;

1. The condition no. 3.5 of the said order is amended as below:

3.5 The quantity of domestic waste water shall not exceed 263 KL/Day.

2. The condition no. 5.2 of the said order is amended as below:

5.2 M/s. Adani Ports & Special Economic Zone Ltd., is hereby granted an authorization based on the enclosed signed inspection report for generation, collection, treatment, storage, transport of hazardous waste on the premises situated at Plot no. 169/P, At Navinal Island, Taluka: Mundra, Dist: Kutch.

Sr. No.	Waste	Quantity per Annum	Schedule & Category	Facility
1	Used/ Spent Oil	360 MT	I- 5.1	Collection, storage, Transportation, Disposal by selling out to registered recyclers/ reprocessor and/ or reuse within premises.
2	ETP Sludge	109.5 MT	I-35.3	Collection, storage, Transportation & disposal by sent out for co processing at cement industries and/ or CHWIF site.

Clean Gujarat Green Gujarat

Website : <https://gpcb.gujarat.gov.in>

3	Sludge & filters contaminated with oil	5 MT	I-3.3	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or CHWIF site
4	Waste Residue containing Oil/ oily rags	150 MT	I-33.2	Collection, storage, Transportation & disposal by sent out for co processing at cement industries and/ or CHWIF site.
5	Pig Waste	24 MT	I-3.1	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or CHWIF site
6	Tank Bottom sludge	Whatever Quantity generated	I-3.2	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or CHWIF site/ or recycling to registered recycler.
7	Discard containers/ barrels	25 MT	I-33.3	Collection, storage, Transportation, Disposal by reuse within premises and / or selling out to registered decontamination.
8	Asbestos Waste	Whatever Quantity generated	I-15.1	Collection, storage, Transportation, Disposal at CHWIF site.
9	Glass Wool Waste	Whatever Quantity generated	II/C-9	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or incineration at CHWIF site and / or recycling through registered recycler.
10	Downgrade Chemical	Whatever Quantity generated	I-20.2	Collection, storage, Transportation, Disposal by reuse within premises and / or selling out to authorized solvent recover.
11	Waste Oil	1,80,000 MT (0.18 MMTA)	I-5.2	Collection, storage, Transportation,, Disposal by selling out to registered recyclers
12	Expired Paint Material	10 MT	I-21.1	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or CHWIF site

9



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN, SECTOR 10-A,
GANDHINAGAR - 382010,
(T) 079-23232152

3. Rest of conditions of CCA order no. AWH—117045 issued vide order no. GPCB/CCA-KUTCH-39(7)/ ID-17739/625051 dated 09/03/2022 shall remain unchanged & industry shall comply with the same judiciously.

For and on behalf of
Gujarat Pollution Control Board

(T.C. Patel)
Unit Head



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN, SECTOR 10-A,

GANDHINAGAR - 382010,

(T) 079-23232152

By R.P.A.D

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 6(2) of the Hazardous and Other Waste (Management and Transboundary) Rules, 2016 framed under the Environmental (Protection) Act-1986.

And whereas Board has received consolidated consent application Inward No.310352 dated 26/04/2024 for the Renewal of Consolidated Consent and Authorization (CO&A) of this Board under the provisions / rules of the aforesaid Acts. Consents & Authorization are hereby granted as under:

CONSENTS AND AUTHORISATION:

(Under the provisions /rules of the aforesaid environmental acts)

To,

M/s. Mundra LPG Terminal Private Limited, (ID-53331).

Survey no. 169/P,

Navinal Island, Mundra,

Tal: Mundra, Dist: Kutch - 370 421.

1. Consent Order No. AWH-134895 Date of issue: 12/06/2024.

2. The consents shall be valid upto 27/06/2029 for the use of outlet for the discharge of trade effluent and emission due to operation of industrial plant for storage & handling of the following items/ products:

Sr No.	Product	Quantity
1.	Handling, Storage & Distribution of LPG	35,60,000 MT/Annum

* Total storage capacity of 2 tanks is 50,000 MT (each capacity of 25,000 MT).

Subject to specific condition:

1. Industry shall comply with Environment Clearance obtained by APSEZ for desalination plant, sea water intake channel, outfall facility & pipeline, Multiproduct SEZ at Mundra vide order no. 10-138/2008-IA.III dated 15/07/2014 issued MoEF & CC.
2. Industry shall not withdrawal ground water without prior NOC of CGWA as per order of Hon. National Green Tribunal.
3. Unit shall obtain fresh water from valid source have permission of the complete authority.
4. Industry shall renew Public Liability Insurance Policy time to time & submit a copy of the same to this office.
5. Industry shall comply with PESO permission issued by competent authority and renew PESO permission time to time & submit a copy of the same to this office.

Page 1 of 8

Clean Gujarat Green Gujarat

Website : <https://gpcb.gujarat.gov.in>

6. Industry shall comply with Manufacturing, Storage and Import of Hazardous Chemicals Rules – 1989 framed under the Environment (Protection) Act-1986 including site notification of competent authority for isolated storage & submit acknowledge copy of onsite emergency plan & third party safety audit report time to time.
7. Industry shall comply with circular of the Board dated 27/08/2021 regarding retrofitting of emission control/ equipment in D.G. Set of capacity 125 KVA and above as per system & procedure for emission compliance testing of Retrofit Emission Control Devices (RECD) for D.G. Set issued by CPCB dated 01/02/2022 at the earliest and submit compliance.

3. CONDITIONS UNDER THE WATER ACT:

- 3.1 Source of Water: - GWIL & Desalination Plant.
- 3.2 The quantity of the fresh water consumption for industrial purpose shall not exceed 460.10 KL/Day.
- 3.3 The quantity of the fresh water consumption for domestic purpose shall not exceed 80 KL/Day.
- 3.4 The quantity of the industrial effluent to be generated from the industrial plant and other ancillary industrial operations shall not exceed 217.6 KL/Day.
- 3.5 The quantity of domestic waste water shall not exceed 64 KL/Day.
- 3.6 Industrial effluent shall be conveyed to neutralization tank for pH collection & stored in 1500 KLD tank, which shall be utilized for gardening/ horticulture purpose within APSEZ premises (ID-17739).
- 3.7 Domestic effluent shall be treated into ETP of APSEZ (ID-17739) & discharged on land for gardening and horticulture purpose within APSEZ premises.
- 3.8 Industry shall provide fixed underground pipeline with flow meter for conveyance of industrial & domestic effluent to M/s. Adani Port and Special Economic Zone (ID-17739).
- 3.9 In case of non compliance under Water Act-1974 by any of the units, both industries i.e. M/s. Mundra LPG Terminal Pvt. Ltd., (ID-53331) & M/s. Adani Port and Special Economic Zone (ID-17739) are jointly & severally responsible for action under Water Act-1974 & other Environmental Acts/ Rules.
- 3.10 Disposal system for storm water shall be provided separately. In no case storm water & sewage from port facility shall not be discharge into surface water.

4. Conditions under the Air Act-1981:

- 4.1. The following shall be used as a fuel in Steam Boiler & D.G. Set respectively:

Sr. No.	Utility	Name of Fuel	Quantity
1.	Steam Boiler	LPG	2000 Kg/Hr
2.	D.G. Set	HSD	390 Lit/Hr



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN, SECTOR 10-A,
GANDHINAGAR - 382010,

(T) 079-23232152

- 4.2. The applicant shall install & operate air pollution control system efficiently in order to achieve prescribed norms.
- 4.3. The flue gas emission through stack attached to Steam Boiler & D.G. Set shall conform to the following standards;

Sr. No.	Stack attached to	Stack height	APCM	Parameter	Permissible Limit
1.	Steam Boiler (Total 2 nos.) (12 TPH (1 nos.) & 14 TPH (1 nos.))	35 mtr common stack	Adequate Stack Height	PM SO ₂ NO _x	150 mg/NM ³ 100 ppm 50 ppm
2.	Steam Boiler (12 TPH (1 nos.))				
3.	D.G. Set (2000 KVA)	11 mtr	Adequate Stack Height		

- 4.4. The process gas emission through stack attached to Flare Stack shall conform to the following standards.

Sr. No.	Stack attached to	Stack height	Parameter	Permissible Limit
1.	Flare Stack	38 mtr	SO ₂ NO _x	100 ppm 50 ppm

- 4.5. The concentration of the following parameters in the ambient air within the premises of the industry shall not exceed the limits specified hereunder as per National Ambient Air Quality Standards issued by MoEF & CC dated 18th November-2009. In addition to following parameters industry shall also carry out AAQ monitoring of all other applicable parameter as per MoEF notification dated 18/11/2009 and submit the report to the Board.

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient air in µg/M ³
1.	Sulphur Dioxide (SO ₂)	Annual 24 Hours	50 80
2.	Nitrogen Dioxide (NO ₂)	Annual 24 Hours	40 80
3.	Particulate Matter (Size less than 10 µm) or PM ₁₀	Annual 24 Hours	60 100
4.	Particulate Matter (Size less than 2.5 µm) or PM _{2.5}	Annual 24 Hours	40 60

- 4.6. The applicant shall provide perches, ladder, platform etc. at chimney(s) for monitoring the air emissions and the same shall be open for inspection to/and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/ displayed to facilitate identification.

4.7. The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75dB(A) during day time and 70 dB (A) during night time. Daytime is reckoned in between 6a.m. and 10 p.m. and nighttime is reckoned between 10 p.m. and 6 a.m.

4.8. **D.G. Sets Conditions**

The D.G. Set shall have acoustic enclosure and shall comply with the standards specified at Sr. no. 95 of Schedule-I of the rule-3 of E.P. Rules -1986 and Noise pollution level as per the Air Act-1981.

D.G. Sets standards:-

The flue gas emission through stack attached to D.G. Sets shall conform to the following standards.

- a) The minimum height of stack to be provided with each of the generator set shall be $H = h + 0.2 (KVA)^{1/2}$, where H= Total stack height in meter, h= height of the building in meters where or by the side of which the generator set is installed.
- b) Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the users end.
- c) The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/ acoustic treatment. Such circumstances the performance may be checked for noise reduction up to actual ambient noise level, preferably in the night time). The measurement for insertion loss may be done at different points at 0.5 m from the acoustic enclosure/room, and the averaged.
- d) The D.G. Set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).
- e) All efforts shall be made to bring down the noise level due to the D.G. Set, outside the premises, within the ambient noise requirements by proper siting and control measures.
- f) Installation of a D.G. Sets must be strictly in compliance with the recommendations of the D.G. Set manufacturer.
- g) A proper routine and preventive maintenance procedure for the D.G. Set should be set and followed in consultation with the DG Set manufacture which would help prevent noise levels of the DG Set from deteriorating with use.

5. AUTHORIZATION as per HAZARDOUS AND OTHER WASTE MANAGEMENT AND TRANSBOUNDARY) RULES, 2016 Form-2 [See rule 6 (2)]

Form for grant of authorization for occupier or operator handling Hazardous waste

5.1 Authorization order no:-AWH-184395 Date of issue: 12/08/2024

5.2 M/s. Mundra LPG Terminal Private Limited is hereby granted an authorization based on the enclosed signed inspection report for generation, collection,



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN, SECTOR 10-A,

GANDHINAGAR - 382010,

(T) 079-23232152

treatment, storage, transport of hazardous waste on the premises situated at Survey no. 189/P, Navinal Island, Mundra, Tal: Mundra, Dist: Kutch.

Sr. No	Waste	Quantity per Annum	Schedule & Category	Facility
1.	Used Oil	7.5 MT	I-5.1	Collection, storage, Transportation, and send to registered recycler.
2.	Discarded Drums & Containers	5 MT	I-33.3	Collection, Storage, Transportation and disposal by selling to authorized decontaminator.
3.	Oily Cotton Rags	5 MT	I-33.2	Collection, storage, transportation & disposed at cement industry for co-processing.
4.	Sludge & Filters Contaminated with Oil	0.2 MT	I-3.3	Collection, storage, Transportation, and send to registered recycler.

5.3 The authorization shall be valid up to 31/03/2025.

5.4 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.

5.5 The authorization is granted to operate a facility for collection, storage within factory premises transportation and ultimate disposal of Hazardous wastes as per condition no 5.2 to the industry having valid CCA of this Board.

5.6 TERMS AND CONDITIONS OF AUTHORIZATION

1. The applicant shall comply with the provisions of the Environment (Protection) Act-1986 and the rules made there under.
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board.
3. The persons authorized shall not rent, lend, sell, and transfer or otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.
4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a breach of this authorization.
5. The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;

6. The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Wastes and Penalty"
7. It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.
8. An application for the renewal of an authorization shall be made as laid down in rules 6(2) under Hazardous and Other Waste Rules, 2016.
9. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
10. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
11. The hazardous and other wastes which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.
12. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
14. The waste generator shall be totally responsible for (i.e. collection, storage, transportation and ultimate disposal) the wastes generated.
15. Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form-4 by 30th day of June of every year for the preceding period April to March.
16. In case of any accident, details of the same shall be submitted on Form-11 to Gujarat Pollution Control Board.
17. As per "Public Liability Insurance Act-91" company shall get Insurance Policy, if applicable.
18. Empty drums and containers of toxic and hazard material shall be treated as per guideline published for "Management & Handling of discarded containers". Records of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.
19. In case of transport of hazardous wastes to a facility for (i.e. treatment, storage and disposal) existing in a State other than the State where hazardous wastes are generated, the occupier shall obtain 'No Objection Certificate' from the State Pollution Control Board or Committee of the concerned State of Union Territory Administration where the facility exists.
20. Unit shall take all concrete measures to show tangible results in waste generation, reduction, avoidance, reuse and recycle. Actions taken in this regard shall be submitted within three months and also along with Form-4.



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN, SECTOR 10-A,
GANDHINAGAR - 382010,
(T) 079-23232152

21. Industry shall have to display the relevant information with regards to hazardous waste as indicated in the Hon. Supreme Court's Order in W.P. No.657 of 1995 dated 14th October, 2003.
22. Industry shall have to display on-line data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including wastewater and air emissions and solid hazardous wastes generated within the factory premises.

6. SPECIFIC CONDITIONS:-

- 6.1 The authorized actual user of hazardous and other wastes shall maintain records of hazardous and other wastes purchased in a passbook issued by the State Pollution Control Board along with the authorization.
- 6.2 Handling over of the hazardous and other wastes to the authorized actual user shall be only after making the entry in the passbook of the actual user.
- 6.3 In case of renewal of authorization, a self-certified compliance report in respect of effluent, emission standards and the conditions specified in the authorization for hazardous and other wastes shall be submitted to SPCB.
- 6.4 The occupier of the facility shall comply Standard operating procedure/guidelines published by MOEF&CC or CPCB or GPCB from time to time.
- 6.5 Unit shall comply provisions of E-Waste Management Rules 2016.
- 6.6 The disposal of Hazardous Waste shall be carried out as per the waste Management hierarchy.
- 6.7 The occupiers of facilities shall not store the hazardous and other wastes for a period not exceeding ninety days. Prior permission of the Board shall be obtained for extension of the storage period.
- 6.8 The occupier shall maintain the records of generation, sale, storage, transport, recycling, re processing and disposal of hazardous waste and make available during the inspection.
- 6.9 The transportation of the hazardous waste shall be carried out in GPS mounted dedicated vehicles.

7. GENERAL CONDITIONS:-

- 7.1 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.
- 7.2 Applicant shall also comply with the general conditions given in annexure I.
- 7.3 Whenever due to accident or other unforeseen act or event, such emissions occur or is apprehended to occur in excess of standards laid down such information shall be forthwith reported to Board, concerned Police Station Office of Directorate of Health Service, Department of Explosives, Inspectorate of Factories and local body.

Page 7 of 8

Clean Gujarat Green Gujarat

Website : <https://gpcb.gujarat.gov.in>

- 7.4 In case of failure of pollution control equipments, the production process connected to it shall be stopped. Remedial actions/measures shall be implemented immediately to bring entire situation normal.
- 7.5 The Environmental Management Unit/Cell shall be setup to ensure implementation on and monitoring of environmental safeguards and other conditions stipulated by statutory authorities. The Environmental Management Cell/Unit shall directly report to the Chief Executive of the organization and shall work as a focal point for internalizing environmental issues. These cells/units also coordinate the exercise of environmental audit and preparation of environmental statements.
- 7.6 The Environmental audit shall be carried out yearly and the environmental statements pertaining to the previous year shall be submitting to this State Board latest by 30th September every year.
- 7.7 The Board reserves the right to review and/or revoke the consent and/or make variations in the conditions, which the Board deems, fit in accordance with Section 27 of the Act.
- 7.8 In case of change of ownership/management the name and address of the new owners/ partners/directors/proprietor should immediately be intimated to the Board.
- 7.9 Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon. Supreme order in w.p. no. 657 of 1995 dated 14th October 2003.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD


(T.C. Patel)
Unit Head

Date: - /07/2024

NO: PC/CCA-KUTCH-1437(2)/ GPCB ID-83331/
Issued to:
M/s. Mundra LPG Terminal Private Limited,
Survey no. 169/P,
Navinal Island, Mundra,
Tal: Mundra, Dist: Kutch - 370 421.

Outward No: 816485, 19/07/2024

Annexure – 9

Compliance Report of Marine EMP

Sr. No.	Suggested Measures	Compliance Status
✗ Construction Phase:		
✗ Dredging and Reclamation Management Plan		
1	Installation of silt screens around the dredging area to prevent dispersion of suspended sediment plume into the adjacent areas and fish species from entering the activity area.	Being Complied Silt curtains is being provided during dredging activity around the dredging area to prevent dispersion of suspended sediment plume into the adjacent areas and fish species from entering the activity area. For further details regarding control measures for dredging activity, please refer to Water Quality Monitoring and Preservation condition no 3.2 of the EC and CRZ clearance.
2	Turbidity levels will be maintained as to the baseline data by continuous monitoring and proper care by way of stopping the activities whenever there is increase in turbidity by way of land sliding/bottom turbulence so avoid any impact either to water quality or to marine organisms	Being Complied Dredging activity is being carried out in proper manner so that turbidity level can be maintained.
3	Dredge Management Programme shall include measures to avoid entrapment of macro marine fauna.	Complied Dredging activity is being carried out through a well-trained / skilled manpower/ team in line with the SOP / management plan. All the measures are being taken to avoid entrapment of macro marine fauna.
4	Dredging shall be done in a planned manner following grid pattern	Complied Dredging activity is being carried out in planned manner so no adverse impact will be happened on marine ecology.
5	Sheet piling will be done around the project area to avoid spreading and sliding of reclaimed sediments into the marine environment.	Complied This compliance covers points 5 & 6.
6	The land (mostly inter tidal) to be reclaimed with dredged material will be separated from adjoining land by	The entire quantity of capital dredged material will be used for reclamation / level raising within approved area.

Sr. No.	Suggested Measures	Compliance Status
	creating containment bund for effective compaction on the soil and avoid runoff into adjoining land	While carrying out reclamation, containment bund / sheet piling will be made for effective compaction on the soil and avoid runoff into adjoining land.
7	Shoreline Protection Techniques such as Sand by passing if any will be carried.	Complied. Shoreline protection is being taken while carrying out dredging / reclamation activity.
8	Detailed borehole analysis of sub-surface seabed sediments for sediment characteristics analysis to identify heavy metal or other pollutant contamination	Complied. For further details regarding water & marine monitoring, please refer to specific condition no 1.12 of the EC and CRZ clearance.
9	If the sediment is contaminated it shall be treated before being utilized for reclamation purpose	Point Noted and Agreed Sediment/ dredged material to be utilized for reclamation / level raising is being analyzed before using.
10	Detailed biological analysis of benthic community richness and population in the sites proposed for reclamation	Complied. For further details regarding marine monitoring, please refer to specific condition no 1.12 of the EC and CRZ clearance.
11	Dredging shall only be done in fair weather period, daytime and avoid fish breeding and migratory seasons.	Complied Dredging activity is being done in fair weather, daytime and during none fish breeding and spawning seasons only and dredged material is being disposed-off in line permission granted in EC & CRZ Clearance.
12	To compensate the loss of mangroves in the reclamation area, mangroves afforestation measure is being executed in the nearby areas.	Complied. There is no mangrove or mangrove buffer area present in the area proposed for reclamation / level raising. For further details regarding mangrove conservation & afforestation, please refer to specific condition no 1.5 & 1.6 of the EC and CRZ clearance.

Sr. No.	Suggested Measures	Compliance Status
13	Utmost care shall be taken to ensure that the drainage pattern of the intertidal areas and creeks are not altered due to the proposed activities.	Complied. For further details regarding creek conservation, please refer to specific condition no 1.13 of the EC and CRZ clearance.
✎ Construction of Breakwater, SBM, Island Jetty and Berth (quay lengths)		
1	Care should be taken to prevent the contaminated runoff from the construction site entering into the marine environment and nearby natural streams, if any, by isolating the area of development from the surrounding waters.	Complied As a part of this proposed expansion, construction of new berth / berth quay length extension is in progress. No new construction of Breakwater, Sea Island jetty and SPM has been undertaken.
2	Proper silt barriers and floater booms shall be deployed around the construction site in water environment to avoid dispersion of debris/ sediment plume.	Advance construction methodology is being applied for construction of berth to avoid marine water contamination as well as isolating the area of development from the surrounding waters.
3	During construction of breakwater and New port the spillage of construction materials and oil spill from these heavy machinery/ equipment shall be well maintained	For further details regarding control measures during construction activity, please refer to specific condition no 1.9, 1.17 & 3.2 of the EC and CRZ clearance.
4	The best suitable and minimal impact methodology shall be adopted for piling to avoid the impact of noise and vibration on the marine species by controlling the rate of dredging and by isolating the area devoid of any pelagic species.	
5	Grab dredging shall be done in areas of sandy stratum.	Point Noted and Agreed
6	Storage areas for sand and soil, and all work areas must be at least 20m away from the high-water mark	Complied.
7	Construction site near water need to be kept tidy to prevent tools and debris from falling into the water and damaging the environment	Point Noted and being complied
8	Project proponent shall appoint a supervisor to be present at construction site for inspection and smooth operation	Point Noted and being complied
9	Any accidents at site including spillage of construction materials, fuel oil, debris etc shall be contained	Point Noted and Agreed

Sr. No.	Suggested Measures	Compliance Status
	and removed immediately.	
10	Any such accidents shall be reported immediately by the site supervisor to keep track and avoid any further incidents.	Point Noted and Agreed
11	Construction activities shall be limited to daytime to prevent the increased possibility of risk due to night time and reduce the impact of artificial lighting on marine ecological environment.	Point noted and being complied.
12	The existing mangrove afforestation program shall be adopted for compensating the loss of mangroves, if any due to the proposed construction.	Complied. For further details regarding mangrove conservation & afforestation, please refer to specific condition no 1.5 & 1.6 of the EC and CRZ clearance.
13	During installation of offshore SPM's/SBM's and a sea island jetty appropriate mooring system shall be adopted based on detailed engineering study to reduce footprint area	Point Noted and Will be complied
14	Emergency preparedness and spill control measures such as floater booms, skimmers shall be present either in the proposed SPM's/SBM's and a sea island jetty or in readily available manner to prevent any incidents of spill, system failure and transportation facility rupture.	Point Noted and Will be complied
Water Quality Maintenance and Protection of Marine Organisms: Sub-Sea Pipelines and Intake, Outfall Pipeline		
As a part of WFDP-Expansion, we have not undertaken any activity w.r.t. laying of Sub-Sea Pipelines and Intake, Outfall Pipeline. Once it is initiated, we will comply all the measures suggested / recommended in EMP.		
1	During laying of sub-sea pipelines, the major action of concern is the spillage of on-board fuel/oil from vessel or pipe laying instruments	Point Noted and Will be complied
2	Spill control measures shall be available on-board to contain any spill while laying of the pipelines	
3	The installation activity shall be done avoiding peak photosynthesis period of the day to reduce the impact on plankton population	

Sr. No.	Suggested Measures	Compliance Status
4	Marine environmental monitoring shall be done during the pre-installation and post installation stage to analyze the change in baseline environment.	
5	Since the area has very poor algal growth, as the sandy/muddy substratum is associated with relatively high turbidity which does not support the growth of algal species and patchy occurrence of seaweed species minimal temporary impact is envisaged on the marine environment due to pipeline installation	
Operation Phase:		
Dredging Management Plan		
1	Silt screens shall be installed around the maintenance dredging areas and spoil disposal site to contain the sediment plume dispersing into the surrounding environment.	<p>Being Complied</p> <p>The entire quantity of maintenance dredged material will be disposed off in deep sea at identified locations.</p> <p>For further details regarding control measures for dredging activity, please refer to Water Quality Monitoring and Preservation condition no 3.2 of the EC and CRZ clearance.</p>
2	Sediment screens also help in preventing fishes from entering into the activity core zone to avoid any possible injury or death	Point Noted and Agreed
3	Disposal shall be done during fair weather period and avoid peak photosynthesis period avoiding the impact on planktons and other benthic species in the vicinity	Point Noted and Agreed
4	Detailed benthic species analysis shall be done in the identified disposal sites to mitigate the impact on benthic species caused by smothering effect	<p>Point Noted and Being Complied</p> <p>For further details regarding Marine Water Quality Monitoring condition no 1.12 of the EC and CRZ clearance.</p>
5	Due to strong tidal currents and water circulation the disposed sediments will be majorly dispersed into the marine environment causing	Point Noted and Agreed

Sr. No.	Suggested Measures	Compliance Status
	minimal temporary impact in the disposal site as the benthic species have the ability to rejuvenate back to the baseline scenario	
6	The dredged spoil shall be analyzed for heavy metal and other pollutant concentration prior to disposal	Point Noted and Agreed
7	Noise mitigation measures such as bubble barriers/curtains, double pile, filled double pile, double walled air filled sleeve around the pile, can be used to reduce noise generated from piling.	Point Noted and Agreed
Cargo handling in the proposed Waterfront and Offshore Berths/Jetty:		
Still, we have not commenced cargo handling activity for the proposed waterfront expansion project. All the mitigation measures to avoid air, water or land contamination is being taken and the same will be implanted during proposed expansion activity also.		
Multipurpose Cargo Handling in Ports		
1	Handling of Multipurpose cargo (coal, iron ore, limestone, fertilizers, food grains, cement, etc), hazardous cargo (Ethylene, Propylene (Propene), Butadiene, Pentane, etc) and liquid/ gas/ cryogenic cargo (LNG, propane, LPG, etc) has the possibility of contaminating the marine environment when coming into contact	Point Noted and Agreed
2	The cargo handling facility and operations shall be monitored by an site supervisor	Point Noted and Agreed
3	In case of a cargo spill the cargo handling activity shall be kept on halt based on spill quantity and immediate action for removal of cargo spilt shall done	Point Noted and Agreed
4	Cargo handling shall be done only during fair weather period	Point Noted and Agreed
5	Spillage or leak of liquid and other hazardous cargo during handling from vessel to onsite facility shall be contained in the manner of utilizing floater booms and skimmers.	Point Noted and Agreed
6	In case of a dense liquid utmost care shall be taken to avoid any spill accidents because dense liquid when settling onto seabed destroys	Point Noted and Agreed

Sr. No.	Suggested Measures	Compliance Status
	the benthos in the region.	
7	Possible dusty cargos shall be water sprayed to reduce the particulate emissions arising during cargo handling	Point Noted and Agreed
8	Mechanization of cargo handling facility will further reduce the possibilities of spillage and accidents	Point Noted and Agreed
9	The Multipurpose cargo include hazardous cargo and liquid/gas/cryogenic cargo emergency response and preparedness plan shall be place	Point Noted and Agreed
10	Online monitoring system for pressure gauges, operation valves, pipeline pressure, transfer point junctions, storage tanks, etc shall be installed and periodically maintained.	Point Noted and Agreed
11	Floating, marking buoys, Signboards will be displayed to educating the seafarers about the orientation of approach channel	Point Noted and Agreed
12	Acoustic Barriers and Enclosures and the conveyor galleries will be covered.	Point Noted and Agreed
Liquid Cargo Handling in Offshore Facilities:		
1	Emergency preparedness plan for handling liquid cargo in the offshore facilities shall be in place	Complied Please refer to specific condition 1.19 for further details.
2	In case of an unlikely event of spillage of liquid cargo while handling from vessel to facility, it shall be immediately acted upon by containing the spill and removing from the marine environment	Complied This reply covers condition no 2 & 3
3	If the spillage or leak occurs during transporting the liquid cargo from the offshore facility to the Port, the source shall be cut-off to prevent major disaster and the leak/ spill shall be handled through floater booms, skimmers, biological degradation and suction methods.	Please refer to specific condition 1.18 & 1.19 for further details.
4	Pressure sensors in the pipeline transportation system shall be regularly monitored to ensure no	Point Noted and Agreed

Sr. No.	Suggested Measures	Compliance Status
	leak in the system.	
5	Periodical monitoring for quality assurance of pipeline system and offshore facility has to be done.	Being Complied
6	Trained personnel shall be employed for liquid cargo handling in areas of manual operation to avoid accidents.	Complied
7	An online monitoring system shall be installed in Port for monitoring the handling/ transportation of liquid cargo from off-shore facility to port.	Point Noted and Agreed
8	The monitoring shall include pipe pressure sensors, valves/ junctions/joints pressure sensors, flow velocity and automized cut-off systems.	Point Noted and Agreed
9	Emergency response team shall be deployed in such a manner to address any possible event in the shortest response time and period.	Complied Please refer to specific condition 1.19 for further details.
10	Ensure that slop tanks will be provided to barges/ workboats for collection of liquid/ solid waste	Point Noted and Agreed
11	Floating, marking buoys, Signboards will be displayed to educating the seafarers about the orientation of approach channel	Point noted and agreed
Discharge from ETP, Desalination Plant and Bilge Water:		
At present no sea discharge from ETP as well as bilge water. The existing Outfall channel is suitable for 300 MLD Desalination capacity. For additional desalination plant capacity will have intake & outfall with pipeline system.		
1	Continuous online monitoring system of the combined discharge from ETP and Desalination Plant shall be done to ensure that the outfall characteristics does not exceed the CPCB discharge standards.	Will be complied Continuous online monitoring system of the combined discharge from ETP and Desalination Plant will be provided once pipeline with diffuser system laid.
2	The outfall shall be diluted with raw sea water in an mixing chamber prior to disposal into marine environment to avoid change in baseline conditions	Outfall will be diluted with raw sea water in a mixing chamber prior to disposal into marine environment to avoid change in baseline conditions.
3	The outfall diffusers shall be monitored via flow sensors to ensure proper dispersion of outfall.	Will be complied Outfall diffusers will be monitored via flow sensors to ensure proper dispersion of

Sr. No.	Suggested Measures	Compliance Status
		outfall once pipeline with diffuser system laid.
4	Periodical monitoring of marine water, sediment and other biological components shall be done to analyze the change in baseline conditions if any.	<p>Complied.</p> <p>Periodical monitoring of marine water, sediment and other biological components is being carried out at regular interval including existing intake and outfall points. The same will be continued after proposed expansion also.</p> <p>Please refer to specific condition no 1.12 for further details.</p>
5	Maximum utilization of treated waste water from ETP shall be done with the port to reduce the outfall quantity	<p>Will be complied</p> <p>Maximum utilization of treated water from ETP will be done for horticulture purposes within port premises.</p> <p>Sea discharge will be done if it does not confirm the permissible norms for on land utilization.</p>
6	Discharge of waste into the sea will be prohibited	Point Noted and Agreed
7	Oil Spill control measures will be adopted	<p>Complied.</p> <p>Please refer to specific condition no 1.18 for further details.</p>
8	Ensure that slop tanks will be provided to barges/ workboats for collection of liquid/ solid waste	Point Noted and Complied
9	Discharge of treated wastewater as per marine discharge standards	<p>Complied</p> <p>Please refer to Water Quality Monitoring and Preservation condition no 3.3 for further details.</p>
10	Ships will be prohibited from discharging wastewater, bilge, oil wastes, etc. into the nearshore as well as harbour waters by adopting International Convention for the Prevention of Pollution from Ships (MARPOL) 1974/1978, Consolidated Edition, IMO, 1991, including 1992 amendments to Annex 1 and 2002 amendments.	<p>Point Noted and Being Complied with.</p> <p>Please refer to Air Quality Monitoring and Preservation condition no 2.5 for further details.</p>

Sr. No.	Suggested Measures	Compliance Status
11	Ships shall conduct ballast water exchange at least 200 nautical miles from the nearest land and in water at least 200 m in depth prior to calling at a Shipyard Cum Captive jetties including LNG Terminal.	Point Noted Please refer to specific condition no 1.21 for further details
12	Regular Interactions shall be initiated with the fishing community and conflicts, if any with fishing community shall be amicably resolved in all cases.	Point Noted and being complied with Please refer to specific condition 1.26 & 1.29 for further details regarding CSR activities by Adani foundation.
13	Shoreline Protection Techniques such as Sand by passing if any will be carried.	Point Noted and Agreed
Measures to maintain the Beaches/Sand Dunes and to conserve Turtle Nesting sites		
There are no Beaches, Sand Dunes and Turtle Nesting sites around the project site. Hence, below measures are not applicable to our project.		
1	The fixture will be mounted as low as possible to minimize light trespass and the lowest amount of light needed for the task shall be used.	Not Applicable
2	Long wavelength lights will be used wherever possible. Low pressure sodium (LPS) lights are considered more desirable than HPS sources. Short wavelength (blue) and broad spectrum sources such as metal halide, mercury vapour, fluorescent or halogen lights will be avoided.	
3	Amber filters on HPS lights will be used if HPS lights use cannot be avoided,	
4	White lights that emit ultraviolet light will not be used.	
5	Strong blue or green spectral elements (eg. mercury vapour lights) will be limited as far as possible.	
6	Lights will be directed downward and will be shielded to avoid overhead glow on cloudy nights	
7	To mitigate the erosion related issues, sand by passing / Beach nourishment is considered as one way to mitigate erosion. The classical mitigation measures such as shore walls, groynes, etc is	

Sr. No.	Suggested Measures	Compliance Status
	completely avoided since it may prohibit access of sea turtles to nearby nesting beaches.	
8	Awareness programmes for local fisher population, company laborers and employees shall be undertaken to highlight sea turtle conservation. Awareness regarding fisheries related issues is also necessary among fishing community.	
9	Incidental capture of turtles in shrimp trawls and gill nets account for more deaths than all other human activities combined. In addition to the trawl entanglement, sea turtles have been killed after becoming entangled in other types of fishing gear, such as, gill nets, long lines (hook and line), and lobster or crab pot lines.	
10	Creation of awareness among villagers and fishermen shall be undertaken as part of conservation measures.	

Annexure – 10



“Half Yearly Environmental Monitoring Reports “

For,
adani
Ports and
Logistics

M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)

PLOT NO: - NAVINAL ISLAND, Village - MUNDRA, Tal. – Bhuj, DIST. - KUTCH - 370421.

Monitoring Period: April - 2024 to September - 2024

Submitted By



UniStar Environment & Research Labs Pvt. Ltd.

White House, Near GIDC Office, Char Rasta, Vapi, Gujarat, India – 396195

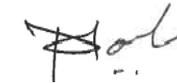


RESULTS OF STP OUTLET WATER

SR.N O.	TEST PARAMETERS	UNIT	WFDP WEST PORT STP OUTLET						GPCB Permissible Limit	TEST METHOD
			Apr-24		May-24		Jun-24			
			11-04-2024	27-04-2024	10-05-2024	24-05-2024	12-06-2024	26-06-2024		
1.	pH @ 25 ° C	--	7.44	7.39	7.46	7.41	7.42	7.42	6.5 to 9	IS 3025 (Part-11):2022
2.	Total Suspended Solids	mg/L	24	28	24	26	22	22	100	APHA 24th Ed.2023,2540 -D
3.	Biochemical Oxygen Demand (BOD) (5 days at 20 ° C)	mg/L	16	18	16.8	16.4	14.8	15.2	30	APHA 24th Ed.2023,5210-B
4.	Residual chlorine	mg/L	0.77	0.72	0.68	0.74	0.72	0.66	0.5 Min.	APHA 24th Ed.2023,4500-CI-G
5.	Fecal Coliform	MPN Index/100 ml	60	80	50	70	60	90	1000	IS 3025 (Part-11):2022



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF STP OUTLET WATER

SR.NO.	TEST PARAMETERS	UNIT	WFDP WEST PORT STP OUTLET						GPCB Permissible Limit	TEST METHOD
			Jul-24		Aug-24		Sep-24			
			06-07-2024	24-07-2024	13-08-2024	24-08-2024	05-09-2024	20-09-2024		
1.	pH @ 25 ° C	--	7.35	7.28	7.12	7.11	7.88	7.49	6.5 to 9	IS 3025 (Part-11):2022
2.	Total Suspended Solids	mg/L	16	22	18	18	14	18	100	APHA 24th Ed.2023,2540 - D
3.	Biochemical Oxygen Demand (BOD) (5 days at 20 ° C)	mg/L	16	15	16.8	14.9	9	12	30	APHA 24th Ed.2023,5210- B
4.	Residual chlorine	mg/L	0.62	0.63	0.59	0.64	0.72	0.78	0.5 Min.	APHA 24th Ed.2023,4500- CI-G
5.	Fecal Coliform	MPN Index/100ml	50	80	60	90	70	80	1000	IS 3025 (Part-11):2022



Mr. Nilesh Patel
Sr. Chemist




Mr. Nitin Tandel
Technical Manager

MARINE WATER MONITORING SUMMARY REPORT

RESULTS OF MARINE WATER [M1 LEFT SIDE OF BOCHA CREEK - N 22°45'183" E 069°43'241"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM											
1.	pH	--	8.11	7.94	7.96	7.81	8.05	7.89	7.98	7.74	7.91	7.82	8.12	7.94	IS 3025 (Part 11):2022
2.	Temperature	°C	29.9	29.8	30.5	30.4	30.7	30.6	30.1	30	30	29.9	29.9	29.8	IS 3025 (Part 9):2023
3.	Total Suspended Solids	mg/L	138	118	144	120	132	118	98	82	142	126	128	102	APHA 24th Ed.,2023,254 0- D
4.	BOD (3 Days @ 27°C)	mg/L	2.9	BDL(MDL :1.0)	3.1	BDL(MDL :1.0)	2.9	BDL(MDL :1.0)	3.1	BDL(MDL :1.0)	2.6	BDL(MDL :1.0)	2.8	BDL(MDL :1.0)	IS 3025 (Part 44):2023
5.	Dissolved Oxygen	mg/L	6.12	5.92	6.02	5.77	5.93	5.68	6.42	6.22	6.59	6.3	6.69	6.4	APHA 24th Ed.2023,4500 -O, B
6.	Salinity	ppt	35.86	37.11	35.92	37.28	38.82	37.15	36.12	36.88	35.78	36.71	35.87	36.64	By Calculation
7.	Oil & Grease	mg/L	BDL(MDL :2.0)	IS 3025 (Part 39):2021											
8.	Nitrate as NO ₃	µmol/L	3.39	3.06	3.55	3.23	3.71	3.39	3.55	3.39	1.94	1.61	2.32	1.72	APHA 24th Ed. 2023,4500 NO3-B
9.	Nitrite as NO ₂	µmol/L	0.543	0.478	0.609	0.565	0.565	0.522	0.456	0.435	0.174	0.13	0.379	0.312	APHA 24th Ed.2023,4500 NO ₂ B
10.	Ammonical Nitrogen as NH ₃	µmol/L	4.22	4.11	4.48	4.37	4.43	4.37	3.8	3.69	3.954	3.85	2.59	2.16	APHA 24th Ed. 2023,4500-NH3 B
11.	Phosphates as PO ₄	µmol/L	1.68	1.58	1.9	1.68	1.16	1.05	1.05	BDL(MDL :0.4)	1.37	1.16	1.47	1.26	APHA 24th Ed.2023,4500 -P, D

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

12.	Total Nitrogen	µmol/L	8.153	7.648	8.639	8.165	8.705	8.282	7.806	7.515	6.068	5.59	5.289	4.192	APHA 24th Ed. 2023,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	ND	ND	ND	ND	ND	ND	APHA 24th ED.2023,552 OF
14.	Total Dissolved Solids	mg/L	36410	37180	36550	37210	36480	37180	36120	36980	34970	35960	34740	35830	IS 3025(Part 16):2023
15.	COD	mg/L	23.9	7.9	28.17	12.07	23.9	8	16.1	4	20	8	24.1	12	IS 3025(Part 58):2023

Continue...

RESULTS OF MARINE WATER [M1 LEFT SIDE OF BOCHA CREEK - N 22°45'183" E 069°43'241"]

SR. NO	TEST PARAMETER	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
Phytoplankton															
1.	Chlorophyll	mg/m ³	3.05	3.25	3.06	3.24	3.08	3.26	3.07	3.27	3.08	3.26	3.07	3.07	APHA (24 th Ed. 2023)10200A-G
2.	Phaeophytin	mg/m ³	2	1.56	3	1.59	4	1.56	3	1.55	4	1.57	6	6	APHA (24 th Ed. 2023)10200A-G
3.	Cell Count	No. x 10 ³ /L	109	90	110	92	114	91	112	92	114	93	112	112	APHA (24 th Ed. 2023)10200A-G
4	Name of Group Number and name of group species of each group	--	<i>Coscinodiscus</i>	<i>Odentella</i>	<i>Nitzschia</i>	<i>Biddulphia</i>	<i>Nitzschia</i>	<i>Biddulphia</i>	<i>Thalassiothrix</i>	<i>Dinophysis</i>	<i>Thalassiothrix</i>	<i>Dinophysis</i>	<i>Thalassiothrix</i>	<i>Dinophysis</i>	APHA (24 th Ed. 2023)10200A-G
			<i>Diploneis</i>	<i>Rhizosolenia</i>	<i>Diploneis</i>	<i>Rhizosolenia</i>	<i>Pinnularia</i>	<i>Rhizosolenia</i>	<i>Surirella</i>	<i>Pinnularia</i>	<i>Surirella</i>	<i>Pinnularia</i>	<i>Biddulphia</i>	<i>Pinnularia</i>	
			<i>Rhizosolenia</i>	<i>Coscinodiscus</i>	<i>Rhizosolenia</i>	<i>Coscinodiscus</i>	<i>Rhizosolenia</i>	<i>Coscinodiscus</i>	<i>Navicula</i>	<i>Thalassiothrix</i>	<i>Navicula</i>	<i>Thalassiothrix</i>	<i>Navicula</i>	<i>Thalassiothrix</i>	
			<i>Dinophysis</i>	<i>Grammatophora</i>	<i>Dinophysis</i>	<i>Grammatophora</i>	<i>Dinophysis</i>	<i>Grammatophora</i>	<i>Thalassiosira</i>	<i>Grammatophora</i>	<i>Nitzschia</i>	<i>Grammatophora</i>	<i>Nitzschia</i>	<i>Grammatophora</i>	
			<i>Thalassionema</i>	<i>Thalassiosira</i>	<i>Biddulphia</i>	<i>Navicula</i>	<i>Biddulphia</i>	<i>Navicula</i>	<i>Skeletonema</i>	<i>Ceratium</i>	<i>Skeletonema</i>	<i>Ceratium</i>	<i>Skeletonema</i>	<i>Ceratium</i>	

Zooplankton															
1	Abundance(Population)	noX103/100 m3	66		65		64		66		68		67		APHA (24 th Ed. 2023)10200 G
2	Name of Group Number and name of group species of each group		<i>Crustacean Larvae</i>		<i>Oikoplura</i>		<i>Oikoplura</i>		<i>Egg(Fish and Shrimps)</i>		<i>Egg(Fish and Shrimps)</i>		<i>Egg(Fish and Shrimps)</i>		
			<i>Egg(Fish and Shrimps)</i>		<i>Pinnularia</i>		<i>Pinnularia</i>		<i>Oikoplura</i>		<i>Oikoplura</i>		<i>Oikoplura</i>		
			<i>Copepods</i>		<i>Copepods</i>		<i>Copepods</i>		<i>Copepods nauplii</i>		<i>Copepods nauplii</i>		<i>Copepods nauplii</i>		
			<i>Crustacean</i>		<i>Copepods nauplii</i>		<i>Copepods nauplii</i>		<i>Crustacean</i>		<i>Crustacean</i>		<i>Crustacean</i>		
			<i>Bivalve Larvae</i>		<i>Thalassionema</i>		<i>Thalassionema</i>		<i>Bivalve Larvae</i>		<i>Bivalve Larvae</i>		<i>Bivalve Larvae</i>		
3	Total Biomass	ml/100 m ³	13.64		13.65		13.64		13.66		13.67		13.67		

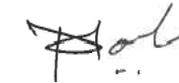
Continue...

RESULTS OF MARINE WATER [M1 LEFT SIDE OF BOCHA CREEK - N 22°45'183" E 069°43'241"]

SR. NO	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM											
Microbiological															
1	Total Bacterial Count	CFU/ml	100		102		104		106		108		110		APHA 24 th Ed.2023,9215-C
2	Total Coliform	/100ml	12		10		11		12		14		13		APHA 24 th Ed.2023,9222-B
3	Ecoli	/100ml	10		12		9		8		7		8		IS :15185:2016
4	Enterococcus	/100ml	Absent		IS:15186:2002										
5	Salmonella	/100ml	Absent		IS:15187:2016										
6	Shigella	/100ml	Absent		APHA 24 th Ed.2023,9260-E										
7	Vibrio	/100ml	Absent		IS: 5887 (Part V):1976										



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF SEDIMENT ANALYSIS [M1 LEFT SIDE OF BOCHA CREEK - N 22°45'183" E 069°43'241"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.43	0.46	0.44	0.48	0.41	0.44	IS: 2720 (Part 22):1972
2.	Phosphorus as P	µg/g	558.4	551.2	558.6	542.2	510.5	524.2	IS: 10158 :1982, Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 24th Ed.2023,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	4.09	4.05	4.08	3.98	3.82	3.88	IS3025(Part 55):2003
5.2	Total Chromium as Cr+3	µg/g	138.4	132.2	136.4	144.2	120.8	128.7	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.3	Manganese as Mn	µg/g	594.6	580.4	574.2	550.6	610.2	624.3	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.4	Iron as Fe	%	4.12	4.08	3.98	3.86	3.94	3.86	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.5	Nickel as Ni	µg/g	42.06	41.25	41.36	42.35	48.65	44.62	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.6	Copper as Cu	µg/g	42.86	41.94	42.28	43.25	51.25	48.96	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.7	Zinc as Zn	µg/g	122.4	120.2	120.84	116.5	124.6	120.3	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.8	Lead as Pb	µg/g	2.41	2.36	2.48	2.41	2.31	2.22	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

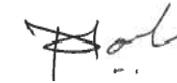
Continue...

RESULTS OF SEDIMENT ANALYSIS [M1 LEFT SIDE OF BOCHA CREEK - N 22°45'183" E 069°43'241"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24 SEDIMENT	May-24 SEDIMENT	Jun-24 SEDIMENT	Jul-24 SEDIMENT	Aug-24 SEDIMENT	Sep-24 SEDIMENT	TEST METHOD
D Benthic Organisms									
1	Macrobenthos	--	<i>Isopods</i>	<i>Isopods</i>	<i>Isopods</i>	<i>Foraminiferan</i>	<i>Foraminiferan</i>	<i>Foraminiferan</i>	APHA (24 th Ed. 2023)10500
			<i>Polychates</i>	<i>Polychates</i>	<i>Polychates</i>	<i>Decapods Larvae</i>	<i>Decapods Larvae</i>	<i>Decapods Larvae</i>	
			<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Amphipods</i>	<i>Gastropods</i>	<i>Gastropods</i>	
			<i>Amphipods</i>	<i>Foraminiferan</i>	<i>Foraminiferan</i>	<i>Polychates</i>	<i>Polychates</i>	<i>Polychates</i>	
2	MeioBenthos	--	<i>Herpectacoids</i>	<i>Gastropods</i>	<i>Herpectacoids</i>	<i>Turbellarians</i>	<i>Turbellarians</i>	<i>Turbellarians</i>	
			<i>Decapods Larvae</i>	<i>Decapods Larvae</i>	<i>Decapods Larvae</i>	<i>Foraminiferan</i>	<i>Foraminiferan</i>	<i>Foraminiferan</i>	
3	Population	no/m ²	364	366	368	367	368	367	



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF MARINE WATER [M2 MOUTH OF BOCHA & NAVINAL CREEK - N 22°44'239" E 069°43'757"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFAC E	BOTTO M											
1.	pH	--	8.18	7.98	8.06	7.86	8.12	7.94	8.05	7.86	7.96	7.84	8.06	7.94	IS 3025 (Part 11):2022
2.	Temperature	°C	29.8	29.7	30.4	30.3	30.5	30.4	30.2	30.1	30.1	30	29.8	29.7	IS 3025 (Part 9):2023
3.	Total Suspended Solids	mg/L	142	118	136	104	142	122	118	96	94	76	114	88	APHA 24th Ed.,2023,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.9	BDL(M DL:1.0)	3.2	BDL(M DL:1.0)	2.8	BDL(M DL:1.0)	2.5	BDL(M DL:1.0)	2.6	BDL(M DL:1.0)	2.8	BDL(M DL:1.0)	IS 3025 (Part 44):2023
5.	Dissolved Oxygen	mg/L	6.12	5.82	6.02	5.67	5.93	5.58	6.22	6.03	6.4	6.1	6.49	6.2	APHA 24th Ed.2023,4500-O, B
6.	Salinity	ppt	36.38	37.13	36.44	37.42	36.35	37.36	35.94	36.84	35.69	36.72	35.59	36.78	By Calculation
7.	Oil & Grease	mg/L	BDL(M DL:2.0)	IS 3025 (Part 39):2021											
8.	Nitrate as NO ₃	µmol/L	3.39	3.23	3.71	3.55	3.87	3.55	3.39	3.23	2.42	2.1	2.49	2.15	APHA 24th Ed. 2023,4500 NO3-B
9.	Nitrite as NO ₂	µmol/L	0.5	0.478	0.543	0.522	0.5	0.456	0.478	0.435	0.239	0.196	0.259	0.13	APHA 24th Ed.2023,4500NO ₂ B
10.	Ammonical Nitrogen as NH ₃	µmol/L	4.27	4.16	4.48	4.43	4.32	4.27	3.74	3.69	4.11	4.014	2.28	1.81	APHA 24th Ed. 2023,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	1.68	1.47	1.47	1.37	1.26	1.16	1.16	1.05	1.05	BDL(M DL:0.4)	1.16	1.05	APHA 24th Ed.2023,4500-P, D
12.	Total Nitrogen	µmol/L	8.16	7.868	8.733	8.502	8.69	8.276	7.608	7.355	6.769	6.31	5.029	4.09	APHA 24th Ed. 2023,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	ND	ND	ND	ND	ND	ND	APHA 24th ED.2023,5520 F
14.	Total Dissolved Solids	mg/L	36240	37310	36280	37340	36110	37140	35860	36920	35810	36860	35860	36740	IS 3025(Part 16):2023
15.	COD	mg/L	19.9	7.9	32.19	16.1	27.9	12	20.1	8	24	12	28.1	16.1	IS 3025(Part 58):2023

RESULTS OF MARINE WATER [M2 MOUTH OF BOCHA & NAVINAL CREEK - N 22°44'239" E 069°43'757"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD	
			SURFACE	BOTTOM												
A																
Phytoplankton																
1.	Chlorophyll	mg/m ³	2.98	2.69	2.97	2.64	2.96	2.63	2.95	2.66	2.98	2.67	2.99	2.68	APHA (24 th Ed. 2023)10200A-G	
2.	Phaeophytin	mg/m ³	2.09	2.06	2.08	2.07	2.05	2.05	2.06	2.06	2.08	2.05	2.06	2.04	APHA (24 th Ed. 2023)10200A-G	
3.	Cell Count	No. x 10 ³ /L	95	147	97	146	94	148	95	147	93	148	94	147	APHA (24 th Ed. 2023)10200A-G	
4	Name of Group Number and name of group species of each group	--	<i>Thalassiothrix</i>	<i>Pinnularia</i>	<i>Thalassiothrix</i>	<i>Pinnularia</i>	<i>Dinophysis</i>	<i>Pinnularia</i>	<i>Navicula</i>	<i>Thalassiothrix</i>	<i>Surirella</i>	<i>Thalassiothrix</i>	<i>Surirella</i>	<i>Thalassiothrix</i>	APHA (24 th Ed. 2023)10200A-G	
			<i>Surirella</i>	<i>Biddulphia</i>	<i>Surirella</i>	<i>Biddulphia</i>	<i>Surirella</i>	<i>Biddulphia</i>	<i>Skeletonema</i>	<i>Surirella</i>	<i>Pinnularia</i>	<i>Surirella</i>	<i>Pinnularia</i>	<i>Surirella</i>		
			<i>Navicula</i>	<i>Navicula</i>	<i>Navicula</i>	<i>Navicula</i>	<i>Nitzschia</i>	<i>Navicula</i>	<i>Rhizosolenia</i>	<i>Navicula</i>	<i>Rhizosolenia</i>	<i>Navicula</i>	<i>Melosira</i>	<i>Navicula</i>		
			<i>Thalassiosira</i>	<i>Rhizosolenia</i>	<i>Cyclotella</i>	<i>Rhizosolenia</i>	<i>Cyclotella</i>	<i>Rhizosolenia</i>	<i>Dinophysis</i>	<i>Thalassiosira</i>	<i>Dinophysis</i>	<i>Thalassiosira</i>	<i>Dinophysis</i>	<i>Thalassiosira</i>		
			<i>Skeletonema</i>	<i>Skeletonema</i>	<i>Skeletonema</i>	<i>Thalassiosira</i>	<i>Skeletonema</i>	<i>Thalassiosira</i>	<i>Thalassionema</i>	<i>Skeletonema</i>	<i>Thalassionema</i>	<i>Skeletonema</i>	<i>Thalassionema</i>	<i>Skeletonema</i>		
B																
Zooplankton																
1	Abundance (Population)	noX10 ³ / 100 m ³	42	44	43	42	43	42	43	42	43	42	43	42	APHA (24 th Ed. 2023)10200 G	
2	Name of Group Number and name of group species of each group		<i>Egg(Fish and Shrimps)</i>													
			<i>Copepods</i>	<i>Oikoplura</i>	<i>Nitzschia</i>	<i>Copepods</i>										
			<i>Copepods nauplii</i>		<i>Copepods nauplii</i>											
			<i>Crustacean</i>	<i>Crustacean</i>	<i>Pinnularia</i>	<i>Crustacean</i>		<i>Crustacean</i>								
			<i>Bivalve Larvae</i>		<i>Bivalve Larvae</i>											
3	Total Biomass	ml/100 m ³	15.74	15.7	15.25	15.5	15.3	15.3	15.3	15.3	15.3	15.3	15.3			

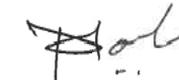
Continue...

RESULTS OF MARINE WATER [M2 MOUTH OF BOCHA & NAVINAL CREEK - N 22°44'239" E 069°43'757"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM											
C	Microbiological														
1	Total Bacterial Count	CFU/ml	110		114		116		118		120		122		APHA 24 th Ed.2023,9215 -C
2	Total Coliform	/100ml	32		34		33		34		35		36		APHA 24 th Ed.2023, 9222-B
3	E.coli	/100ml	13		16		14		13		14		12		IS :15185:2016
4	Enterococcus	/100ml	Absent		IS:15186:2002										
5	Salmonella	/100ml	Absent		IS:15187:2016										
6	Shigella	/100ml	Absent		APHA 24 th Ed.2023,9260 -E										
7	Vibrio	/100ml	Absent		IS: 5887 (Part V):1976										



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF SEDIMENT ANALYSIS [M2 MOUTH OF BOCHA & NAVINAL CREEK - N 22°44'239" E 069°43'757"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.48	0.44	0.49	0.46	0.52	0.48	IS: 2720 (Part 22):1972
2.	Phosphorus as P	µg/g	574.2	564.8	562.2	550.2	590.5	582.1	IS: 10158 :1982, Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 24th Ed.2023,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	4.12	4.06	4.11	4.02	3.83	3.84	IS3025(Part 55):2003
5.2	Total Chromium as Cr+3	µg/g	151.4	154.2	148.9	135.4	146.2	152.2	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.3	Manganese as Mn	µg/g	659	668	672.2	640.5	710.2	685.4	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.4	Iron as Fe	%	4.09	4.02	4.11	4.02	4.16	4.02	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.5	Nickel as Ni	µg/g	43.21	44.13	44.28	39.82	42.44	44.31	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.6	Copper as Cu	µg/g	43.05	42.64	42.86	41.25	48.95	46.36	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.7	Zinc as Zn	µg/g	155.4	146.5	145.6	136.4	142.4	135.4	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.8	Lead as Pb	µg/g	2.33	2.13	1.96	2.05	2.11	2.04	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

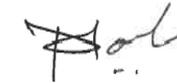
Continue...

RESULTS OF SEDIMENT ANALYSIS [M2 MOUTH OF BOCHA & NAVINAL CREEK - N 22°44'239" E 069°43'757"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D			Benthic Organisms						
1	Macrobenthos	--	<i>Decapods Larvae</i>	<i>Polychates</i>	<i>Polychates</i>	<i>Foraminiferan</i>	<i>Foraminiferan</i>	<i>Foraminiferan</i>	APHA (24 th Ed. 2023)10500
			<i>Isopods</i>	<i>Isopods</i>	<i>Isopods</i>	<i>Gastropods</i>	<i>Gastropods</i>	<i>Gastropods</i>	
			<i>Amphipods</i>	<i>Amphipods</i>	<i>Gastropods</i>	<i>Isopods</i>	<i>Isopods</i>	<i>Isopods</i>	
			<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Amphipods</i>	<i>Amphipods</i>	
2	MeioBenthos	--	<i>Foraminiferan</i>	<i>Foraminiferan</i>	<i>Decapods Larvae</i>	<i>Herpectacoids</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	
			<i>Herpectacoids</i>	<i>Herpectacoids</i>	<i>Herpectacoids</i>	<i>Polychates</i>	<i>Polychates</i>	<i>Polychates</i>	
3	Population	no/m ²	256	350	321	308	254	307	



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF MARINE WATER [M3 EAST OF BOCHASLANOT DETECTED - N 22°46'530" E 069°41'690"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFAC E	BOTTO M											
1.	pH	--	8.22	8.1	8.14	8.06	8.18	8.08	8.07	7.91	8.11	7.89	8.14	7.93	IS 3025 (Part 11):2022
2.	Temperature	°C	29.9	29.8	30.5	30.4	30.4	30.3	30.2	30.1	30.1	30	29.9	29.8	IS 3025 (Part 9):2023
3.	Total Suspended Solids	mg/L	136	112	142	116	136	116	128	118	112	94	106	82	APHA 24th Ed.,2023,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	3	BDL(MD L:1.0)	2.8	BDL(MD L:1.0)	2.9	BDL(MD L:1.0)	2.4	BDL(MD L:1.0)	2.8	BDL(MD L:1.0)	3.1	BDL(MD L:1.0)	IS 3025 (Part 44):2023
5.	Dissolved Oxygen	mg/L	5.92	5.72	5.82	5.57	5.73	5.48	6.32	6.22	6.49	6.3	6.59	6.4	APHA 24th Ed.2023,4500-O, B
6.	Salinity	ppt	36.58	37.28	36.64	37.44	36.55	37.38	36.24	37.21	35.96	36.88	35.88	36.74	By Calculation
7.	Oil & Grease	mg/L	BDL(MD L:2.0)	IS 3025 (Part 39):2021											
8.	Nitrate as NO ₃	µmol/L	3.23	2.9	3.87	3.55	3.23	2.9	3.06	2.9	2.26	1.94	3.23	2.59	APHA 24th Ed. 2023,4500 NO3-B
9.	Nitrite as NO ₂	µmol/L	0.435	0.413	0.478	0.456	0.522	0.5	0.435	0.413	0.304	0.261	0.413	0.379	APHA 24th Ed.2023,4500NO ₂ B
10.	Ammonical Nitrogen as NH ₃	µmol/L	4.37	4.22	4.498	4.32	4.22	4.16	3.64	3.59	3.95	3.85	3.66	2.93	APHA 24th Ed. 2023,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	1.37	1.16	1.26	1.05	1.37	1.26	1.26	1.05	1.37	1.16	1.05	BDL(MD L:0.4)	APHA 24th Ed.2023,4500-P, D
12.	Total Nitrogen	µmol/L	8.035	7.533	8.846	8.326	7.972	7.56	7.135	6.903	6.514	6.051	7.303	5.899	APHA 24th Ed. 2023,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	ND	ND	ND	ND	ND	ND	APHA 24th ED.2023,5520 F
14.	Total Dissolved Solids	mg/L	36246	37250	36270	37310	36190	37240	35560	36770	35090	36680	35120	36550	IS 3025(Part 16):2023
15.	COD	mg/L	15.9	7.9	28.17	16.1	23.9	12	12	BDL(MD L:2.0)	16	4	20.1	8	IS 3025(Part 58):2023

RESULTS OF MARINE WATER [M3 EAST OF BOCHAISLANOT DETECTED - N 22°46'530" E 069°41'690"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD	
			SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M		
A			Phytoplankton													
1.	Chlorophyll	mg/m ³	2.47	2.47	2.44	2.48	2.42	2.44	2.43	2.46	2.42	2.47	2.41	2.46	APHA (24 th Ed. 2023)10200A-G	
2.	Phaeophytin	mg/m ³	1.66	1.47	1.65	1.42	1.67	1.43	1.68	1.44	1.67	1.42	1.68	1.41	APHA (24 th Ed. 2023)10200A-G	
3.	Cell Count	No. x 10 ³ /L	140	98	142	97	146	96	148	97	150	98	154	99	APHA (24 th Ed. 2023)10200A-G	
4	Name of Group Number and name of group species of each group	--	<i>Pinnularia</i>	<i>Coscino discus</i>	<i>Pinnularia</i>	<i>Coscino discus</i>	<i>Pinnularia</i>	<i>Coscino discus</i>	<i>Melosira</i>	<i>Cyclotella</i>	<i>Melosira</i>	<i>Cyclotella</i>	<i>Melosira</i>	<i>Cyclotella</i>	APHA (24 th Ed. 2023)10200A-G	
			<i>Biddulphia</i>	<i>Pinnularia</i>	<i>Biddulphia</i>	<i>Pinnularia</i>	<i>Biddulphia</i>	<i>Pinnularia</i>	<i>Pinnularia</i>	<i>Pinnularia</i>	<i>Pinnularia</i>	<i>Pinnularia</i>	<i>Pinnularia</i>	<i>Pinnularia</i>		
			<i>Navicula</i>	<i>Rhizosolenia</i>	<i>Navicula</i>	<i>Rhizosolenia</i>	<i>Navicula</i>	<i>Rhizosolenia</i>	<i>Skeletonema</i>	<i>Skeletonema</i>	<i>Rhizosolenia</i>	<i>Skeletonema</i>	<i>Rhizosolenia</i>	<i>Skeletonema</i>		<i>Skeletonema</i>
			<i>Thalassiosira</i>	<i>Dinophysis</i>	<i>Thalassiosira</i>	<i>Dinophysis</i>	<i>Thalassiosira</i>	<i>Dinophysis</i>	<i>Thalassiosira</i>	<i>Thalassiosira</i>	<i>Thalassiosira</i>	<i>Thalassiosira</i>	<i>Thalassiosira</i>	<i>Thalassiosira</i>		<i>Thalassiosira</i>
			<i>Skeletonema</i>	<i>Thalassionema</i>	<i>Skeletonema</i>	<i>Thalassionema</i>	<i>Skeletonema</i>	<i>Thalassionema</i>	<i>Thalassionema</i>	<i>Thalassionema</i>	<i>Thalassionema</i>	<i>Thalassionema</i>	<i>Thalassionema</i>	<i>Thalassionema</i>		<i>Thalassionema</i>

B			Zooplankton										TEST METHOD	
SR. NO.	TEST PARAMETERS	UNIT	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	TEST METHOD					
1	Abundance (Population)	noX10 ³ /100 m ³	40	41	40	43	45	44	APHA (24 th Ed. 2023)10200 G					
2	Name of Group Number and name of group species of each group		<i>Copepods</i>	<i>Copepods</i>	<i>Rhizosolenia</i>	<i>Crustacean</i>	<i>Crustacean</i>	<i>Crustacean</i>						
			<i>Copepods nauplii</i>	<i>Copepods nauplii</i>	<i>Crustacean Larvae</i>	<i>Copepods nauplii</i>	<i>Copepods nauplii</i>	<i>Copepods nauplii</i>						
			<i>Egg(Fish and Shrimps)</i>	<i>Egg(Fish and Shrimps)</i>	<i>Egg(Fish and Shrimps)</i>	<i>Crustacean Larvae</i>	<i>Crustacean Larvae</i>	<i>Crustacean Larvae</i>						
			<i>Crustacean</i>	<i>Pinnularia</i>	<i>Oikoplura</i>	<i>Crustacean</i>	<i>Crustacean</i>	<i>Egg(Fish and Shrimps)</i>						
3	Total Biomass	ml/100 m ³	14.48	15.5	15.4	15.6	15.5	15.5						

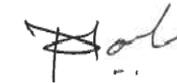
Continue...

RESULTS OF MARINE WATER [M3 EAST OF BOCHAISLANOT DETECTED - N 22°46'530" E 069°41'690"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C			Microbiological												
1	Total Bacterial Count	CFU/ml	126		128		130		132		130		132		APHA 24 th Ed.2023,9215 -C
2	Total Coliform	/100ml	28		27		29		30		31		30		APHA 24 th Ed.2023, 9222-B
3	E.coli	/100ml	24		23		22		21		22		21		IS :15185:2016
4	Enterococcus	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 24 th Ed.2023,9260 -E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF SEDIMENT ANALYSIS [M3 EAST OF BOCHAISLANOT DETECTED - N 22°46'530" E 069°41'690"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.42	0.46	0.42	0.48	0.52	0.46	IS: 2720 (Part 22):1972
2.	Phosphorus as P	µg/g	618.2	620.5	611.8	618.6	632.4	610.2	IS: 10158 :1982, Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 24th Ed.2023,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	4.14	4.36	4.09	4.12	3.94	3.88	IS3025(Part 55):2003
5.2	Total Chromium as Cr+3	µg/g	146.2	154.1	146.5	138.5	124.5	132.4	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.3	Manganese as Mn	µg/g	618.9	620.2	608.5	619.2	520.6	538.4	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.4	Iron as Fe	%	4.09	4.11	4.06	3.98	4.09	4.14	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.5	Nickel as Ni	µg/g	44.6	42.5	44.8	41.62	36.8	35.2	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.6	Copper as Cu	µg/g	42.05	43.11	43.82	45.08	40.95	36.8	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.7	Zinc as Zn	µg/g	134.6	142.2	143.8	146.7	124.9	115.8	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.8	Lead as Pb	µg/g	2.33	2.16	2.22	2.15	1.96	2.05	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

RESULTS OF SEDIMENT ANALYSIS [M3 EAST OF BOCHAISLANOT DETECTED - N 22°46'530" E 069°41'690"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24 SEDIMENT	May-24 SEDIMENT	Jun-24 SEDIMENT	Jul-24 SEDIMENT	Aug-24 SEDIMENT	Sep-24 SEDIMENT	TEST METHOD
D			Benthic Organisms						
1	Macrobenthos	--	Polychates	<i>Polychates</i>	<i>Amphipods</i>	<i>Gastropods</i>	<i>Gastropods</i>	<i>Decapods Larvae</i>	APHA (24 th Ed. 2023)10500
			<i>Gastropods</i>	<i>Gastropods</i>	<i>Gastropods</i>	<i>Isopods</i>	<i>Isopods</i>	<i>Isopods</i>	
			<i>Isopods</i>	<i>Isopods</i>	<i>Isopods</i>	<i>Amphipods</i>	<i>Amphipods</i>	<i>Amphipods</i>	
			<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	
2	MeioBenthos	--	<i>Herpectacoids</i>	<i>Herpectacoids</i>	<i>Herpectacoids</i>	<i>Polychates</i>	<i>Polychates</i>	<i>Foraminiferan</i>	
			<i>Polychates</i>	<i>Polychates</i>	<i>Polychates</i>	<i>Herpectacoids</i>	<i>Herpectacoids</i>	<i>Herpectacoids</i>	
3	Population	no/m ²	298	296	298	297	295	294	



Mr. Nilesh Patel
Sr. Chemist




Mr. Nitin Tandel
Technical Manager

RESULTS OF MARINE WATER [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFAC E	BOTTO M											
1.	pH	--	8.19	8.01	8.14	8.04	8.17	8.01	8.12	7.99	8.05	7.92	8.16	7.98	IS 3025 (Part 11):2022
2.	Temperature	°C	29.8	29.7	30.4	30.3	30.6	30.5	30.1	30	30	29.9	29.9	29.8	IS 3025 (Part 9):2023
3.	Total Suspended Solids	mg/L	138	122	142	128	144	132	132	114	124	108	132	102	APHA 24th Ed.,2023,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.8	BDL(MD L:1.0)	3.1	BDL(MD L:1.0)	3.2	BDL(MD L:1.0)	2.6	BDL(MD L:1.0)	2.9	BDL(MD L:1.0)	2.5	BDL(MD L:1.0)	IS 3025 (Part 44):2023
5.	Dissolved Oxygen	mg/L	6.22	6.12	6.12	5.97	6.03	5.88	6.42	6.32	6.59	6.4	6.69	6.49	APHA 24th Ed.2023,4500-O, B
6.	Salinity	ppt	35.94	36.97	36.15	37.22	36.18	37.24	35.84	36.92	35.66	36.78	35.74	36.82	By Calculation
7.	Oil & Grease	mg/L	BDL(MD L:2.0)	IS 3025 (Part 39):2021											
8.	Nitrate as NO ₃	µmol/L	3.39	3.23	3.55	3.39	3.23	2.9	3.06	2.9	2.1	1.77	2.37	2.16	APHA 24th Ed. 2023,4500 NO3-B
9.	Nitrite as NO ₂	µmol/L	0.435	0.391	0.478	0.5	0.543	0.522	0.391	0.37	0.239	0.174	0.207	0.189	APHA 24th Ed.2023,4500NO ₂ B
10.	Ammonical Nitrogen as NH ₃	µmol/L	4.27	4.16	4.22	4.16	4.32	4.27	3.53	3.48	4.01	3.9	2.75	2.62	APHA 24th Ed. 2023,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	1.79	1.68	1.16	1.05	1.26	1.16	1.05	BDL(MD L:0.4)	1.26	1.05	1.16	BDL(MD L:0.4)	APHA 24th Ed.2023,4500-P, D
12.	Total Nitrogen	µmol/L	8.095	7.781	8.248	8.05	8.093	7.692	6.981	6.75	6.349	5.844	5.327	4.969	APHA 24th Ed. 2023,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	ND	ND	ND	ND	ND	ND	APHA 24th ED.2023,5520 F
14.	Total Dissolved Solids	mg/L	36380	37320	36410	37360	36320	37180	35730	36810	35650	36780	35710	36790	IS 3025(Part 16):2023
15.	COD	mg/L	23.9	7.9	32.19	20.12	27.9	16	16.1	4	20	8	24.1	12	IS 3025(Part 58):2023

RESULTS OF MARINE WATER [M4 JUNA BANOT DETECTEDAR N 22°47'57" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD	
			SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M		
A																
Phytoplankton																
1.	Chlorophyll	mg/m ³	2.36	3.14	2.38	3.17	2.37	3.19	2.35	3.2	2.36	3.1	2.37	3.2	APHA (24 th Ed. 2023)10200A-G	
2.	Phaeophytin	mg/m ³	2.69	2	2.66	3	2.59	4	2.6	5	2.7	4	2.5	6	APHA (24 th Ed. 2023)10200A-G	
3.	Cell Count	No. x 10 ³ /L	154	88	156	86	154	84	155	88	152	89	156	88	APHA (24 th Ed. 2023)10200A-G	
4	Name of Group Number and name of group species of each group	--	<i>Coscino discus</i>	<i>Surirella</i>	<i>Surirella</i>	<i>Surirella</i>	<i>Coscino discus</i>	<i>Surirella</i>	<i>Thalassiosira</i>	<i>Coscino discus</i>	<i>Thalassiosira</i>	<i>Coscino discus</i>	<i>Thalassiosira</i>	<i>Coscino discus</i>	APHA (24 th Ed. 2023)10200A-G	
			<i>Diploneis</i>	<i>Biddulphia</i>	<i>Diploneis</i>	<i>Biddulphia</i>	<i>Diploneis</i>	<i>Biddulphia</i>	<i>Melosira</i>	<i>Diploneis</i>	<i>Melosira</i>	<i>Diploneis</i>	<i>Melosira</i>	<i>Diploneis</i>		
			<i>Rhizosolenia</i>	<i>Navicula</i>	<i>Thalassiothrix</i>	<i>Coscino discus</i>	<i>Skeletonema</i>	<i>Coscino discus</i>	<i>Nitzschia</i>	<i>Rhizosolenia</i>	<i>Nitzschia</i>	<i>Rhizosolenia</i>	<i>Rhizosolenia</i>	<i>Nitzschia</i>		<i>Rhizosolenia</i>
			<i>Dinophysis</i>	<i>Thalassiosira</i>	<i>Navicula</i>	<i>Thalassiosira</i>	<i>Navicula</i>	<i>Thalassiosira</i>	<i>Rhizosolenia</i>	<i>Dinophysis</i>	<i>Rhizosolenia</i>	<i>Dinophysis</i>	<i>Rhizosolenia</i>	<i>Dinophysis</i>		<i>Dinophysis</i>
			<i>Thalassionema</i>	<i>Skeletonema</i>	<i>Thalassionema</i>	<i>Skeletonema</i>	<i>Thalassionema</i>	<i>Skeletonema</i>	<i>Pleurosigma</i>	<i>Thalassionema</i>	<i>Pleurosigma</i>	<i>Thalassionema</i>	<i>Pleurosigma</i>	<i>Thalassionema</i>		

B															
Zooplankton															
1	Abundance (Population)	noX10 ³ / 100 m ³	37		36		37		36		37		38		APHA (24 th Ed. 2023)10200 G
2	Name of Group Number and name of group species of each group		<i>Oikoplura</i>		<i>Oikoplura</i>		<i>Copepods nauplii</i>		<i>Copepods nauplii</i>		<i>Copepods nauplii</i>		<i>Copepods nauplii</i>		
			<i>Copepods nauplii</i>		<i>Rhizosolenia</i>		<i>Rhizosolenia</i>		<i>Crustacean Larvae</i>		<i>Crustacean Larvae</i>		<i>Egg(Fish and Shrimps)</i>		
			<i>Crustacean Larvae</i>		<i>Crustacean Larvae</i>		<i>Egg(Fish and Shrimps)</i>		<i>Oikoplura</i>		<i>Oikoplura</i>		<i>Oikoplura</i>		
			<i>Crustacean</i>		<i>Crustacean</i>		<i>Crustacean</i>		<i>Bivalve Larvae</i>		<i>Bivalve Larvae</i>		<i>Copepods nauplii</i>		
			<i>Bivalve Larvae</i>		<i>Bivalve Larvae</i>		<i>Bivalve Larvae</i>		<i>Oikoplura</i>		<i>Oikoplura</i>		<i>Oikoplura</i>		
3	Total Biomass	ml/100 m ³	14.22		14.24		14.23		14.26		14.27		14.27		

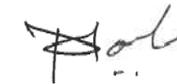
Continue...

RESULTS OF MARINE WATER [M4 JUNA BANOT DETECTEDAR N 22°47'57" E 069°43'620"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM											
Microbiological															
1	Total Bacterial Count	CFU/ml	100		92		94		96		98		100		APHA 24 th Ed.2023,9215 -C
2	Total Coliform	/100ml	44		42		44		43		42		44		APHA 24 th Ed.2023, 9222-B
3	E.coli	/100ml	12		11		10		11		10		12		IS :15185:2016
4	Enterococcus	/100ml	Absent		IS:15186:2002										
5	Salmonella	/100ml	Absent		IS:15187:2016										
6	Shigella	/100ml	Absent		APHA 24 th Ed.2023,9260 -E										
7	Vibrio	/100ml	Absent		IS: 5887 (Part V):1976										



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF SEDIMENT ANALYSIS [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.51	0.52	0.49	0.41	0.49	0.44	IS: 2720 (Part 22):1972
2.	Phosphorus as P	µg/g	619.4	621.4	624.2	612.5	580	560.8	IS: 10158 :1982, Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 24th Ed.2023,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	4.14	4.06	3.98	3.88	3.92	3.99	IS3025(Part 55):2003
5.2	Total Chromium as Cr+3	µg/g	144.4	138.9	142.2	132.6	122.6	132.2	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.3	Manganese as Mn	µg/g	611.5	602.5	610.4	589.2	554.6	540.3	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.4	Iron as Fe	%	4.06	4.11	4.08	4.11	4.18	4.06	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.5	Nickel as Ni	µg/g	51.24	52.2	53.1	55.6	48.6	48.2	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.6	Copper as Cu	µg/g	48.62	48.44	49.02	52.1	46.9	45.3	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.7	Zinc as Zn	µg/g	134.2	136.2	138.4	148.6	138	144.2	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.8	Lead as Pb	µg/g	2.24	2.22	2.31	2.24	2.11	2.16	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

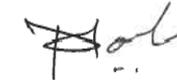
Continue...

RESULTS OF SEDIMENT ANALYSIS [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24 SEDIMENT	May-24 SEDIMENT	Jun-24 SEDIMENT	Jul-24 SEDIMENT	Aug-24 SEDIMENT	Sep-24 SEDIMENT	TEST METHOD
D	Benthic Organisms								
1	Macrobenthos	--	<i>Foraminiferan</i>	<i>Amphipods</i>	<i>Amphipods</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	APHA (24 th Ed. 2023)10500
			<i>Gastropods</i>	<i>Gastropods</i>	<i>Gastropods</i>	<i>Decapods Larvae</i>	<i>Decapods Larvae</i>	<i>Decapods Larvae</i>	
			<i>Isopods</i>	<i>Isopods</i>	<i>Isopods</i>	<i>Polychates</i>	<i>Polychates</i>	<i>Polychates</i>	
			<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Turbellarians</i>	<i>Isopods</i>	<i>Isopods</i>	<i>Foraminiferan</i>	
2	MeioBenthos	--	<i>Herpectacoids</i>	<i>Herpectacoids</i>	<i>Herpectacoids</i>	<i>Turbellarians</i>	<i>Gastropods</i>	<i>Gastropods</i>	
			<i>Polychates</i>	<i>Turbellarians</i>	<i>Decapods Larvae</i>	<i>Herpectacoids</i>	<i>Herpectacoids</i>	<i>Herpectacoids</i>	
3	Population	no/m ²	322	341	288	304	308	300	



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF MARINE WATER [M5 TOWARDS WESTERN SIDE OF EAST PORT – N 22°46'041" E 069°47'296"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFAC E	BOTTO M											
1.	pH	--	8.16	8.06	8.18	8.11	8.21	8.09	8.14	8.04	8.07	7.88	8.18	8.02	IS 3025 (Part 11):2022
2.	Temperature	°C	29.8	29.7	30.5	30.4	30.6	30.5	30.2	30.1	30.1	30	30	29.9	IS 3025 (Part 9):2023
3.	Total Suspended Solids	mg/L	134	114	128	112	130	108	138	114	132	108	122	104	APHA 24th Ed.,2023,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	3.1	BDL(MD L:1.0)	3.3	BDL(MD L:1.0)	3.1	BDL(MD L:1.0)	2.7	BDL(MD L:1.0)	2.8	BDL(MD L:1.0)	2.7	BDL(MD L:1.0)	IS 3025 (Part 44):2023
5.	Dissolved Oxygen	mg/L	6.22	6.02	6.12	5.87	6.03	5.78	6.22	6.13	6.4	6.2	6.49	6.3	APHA 24th Ed.2023,4500-O, B
6.	Salinity	ppt	36.54	37.1	36.62	37.26	36.55	37.33	35.55	36.28	35.42	36.34	35.31	36.41	By Calculation
7.	Oil & Grease	mg/L	BDL(MD L:2.0)	IS 3025 (Part 39):2021											
8.	Nitrate as NO ₃	µmol/L	3.87	3.55	4.03	3.87	3.71	3.39	2.9	2.74	2.1	1.94	2.8	2.37	APHA 24th Ed. 2023,4500 NO3-B
9.	Nitrite as NO ₂	µmol/L	0.456	0.413	0.522	0.5	0.478	0.456	0.435	0.413	0.391	0.348	0.259	0.189	APHA 24th Ed.2023,4500NO ₂ B
10.	Ammonical Nitrogen as NH ₃	µmol/L	3.95	3.8	4.16	4.11	4.11	4.06	3.64	3.59	3.48	3.42	4.05	3.83	APHA 24th Ed. 2023,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	1.9	1.68	1.37	1.26	1.16	1.05	1.05	BDL(MD L:0.4)	1.16	BDL(MD L:0.4)	1.26	1.16	APHA 24th Ed.2023,4500-P, D
12.	Total Nitrogen	µmol/L	8.276	7.763	8.712	8.48	8.298	7.906	6.975	6.743	5.971	5.708	7.109	6.389	APHA 24th Ed. 2023,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	ND	ND	ND	ND	ND	ND	APHA 24th ED.2023,5520 F
14.	Total Dissolved Solids	mg/L	36210	37300	36250	37340	36190	37240	35640	36930	34680	35880	34720	35910	IS 3025(Part 16):2023
15.	COD	mg/L	23.9	11.9	24.14	20.12	19.9	16	4	BDL(MD L:2.0)	8	4	12	8	IS 3025(Part 58):2023

RESULTS OF MARINE WATER [M5 TOWARDS WESTERN SIDE OF EAST PORT – N 22°46'041" E 069°47'296"]

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

SR. NO.	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
Phytoplankton															
1.	Chlorophyll	mg/m ³	3.17	3.15	3.14	3.17	3.11	3.15	3.13	3.16	3.14	3.18	3.12	3.17	APHA (24 th Ed. 2023)10200A-G
2.	Phaeophytin	mg/m ³	2.4	1.25	2.3	1.24	2.2	1.23	2.3	1.24	2.4	1.23	2.3	1.22	APHA (24 th Ed. 2023)10200A-G
3.	Cell Count	No. x 10 ³ /L	115	105	118	107	120	106	122	108	123	109	122	110	APHA (24 th Ed. 2023)10200A-G
4	Name of Group Number and name of group species of each group	--	<i>Diploneis</i>	<i>Navicula</i>	<i>Diploneis</i>	<i>Navicula</i>	<i>Navicula</i>	<i>Navicula</i>	<i>Navicula</i>	<i>Pinnularia</i>	<i>Navicula</i>	<i>Pinnularia</i>	<i>Navicula</i>	<i>Pinnularia</i>	APHA (24 th Ed. 2023)10200A-G
			<i>Rhizosolenia</i>	<i>Skeletonema</i>	<i>Rhizosolenia</i>	<i>Skeletonema</i>	<i>Biddulphia</i>	<i>Skeletonema</i>	<i>Biddulphia</i>	<i>Biddulphia</i>	<i>Biddulphia</i>	<i>Biddulphia</i>	<i>Biddulphia</i>	<i>Rhizosolenia</i>	
			<i>Nitzschia</i>	<i>Rhizosolenia</i>	<i>Nitzschia</i>	<i>Rhizosolenia</i>	<i>Nitzschia</i>	<i>Rhizosolenia</i>	<i>Nitzschia</i>	<i>Navicula</i>	<i>Nitzschia</i>	<i>Navicula</i>	<i>Odontella</i>	<i>Dinophysis</i>	
			<i>Cyclotella</i>	<i>Dinophysis</i>	<i>Cyclotella</i>	<i>Biddulphia</i>	<i>Cyclotella</i>	<i>Biddulphia</i>	<i>Cyclotella</i>	<i>Thalassiosira</i>	<i>Cyclotella</i>	<i>Thalassiosira</i>	<i>Cyclotella</i>	<i>Coscinodiscus</i>	
			<i>Pleurosigma</i>	<i>Thalassionema</i>	<i>Pleurosigma</i>	<i>Thalassionema</i>	<i>Pleurosigma</i>	<i>Thalassionema</i>	<i>Pleurosigma</i>	<i>Skeletonema</i>	<i>Pleurosigma</i>	<i>Skeletonema</i>	<i>Pleurosigma</i>	<i>Skeletonema</i>	

Zooplankton															
1	Abundance (Population)	noX10 ³ /100 m ³	48	49	48	50	52	51							APHA (24 th Ed. 2023)10200 G
2	Name of Group Number and name of group species of each group		<i>Copepods nauplii</i>	<i>Nitzschia</i>	<i>Nitzschia</i>	<i>Crustacean Larvae</i>	<i>Crustacean Larvae</i>	<i>Crustacean Larvae</i>							
			<i>Crustacean Larvae</i>	<i>Crustacean Larvae</i>	<i>Crustacean Larvae</i>	<i>Egg(Fish and Shrimps)</i>	<i>Egg(Fish and Shrimps)</i>	<i>Egg(Fish and Shrimps)</i>							
			<i>Oikoplura</i>	<i>Oikoplura</i>	<i>Oikoplura</i>	<i>Copepods</i>	<i>Copepods</i>	<i>Copepods nauplii</i>							
			<i>Bivalve Larvae</i>	<i>Bivalve Larvae</i>	<i>Bivalve Larvae</i>	<i>Crustacean</i>	<i>Crustacean</i>	<i>Crustacean</i>							
			<i>Oikoplura</i>	<i>Oikoplura</i>	<i>Oikoplura</i>	<i>Bivalve Larvae</i>	<i>Bivalve Larvae</i>	<i>Bivalve Larvae</i>							
3	Total Biomass	ml/100 m ³	14.17	14.15	14.12	14.13	14.12	14.12							

Continue...

RESULTS OF MARINE WATER [M5 TOWARDS WESTERN SIDE OF EAST PORT – N 22°46'041" E 069°47'296"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C			Microbiological												
1	Total Bacterial Count	CFU/ml	130		134		134		136		140		144		APHA 24 th Ed.2023,9215 -C
2	Total Coliform	/100ml	27		30		31		32		33		31		APHA 24 th Ed.2023, 9222-B
3	E.coli	/100ml	15		16		18		17		18		17		IS :15185:2016
4	Enterococcus	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 24 th Ed.2023,9260 -E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976



Mr. Nilesh Patel
Sr. Chemist




Mr. Nitin Tandel
Technical Manager

RESULTS OF SEDIMENT ANALYSIS [M5 TOWARDS WESTERN SIDE OF EAST PORT – N 22°46'041" E 069°47'296"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.48	0.49	0.46	0.42	0.53	0.48	IS: 2720 (Part 22):1972
2.	Phosphorus as P	µg/g	728.4	710.5	698.5	650.9	612.1	590.8	IS: 10158 :1982, Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 24th Ed.2023,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	4.06	4.08	4.12	3.91	3.88	3.92	IS3025(Part 55):2003
5.2	Total Chromium as Cr+3	µg/g	142.2	162.4	166.2	156.4	142.3	136.2	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.3	Manganese as Mn	µg/g	598.4	602.4	609.8	617.2	570.9	560.4	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.4	Iron as Fe	%	4.06	4.14	4.09	4.16	4.19	4.11	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.5	Nickel as Ni	µg/g	44.36	43.36	43.12	42.19	44.36	45.68	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.6	Copper as Cu	µg/g	45.91	45.28	45.11	45.86	41.25	48.2	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.7	Zinc as Zn	µg/g	121.4	124.4	122.2	120.8	111.6	116.5	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.8	Lead as Pb	µg/g	2.09	1.89	1.94	2.08	1.92	2.11	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

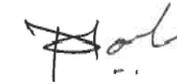
Continue...

RESULTS OF SEDIMENT ANALYSIS [M5 TOWARDS WESTERN SIDE OF EAST PORT – N 22°46'041" E 069°47'296"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D			Benthic Organisms						
1	Macrobenthos	--	Amphipods	Amphipods	Amphipods	Isopods	Isopods	Isopods	APHA (24 th Ed. 2023)10500
			Polychates	Sipunculids	Polychates	Polychates	Polychates	Gastropods	
			Isopods	Isopods	Isopods	Sipunculids	Sipunculids	Sipunculids	
			Gastropods	Gastropods	Gastropods	Amphipods	Amphipods	Amphipods	
2	MeioBenthos	--	Decapods Larvae	Decapods Larvae	Foraminiferan	Polychates	Herpectacoids	Herpectacoids	
			Herpectacoids	Gastropods	Herpectacoids	Foraminiferan	Foraminiferan	Polychates	
3	Population	no/m ²	306	305	304	305	307	302	



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF MARINE WATER [M7 EAST PORT N 22°47'120" E 069°47'110"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFAC E	BOTTO M											
1.	pH	--	8.18	7.98	8.15	8.04	8.19	8.06	8.04	7.88	8.15	7.98	8.16	8.04	IS 3025 (Part 11):2022
2.	Temperature	°C	29.9	29.8	30.5	30.4	30.7	30.6	30.2	30.1	30.1	30	29.8	29.7	IS 3025 (Part 9):2023
3.	Total Suspended Solids	mg/L	118	96	124	106	120	108	134	116	122	106	104	78	APHA 24th Ed.,2023,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	3.1	BDL(MD L:1.0)	3.4	BDL(MD L:1.0)	2.8	BDL(MD L:1.0)	2.5	BDL(MD L:1.0)	3.1	BDL(MD L:1.0)	2.5	BDL(MD L:1.0)	IS 3025 (Part 44):2023
5.	Dissolved Oxygen	mg/L	6.02	5.92	5.92	5.77	5.83	5.68	6.42	6.22	6.59	6.3	6.69	6.4	APHA 24th Ed.2023,4500-O, B
6.	Salinity	ppt	36.52	37.35	36.58	37.48	36.42	37.21	36.14	36.97	35.97	36.77	35.81	36.58	By Calculation
7.	Oil & Grease	mg/L	BDL(MD L:2.0)	IS 3025 (Part 39):2021											
8.	Nitrate as NO ₃	µmol/L	3.39	3.23	4.19	4.03	4.03	3.71	3.39	3.23	2.42	2.1	3.66	3.44	APHA 24th Ed. 2023,4500 NO3-B
9.	Nitrite as NO ₂	µmol/L	0.5	0.456	0.565	0.522	0.564	0.543	0.37	0.348	0.196	0.13	0.413	0.379	APHA 24th Ed.2023,4500NO ₂ B
10.	Ammonical Nitrogen as NH ₃	µmol/L	4.06	3.9	4.16	4.11	4.27	4.22	3.69	3.59	4.22	4.06	3.96	3.62	APHA 24th Ed. 2023,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	2.21	2	2.11	1.9	1.9	1.68	1.37	1.26	1.47	1.37	1.58	1.47	APHA 24th Ed.2023,4500-P, D
12.	Total Nitrogen	µmol/L	7.95	7.586	8.915	8.662	8.864	8.473	7.45	7.168	6.836	6.29	8.033	7.439	APHA 24th Ed. 2023,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	ND	ND	ND	ND	ND	ND	APHA 24th ED.2023,5520 F
14.	Total Dissolved Solids	mg/L	36290	37340	36320	37110	36260	37180	35860	36720	35780	36690	35690	36480	IS 3025(Part 16):2023
15.	COD	mg/L	19.9	7.9	36.22	24.14	31.9	19.9	8	4	12	8	16.1	12	IS 3025(Part 58):2023

RESULTS OF MARINE WATER [M7 EAST PORT N 22°47'120" E 069°47'110"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M	SURFAC E	BOTTO M	
A			Phytoplankton												
1.	Chlorophyll	mg/m ³	3.04	2.3	3.06	2.6	3.08	2.5	3.07	2.4	3.08	2.6	3.07	2.6	APHA (24 th Ed. 2023)10200A-G
2.	Phaeophytin	mg/m ³	2.6	1.77	2.7	1.78	2.5	1.77	2.6	1.78	2.7	1.77	2.6	1.78	APHA (24 th Ed. 2023)10200A-G
3.	Cell Count	No. x 10 ³ /L	88	122	89	124	87	123	89	122	91	123	92	122	APHA (24 th Ed. 2023)10200A-G
4	Name of Group Number and name of group species of each group	--	<i>Nitzschia</i>	<i>Thalassiothrix</i>	<i>Nitzschia</i>	<i>Rhizosolenia</i>	<i>Nitzschia</i>	<i>Rhizosolenia</i>	<i>Diploneis</i>	<i>Coscinodiscus</i>	<i>Diploneis</i>	<i>Coscinodiscus</i>	<i>Diploneis</i>	<i>Coscinodiscus</i>	APHA (24 th Ed. 2023)10200A-G
			<i>Pinnularia</i>	<i>Surirella</i>	<i>Pinnularia</i>	<i>Surirella</i>	<i>Odontella</i>	<i>Surirella</i>	<i>Rhizosolenia</i>	<i>Diploneis</i>	<i>Rhizosolenia</i>	<i>Diploneis</i>	<i>Rhizosolenia</i>	<i>Diploneis</i>	
			<i>Odontella</i>	<i>Navicula</i>	<i>Dinophysis</i>	<i>Navicula</i>	<i>Dinophysis</i>	<i>Navicula</i>	<i>Nitzschia</i>	<i>Rhizosolenia</i>	<i>Nitzschia</i>	<i>Rhizosolenia</i>	<i>Nitzschia</i>	<i>Rhizosolenia</i>	
			<i>Dinophysis</i>	<i>Thalassiosira</i>	<i>Pleurosigma</i>	<i>Thalassionema</i>	<i>Pleurosigma</i>	<i>Thalassionema</i>	<i>Thalassiothrix</i>	<i>Dinophysis</i>	<i>Thalassiothrix</i>	<i>Dinophysis</i>	<i>Thalassiothrix</i>	<i>Dinophysis</i>	
			<i>Surirella</i>	<i>Skeletonema</i>	<i>Surirella</i>	<i>Skeletonema</i>	<i>Cyclotella</i>	<i>Skeletonema</i>	<i>Pleurosigma</i>	<i>Thalassionema</i>	<i>Pleurosigma</i>	<i>Thalassionema</i>	<i>Cyclotella</i>	<i>Thalassionema</i>	

B			Zooplankton										TEST METHOD
SR. NO.	TEST PARAMETERS	UNIT	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	TEST METHOD				
1	Abundance (Population)	noX10 ³ /100 m ³	41	42	42	43	42	43	APHA (24 th Ed. 2023)10200 G				
2	Name of Group Number and name of group species of each group		<i>Nitzschia</i>	<i>Nitzschia</i>	<i>Egg(Fish and Shrimps)</i>	<i>Egg(Fish and Shrimps)</i>	<i>Egg(Fish and Shrimps)</i>	<i>Egg(Fish and Shrimps)</i>					
			<i>Pinnularia</i>	<i>Pinnularia</i>	<i>Coscinodiscus</i>	<i>Oikoplura</i>	<i>Oikoplura</i>	<i>Oikoplura</i>					
			<i>Odontella</i>	<i>Odontella</i>	<i>Odontella</i>	<i>Copepods nauplii</i>	<i>Copepods nauplii</i>	<i>Copepods nauplii</i>					
			<i>Dinophysis</i>	<i>Dinophysis</i>	<i>Dinophysis</i>	<i>Crustacean</i>	<i>Crustacean</i>	<i>Crustacean</i>					
			<i>Surirella</i>	<i>Surirella</i>	<i>Bivalve Larvae</i>	<i>Bivalve Larvae</i>	<i>Bivalve Larvae</i>	<i>Bivalve Larvae</i>					
3	Total Biomass	ml/100 m ³	16.54	16.55	16.57	16.58	16.59	16.59					

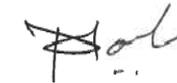
Continue...

RESULTS OF MARINE WATER [M7 EAST PORT N 22°47'120" E 069°47'110"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C			Microbiological												
1	Total Bacterial Count	CFU/ml	90		94		94		92		94		92		APHA 24 th Ed.2023,9215 -C
2	Total Coliform	/100ml	29		27		25		26		27		26		APHA 24 th Ed.2023, 9222-B
3	E.coli	/100ml	11		13		12		13		14		12		IS :15185:2016
4	Enterococcus	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 24 th Ed.2023,9260 -E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF MARINE WATER [M8 RIGHT SIDE OF BOCHA CREEK N 22°45'987" E 069°43'119"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFAC E	BOTTO M											
1.	pH	--	8.14	7.94	8.24	8.11	8.18	8.02	8.1	7.94	8.21	8.06	8.15	8.01	IS 3025 (Part 11):2022
2.	Temperature	°C	29.9	29.8	30.5	30.4	30.7	30.6	30.2	30.1	30.1	30	29.9	29.8	IS 3025 (Part 9):2023
3.	Total Suspended Solids	mg/L	114	92	118	104	122	110	108	88	124	98	122	94	APHA 24th Ed.,2023,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.9	BDL(MD L:1.0)	2.8	BDL(MD L:1.0)	2.9	BDL(MD L:1.0)	2.4	BDL(MD L:1.0)	2.8	BDL(MD L:1.0)	3.2	BDL(MD L:1.0)	IS 3025 (Part 44):2023
5.	Dissolved Oxygen	mg/L	6.02	5.82	5.92	5.67	5.83	5.58	6.42	6.32	6.59	6.4	6.69	6.49	APHA 24th Ed.2023,4500-O, B
6.	Salinity	ppt	36.42	37.24	35.44	37.37	35.39	37.28	35.44	37.05	35.48	36.82	35.64	36.71	By Calculation
7.	Oil & Grease	mg/L	BDL(MD L:2.0)	IS 3025 (Part 39):2021											
8.	Nitrate as NO ₃	µmol/L	3.71	3.23	4.03	3.71	4.19	3.87	3.55	3.23	2.74	2.42	3.45	3.02	APHA 24th Ed. 2023,4500 NO3-B
9.	Nitrite as NO ₂	µmol/L	0.522	0.478	0.565	0.522	0.609	0.543	0.478	0.456	0.239	0.174	0.379	0.328	APHA 24th Ed.2023,4500NO ₂ B
10.	Ammonical Nitrogen as NH ₃	µmol/L	4.16	4.11	4.11	4.06	4.32	4.27	3.59	3.48	4.37	4.22	3.84	3.62	APHA 24th Ed. 2023,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	2.21	2	1.9	1.79	1.68	1.58	1.26	1.05	1.26	BDL(MD L:0.4)	BDL(MD L:0.4)	BDL(MD L:0.4)	APHA 24th Ed.2023,4500-P, D
12.	Total Nitrogen	µmol/L	8.392	7.818	8.705	8.292	9.119	8.683	7.618	7.166	7.349	6.814	7.669	6.968	APHA 24th Ed. 2023,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	ND	ND	ND	ND	ND	ND	APHA 24th ED.2023,5520 F
14.	Total Dissolved Solids	mg/L	36540	37610	36410	37480	36220	37340	35760	36520	35110	36460	35260	36180	IS 3025(Part 16):2023
15.	COD	mg/L	23.9	15.9	32.19	28.17	23.9	19.9	8	BDL(MD L:2.0)	12	4	16.1	8	IS 3025(Part 58):2023

RESULTS OF MARINE WATER [M8 RIGHT SIDE OF BOCHA CREEK N 22°45'987" E 069°43'119"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A			Phytoplankton												
1.	Chlorophyll	mg/m ³	3.1	3.17	3.2	3.14	3.1	3.12	3.2	3.11	3.3	3.12	3.2	3.11	APHA (24 th Ed. 2023)10200A-G
2.	Phaeophytin	mg/m ³	1.8	1.34	1.4	1.38	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.7	APHA (24 th Ed. 2023)10200A-G
3.	Cell Count	No. x 10 ³ /L	109	107	112	109	114	107	116	108	117	109	116	108	APHA (24 th Ed. 2023)10200A-G
4	Name of Group Number and name of group species of each group	--	<i>Odontella</i>	<i>Cyclotella</i>	<i>Odontella</i>	<i>Cyclotella</i>	<i>Odontella</i>	<i>Cyclotella</i>	<i>Nitzschia</i>	<i>Diploneis</i>	<i>Nitzschia</i>	<i>Diploneis</i>	<i>Nitzschia</i>	<i>Diploneis</i>	APHA (24 th Ed. 2023)10200A-G
			<i>Rhizosolenia</i>	<i>Pinnularia</i>	<i>Rhizosolenia</i>	<i>Pinnularia</i>	<i>Rhizosolenia</i>	<i>Pinnularia</i>	<i>Grammatophora</i>	<i>Rhizosolenia</i>	<i>Grammatophora</i>	<i>Rhizosolenia</i>	<i>Grammatophora</i>	<i>Rhizosolenia</i>	
			<i>Coscinodiscus</i>	<i>Skeletonema</i>	<i>Coscinodiscus</i>	<i>Skeletonema</i>	<i>Coscinodiscus</i>	<i>Skeletonema</i>	<i>Diploneis</i>	<i>Nitzschia</i>	<i>Diploneis</i>	<i>Nitzschia</i>	<i>Diploneis</i>	<i>Nitzschia</i>	
			<i>Grammatophora</i>	<i>Thalassiosira</i>	<i>Grammatophora</i>	<i>Thalassiosira</i>	<i>Grammatophora</i>	<i>Thalassiosira</i>	<i>Thalassiosira</i>	<i>Cyclotella</i>	<i>Thalassiosira</i>	<i>Cyclotella</i>	<i>Thalassiosira</i>	<i>Grammatophora</i>	
			<i>Thalassiosira</i>	<i>Thalassionema</i>	<i>Thalassiosira</i>	<i>Thalassionema</i>	<i>Thalassiosira</i>	<i>Thalassionema</i>	<i>Pleurosigma</i>	<i>Pleurosigma</i>	<i>Pleurosigma</i>	<i>Pleurosigma</i>	<i>Pleurosigma</i>	<i>Pleurosigma</i>	
B			Zooplankton												
1	Abundance (Population)	noX10 ³ /100 m ³	34		33		31		32		33		31		APHA (24 th Ed. 2023)10200 G
2	Name of Group Number and name of group species of each group		<i>Coscinodiscus</i>		<i>Coscinodiscus</i>		<i>Odontella</i>		<i>Oikoplura</i>		<i>Oikoplura</i>		<i>Oikoplura</i>		
			<i>Diploneis</i>		<i>Egg(Fish and Shrimps)</i>		<i>Egg(Fish and Shrimps)</i>		<i>Copepods nauplii</i>		<i>Copepods nauplii</i>		<i>Egg(Fish and Shrimps)</i>		
			<i>Rhizosolenia</i>		<i>Rhizosolenia</i>		<i>Rhizosolenia</i>		<i>Crustacean Larvae</i>		<i>Crustacean Larvae</i>		<i>Crustacean Larvae</i>		
			<i>Dinophysis</i>		<i>Bivalve Larvae</i>		<i>Bivalve Larvae</i>		<i>Crustacean</i>		<i>Crustacean</i>		<i>Crustacean</i>		
<i>Thalassionema</i>		<i>Thalassionema</i>		<i>Thalassionema</i>		<i>Bivalve Larvae</i>		<i>Bivalve Larvae</i>		<i>Bivalve Larvae</i>		<i>Bivalve Larvae</i>			
3	Total Biomass	ml/100 m ³	14.78		14.77		14.78		14.77		14.78		14.78		

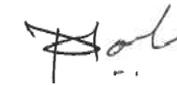
Continue...

RESULTS OF MARINE WATER [M8 RIGHT SIDE OF BOCHA CREEK N 22°45'987" E 069°43'119"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24	TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM		
C			Microbiological											
1	Total Bacterial Count	CFU/ml	96		98		96		94		98		90	APHA 24 th Ed.2023,9215 -C
2	Total Coliform	/100ml	14		16		15		14		12		11	APHA 24 th Ed.2023, 9222-B
3	E.coli	/100ml	13		14		11		10		11		13	IS :15185:2016
4	Enterococcus	/100ml	8		7		9		8		6		7	IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent	IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent	APHA 24 th Ed.2023,9260 -E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent	IS: 5887 (Part V):1976



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF SEDIMENT ANALYSIS [M8 RIGHT SIDE OF BOCHA CREEK N 22°45'987" E 069°43'119"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.49	0.42	0.41	0.49	0.53	0.45	IS: 2720 (Part 22):1972
2.	Phosphorus as P	µg/g	602	596	602.4	610.5	564.8	574.2	IS: 10158 :1982, Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 24th Ed.2023,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	3.98	3.94	3.98	4.05	4.19	4.06	IS3025(Part 55):2003
5.2	Total Chromium as Cr+3	µg/g	122.4	128.6	132.2	134.4	142.3	134.2	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.3	Manganese as Mn	µg/g	618.3	606	608.4	612.6	580.5	590.4	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.4	Iron as Fe	%	4.11	4.02	4.06	4.11	4.09	4.12	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.5	Nickel as Ni	µg/g	42.31	43.22	43.84	44.69	39.55	40.85	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.6	Copper as Cu	µg/g	44.86	44.685	44.23	42.36	51.31	52.31	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.7	Zinc as Zn	µg/g	121.2	120.4	122.5	114.6	128.4	122	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.8	Lead as Pb	µg/g	2.44	2.52	2.43	2.31	2.06	1.92	EPA 3050B/7000B (Extraction &Analytical Method):2007
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

RESULTS OF SEDIMENT ANALYSIS [M8 RIGHT SIDE OF BOCHA CREEK N 22°45'987" E 069°43'119"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24 SEDIMENT	May-24 SEDIMENT	Jun-24 SEDIMENT	Jul-24 SEDIMENT	Aug-24 SEDIMENT	Sep-24 SEDIMENT	TEST METHOD
D			Benthic Organisms						
1	Macrobenthos	--	<i>Polychates</i>	<i>Gastropods</i>	<i>Gastropods</i>	<i>Polychates</i>	<i>Polychates</i>	<i>Polychates</i>	APHA (24 th Ed. 2023)10500
			<i>Decapods Larvae</i>	<i>Decapods Larvae</i>	<i>Decapods Larvae</i>	<i>Amphipods</i>	<i>Amphipods</i>	<i>Amphipods</i>	
			<i>Isopods</i>	<i>Isopods</i>	<i>Isopods</i>	<i>Isopods</i>	<i>Isopods</i>	<i>Sipunculids</i>	
			<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Sipunculids</i>	<i>Herpectacoids</i>	<i>Herpectacoids</i>	
2	MeioBenthos	--	<i>Herpectacoids</i>	<i>Herpectacoids</i>	<i>Herpectacoids</i>	<i>Foraminiferan</i>	<i>Foraminiferan</i>	<i>Foraminiferan</i>	
			<i>Turbellarians</i>	<i>Turbellarians</i>	<i>Turbellarians</i>	<i>Turbellarians</i>	<i>Turbellarians</i>	<i>Turbellarians</i>	
3	Population	no/m ²	368	367	365	366	367	368	



Mr. Nilesh Patel
Sr. Chemist




Mr. Nitin Tandel
Technical Manager

RESULTS OF MARINE WATER [M11 MPT T1 JETTY N 22°42'27" E 069°43'45"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFAC E	BOTTO M											
1.	pH	--	8.21	8.06	8.24	8.16	8.17	8	8.09	7.89	8.02	7.84	8.11	7.91	IS 3025 (Part 11):2022
2.	Temperature	°C	29.8	29.7	30.5	30.4	30.7	30.6	30.2	30.1	30.1	30	29.8	29.7	IS 3025 (Part 9):2023
3.	Total Suspended Solids	mg/L	132	108	124	112	130	118	122	104	138	116	142	128	APHA 24th Ed.,2023,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.9	BDL(MD L:1.0)	3.4	BDL(MD L:1.0)	3.1	BDL(MD L:1.0)	2.8	BDL(MD L:1.0)	2.2	BDL(MD L:1.0)	3.4	BDL(MD L:1.0)	IS 3025 (Part 44):2023
5.	Dissolved Oxygen	mg/L	6.02	5.92	5.92	5.77	5.83	5.68	6.32	6.22	6.49	6.3	6.59	6.4	APHA 24th Ed.2023,4500-O, B
6.	Salinity	ppt	36.34	37.33	36.42	37.51	36.34	37.39	35.82	37.08	35.73	37.12	35.84	36.98	By Calculation
7.	Oil & Grease	mg/L	BDL(MD L:2.0)	IS 3025 (Part 39):2021											
8.	Nitrate as NO ₃	µmol/L	3.06	2.74	3.39	3.23	3.55	3.39	3.06	2.74	2.42	2.26	3.02	2.59	APHA 24th Ed. 2023,4500 NO3-B
9.	Nitrite as NO ₂	µmol/L	0.565	0.543	0.652	0.609	0.543	0.522	0.5	0.456	0.413	0.37	0.276	0.215	APHA 24th Ed.2023,4500NO ₂ B
10.	Ammonical Nitrogen as NH ₃	µmol/L	4.22	4.06	4.32	4.22	4.37	4.27	3.48	3.42	4.43	4.27	3.79	3.36	APHA 24th Ed. 2023,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	1.9	1.68	1.79	1.68	1.47	1.37	1.16	1.05	1.16	1.05	BDL(MD L:0.4)	BDL(MD L:0.4)	APHA 24th Ed.2023,4500-P, D
12.	Total Nitrogen	µmol/L	7.845	7.343	8.362	8.059	8.463	8.182	7.04	6.616	7.263	6.9	7.086	6.165	APHA 24th Ed. 2023,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	ND	ND	ND	ND	ND	ND	APHA 24th ED.2023,5520 F
14.	Total Dissolved Solids	mg/L	36280	37190	36240	37230	36230	37140	36110	36940	35280	36860	35310	36520	IS 3025(Part 16):2023
15.	COD	mg/L	19.9	11.9	28.17	24.14	19.9	16	8	4	12	8	16.1	12	IS 3025(Part 58):2023

RESULTS OF MARINE WATER [M11 MPT T1 JETTY N 22°42'278" E 069°43'450"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A			Phytoplankton												
1.	Chlorophyll	mg/m ³	2.9	2.8	2.7	2.6	2.6	2.7	2.7	2.8	2.6	2.9	2.9	2.8	APHA (24 th Ed. 2023)10200A-G
2.	Phaeophytin	mg/m ³	2.7	1.6	2.6	1.7	2.7	1.5	2.9	1.6	2.8	1.5	2.7	1.6	APHA (24 th Ed. 2023)10200A-G
3.	Cell Count	No. x 10 ³ /L	132	117	129	115	128	116	130	117	133	118	132	117	APHA (24 th Ed. 2023)10200A-G
4	Name of Group Number and name of group species of each group	--	<i>Dinophysis</i>	<i>Navicula</i>	<i>Odontella</i>	<i>Cyclotella</i>	<i>Cyclotella</i>	<i>Surirella</i>	<i>Odontella</i>	<i>Nitzschia</i>	<i>Odontella</i>	<i>Nitzschia</i>	<i>Odontella</i>	<i>Nitzschia</i>	APHA (24 th Ed. 2023)10200A-G
			<i>Pinnularia</i>	<i>Skeletonema</i>	<i>Rhizosolenia</i>	<i>Pinnularia</i>	<i>Pinnularia</i>	<i>Skeletonema</i>	<i>Rhizosolenia</i>	<i>Pinnularia</i>	<i>Rhizosolenia</i>	<i>Pinnularia</i>	<i>Rhizosolenia</i>	<i>Pinnularia</i>	
			<i>Thalassiothrix</i>	<i>Rhizosolenia</i>	<i>Coscinodiscus</i>	<i>Skeletonema</i>	<i>Thalassiothrix</i>	<i>Rhizosolenia</i>	<i>Coscinodiscus</i>	<i>Odontella</i>	<i>Coscinodiscus</i>	<i>Odontella</i>	<i>Coscinodiscus</i>	<i>Odontella</i>	
			<i>Grammatophora</i>	<i>Dinophysis</i>	<i>Grammatophora</i>	<i>Thalassiosira</i>	<i>Rhizosolenia</i>	<i>Cyclotella</i>	<i>Grammatophora</i>	<i>Dinophysis</i>	<i>Grammatophora</i>	<i>Dinophysis</i>	<i>Pleurosigma</i>	<i>Dinophysis</i>	
			<i>Ceratium</i>	<i>Thalassionema</i>	<i>Thalassiosira</i>	<i>Thalassionema</i>	<i>Ceratium</i>	<i>Thalassionema</i>	<i>Thalassiosira</i>	<i>Surirella</i>	<i>Thalassiosira</i>	<i>Surirella</i>	<i>Thalassiosira</i>	<i>Surirella</i>	
B			Zooplankton												
1	Abundance (Population)	noX10 ³ /100 m ³	31		36		35		34		35		36		APHA (24 th Ed. 2023)10200 G
2	Name of Group Number and name of group species of each group		<i>Diploneis</i>		<i>Diploneis</i>		<i>Diploneis</i>		<i>Decapoda</i>		<i>Decapoda</i>		<i>Decapoda</i>		
			<i>Rhizosolenia</i>		<i>Rhizosolenia</i>		<i>Rhizosolenia</i>		<i>Copepods</i>		<i>Copepods</i>		<i>Oikoplura</i>		
			<i>Nitzschia</i>		<i>Nitzschia</i>		<i>Nitzschia</i>		<i>Crustacean Larvae</i>		<i>Crustacean Larvae</i>		<i>Crustacean Larvae</i>		
			<i>Thalassiothrix</i>		<i>Coscinodiscus</i>		<i>Coscinodiscus</i>		<i>Crustacean</i>		<i>Crustacean</i>		<i>Bivalve Larvae</i>		
3	Total Biomass	ml/100 m ³	15.23		15.22		15.23		15.23		15.23		15.25		

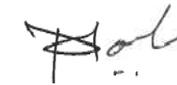
Continue...

RESULTS OF MARINE WATER [M11 MPT T1 JETTY N 22°42'27" E 069°43'45"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C			Microbiological												
1	Total Bacterial Count	CFU/ml	224		230		230		234		230		232		APHA 24 th Ed.2023,9215 -C
2	Total Coliform	/100ml	42		40		40		43		44		43		APHA 24 th Ed.2023, 9222-B
3	E.coli	/100ml	32		33		33		33		32		31		IS :15185:2016
4	Enterococcus	/100ml	18		15		15		12		14		13		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 24 th Ed.2023,9260 -E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF MARINE WATER [M12 SPM N 22°40'938" E 069°39'191"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFAC E	BOTTO M											
1.	pH	--	8.18	8.03	8.12	7.94	8.15	8.04	8.07	7.94	8.12	7.88	8.16	7.96	IS 3025 (Part 11):2022
2.	Temperature	°C	29.8	29.7	30.4	30.3	30.6	30.5	30.3	30.2	30.2	30.1	29.9	29.8	IS 3025 (Part 9):2023
3.	Total Suspended Solids	mg/L	142	122	130	104	132	112	120	102	110	92	124	88	APHA 24th Ed.,2023,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	3.1	BDL(M DL:1.0)	3.3	BDL(M DL:1.0)	3.1	BDL(M DL:1.0)	2.2	BDL(M DL:1.0)	2.8	BDL(M DL:1.0)	3.4	BDL(M DL:1.0)	IS 3025 (Part 44):2023
5.	Dissolved Oxygen	mg/L	5.92	5.82	5.82	5.67	5.73	5.58	6.42	6.32	6.59	6.4	6.69	6.49	APHA 24th Ed.2023,4500-O, B
6.	Salinity	ppt	36.39	37.44	36.42	37.54	36.12	37.28	35.74	36.91	35.81	36.87	35.67	26.76	By Calculation
7.	Oil & Grease	mg/L	BDL(M DL:2.0)	IS 3025 (Part 39):2021											
8.	Nitrate as NO ₃	µmol/L	3.06	2.74	3.23	3.06	3.39	3.23	3.23	2.9	2.1	1.77	2.67	2.54	APHA 24th Ed. 2023,4500 NO3-B
9.	Nitrite as NO ₂	µmol/L	0.543	0.5	0.652	0.565	0.609	0.565	0.522	0.478	0.435	0.371	0.414	0.362	APHA 24th Ed.2023,4500NO ₂ B
10.	Ammonical Nitrogen as NH ₃	µmol/L	4.43	4.22	4.37	4.27	4.43	4.32	3.74	3.64	4.16	3.95	3.4	3.32	APHA 24th Ed. 2023,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	2	1.79	2.11	1.9	1.9	1.68	1.37	1.26	1.26	1.16	1.16	1.05	APHA 24th Ed.2023,4500-P, D
12.	Total Nitrogen	µmol/L	8.033	7.46	8.252	7.895	8.429	8.115	7.492	7.018	6.695	6.091	6.484	6.222	APHA 24th Ed. 2023,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	ND	ND	ND	ND	ND	ND	APHA 24th ED.2023,5520 F
14.	Total Dissolved Solids	mg/L	36370	37410	36230	37140	36190	37110	35720	36410	34680	35370	34410	35420	IS 3025(Part 16):2023
15.	COD	mg/L	11.9	7.9	24.14	20.123	16	12	12	8	16	12	20.1	16.1	IS 3025(Part 58):2023

RESULTS OF MARINE WATER [M12 SPM N 22°40'938" E 069°39'191"]

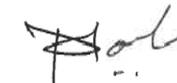
SR. NO.	TEST PARAMETERS	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A			Phytoplankton												
1.	Chlorophyll	mg/m ³	2.7	2.8	2.6	2.7	2.5	2.5	2.3	2.6	2.2	2.5	2.1	2.4	APHA (24 th Ed. 2023)10200A-G
2.	Phaeophytin	mg/m ³	1.16	1.45	1.17	1.47	1.18	1.48	1.17	1.46	1.18	1.47	1.17	1.46	APHA (24 th Ed. 2023)10200A-G
3.	Cell Count	No. x 10 ³ /L	75	122	77	126	75	127	77	130	78	133	77	132	APHA (24 th Ed. 2023)10200A-G
4	Name of Group Number and name of group species of each group	--	<i>Ceratium</i>	<i>Melosira</i>	<i>Ceratium</i>	<i>Rhizosolenia</i>	<i>Surirella</i>	<i>Rhizosolenia</i>	<i>Skeletonema</i>	<i>Odontella</i>	<i>Skeletonema</i>	<i>Odontella</i>	<i>Skeletonema</i>	<i>Odontella</i>	APHA (24 th Ed. 2023)10200A-G
			<i>Pinnularia</i>	<i>Dinophysis</i>	<i>Pinnularia</i>	<i>Dinophysis</i>	<i>Pinnularia</i>	<i>Dinophysis</i>	<i>Grammatophora</i>	<i>Rhizosolenia</i>	<i>Grammatophora</i>	<i>Rhizosolenia</i>	<i>Grammatophora</i>	<i>Rhizosolenia</i>	
			<i>Odontella</i>	<i>Skeletonema</i>	<i>Odontella</i>	<i>Skeletonema</i>	<i>Grammatophora</i>	<i>Skeletonema</i>	<i>Nitzschia</i>	<i>Coscinodiscus</i>	<i>Nitzschia</i>	<i>Coscinodiscus</i>	<i>Nitzschia</i>	<i>Coscinodiscus</i>	
			<i>Thalassiothrix</i>	<i>Thalassiosira</i>	<i>Thalassiothrix</i>	<i>Thalassiosira</i>	<i>Thalassiothrix</i>	<i>Thalassiosira</i>	<i>Thalassiothrix</i>	<i>Grammatophora</i>	<i>Thalassiothrix</i>	<i>Grammatophora</i>	<i>Coscinodiscus</i>	<i>Pinnularia</i>	
			<i>Thalassiosira</i>	<i>Thalassionema</i>	<i>Thalassiosira</i>	<i>Melosira</i>	<i>Rhizosolenia</i>	<i>Melosira</i>	<i>Pleurosigma</i>	<i>Thalassiosira</i>	<i>Pleurosigma</i>	<i>Thalassiosira</i>	<i>Pleurosigma</i>	<i>Thalassiosira</i>	
B			Zooplankton												
1	Abundance (Population)	noX10 ³ /100 m ³	66	37	68	67	67	70							APHA (24 th Ed. 2023)10200 G
2	Name of Group Number and name of group species of each group		<i>Nitzschia</i>	<i>Nitzschia</i>	<i>Nitzschia</i>	<i>Copepods</i>	<i>Copepods</i>	<i>Copepods</i>							
			<i>Grammatophora</i>	<i>Grammatophora</i>	<i>Grammatophora</i>	<i>Oikoplura</i>	<i>Oikoplura</i>	<i>Oikoplura</i>							
			<i>Diploneis</i>	<i>Diploneis</i>	<i>Egg(Fish and Shrimps)</i>	<i>Crustacean Larvae</i>	<i>Crustacean Larvae</i>	<i>Crustacean Larvae</i>							
			<i>Thalassiothrix</i>	<i>Thalassiothrix</i>	<i>Thalassiothrix</i>	<i>Crustacean</i>	<i>Crustacean</i>	<i>Crustacean</i>							
			<i>Pleurosigma</i>	<i>Pleurosigma</i>	<i>Pleurosigma</i>	<i>Bivalve Larvae</i>	<i>Bivalve Larvae</i>	<i>Egg(Fish and Shrimps)</i>							
3	Total Biomass	ml/100 m ³	14.56	14.55	14.54	14.57	14.54	14.57							

RESULTS OF MARINE WATER [M12 SPM N 22°40'938" E 069°39'191"]

SR. NO	TEST PARAMETER S	UNIT	Apr-24		May-24		Jun-24		Jul-24		Aug-24		Sep-24		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C			Microbiological												
1	Total Bacterial Count	CFU/ml	248		250		254		256		250		254		APHA 24 th Ed.2023,9215 -C
2	Total Coliform	/100ml	50		52		50		52		51		50		APHA 24 th Ed.2023, 9222-B
3	E.coli	/100ml	40		41		44		43		45		44		IS :15185:2016
4	Enterococcus	/100ml	31		30		32		31		32		30		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 24 th Ed.2023,9260 -E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976



Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

Results of Ambient Air Quality Monitoring

Name of Location		West Port – West Basin Main Gate						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
1.	01-04-2024	80.51	35.37	32.63	36.48	1.16	--	NOT DETECTED
2.	04-04-2024	84.28	38.12	35.84	38.91	1.19	4.83	NOT DETECTED
3.	08-04-2024	82.47	34.93	32.68	36.35	1.15	4.65	NOT DETECTED
4.	11-04-2024	84.83	37.96	34.54	38.68	1.23	4.87	NOT DETECTED
5.	15-04-2024	78.68	32.38	31.27	35.24	1.17	4.57	NOT DETECTED
6.	18-04-2024	80.26	35.82	33.47	36.73	1.14	4.62	NOT DETECTED
7.	22-04-2024	75.42	32.84	30.97	35.02	1.15	4.5	NOT DETECTED
8.	25-04-2024	78.52	33.5	32.25	35.37	1.18	4.64	NOT DETECTED
9.	29-04-2024	81.27	36.59	35.43	37.81	1.21	4.73	NOT DETECTED
10.	02-05-2024	77.82	33.76	30.95	34.81	1.13	4.54	NOT DETECTED
11.	06-05-2024	80.42	36.91	33.54	36.72	1.15	4.78	NOT DETECTED
12.	09-05-2024	76.48	34.57	31.13	34.59	1.14	4.48	NOT DETECTED
13.	13-05-2024	74.38	31.85	29.97	32.25	1.12	4.41	NOT DETECTED
14.	16-05-2024	78.14	33.57	31.38	34.63	1.15	4.56	NOT DETECTED
15.	20-05-2024	80.42	37.12	33.46	36.22	1.17	4.65	NOT DETECTED

Continue...

Name of Location		West Port – West Basin Main Gate						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
16.	23-05-2024	77.46	34.52	30.83	33.94	1.14	4.43	NOT DETECTED
17.	27-05-2024	79.53	35.24	32.56	36.25	1.2	4.36	NOT DETECTED
18.	30-05-2024	81.26	37.12	30.36	33.65	1.16	4.53	NOT DETECTED
19.	03-06-2024	78.62	35.12	31.63	35.2	1.15	4.46	NOT DETECTED
20.	06-06-2024	80.13	36.32	32.84	35.96	1.16	4.61	NOT DETECTED
21.	10-06-2024	76.49	33.49	28.73	31.35	1.14	4.53	NOT DETECTED
22.	13-06-2024	79.64	35.18	29.42	32.49	1.15	4.45	NOT DETECTED
23.	17-06-2024	74.16	32.39	28.42	31.81	1.13	4.26	NOT DETECTED
24.	20-06-2024	72.19	30.75	29.21	33.56	1.1	4.17	NOT DETECTED
25.	24-06-2024	43.29	25.74	24.48	28.11	0.82	3.48	NOT DETECTED
26.	27-06-2024	39.65	22.51	21.64	24.78	0.64	3.12	NOT DETECTED
27.	01-07-2024	46.58	21.39	20.76	23.32	0.57	--	NOT DETECTED
28.	04-07-2024	52.39	24.74	23.46	26.13	0.64	3.47	NOT DETECTED
29.	08-07-2024	59.64	27.25	25.47	29.53	0.61	3.65	NOT DETECTED
30.	11-07-2024	55.37	25.48	22.31	25.83	0.64	3.51	NOT DETECTED
31.	15-07-2024	57.13	26.91	24.39	27.36	0.67	3.58	NOT DETECTED

Continue...

Name of Location		West Port – West Basin Main Gate						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
32.	18-07-2024	62.49	29.64	26.95	30.11	0.68	3.79	NOT DETECTED
33.	22-07-2024	59.35	27.42	25.13	29.47	0.61	3.68	NOT DETECTED
34.	25-07-2024	53.61	24.87	23.5	26.24	0.59	3.57	NOT DETECTED
35.	29-07-2024	49.42	22.46	21.17	24.8	0.56	3.52	NOT DETECTED
36.	01-08-2024	53.53	22.85	21.97	24.65	0.51	3.45	NOT DETECTED
37.	05-08-2024	57.71	25.46	24.28	27.91	0.57	3.53	NOT DETECTED
38.	08-08-2024	55.42	23.19	22.64	25.38	0.53	3.55	NOT DETECTED
39.	12-08-2024	58.51	25.68	23.89	26.17	0.59	3.5	NOT DETECTED
40.	15-08-2024	63.29	27.35	26.06	29.41	0.61	3.63	NOT DETECTED
41.	19-08-2024	61.29	26.34	25.13	29.11	0.56	3.56	NOT DETECTED
42.	22-08-2024	56.46	24.18	22.79	25.47	0.53	3.47	NOT DETECTED
43.	26-08-2024	58.13	23.52	23.24	26.51	0.56	3.52	NOT DETECTED
44.	29-08-2024	60.41	25.22	25.31	29.15	0.58	3.58	NOT DETECTED
45.	02-09-2024	56.48	23.35	24.1	27.32	0.61	3.59	NOT DETECTED
46.	05-09-2024	54.39	22.72	23.37	26.54	0.55	3.57	NOT DETECTED
47.	09-09-2024	56.35	23.49	24.58	27.81	0.58	3.64	NOT DETECTED

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Name of Location		West Port – West Basin Main Gate						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
48.	12-09-2024	58.42	25.61	25.05	28.73	0.62	3.66	NOT DETECTED
49.	16-09-2024	61.29	27.02	25.85	29.11	0.63	3.81	NOT DETECTED
50.	19-09-2024	64.11	27.25	26.00	29.73	0.64	3.88	NOT DETECTED
51.	23-09-2024	62.39	25.83	25.23	28.56	0.60	3.72	NOT DETECTED
52.	26-09-2024	58.37	23.19	22.68	25.35	0.56	3.64	NOT DETECTED
53.	30-09-2024	60.25	24.74	23.91	26.18	0.61	3.72	NOT DETECTED
Permissible Value as per NAAQMS		100.0	60.0	80.0	80.0	2.0	---	5.0
Test Method		IS - 5182, Part- 23	UERL/AIR/ SOP/11	IS - 5182, Part - 2	IS - 5182, Part - 6	IS - 5182, Part - 10	Gas analyzer	IS – 5182, Part – 11



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Ambient Air Quality Monitoring

Name of Location		West Port – Horti Culture						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
1.	01-04-2024	85.61	42.33	33.74	37.12	1.18	--	NOT DETECTED
2.	04-04-2024	82.49	40.85	31.37	35.63	1.22	3.51	NOT DETECTED
3.	08-04-2024	80.75	38.26	30.86	34.1	1.15	3.36	NOT DETECTED
4.	11-04-2024	83.38	40.45	33.31	37.56	1.27	3.59	NOT DETECTED
5.	15-04-2024	85.19	44.72	35.18	40.03	1.21	3.85	NOT DETECTED
6.	18-04-2024	81.36	42.88	34.52	38.26	1.17	3.72	NOT DETECTED
7.	22-04-2024	76.38	38.63	31.31	34.48	1.14	3.46	NOT DETECTED
8.	25-04-2024	79.02	40.25	33.57	37.24	1.11	3.53	NOT DETECTED
9.	29-04-2024	82.16	43.46	35.37	40.15	1.18	3.67	NOT DETECTED
10.	02-05-2024	83.81	39.62	32.96	35.86	1.16	3.67	NOT DETECTED
11.	06-05-2024	78.93	37.89	30.68	35.12	1.1	3.46	NOT DETECTED
12.	09-05-2024	80.15	40.42	31.86	34.63	1.16	3.55	NOT DETECTED
13.	13-05-2024	82.48	42.1	35.24	38.76	1.2	3.71	NOT DETECTED
14.	16-05-2024	79.27	38.51	32.35	37.41	1.15	3.62	NOT DETECTED
15.	20-05-2024	75.39	35.93	29.87	33.26	1.13	3.37	NOT DETECTED

Continue...

Name of Location		West Port – Horti Culture						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
16.	23-05-2024	78.73	37.64	31.2	34.76	1.16	3.43	NOT DETECTED
17.	27-05-2024	80.42	40.51	33.45	37.21	1.18	3.57	NOT DETECTED
18.	30-05-2024	81.3	38.63	35.72	39.42	1.17	3.46	NOT DETECTED
19.	03-06-2024	81.53	38.28	30.56	34.13	1.17	3.53	NOT DETECTED
20.	06-06-2024	83.26	41.1	32.71	36.42	1.19	3.65	NOT DETECTED
21.	10-06-2024	78.87	37.11	29.85	33.67	1.15	3.55	NOT DETECTED
22.	13-06-2024	80.14	39.75	30.14	34.13	1.17	3.67	NOT DETECTED
23.	17-06-2024	74.38	36.73	28.61	31.89	1.14	3.39	NOT DETECTED
24.	20-06-2024	71.95	34.89	27.73	31.12	1.11	3.25	NOT DETECTED
25.	24-06-2024	61.12	30.74	24.61	28.47	0.74	2.27	NOT DETECTED
26.	27-06-2024	55.28	27.53	22.76	25.91	0.53	2.14	NOT DETECTED
27.	01-07-2024	60.14	30.63	23.75	26.36	0.61	--	NOT DETECTED
28.	04-07-2024	53.21	28.74	22.24	24.98	0.55	2.38	NOT DETECTED
29.	08-07-2024	59.74	30.42	24.57	28.13	0.64	2.56	NOT DETECTED
30.	11-07-2024	65.14	32.47	26.83	29.42	0.58	2.62	NOT DETECTED
31.	15-07-2024	60.48	29.95	25.46	29.14	0.65	2.58	NOT DETECTED

Continue...

Name of Location		West Port – Horti Culture						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
32.	18-07-2024	64.37	33.29	28.12	31.74	0.62	2.71	NOT DETECTED
33.	22-07-2024	58.36	29.54	24.57	27.32	0.57	2.63	NOT DETECTED
34.	25-07-2024	61.35	32.42	26.35	29.16	0.62	2.67	NOT DETECTED
35.	29-07-2024	54.91	27.76	24.19	26.88	0.58	2.57	NOT DETECTED
36.	01-08-2024	56.92	27.81	22.58	25.17	0.56	2.34	NOT DETECTED
37.	05-08-2024	58.53	28.58	23.45	26.83	0.59	2.45	NOT DETECTED
38.	08-08-2024	62.38	29.42	22.49	26.31	0.61	2.59	NOT DETECTED
39.	12-08-2024	64.37	32.53	25.41	29.38	0.66	2.48	NOT DETECTED
40.	15-08-2024	60.37	30.48	23.63	26.58	0.59	2.65	NOT DETECTED
41.	19-08-2024	63.21	31.55	24.37	27.15	0.62	2.68	NOT DETECTED
42.	22-08-2024	66.49	33.18	26.62	29.37	0.65	2.73	NOT DETECTED
43.	26-08-2024	59.74	29.53	24.96	27.38	0.58	2.62	NOT DETECTED
44.	29-08-2024	63.27	31.18	25.41	28.36	0.6	2.65	NOT DETECTED
45.	02-09-2024	58.17	29.31	21.93	24.58	0.62	2.41	NOT DETECTED
46.	05-09-2024	59.78	30.52	22.53	25.38	0.57	2.32	NOT DETECTED
47.	09-09-2024	61.38	31.45	24.59	27.15	0.6	2.58	NOT DETECTED

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Name of Location		West Port – Horti Culture						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
48.	12-09-2024	62.81	33.27	25.13	27.83	0.62	2.61	NOT DETECTED
49.	16-09-2024	65.38	34.18	25.73	28.12	0.65	2.66	NOT DETECTED
50.	19-09-2024	68.15	35.03	25.97	29.41	0.68	2.75	NOT DETECTED
51.	23-09-2024	66.1	33.59	24.31	27.54	0.63	2.62	NOT DETECTED
52.	26-09-2024	61.38	30.19	22.36	25.62	0.6	2.46	NOT DETECTED
53.	30-09-2024	64.26	32.45	23.61	27.15	0.64	2.53	NOT DETECTED
Permissible Value as per NAAQMS		100.0	60.0	80.0	80.0	2.0	---	5.0
Test Method		IS - 5182, Part- 23	UERL/AIR/ SOP/11	IS - 5182, Part - 2	IS - 5182, Part - 6	IS - 5182, Part - 10	Gas analyzer	IS – 5182, Part – 11



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Ambient Air Quality Monitoring

Name of Location		WEST PORT - PMC OFFICE						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
1.	01-04-2024	84.24	39.46	37.13	41.64	1.18	--	NOT DETECTED
2.	04-04-2024	87.52	41.38	40.42	44.27	1.23	4.87	NOT DETECTED
3.	08-04-2024	85.17	40.32	38.4	41.32	1.16	4.67	NOT DETECTED
4.	11-04-2024	82.63	37.82	35.75	39.48	1.15	4.5	NOT DETECTED
5.	15-04-2024	80.89	34.47	33.81	38.72	1.12	4.36	NOT DETECTED
6.	18-04-2024	83.41	35.93	37.54	41.36	1.18	4.47	NOT DETECTED
7.	22-04-2024	81.36	34.73	35.1	39.78	1.14	4.26	NOT DETECTED
8.	25-04-2024	85.12	39.57	38.43	41.27	1.21	4.58	NOT DETECTED
9.	29-04-2024	83.37	36.79	35.66	38.34	1.17	4.42	NOT DETECTED
10.	02-05-2024	82.37	37.82	35.12	39.43	1.16	4.58	NOT DETECTED
11.	06-05-2024	80.19	34.98	32.95	36.47	1.14	4.41	NOT DETECTED
12.	09-05-2024	83.48	36.57	37.42	41.94	1.18	4.65	NOT DETECTED
13.	13-05-2024	85.16	39.62	38.98	43.17	1.20	4.81	NOT DETECTED
14.	16-05-2024	81.29	36.51	36.14	40.37	1.15	4.62	NOT DETECTED
15.	20-05-2024	78.64	34.49	34.18	38.32	1.13	4.39	NOT DETECTED

Continue...

Name of Location		WEST PORT - PMC OFFICE						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
16.	23-05-2024	80.41	36.29	37.83	41.45	1.17	4.48	NOT DETECTED
17.	27-05-2024	82.39	38.41	35.26	39.31	1.14	4.7	NOT DETECTED
18.	30-05-2024	79.93	35.17	34.03	38.47	1.16	4.51	NOT DETECTED
19.	03-06-2024	83.15	38.28	36.61	40.05	1.17	4.89	NOT DETECTED
20.	06-06-2024	79.94	36.72	34.87	38.73	1.15	4.58	NOT DETECTED
21.	10-06-2024	78.58	33.97	32.46	37.45	1.16	4.49	NOT DETECTED
22.	13-06-2024	81.64	36.25	35.46	39.13	1.19	4.75	NOT DETECTED
23.	17-06-2024	76.19	33.81	33.19	37.82	1.16	4.43	NOT DETECTED
24.	20-06-2024	75.42	32.35	31.89	35.44	1.13	4.27	NOT DETECTED
25.	24-06-2024	57.42	29.31	28.19	31.75	1.03	3.75	NOT DETECTED
26.	27-06-2024	51.48	27.63	25.86	29.53	0.84	3.24	NOT DETECTED
27.	01-07-2024	56.63	26.95	20.48	23.74	0.37	--	NOT DETECTED
28.	04-07-2024	61.37	28.22	22.34	26.41	0.49	3.31	NOT DETECTED
29.	08-07-2024	64.38	30.74	25.28	28.75	0.61	3.57	NOT DETECTED
30.	11-07-2024	62.48	28.65	22.79	25.67	0.66	3.46	NOT DETECTED
31.	15-07-2024	67.48	30.25	25.97	29.26	0.75	3.62	NOT DETECTED

Continue...

Name of Location		WEST PORT - PMC OFFICE						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
32.	18-07-2024	60.48	27.81	23.42	26.86	0.65	3.42	NOT DETECTED
33.	22-07-2024	65.13	29.46	25.34	30.13	0.71	3.57	NOT DETECTED
34.	25-07-2024	58.47	26.94	21.43	25.26	0.57	3.45	NOT DETECTED
35.	29-07-2024	55.84	25.76	19.81	24.14	0.48	3.37	NOT DETECTED
36.	01-08-2024	53.29	24.78	20.93	23.75	0.56	3.15	NOT DETECTED
37.	05-08-2024	57.28	25.63	21.75	25.14	0.59	3.42	NOT DETECTED
38.	08-08-2024	55.17	24.91	21.1	24.96	0.57	3.1	NOT DETECTED
39.	12-08-2024	60.14	26.26	23.53	26.42	0.63	3.29	NOT DETECTED
40.	15-08-2024	63.31	27.84	24.81	27.35	0.66	3.48	NOT DETECTED
41.	19-08-2024	59.64	25.16	23.42	26.53	0.64	3.71	NOT DETECTED
42.	22-08-2024	62.39	26.43	24.74	28.11	0.67	3.62	NOT DETECTED
43.	26-08-2024	54.58	24.13	21.84	24.68	0.58	3.37	NOT DETECTED
44.	29-08-2024	58.15	25.47	23.52	27.25	0.63	3.51	NOT DETECTED
45.	02-09-2024	55.19	25.48	21.55	24.82	0.61	3.38	NOT DETECTED
46.	05-09-2024	56.92	24.83	22.08	26.42	0.57	3.14	NOT DETECTED
47.	09-09-2024	58.16	25.91	23.74	27.55	0.59	3.27	NOT DETECTED

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Name of Location		WEST PORT - PMC OFFICE						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
48.	12-09-2024	61.49	27.74	25.41	29.15	0.62	3.76	NOT DETECTED
49.	16-09-2024	59.73	26.35	24.25	27.74	0.63	3.46	NOT DETECTED
50.	19-09-2024	63.48	28.12	24.86	28.39	0.66	3.69	NOT DETECTED
51.	23-09-2024	64.73	28.64	25.13	29.42	0.62	3.79	NOT DETECTED
52.	26-09-2024	60.52	25.47	22.59	26.27	0.56	3.37	NOT DETECTED
53.	30-09-2024	63.13	26.46	23.28	27.41	0.58	3.52	NOT DETECTED
Permissible Value as per NAAQMS		100.0	60.0	80.0	80.0	2.0	---	5.0
Test Method		IS - 5182, Part- 23	UERL/AIR/ SOP/11	IS - 5182, Part - 2	IS - 5182, Part - 6	IS - 5182, Part - 10	Gas analyzer	IS – 5182, Part – 11



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Ambient Air Quality Monitoring

Name of Location		LPG Terminal Substation						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
1.	01-04-2024	74.28	34.92	25.36	29.07	1.1	--	NOT DETECTED
2.	04-04-2024	77.62	36.34	28.13	32.47	1.15	4.91	NOT DETECTED
3.	08-04-2024	72.35	34.11	24.87	28.53	1.12	4.84	NOT DETECTED
4.	11-04-2024	76.91	35.49	26.75	29.87	1.10	4.67	NOT DETECTED
5.	15-04-2024	80.24	38.63	28.59	33.12	1.18	4.79	NOT DETECTED
6.	18-04-2024	78.51	36.23	27.46	31.24	1.15	4.6	NOT DETECTED
7.	22-04-2024	75.89	33.96	26.19	29.68	1.12	4.42	NOT DETECTED
8.	25-04-2024	72.31	32.79	24.56	28.43	1.07	4.46	NOT DETECTED
9.	29-04-2024	77.57	35.68	27.46	31.74	1.13	4.58	NOT DETECTED
10.	02-05-2024	74.29	33.61	23.83	27.79	1.12	4.68	NOT DETECTED
11.	06-05-2024	76.82	34.98	26.12	30.27	1.13	4.73	NOT DETECTED
12.	09-05-2024	78.52	37.03	27.32	31.46	1.15	4.82	NOT DETECTED
13.	13-05-2024	75.43	35.72	24.38	28.56	1.13	4.72	NOT DETECTED
14.	16-05-2024	72.84	32.37	23.21	27.63	1.1	4.63	NOT DETECTED
15.	20-05-2024	76.13	36.72	24.39	28.96	1.14	4.57	NOT DETECTED

Continue...

Name of Location		LPG Terminal Substation						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
16.	23-05-2024	78.53	37.12	26.51	30.27	1.15	4.6	NOT DETECTED
17.	27-05-2024	74.37	34.81	23.48	27.33	1.12	4.54	NOT DETECTED
18.	30-05-2024	76.19	35.52	25.27	29.78	1.14	4.7	NOT DETECTED
19.	03-06-2024	76.12	35.41	24.29	29.63	1.14	4.57	NOT DETECTED
20.	06-06-2024	73.49	33.58	22.75	26.85	1.11	4.45	NOT DETECTED
21.	10-06-2024	71.58	32.38	21.84	26.27	1.13	4.32	NOT DETECTED
22.	13-06-2024	74.31	34.67	24.11	29.61	1.14	4.61	NOT DETECTED
23.	17-06-2024	67.48	31.29	21.35	26.42	1.06	4.23	NOT DETECTED
24.	20-06-2024	70.53	32.47	23.36	27.7	1.10	4.41	NOT DETECTED
25.	24-06-2024	44.28	26.39	16.78	20.1	0.64	3.75	NOT DETECTED
26.	27-06-2024	48.74	28.36	19.65	22.37	0.72	3.88	NOT DETECTED
27.	01-07-2024	45.28	24.81	18.64	22.13	0.61	--	NOT DETECTED
28.	04-07-2024	48.69	26.34	16.49	20.73	0.66	3.58	NOT DETECTED
29.	08-07-2024	53.27	29.11	19.25	23.42	0.7	3.63	NOT DETECTED
30.	11-07-2024	51.48	27.35	18.74	22.1	0.67	3.75	NOT DETECTED
31.	15-07-2024	55.49	29.41	20.68	24.36	0.71	3.84	NOT DETECTED

Continue...

Name of Location		LPG Terminal Substation						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
32.	18-07-2024	57.37	31.68	23.54	26.49	0.82	3.88	NOT DETECTED
33.	22-07-2024	52.39	29.75	19.68	23.95	0.65	3.72	NOT DETECTED
34.	25-07-2024	47.65	26.31	17.47	21.38	0.57	3.65	NOT DETECTED
35.	29-07-2024	42.39	23.88	14.91	18.77	0.49	3.52	NOT DETECTED
36.	01-08-2024	49.48	25.79	15.81	19.96	0.61	3.55	NOT DETECTED
37.	05-08-2024	51.29	27.18	16.92	20.85	0.63	3.63	NOT DETECTED
38.	08-08-2024	54.38	28.83	17.45	21.62	0.68	3.58	NOT DETECTED
39.	12-08-2024	57.48	29.91	19.2	23.52	0.72	3.69	NOT DETECTED
40.	15-08-2024	53.92	26.54	17.25	21.39	0.65	3.64	NOT DETECTED
41.	19-08-2024	55.73	27.36	18.31	22.78	0.69	3.67	NOT DETECTED
42.	22-08-2024	58.14	28.47	19.1	23.69	0.73	3.71	NOT DETECTED
43.	26-08-2024	56.58	26.29	17.64	21.57	0.68	3.68	NOT DETECTED
44.	29-08-2024	54.37	25.63	16.42	20.73	0.64	3.59	NOT DETECTED
45.	02-09-2024	52.38	26.14	16.82	20.68	0.66	3.6	NOT DETECTED
46.	05-09-2024	55.18	28.61	17.16	21.37	0.69	3.65	NOT DETECTED
47.	09-09-2024	53.48	25.14	16.74	20.61	0.67	3.63	NOT DETECTED

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Name of Location		LPG Terminal Substation						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
48.	12-09-2024	57.73	27.64	17.83	21.58	0.73	3.66	NOT DETECTED
49.	16-09-2024	55.49	26.14	17.22	20.94	0.69	3.69	NOT DETECTED
50.	19-09-2024	58.84	27.91	18.53	22.37	0.71	3.74	NOT DETECTED
51.	23-09-2024	61.28	28.91	19.18	23.41	0.76	3.77	NOT DETECTED
52.	26-09-2024	55.43	25.74	16.98	20.49	0.67	3.65	NOT DETECTED
53.	30-09-2024	58.18	27.26	17.42	21.64	0.7	3.68	NOT DETECTED
Permissible Value as per NAAQMS		100.0	60.0	80.0	80.0	2.0	---	5.0
Test Method		IS - 5182, Part- 23	UERL/AIR/ SOP/11	IS - 5182, Part - 2	IS - 5182, Part - 6	IS - 5182, Part - 10	Gas analyzer	IS - 5182, Part - 11



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Ambient Air Quality Monitoring

Name of Location		Adani Guest House				
Sr. No.	Date of Monitoring	Parameter with Results				
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³
1.	01-04-2024	80.11	29.53	12.83	16.52	NOT DETECTED
2.	04-04-2024	84.26	30.71	14.32	18.11	--
3.	08-04-2024	79.46	28.47	13.11	17.54	--
4.	11-04-2024	75.27	25.39	12.85	17.03	--
5.	15-04-2024	77.36	27.17	13.26	16.59	--
6.	18-04-2024	73.91	25.48	12.26	15.86	--
7.	22-04-2024	76.84	26.97	12.79	16.44	--
8.	25-04-2024	80.49	28.66	14.52	17.16	--
9.	29-04-2024	82.35	30.42	13.73	16.85	--
10.	02-05-2024	77.39	26.19	13.05	15.89	--
11.	06-05-2024	75.19	25.42	12.73	17.42	--
12.	09-05-2024	78.27	27.49	13.26	16.38	--
13.	13-05-2024	80.52	29.71	14.25	17.36	--
14.	16-05-2024	78.64	27.47	13.64	16.83	--
15.	20-05-2024	74.38	26.16	12.39	16.37	--

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Name of Location		Adani Guest House				
Sr. No.	Date of Monitoring	Parameter with Results				
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³
16.	23-05-2024	76.73	28.64	13.56	16.98	--
17.	27-05-2024	79.62	30.11	14.01	17.63	--
18.	30-05-2024	75.2	26.85	12.69	15.63	--
19.	03-06-2024	80.12	28.47	14.14	17.21	--
20.	06-06-2024	78.63	27.91	13.85	16.32	--
21.	10-06-2024	75.94	25.38	13.11	15.83	--
22.	13-06-2024	77.53	27.15	13.52	16.14	--
23.	17-06-2024	71.28	24.39	12.25	15.47	--
24.	20-06-2024	68.88	23.64	11.85	14.98	--
25.	24-06-2024	51.25	19.64	9.31	12.46	--
26.	27-06-2024	47.49	17.83	8.65	10.94	--
27.	01-07-2024	44.75	16.94	8.87	10.68	NOT DETECTED
28.	04-07-2024	50.13	18.52	10.12	13.25	--
29.	08-07-2024	54.76	20.47	11.73	13.41	--
30.	11-07-2024	57.39	23.42	13.11	15.87	--
31.	15-07-2024	52.49	19.37	12.36	14.62	--

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Name of Location		Adani Guest House				
Sr. No.	Date of Monitoring	Parameter with Results				
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³
32.	18-07-2024	55.85	21.52	12.96	15.19	--
33.	22-07-2024	49.72	19.15	11.64	13.29	--
34.	25-07-2024	45.23	16.74	10.21	13.45	--
35.	29-07-2024	51.42	18.31	9.28	11.63	--
36.	01-08-2024	52.37	17.72	10.65	13.28	--
37.	05-08-2024	48.94	16.98	10.11	13.92	--
38.	08-08-2024	55.13	18.42	11.24	14.75	--
39.	12-08-2024	53.49	17.36	10.62	13.46	--
40.	15-08-2024	57.82	19.06	12.11	15.34	--
41.	19-08-2024	54.59	17.71	11.31	13.64	--
42.	22-08-2024	56.1	18.17	11.85	14.42	--
43.	26-08-2024	52.25	16.91	10.73	13.65	--
44.	29-08-2024	54.81	17.42	11.26	13.41	--
45.	02-09-2024	50.93	15.86	11.12	14.07	--
46.	05-09-2024	53.27	16.42	11.48	14.65	--
47.	09-09-2024	55.36	16.83	12.24	15.41	--

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Name of Location		Adani Guest House				
Sr. No.	Date of Monitoring	Parameter with Results				
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³
48.	12-09-2024	58.91	17.48	12.52	15.29	--
49.	16-09-2024	55.71	15.47	11.79	14.36	--
50.	19-09-2024	57.28	16.63	12.18	15.36	--
51.	23-09-2024	59.13	18.15	12.86	15.17	--
52.	26-09-2024	53.28	15.93	11.16	14.38	--
53.	30-09-2024	56.16	16.42	11.53	14.31	--
Permissible Value as per NAAQMS		100.0	60.0	80.0	80.0	2.0
Test Method		IS - 5182, Part- 23	UERL/AIR/ SOP/11	IS - 5182, Part - 2	IS - 5182, Part - 6	IS - 5182, Part - 10



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Ambient Air Quality Monitoring

Name of Location		CT-4 RMU-2						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
1.	01-04-2024	85.13	30.82	27.35	30.15	0.81	--	NOT DETECTED
2.	04-04-2024	82.39	29.25	25.72	29.13	0.78	4.74	NOT DETECTED
3.	08-04-2024	80.18	27.31	24.86	27.35	0.73	4.61	NOT DETECTED
4.	11-04-2024	77.49	29.16	23.12	26.83	0.75	4.53	NOT DETECTED
5.	15-04-2024	81.93	28.38	24.64	28.02	0.86	4.86	NOT DETECTED
6.	18-04-2024	84.13	29.48	25.81	28.37	0.80	4.93	NOT DETECTED
7.	22-04-2024	87.39	32.15	27.68	30.64	0.85	4.75	NOT DETECTED
8.	25-04-2024	83.57	30.57	24.82	27.91	0.78	4.67	NOT DETECTED
9.	29-04-2024	86.12	32.81	27.14	31.25	0.83	4.81	NOT DETECTED
10.	02-05-2024	83.74	29.83	25.24	29.15	0.79	4.75	NOT DETECTED
11.	06-05-2024	85.19	32.53	27.81	31.11	0.85	4.88	NOT DETECTED
12.	09-05-2024	82.37	30.88	25.37	29.42	0.75	4.81	NOT DETECTED
13.	13-05-2024	79.36	28.64	24.93	28.64	0.73	4.73	NOT DETECTED
14.	16-05-2024	82.38	31.27	26.45	29.71	0.83	4.61	NOT DETECTED
15.	20-05-2024	80.91	30.15	25.19	29.37	0.79	4.70	NOT DETECTED

Continue...

Name of Location		CT-4 RMU-2						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
16.	23-05-2024	77.37	28.53	23.75	26.89	0.75	4.63	NOT DETECTED
17.	27-05-2024	79.52	29.75	25.29	28.74	0.81	4.68	NOT DETECTED
18.	30-05-2024	81.27	31.43	28.31	31.74	0.84	4.61	NOT DETECTED
19.	03-06-2024	81.84	30.14	24.26	28.74	0.80	4.67	NOT DETECTED
20.	06-06-2024	78.63	28.58	22.19	26.54	0.77	4.58	NOT DETECTED
21.	10-06-2024	80.27	29.18	22.97	27.15	0.72	4.63	NOT DETECTED
22.	13-06-2024	82.36	30.47	23.65	27.14	0.81	4.75	NOT DETECTED
23.	17-06-2024	76.21	27.63	22.1	26.74	0.70	4.67	NOT DETECTED
24.	20-06-2024	74.39	26.84	21.62	25.36	0.68	4.52	NOT DETECTED
25.	24-06-2024	60.67	23.71	18.64	22.37	0.24	3.65	NOT DETECTED
26.	27-06-2024	56.52	20.85	16.39	19.96	0.16	3.32	NOT DETECTED
27.	01-07-2024	58.28	22.31	17.53	20.47	0.38	--	NOT DETECTED
28.	04-07-2024	55.91	21.85	16.48	18.95	0.45	3.64	NOT DETECTED
29.	08-07-2024	61.38	24.62	18.25	22.17	0.49	3.78	NOT DETECTED
30.	11-07-2024	66.38	26.82	19.69	23.53	0.54	3.83	NOT DETECTED
31.	15-07-2024	63.73	25.21	18.14	22.16	0.46	3.71	NOT DETECTED

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Name of Location		CT-4 RMU-2						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
32.	18-07-2024	70.16	27.13	21.36	24.64	0.52	3.77	NOT DETECTED
33.	22-07-2024	67.52	24.31	18.77	21.38	0.47	3.63	NOT DETECTED
34.	25-07-2024	63.1	21.96	16.35	19.13	0.41	3.69	NOT DETECTED
35.	29-07-2024	59.47	20.58	15.19	18.57	0.36	3.59	NOT DETECTED
36.	01-08-2024	61.42	21.86	16.58	20.81	0.52	3.61	NOT DETECTED
37.	05-08-2024	59.47	21.28	15.87	19.38	0.51	3.56	NOT DETECTED
38.	08-08-2024	63.71	22.64	16.95	20.15	0.55	3.68	NOT DETECTED
39.	12-08-2024	67.39	24.47	17.12	21.63	0.51	3.73	NOT DETECTED
40.	15-08-2024	65.28	23.19	16.56	20.06	0.56	3.70	NOT DETECTED
41.	19-08-2024	69.63	25.38	18.19	22.31	0.58	3.76	NOT DETECTED
42.	22-08-2024	63.29	24.37	17.42	21.35	0.57	3.73	NOT DETECTED
43.	26-08-2024	62.11	23.42	16.36	20.81	0.52	3.67	NOT DETECTED
44.	29-08-2024	65.38	24.88	17.15	21.37	0.58	3.71	NOT DETECTED
45.	02-09-2024	64.19	22.47	16.93	21.16	0.55	3.65	NOT DETECTED
46.	05-09-2024	67.28	23.81	17.24	21.72	0.58	3.72	NOT DETECTED
47.	09-09-2024	65.38	22.74	16.69	20.48	0.54	3.62	NOT DETECTED

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Name of Location		CT-4 RMU-2						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
48.	12-09-2024	63.29	22.53	16.24	21.15	0.50	3.66	NOT DETECTED
49.	16-09-2024	67.63	23.96	17.48	21.95	0.57	3.69	NOT DETECTED
50.	19-09-2024	70.16	25.91	18.37	22.28	0.60	3.74	NOT DETECTED
51.	23-09-2024	68.47	24.63	17.86	21.42	0.57	3.71	NOT DETECTED
52.	26-09-2024	65.28	22.85	16.43	20.57	0.53	3.63	NOT DETECTED
53.	30-09-2024	67.83	23.47	17.12	21.63	0.56	3.59	NOT DETECTED
Permissible Value as per NAAQMS		100.0	60.0	80.0	80.0	2.0	---	5.0
Test Method		IS - 5182, Part- 23	UERL/AIR/ SOP/11	IS - 5182, Part - 2	IS - 5182, Part - 6	IS - 5182, Part - 10	Gas analyzer	IS – 5182, Part – 11



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Noise Level Monitoring

Location Name		West Port – West Basin Main Gate					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		18-04-2024	20-05-2024	20-06-2024	18-07-2024	19-08-2024	19-09-2024
1	06:00 to 07:00	64.3	64.1	64.3	62.5	62.4	61.7
2	07:00 to 08:00	64.5	66.4	64.7	64.1	63.5	63.3
3	08:00 to 09:00	65.2	64.8	66.7	63.7	65.7	65.2
4	09:00 to 10:00	66.9	65.7	63.8	65.4	66.5	66.8
5	10:00 to 11:00	67.8	66.3	67.5	64.8	65.8	65.4
6	11:00 to 12:00	67.3	65.4	64.8	67.2	65.3	64.8
7	12:00 to 13:00	65.7	64.7	67.3	65.8	67.2	66.1
8	13:00 to 14:00	68.3	65.7	66.2	67.6	66.5	64.3
9	14:00 to 15:00	66.5	65.4	64.8	65.9	64.6	65.7
10	15:00 to 16:00	64.7	66.7	66.7	65.3	67.6	66.3
11	16:00 to 17:00	65.3	67.1	67.2	66.8	65.4	67.5
12	17:00 to 18:00	64.7	66.3	65.4	63.4	64.1	65.7
13	18:00 to 19:00	66.1	65.4	64.9	63.8	64.6	65.2
14	19:00 to 20:00	65.7	65.7	64.4	65.7	65.4	64.5
15	20:00 to 21:00	64.5	64.9	65.6	64.2	63.8	64.1
16	21:00 to 22:00	62.9	63.7	63.2	62.6	61.5	62.3
Day Time		<75 dB (A)					

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Location Name		West Port – West Basin Main Gate					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) – Night Time					
		18-04-2024	20-05-2024	20-06-2024	18-07-2024	19-08-2024	19-09-2024
1	22:00 to 23:00	63.1	63.5	62.8	61.3	62.5	61.4
2	23:00 to 24:00	63.8	62.4	61.4	60.6	61.3	62.3
3	24:00 to 01:00	62.6	64.7	62.2	63.5	63.7	62.5
4	01:00 to 02:00	61.7	63.6	61.8	62.8	63.4	61.8
5	02:00 to 03:00	62.4	61.9	62.5	61.4	62.5	60.9
6	03:00 to 04:00	60.8	62.5	62.1	62.3	61.3	62.4
7	04:00 to 05:00	61.2	60.4	60.8	61.2	59.7	60.3
8	05:00 to 06:00	58.5	59.7	60.2	59.9	60.4	59.6
Night Time		<70 dB (A)					

Test Method	IS: 9989 : 1981
--------------------	------------------------



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Noise Level Monitoring

Location Name		West Port – Horti Culture					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		22-04-2024	23-05-2024	24-06-2024	22-07-2024	22-08-2024	23-09-2024
1	06:00 to 07:00	64.8	63.8	63.2	63.8	63.2	63.5
2	07:00 to 08:00	67.1	65.7	66.2	63.5	65.2	64.7
3	08:00 to 09:00	64.8	66.4	64.3	65.2	64.8	64.9
4	09:00 to 10:00	67.1	68.4	65.8	64.1	65.7	64.3
5	10:00 to 11:00	65.2	65.7	66.4	67.5	66.3	65.7
6	11:00 to 12:00	65.6	66.2	68.2	66.8	65.8	65.4
7	12:00 to 13:00	68.7	67.4	65.4	64.7	66.8	67.5
8	13:00 to 14:00	66.5	65.4	64.3	63.9	64.7	65.7
9	14:00 to 15:00	68.2	67.2	68.3	64.7	66.2	66.8
10	15:00 to 16:00	67.3	65.6	66.8	64.1	65.8	64.3
11	16:00 to 17:00	64.7	66.3	65.2	62.6	64.6	64.2
12	17:00 to 18:00	66.4	65.8	64.8	65.7	63.5	64.6
13	18:00 to 19:00	64.9	63.7	65.1	65.1	65.5	64
14	19:00 to 20:00	67.5	64.5	63.2	64.3	63.1	63.4
15	20:00 to 21:00	65.7	65.2	64.8	63.6	64.6	62.1
16	21:00 to 22:00	64.5	62.9	61.8	60.3	62.1	61.9
Day Time		<75 dB (A)					

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Location Name		West Port – Horti Culture					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Night Time					
		22-04-2024	23-05-2024	24-06-2024	22-07-2024	22-08-2024	23-09-2024
1	22:00 to 23:00	57.8	58.2	58.5	58.2	58.6	59.1
2	23:00 to 24:00	60.4	59.6	58.8	59.3	60.5	59.5
3	24:00 to 01:00	61.2	61.3	60.4	61.1	63.4	60.7
4	01:00 to 02:00	63.1	62.7	62.4	60.7	61.6	63.7
5	02:00 to 03:00	61.7	60.4	61.8	62.1	62.9	61.4
6	03:00 to 04:00	59.4	61.6	60.4	59.8	60.3	59.8
7	04:00 to 05:00	60.6	62.3	61.3	60.2	58.6	59.5
8	05:00 to 06:00	59.3	61.3	59.5	58.2	57.5	58.3
Night Time		<70 dB (A)					

Test Method	IS: 9989 : 1981
--------------------	------------------------



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Noise Level Monitoring

Location Name		WEST PORT - PMC OFFICE					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		25-04-2024	27-05-2024	27-06-2024	25-07-2024	26-08-2024	26-09-2024
1	06:00 to 07:00	61.2	61.6	60.9	58.6	57.8	58.2
2	07:00 to 08:00	63.8	64.2	61.8	60.4	59.4	58.8
3	08:00 to 09:00	63.4	65.3	63.2	61.8	60.7	59.6
4	09:00 to 10:00	65.7	66.8	62.5	66.4	62.4	61.7
5	10:00 to 11:00	64.6	64.7	64.3	65.2	64.3	63.2
6	11:00 to 12:00	66.1	65.7	65.8	63.5	63.6	64.7
7	12:00 to 13:00	65.9	66.9	64.3	66.3	65.2	63.8
8	13:00 to 14:00	68.1	65.4	66.3	65.7	63.4	66.1
9	14:00 to 15:00	66.8	63.9	64.7	63.4	64.4	65.3
10	15:00 to 16:00	65.1	66.7	64.3	65.2	63.9	63.7
11	16:00 to 17:00	62.3	64.5	62.8	63.4	65.4	65.1
12	17:00 to 18:00	64.8	64.8	65.2	63.5	64.2	65.4
13	18:00 to 19:00	63.8	62.9	63.4	64.3	63.2	63.8
14	19:00 to 20:00	61.9	63.4	61.9	62.4	60.7	61.3
15	20:00 to 21:00	63.4	62.8	62.4	60.5	62.4	63.7
16	21:00 to 22:00	61.3	61.6	60.3	58.5	59.4	60.2
Day Time		<75 dB (A)					

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Location Name		WEST PORT - PMC OFFICE					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Night Time					
		25-04-2024	27-05-2024	27-06-2024	25-07-2024	26-08-2024	26-09-2024
1	22:00 to 23:00	60.8	61.7	60.3	61.5	61.2	60.8
2	23:00 to 24:00	62.7	63.1	61.8	61.8	62.4	62.2
3	24:00 to 01:00	62.9	62.5	63.8	62.4	62.1	63.4
4	01:00 to 02:00	64.5	64.1	63.4	62.9	63.8	62.5
5	02:00 to 03:00	63.2	62.8	62.5	63.2	62.5	63.8
6	03:00 to 04:00	62.6	63.4	62.8	61.7	63.4	62.6
7	04:00 to 05:00	61.2	61.8	61.5	61.4	60.7	60.3
8	05:00 to 06:00	61.6	61.7	61.2	60.4	59.8	60.1
Day Time		<70 dB (A)					

Test Method	IS: 9989 : 1981
-------------	-----------------



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Noise Level Monitoring

Location Name		LPG Terminal Substation					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		15-04-2024	16-05-2024	17-06-2024	15-07-2024	15-08-2024	16-09-2024
1	06:00 to 07:00	60.1	61.4	63.5	64.1	63.8	63.4
2	07:00 to 08:00	61.8	63.2	61.8	65.7	64.7	64.1
3	08:00 to 09:00	63.5	65.1	63.4	64.3	64.3	64.8
4	09:00 to 10:00	63.6	66.4	65.4	66.8	67.7	65.4
5	10:00 to 11:00	64.8	65.8	64.8	67.3	66.4	67.2
6	11:00 to 12:00	66.6	67.2	66.3	65.2	66.8	67.1
7	12:00 to 13:00	65.4	66.3	64.2	67.4	65.5	65.2
8	13:00 to 14:00	64.1	64.1	65.8	65.8	64.8	65.8
9	14:00 to 15:00	64.9	64.8	68.2	67.1	65.7	64.3
10	15:00 to 16:00	66.3	65.3	67.3	64.3	65.2	64.7
11	16:00 to 17:00	65.8	65.7	64.3	65.8	64.8	65.2
12	17:00 to 18:00	66.3	64.2	66.1	65.2	65.7	64.5
13	18:00 to 19:00	64.8	63.9	65.4	64.1	65.2	64.1
14	19:00 to 20:00	64.5	62.7	63.9	66.4	64.7	62.9
15	20:00 to 21:00	63.3	63.6	63.5	65.2	64.2	63.6
16	21:00 to 22:00	61.7	62.4	61.7	63.8	63.7	63.1
Day Time		<75 dB (A)					

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Location Name		LPG Terminal Substation					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) – Night Time					
		15-04-2024	16-05-2024	17-06-2024	15-07-2024	15-08-2024	16-09-2024
1	22:00 to 23:00	60.5	59.8	59.2	58.5	59.3	58.8
2	23:00 to 24:00	62.3	60.8	59.5	58.8	59.6	60.4
3	24:00 to 01:00	61.7	62.4	60.4	61.2	60.5	60.8
4	01:00 to 02:00	61.9	64.1	62.7	61.6	63.1	63.4
5	02:00 to 03:00	63.4	63.4	63.2	62.5	61.7	62.3
6	03:00 to 04:00	62.7	63.9	61.8	60.4	59.8	60.7
7	04:00 to 05:00	62.9	61.7	61.1	59.6	60.3	58.4
8	05:00 to 06:00	61.8	60.4	59.7	58.7	58.3	57.8
Night Time		<70 dB (A)					

Test Method	IS: 9989 : 1981
--------------------	------------------------



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Noise Level Monitoring

Location Name		Adani Guest House					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		17-04-2024	22-05-2024	18-06-2024	20-07-2024	17-08-2024	17-09-2024
1	06:00 to 07:00	57.6	58.7	58.9	57.6	58.2	59.4
2	07:00 to 08:00	59.4	60.3	61.3	59.7	60.3	61.5
3	08:00 to 09:00	60.3	59.8	60.3	61.4	60.9	63.4
4	09:00 to 10:00	64.6	62.4	63.2	60.8	62.4	64.7
5	10:00 to 11:00	66.4	65.4	64.6	62.2	63.6	64.2
6	11:00 to 12:00	65.7	66.8	65.2	64.6	63.1	65.7
7	12:00 to 13:00	64.2	65.3	64.3	65.3	64.5	67.1
8	13:00 to 14:00	65.2	64.2	65.8	64.9	65.4	66.4
9	14:00 to 15:00	66.6	65.4	64.3	63.6	66.7	65.6
10	15:00 to 16:00	63.2	64.6	65.8	65.6	65.4	64.8
11	16:00 to 17:00	65.6	65.1	64.2	63.8	64.5	65.7
12	17:00 to 18:00	64.3	63.8	62.9	63.5	64.3	65.1
13	18:00 to 19:00	65.5	63.4	62.5	64.1	65.2	64.3
14	19:00 to 20:00	64.4	65.1	64.3	66.2	65.6	64.7
15	20:00 to 21:00	63.1	62.8	63.8	63.5	62.5	62.3
16	21:00 to 22:00	60.1	60.3	59.8	60.3	61.5	60.7
Day Time		<75 dB (A)					

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Location Name		Adani Guest House					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) – Night Time					
		17-04-2024	22-05-2024	18-06-2024	20-07-2024	17-08-2024	17-09-2024
1	22:00 to 23:00	60.5	60.6	59.9	58.4	57.9	58.1
2	23:00 to 24:00	62.4	61.7	60.4	59.4	59.1	58.8
3	24:00 to 01:00	61.4	63.3	62.4	61.8	59.6	60.4
4	01:00 to 02:00	63.8	62.8	63.1	63.5	60.5	62.6
5	02:00 to 03:00	62.3	62.4	61.4	62.3	61.9	62.4
6	03:00 to 04:00	60.1	61.8	60.8	61.7	62.2	61.3
7	04:00 to 05:00	61.3	60.2	58.7	59.3	60.3	59.7
8	05:00 to 06:00	61.4	59.8	58.3	59.5	59.3	57.6
Night Time		<70 dB (A)					

Test Method	IS: 9989 : 1981
-------------	-----------------



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Noise Level Monitoring

Location Name		CT-4 RMU-2					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		20-04-2024	25-05-2024	22-06-2024	27-07-2024	24-08-2024	21-09-2024
1	06:00 to 07:00	61.3	61.6	61.4	59.8	61.3	60.8
2	07:00 to 08:00	63.6	62.8	63.5	61.3	63.7	63.2
3	08:00 to 09:00	64.8	65.2	63.7	65.5	62.8	65.7
4	09:00 to 10:00	65.2	65.7	64.1	64.2	64.5	65.2
5	10:00 to 11:00	68.7	66.8	65.4	66.1	65.7	66.5
6	11:00 to 12:00	66.1	68.2	66.5	64.7	64.3	64.3
7	12:00 to 13:00	66.7	66.4	65.8	64.9	67.5	66.4
8	13:00 to 14:00	64.7	65.9	64.7	63.6	65.8	65.2
9	14:00 to 15:00	68.9	67.3	65.3	64.2	65.2	66.1
10	15:00 to 16:00	65.4	68.3	67.4	66.8	66.7	67.4
11	16:00 to 17:00	67.3	66.4	65.9	64.7	63.8	64.4
12	17:00 to 18:00	65.4	65.9	66.3	65.3	64.5	63.9
13	18:00 to 19:00	63.6	64.2	63.8	63.9	63.5	65.5
14	19:00 to 20:00	62.7	63.5	65.2	60.8	61.3	62.3
15	20:00 to 21:00	65.4	64.3	64.2	62.4	61.5	64.7
16	21:00 to 22:00	63.4	62.8	62.3	61.6	60.8	69.6
Day Time		<75 dB (A)					

Continue...

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Location Name		CT-4 RMU-2					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) – Night Time					
		20-04-2024	25-05-2024	22-06-2024	27-07-2024	24-08-2024	21-09-2024
1	22:00 to 23:00	62.2	61.8	61.3	61.5	60.2	61.3
2	23:00 to 24:00	61.7	63.4	62.7	63.7	61.8	60.6
3	24:00 to 01:00	63.2	64.8	61.3	62.6	62.5	61.6
4	01:00 to 02:00	61.7	63.7	62.8	63.8	62.8	61.8
5	02:00 to 03:00	63.5	63.1	62.7	61.5	63.2	60.6
6	03:00 to 04:00	61.2	62.3	61.6	62.3	61.8	62.7
7	04:00 to 05:00	62.4	61.8	60.4	61.1	59.8	61.4
8	05:00 to 06:00	60.8	61.3	60.8	60.3	60.5	60.8
Night Time		<70 dB (A)					

Test Method	IS: 9989 : 1981
--------------------	------------------------



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Results of Stack Monitoring

Sr. No.	Parameter	Unit	Aug – 2024		GPCB LIMIT	Method of Test
			D.G.Set No. S-1 (1500 KVA)	D.G.Set No. S-2 (1500 KVA)		
			14-08-2024	14-08-2024		
1	Particulate Matter	mg/Nm ³	19.73	20.17	150	IS 11255 (Part - 1)
2	Sulfur Dioxide as SO ₂	ppm	16.24	15.37	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO _x	ppm	22.1	21.52	50	IS 11255 (Part - 7)



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Sr. No.	Parameter	Unit	Sep-24	GPCB LIMIT	Method of Test
			D.G. Set-1 (2000 KVA)		
			26-09-2024		
1	Particulate Matter	mg/Nm ³	28.19	150	IS 11255 (Part - 1)
2	Sulphur Dioxide	ppm	11.82	100	IS 11255 (Part - 2)
3	Oxide of Nitrogen	ppm	24.1	50	IS 11255 (Part - 7)
4	Carbon Monoxide	mg/Nm ³	4.6	--	UERL/AIR/SOP/18
5	Non Methyl Hydro Carbon	ppm	Not Detected	--	UERL/AIR/SOP/27



Nikunj D. Patel
(Chemist)




Jaivik S. Tandel
(Manager - Operations)

Minimum Detection Limit

Ambient Air Quality Monitoring

Sr. No.	Test Parameter	Unit	MDL
1	Particulate Matter (PM10)	µg/m ³	5 µg/m ³
2	Particulate Matter (PM10)	µg/m ³	5 µg/m ³
3	Sulphur Dioxide (SO ₂)	µg/m ³	4 µg/m ³
4	Nitrogen Dioxide (NO ₂)	µg/m ³	5 µg/m ³
5	Carbon Monoxide (CO)	mg/m ³	0.01 mg/m ³
6	Ammonia (NH ₃)	µg/m ³	5 µg/m ³
7	Ozone (O ₃)	µg/m ³	5 µg/m ³
8	Lead (Pb)	µg/m ³	0.5 µg/m ³
9	Nickle (Ni)	ng/m ³	1 ng/m ³
10	Arsenic (As)	ng/m ³	1 ng/m ³
11	Benzene	µg/m ³	1µg/m ³
12	Benzo(o)Pyrene	ng/m ³	0.1 ng/m ³
14	Hydro Carbon	µg/m ³	1 µg/m ³

Stack Emission Monitoring

Sr. No.	Test Parameter	Unit	MDL
1	Suspended particulate matter	mg/Nm ³	2 mg/Nm ³
2	Sulphur Dioxide SO ₂	mg/Nm ³	4 mg/Nm ³
3	Oxides of Nitrogen NO _x	mg/Nm ³	5 mg/Nm ³

STP Outlet			
Sr. No.	Test Parameter	Unit	MDL
1	pH @ 25 ° C	--	2
2	Total Suspended Solids	mg/L	4
3	Biochemical Oxygen Demand (BOD) (5 days at 20 ° C)	mg/L	1
4	Residual chlorine	mg/L	0.1
5	Fecal Coliform	MPN/100	<2

ETP Outlet			
Sr. No.	Test Parameter	Unit	MDL
1	Colour	Pt. Co. Scale	5
2	pH @ 27 ° C	--	2
3	Temperature	0c	5
4	Total Suspended Solids	mg/L	4
5	Total Dissolved Solids	mg/L	4
6	COD	mg/L	2
7	BOD (3 days at 27 °C)	mg/L	1
8	Chloride (as Cl) -	mg/L	1
9	Oil & Grease	mg/L	2
10	Sulphate (as SO ₄)	mg/L	1
11	Ammonical Nitrogen	mg/L	2

QCI-NABET Accredited EIA Consultant Organization		GPCB Recognized Environmental Auditor (Schedule-11)		ISO 9001 : 2015 Certified Company		ISO 45001 : 2018 Certified Company	
12	Phenolic Compound			mg/L		0.1	
13	Copper as Cu			mg/L		0.05	
14	Lead as Pb			mg/L		0.01	
15	Sulphide as S			mg/L		0.05	
16	Cadmium as Cd			mg/L		0.003	
17	Fluoride as F			mg/L		0.2	
18	Residual Chlorine			mg/L		0.1	
19	Percent Sodium			%		--	
20	Sodium Absorption ratio			--		--	

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client

M/s. Adani Power Limited, Mundra

Village: Tunda & Siracha,

Tal. Mundra, Dist.: Kutch.

GUJARAT – 370 435.

Month of Monitoring

: April - 2024

Name of Location

: Village - Siracha

ID No.

: URA/ID/A-24/04/001

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	02/04/2024	55.2	21.4	15.5	20.6		--
2.	05/04/2024	55.5	27.2	14.2	18.3		--
3.	09/04/2024	54.9	26.8	12.7	16.1	17.4	BDL
4.	12/04/2024	58.0	25.8	17.3	23.8		--
5.	16/04/2024	52.7	20.5	15.1	21.5		--
6.	19/04/2024	70.6	30.7	18.6	24.2		--
7.	23/04/2024	59.9	27.4	13.6	18.9		--
8.	30/04/2024	49.4	18.5	16.5	22.4		--
Average		57.0	24.8	15.4	20.7		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM – IS: 5182 (Part 4), 1999, PM₁₀ – IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ – IS: 5182 (Part 2), 2001, NO_x – IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment & Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : April - 2024

Name of Location : Village – Kandagara

ID No. : URA/ID/A-24/04/002

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	02/04/2024	64.6	26.2	13.7	17.5		--
2.	05/04/2024	70.1	22.1	11.4	15.2		--
3.	09/04/2024	54.9	19.7	16.7	22.9	22.1	BDL
4.	12/04/2024	64.2	17.1	18.3	25.7		--
5.	16/04/2024	42.6	25.2	15.3	21.4		--
6.	19/04/2024	63.2	24.4	13.5	20.1		--
7.	23/04/2024	50.5	19.5	19.4	26.8		--
8.	30/04/2024	61.6	21.7	17.3	23.7		--
Average		59.0	22.0	15.7	21.7		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, PM₁₀– IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂– IS: 5182 (Part 2), 2001, NO_x– IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : April - 2024

Name of Location : Village - Wandh

ID No. : URA/ID/A-24/04/003

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	02/04/2024	58.1	26.1	16.8	22.3		--
2.	05/04/2024	64.8	31.2	14.6	19.4		--
3.	09/04/2024	64.0	30.5	18.0	22.4	26.1	BDL
4.	12/04/2024	67.4	27.2	17.3	23.1		--
5.	16/04/2024	51.2	28.7	15.7	21.3		--
6.	19/04/2024	63.2	29.4	13.5	17.3		--
7.	23/04/2024	66.1	31.9	19.1	25.7		--
8.	30/04/2024	75.2	29.4	18.4	24.8		--
Average		63.7	29.3	16.7	22.0		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : April - 2024

Name of Location : Nr.20 MLD Plant

ID No. : URA/ID/A-24/04/004

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1	18/04/2024	70.2	32.4	19.5	24.2	32.6	BDL
Average		70.2	32.4	19.5	24.2	32.6	BDL

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment & Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : April - 2024

Name of Location : Nr. Shantiniketan - 1

ID No. : URA/ID/A-24/04/005

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1	18/04/2024	64.3	26.7	15.6	19.7	29.6	BDL
Average		64.3	26.7	15.6	19.7	29.6	BDL

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client

M/s. Adani Power Limited, Mundra

Village: Tunda & Siracha,

Tal. Mundra, Dist.: Kutch.

GUJARAT – 370 435.

Month of Monitoring

: May - 2024

Name of Location

: Village - Siracha

ID No.

: URA/ID/A-24/05/001

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	03/05/2024	56.9	28.3	14.3	19.8		--
2.	07/05/2024	53.1	17.7	16.2	21.6	17.6	BDL
3.	10/05/2024	65.1	24.1	18.2	25.3		--
4.	14/05/2024	58.3	26.7	15.9	22.6		--
5.	17/05/2024	51.5	16.1	14.5	19.2		--
6.	21/05/2024	60.9	24.0	17.3	23.5		--
7.	24/05/2024	68.4	31.9	13.7	17.2		--
8.	28/05/2024	56.8	28.0	19.5	26.8		--
9.	31/05/2024	50.1	31.6	16.5	24.1		--
Average		57.9	25.4	16.2	22.2		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM – IS: 5182 (Part 4), 1999, PM₁₀ – IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ – IS: 5182 (Part 2), 2001, NO_x – IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : May - 2024

Name of Location : Village – Kandagara

ID No. : URA/ID/A-24/05/002

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	03/05/2024	68.5	34.4	16.1	22.6		--
2.	07/05/2024	50.0	29.6	14.4	18.3	22.6	BDL
3.	10/05/2024	66.7	32.4	12.1	16.5		--
4.	14/05/2024	52.9	29.8	17.4	23.8		--
5.	17/05/2024	70.8	38.2	20.6	28.1		--
6.	21/05/2024	55.0	33.5	18.2	24.9		--
7.	24/05/2024	53.6	27.8	14.3	21.1		--
8.	28/05/2024	50.2	25.0	19.2	26.5		--
9.	31/05/2024	67.7	33.0	17.5	24.3		--
Average		59.5	31.5	16.6	22.9		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, PM₁₀– IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂– IS: 5182 (Part 2), 2001, NO_x– IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : May - 2024

Name of Location : Village - Wandh

ID No. : URA/ID/A-24/05/003

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	03/05/2024	53.9	23.7	14.3	18.9		--
2.	07/05/2024	56.0	31.5	18.2	24.3	28.9	BDL
3.	10/05/2024	54.8	30.4	17.6	23.6		--
4.	14/05/2024	70.4	30.3	19.3	26.3		--
5.	17/05/2024	73.2	37.5	15.5	21.1		--
6.	21/05/2024	63.7	23.4	13.8	18.5		--
7.	24/05/2024	52.4	28.4	18.9	23.6		--
8.	28/05/2024	73.8	31.9	20.1	27.3		--
9.	31/05/2024	62.3	27.8	16.5	22.4		--
Average		62.3	29.4	17.1	22.9		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client

M/s. Adani Power Limited, Mundra

Village: Tunda & Siracha,

: Tal. Mundra, Dist.: Kutch.

GUJARAT – 370 435.

Month of Monitoring

: June - 2024

Name of Location

: Village - Siracha

ID No.

: URA/ID/A-24/06/001

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	04/06/2024	61.7	29.4	13.2	18.5		--
2.	07/06/2024	60.9	28.1	17.9	24.2		--
3.	11/06/2024	53.4	27.3	15.8	21.1		--
4.	14/06/2024	59.4	28.2	16.3	23.7		--
5.	18/06/2024	45.9	23.0	12.8	16.5	15.1	BDL
6.	21/06/2024	54.8	21.4	15.2	19.7		--
7.	25/06/2024	Due to Rainfall Monitoring not Performed					
8.	28/06/2024	Due to Rainfall Monitoring not Performed					
Average		56.0	26.2	15.2	20.6		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM – IS: 5182 (Part 4), 1999, PM₁₀ – IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ – IS: 5182 (Part 2), 2001, NO_x – IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment & Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : June - 2024

Name of Location : Village – Kandagara

ID No. : URA/ID/A-24/06/002

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	04/06/2024	50.6	22.0	16.5	21.8		--
2.	07/06/2024	60.5	26.5	15.6	17.2		--
3.	11/06/2024	71.5	31.5	18.9	26.3		--
4.	14/06/2024	54.2	22.1	16.4	22.5		--
5.	18/06/2024	48.8	25.5	15.9	20.7	20.6	BDL
6.	21/06/2024	56.9	24.7	14.7	16.5		--
7.	25/06/2024	Due to Rainfall Monitoring not Performed					
8.	28/06/2024	Due to Rainfall Monitoring not Performed					
Average		57.1	25.4	16.3	20.8		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, PM₁₀– IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂– IS: 5182 (Part 2), 2001, NO_x– IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : June - 2024

Name of Location : Village - Wandh

ID No. : URA/ID/A-24/06/003

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	04/06/2024	62.5	27.0	17.9	20.4		--
2.	07/06/2024	54.1	28.8	19.5	23.6		--
3.	11/06/2024	54.9	32.0	16.2	19.7		--
4.	14/06/2024	68.5	35.5	17.2	22.9		--
5.	18/06/2024	52.5	23.6	12.7	16.7	21.3	BDL
6.	21/06/2024	62.0	26.9	15.8	21.3		--
7.	25/06/2024	Due to Rainfall Monitoring not Performed					
8.	28/06/2024	Due to Rainfall Monitoring not Performed					
Average		59.1	29.0	16.6	20.8		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment & Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : June - 2024

Name of Location : Nr.20 MLD Plant

ID No. : URA/ID/A-24/06/004

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1	17/06/2024	61.3	27.1	15.6	24.1	32.1	BDL
Average		61.3	27.1	15.6	24.1	32.1	BDL

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment & Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : June - 2024

Name of Location : Nr. Shantiniketan - 1

ID No. : URA/ID/A-24/06/005

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1	17/06/2024	55.7	22.6	13.8	19.4	26.7	BDL
Average		55.7	22.6	13.8	19.4	26.7	BDL

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client

M/s. Adani Power Limited, Mundra

Village: Tunda & Siracha,

Tal. Mundra, Dist.: Kutch.

GUJARAT – 370 435.

Month of Monitoring

: July - 2024

Name of Location

: Village - Siracha

ID No.

: URA/ID/A-24/07/001

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	02/07/2024	Due to Rainfall Monitoring not Performed					
2.	05/07/2024	55.7	24.4	14.3	19.4	12.3	BDL
3.	09/07/2024	Due to Rainfall Monitoring not Performed					
4.	12/07/2024	50.1	16.4	12.7	15.9		--
5.	16/07/2024	Due to Rainfall Monitoring not Performed					
6.	19/07/2024	Due to Rainfall Monitoring not Performed					
7.	23/07/2024	Due to Rainfall Monitoring not Performed					
8.	26/07/2024	Due to Rainfall Monitoring not Performed					
9.	30/07/2024	Due to Rainfall Monitoring not Performed					
Average		52.9	20.4	13.5	17.7		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM – IS: 5182 (Part 4), 1999, PM₁₀ – IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ – IS: 5182 (Part 2), 2001, NO_x – IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : July - 2024

Name of Location : Village – Kandagara

ID No. : URA/ID/A-24/07/002

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	02/07/2024	Due to Rainfall Monitoring not Performed					
2.	05/07/2024	53.3	26.7	13.7	18.1	18.5	BDL
3.	09/07/2024	Due to Rainfall Monitoring not Performed					
4.	12/07/2024	55.4	20.8	15.0	17.5		--
5.	16/07/2024	Due to Rainfall Monitoring not Performed					
6.	19/07/2024	Due to Rainfall Monitoring not Performed					
7.	23/07/2024	Due to Rainfall Monitoring not Performed					
8.	26/07/2024	Due to Rainfall Monitoring not Performed					
9.	30/07/2024	Due to Rainfall Monitoring not Performed					
Average		54.3	23.8	14.4	17.8		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, PM₁₀– IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂– IS: 5182 (Part 2), 2001, NO_x– IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : July - 2024

Name of Location : Village - Wandh

ID No. : URA/ID/A-24/07/003

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	02/07/2024	Due to Rainfall Monitoring not Performed					
2.	05/07/2024	60.7	26.2	15.6	19.5	19.7	BDL
3.	09/07/2024	Due to Rainfall Monitoring not Performed					
4.	12/07/2024	51.0	25.4	14.0	17.3		--
5.	16/07/2024	Due to Rainfall Monitoring not Performed					
6.	19/07/2024	Due to Rainfall Monitoring not Performed					
7.	23/07/2024	Due to Rainfall Monitoring not Performed					
8.	26/07/2024	Due to Rainfall Monitoring not Performed					
9.	30/07/2024	Due to Rainfall Monitoring not Performed					
Average		55.9	25.8	14.8	18.4		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : July - 2024

Name of Location : Nr.20 MLD Plant

ID No. : URA/ID/A-24/07/004

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1	15/07/2024	58.2	25.2	15.6	22.1	28.9	BDL
Average		58.2	25.2	15.6	22.1	28.9	BDL

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment & Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : July - 2024

Name of Location : Nr. Shantiniketan - 1

ID No. : URA/ID/A-24/07/005

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1	15/07/2024	49.8	18.9	13.8	18.5	24.3	BDL
Average		49.8	18.9	13.8	18.5	24.3	BDL

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client

M/s. Adani Power Limited, Mundra

Village: Tunda & Siracha,

: Tal. Mundra, Dist.: Kutch.

GUJARAT – 370 435.

Month of Monitoring

: August - 2024

Name of Location

: Village - Siracha

ID No.

: URA/ID/A-24/08/001

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	02/08/2024	Due to Rainfall Monitoring not Performed					
2.	06/08/2024	50.9	25.5	12.1	18.2	13.8	BDL
3.	09/08/2024	Due to Rainfall Monitoring not Performed					
4.	13/08/2024	59.1	27.3	9.2	12.4	--	--
5.	16/08/2024	Due to Rainfall Monitoring not Performed					
6.	20/08/2024	47.9	26.4	10.7	13.5	--	--
7.	23/08/2024	41.8	21.5	12.6	15.7	--	--
8.	27/08/2024	Due to Rainfall Monitoring not Performed					
9.	30/08/2024	Due to Rainfall Monitoring not Performed					
Average		49.9	25.2	11.2	15.0	--	--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM – IS: 5182 (Part 4), 1999, PM₁₀ – IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ – IS: 5182 (Part 2), 2001, NO_x – IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : August - 2024

Name of Location : Village – Kandagara

ID No. : URA/ID/A-24/08/002

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	02/08/2024	Due to Rainfall Monitoring not Performed					
2.	06/08/2024	52.4	26.0	11.6	17.0	17.2	BDL
3.	09/08/2024	Due to Rainfall Monitoring not Performed					
4.	13/08/2024	61.6	29.6	10.2	12.4	--	--
5.	16/08/2024	Due to Rainfall Monitoring not Performed					
6.	20/08/2024	54.0	22.3	13.8	15.2	--	--
7.	23/08/2024	40.5	21.4	10.3	13.8	--	--
8.	27/08/2024	Due to Rainfall Monitoring not Performed					
9.	30/08/2024	Due to Rainfall Monitoring not Performed					
Average		52.1	24.8	11.5	14.6	--	--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, PM₁₀– IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂– IS: 5182 (Part 2), 2001, NO_x– IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : August - 2024

Name of Location : Village - Wandh

ID No. : URA/ID/A-24/08/003

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	02/08/2024	Due to Rainfall Monitoring not Performed					
2.	06/08/2024	50.0	25.8	15.7	19.2	17.8	BDL
3.	09/08/2024	Due to Rainfall Monitoring not Performed					
4.	13/08/2024	67.5	29.3	11.4	17.6	--	--
5.	16/08/2024	Due to Rainfall Monitoring not Performed					
6.	20/08/2024	55.8	28.6	11.7	14.3	--	--
7.	23/08/2024	50.5	27.0	12.6	15.7	--	--
8.	27/08/2024	Due to Rainfall Monitoring not Performed					
9.	30/08/2024	Due to Rainfall Monitoring not Performed					
Average		56.0	27.7	12.9	16.7	--	--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : August - 2024

Name of Location : Nr.20 MLD Plant

ID No. : URA/ID/A-24/08/004

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1	12/08/2024	60.2	23.6	13.8	19.6	21.2	BDL
Average		60.2	23.6	13.8	19.6	21.2	BDL

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment & Research Labs Pvt. Ltd.



(Authorized Signatory)

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : August - 2024

Name of Location : Nr. Shantiniketan - 1

ID No. : URA/ID/A-24/08/005

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1	12/08/2024	47.6	20.5	10.7	17.5	20.3	BDL
Average		47.6	20.5	10.7	17.5	20.3	BDL

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client

M/s. Adani Power Limited, Mundra

Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring

: September - 2024

Name of Location

: Village - Siracha

ID No.

: URA/ID/A-24/09/001

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	03/09/2024	56.0	29.9	14.2	16.7	--	--
2.	06/09/2024	40.4	20.7	11.7	14.2	--	--
3.	10/09/2024	54.4	25.6	15.2	19.5	--	--
4.	13/09/2024	47.1	24.4	13.0	16.9	15.2	BDL
5.	17/09/2024	55.4	21.1	12.8	15.4	--	--
6.	20/09/2024	64.5	29.0	10.5	13.9	--	--
7.	24/09/2024	60.2	27.0	13.7	16.2	--	--
8.	27/09/2024	56.3	26.3	15.6	17.8	--	--
Average		54.3	25.5	13.3	16.3	--	--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM – IS: 5182 (Part 4), 1999, PM₁₀ – IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ – IS: 5182 (Part 2), 2001, NO_x – IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : September - 2024

Name of Location : Village – Kandagara

ID No. : URA/ID/A-24/09/002

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	03/09/2024	50.5	24.6	10.2	14.5	--	--
2.	06/09/2024	56.3	27.4	11.2	14.6	--	--
3.	10/09/2024	54.5	22.4	14.8	18.5	--	--
4.	13/09/2024	45.8	26.2	12.7	15.3	18.9	BDL
5.	17/09/2024	57.4	30.8	15.6	19.8	--	--
6.	20/09/2024	61.4	26.3	13.5	16.9	--	--
7.	24/09/2024	70.6	33.6	12.7	16.4	--	--
8.	27/09/2024	49.4	21.5	14.3	17.5	--	--
Average		55.7	26.6	13.1	16.7	--	--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, PM₁₀– IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂– IS: 5182 (Part 2), 2001, NO_x– IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : September - 2024

Name of Location : Village - Wandh

ID No. : URA/ID/A-24/09/003

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1.	03/09/2024	54.2	30.5	13.3	18.5	--	--
2.	06/09/2024	52.6	28.1	16.2	19.6	--	--
3.	10/09/2024	60.1	30.4	15.4	17.1	--	--
4.	13/09/2024	57.1	30.3	13.0	15.7	19.8	BDL
5.	17/09/2024	71.3	34.1	14.9	20.6	--	--
6.	20/09/2024	64.3	29.0	12.7	15.2	--	--
7.	24/09/2024	55.9	24.7	17.6	19.8	--	--
8.	27/09/2024	58.5	26.3	14.9	18.5	--	--
Average		59.2	29.2	14.8	18.1	--	--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009 Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

Name and Address of Client : M/s. Adani Power Limited, Mundra

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Monthly Average Report

AMBIENT AIR MONITORING

Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : September - 2024
Name of Location : Nr.20 MLD Plant
ID No. : **URA/ID/A-24/09/004**

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1	16/09/2024	67.6	25.9	15.2	22.4	25.8	BDL
Average		67.6	25.9	15.2	22.4	25.8	BDL

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

**UniStar Environment &
Research Labs Pvt. Ltd.**



(Authorized Signatory)

QCI-NABET Accredited EIA
Consultant Organization

GPCB Recognized Environmental
Auditor (Schedule-11)

ISO 9001 : 2015
Certified Company

ISO 45001 : 2018
Certified Company

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : M/s. Adani Power Limited, Mundra
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : September - 2024

Name of Location : Nr. Shantiniketan - 1

ID No. : URA/ID/A-24/09/005

Sr. No.	Sampling Date	Concentration in Ambient Air ($\mu\text{g}/\text{m}^3$)					
		PM ₁₀ $\mu\text{g}/\text{M}^3$	PM _{2.5} $\mu\text{g}/\text{M}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{M}^3$	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{M}^3$	Ozone (O ₃) $\mu\text{g}/\text{M}^3$	Mercury (Hg) $\mu\text{g}/\text{M}^3$
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1	16/09/2024	58.4	23.5	12.8	19.4	22.6	BDL
Average		58.4	23.5	12.8	19.4	22.6	BDL

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, PM₁₀ - IS: 5182 (Part 23), 2006, PM_{2.5}- Guidelines by CPCB (Vol-1), SO₂ - IS: 5182 (Part 2), 2001, NO_x - IS: 5182 (Part 6), 2006, Hg: AAS by VGA Method -3112 B APHA 22 Edison & Hg: 2 ppb O₃: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 $\mu\text{g}/\text{m}^3$

UniStar Environment &
Research Labs Pvt. Ltd.



(Authorized Signatory)

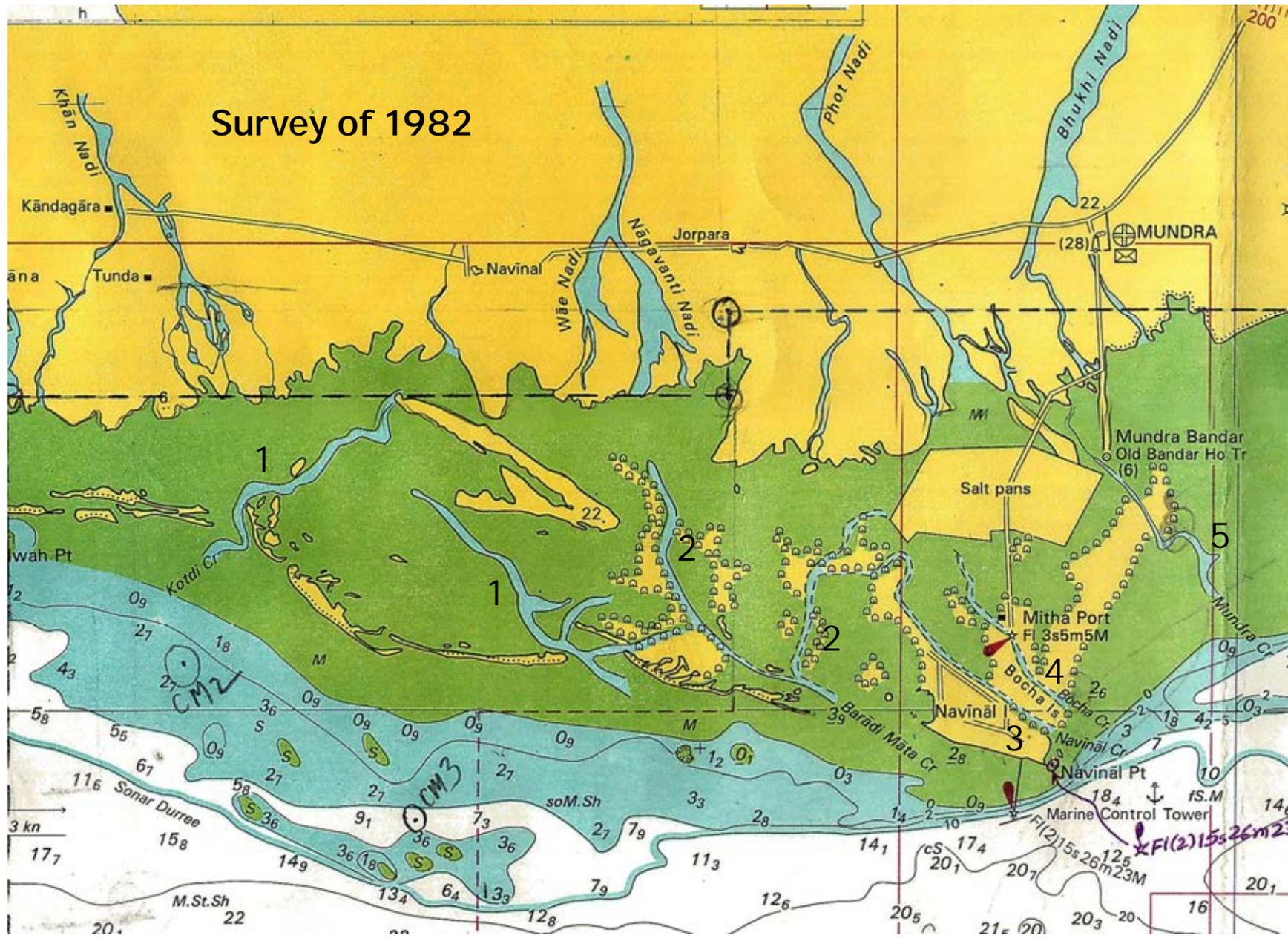
Annexure – 11

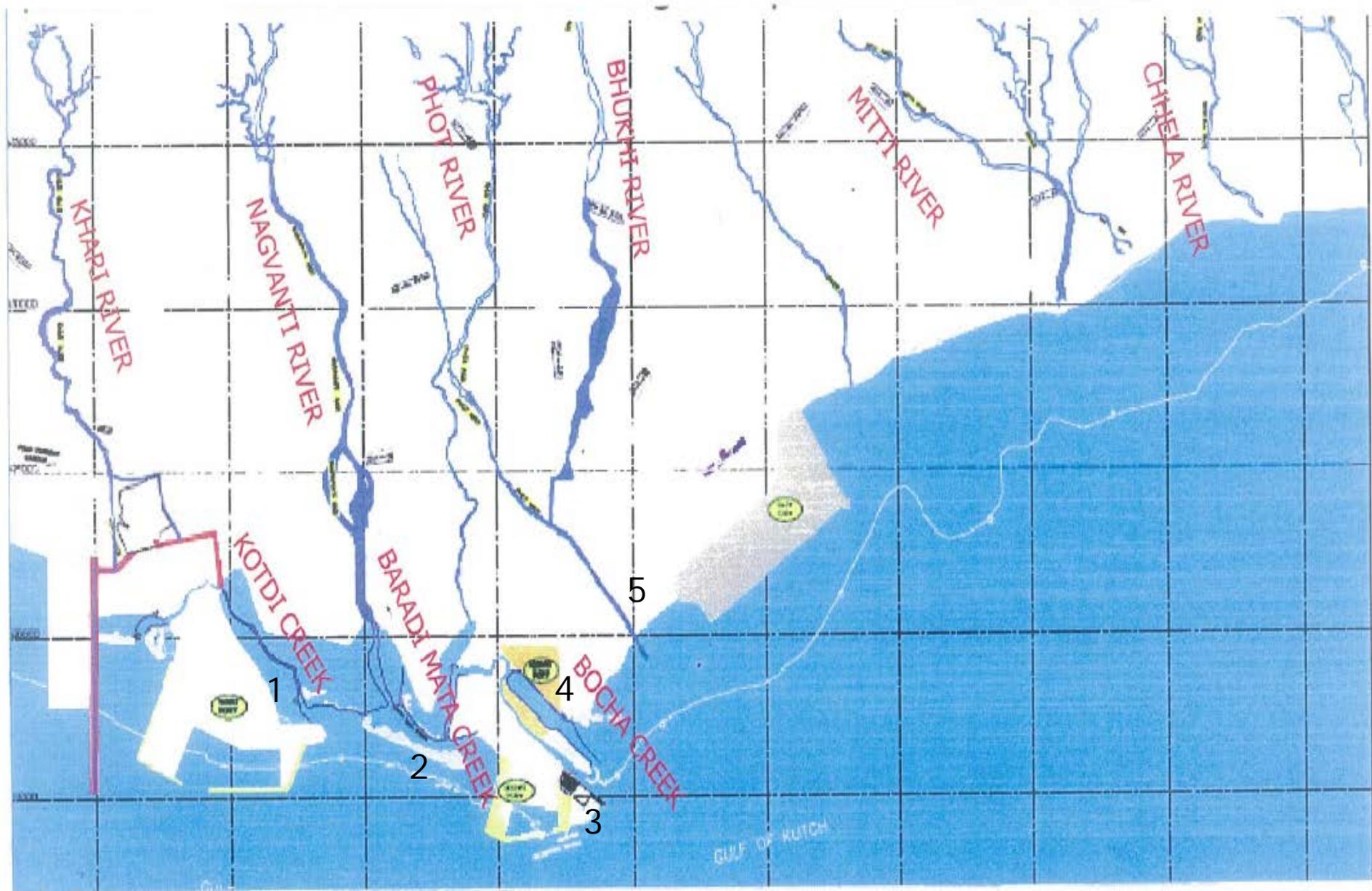
Creek System (before & after)

As per Marine EIA of Waterfront Development project, prominent creek system in the study region are

1. Kotdi
2. Baradimata
3. Navinal
4. Bocha
5. Mundra (Oldest port (Juna Bandar) leading to bhukhi river)

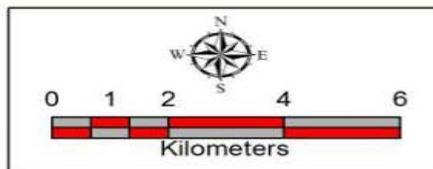
All above creeks are in existence and well functioning as on date.







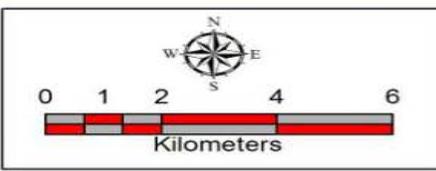
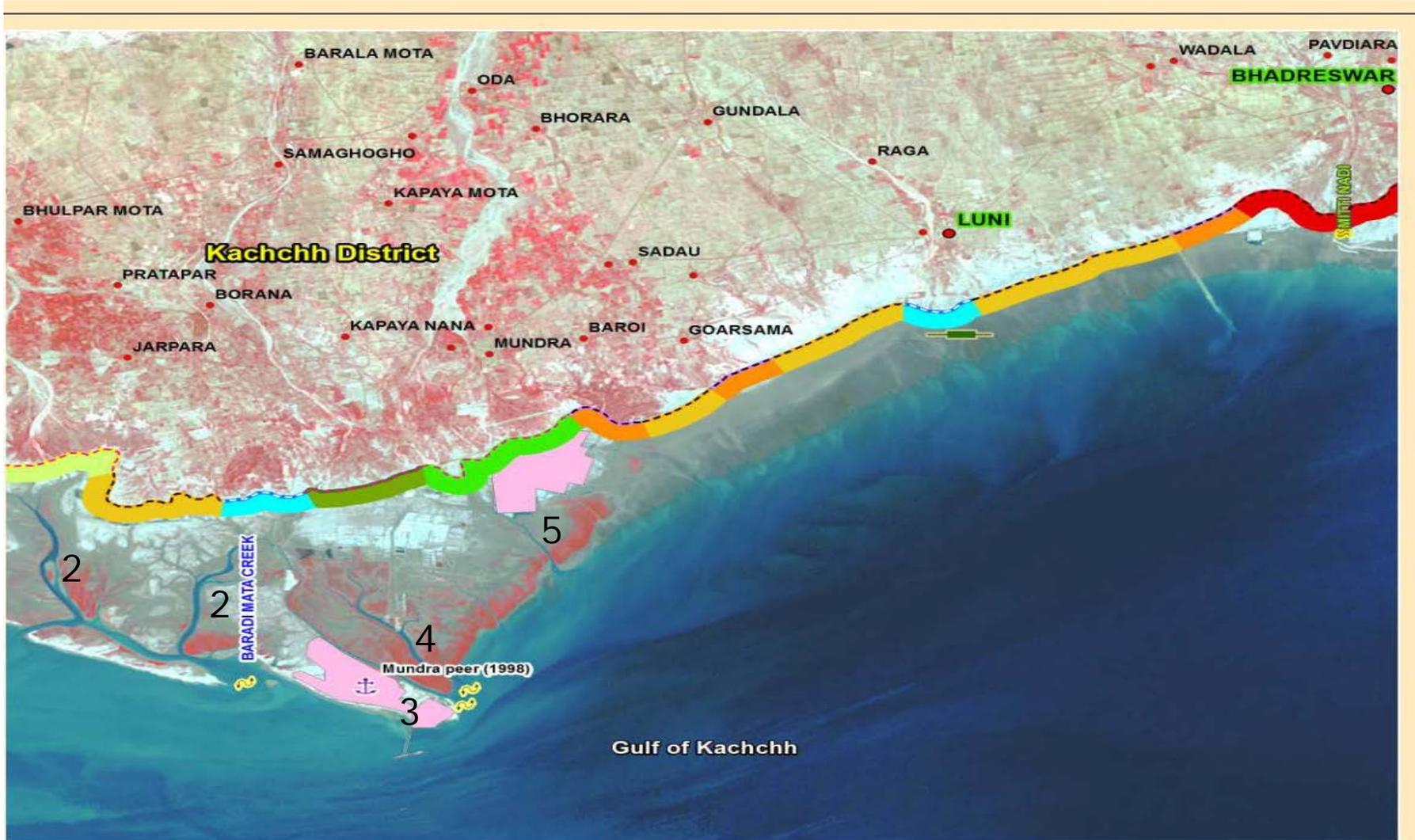
- | | | | |
|--|----------------------|--|------------|
| | River | | Port |
| | Creek | | Groynes |
| | Fish Landing Centres | | Jetty |
| | Sea wall | | Settlement |
| | Boulders | | |



Prepared by :
Institute for Ocean Management
 Anna University, Chennai
Ministry of Environment & Forests
 Government of India

adani

Creek System – As per 2011 Map of MoEF



Prepared by :
Institute for Ocean Management
Anna University, Chennai
Ministry of Environment & Forests
Government of India

Culverts & Bridge

APSEZL has so far constructed 19 culverts having total length of approx. 1100 m and total cost of Rs. 20 Crores.



Culverts & Bridge





Three RCC Bridges have been constructed over Kotdi creek with total length of 230 m and cost of Rs. 10 Crores.



Kotdi
Creek



Outfall of
APSEZL

Outfall of APSEZL and free flowing Kotdi Creek

Annexure – 12

Photographs showing Control Measures for Fugitive Dust Emission



Water Sprinkling on Coal Hip



Water Sprinkling on Open Area



Dry Fog Dust Suppression System



Water Sprinkling on Road side



Closed Silos for Truck & Wagon Loading



Closed Conveyor System



Wind Breaking Wall 16m Height





Mechanized Handling System



Coal Transportation through Covered Truck & Rail Wagon



Dump Pond with Drainage System



Dust Sweeping through Road Sweeping Machine

Adani Ports and Special Economic Zone Ltd
Adani House,
PO Box No. 1
Mundra, Kutch 370 421
Gujarat, India
CIN: L63090GJ1998PLC034182

Tel +91 2838 25 5000
Fax +91 2838 25 51110
info@adani.com
www.adani.com

Photographs showing Green Belt / Plantation



Annexure – 13

RISK ASSESSMENT STUDY AND PREPARATION OF CONTINGENCY PLAN FOR MARINE OIL SPILLS AT ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD., MUNDRA



Final Report

JULY 2022

Client



**ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD
Mundra**



Environ Software Pvt. Ltd.

#60/4, Environ Towers, 4th Floor, Hosur Main Road, Electronic City, Bangalore - 560 100

Certificate of Endorsement

I hereby certify that:

1. The oil spill contingency plan for the facility under my charge has been prepared with due regard to the relevant international best practices, international conventions, and domestic legislation.
2. The nature and size of the possible threat including the worst-case scenario, and the resources consequently at risk have been realistically assessed bearing in mind the probable movement of any oil spill and clearly stated.
3. The priorities for protection have been agreed, taking into account the viability of the various protections and clean up options and clearly spelt out.
4. The strategy for protecting and cleaning the various areas have been agreed and clearly explained.
5. The necessary organization has been outlined, the responsibilities of all those involved have been clearly stated and all those who have a task to perform are aware of what is expected of them.
6. The levels of equipment, materials and manpower are sufficient to deal with the anticipated size of spill. If not, back-up resources been identified and, when necessary, mechanisms for obtaining their release and entry to the country have been established.
7. Temporary storage sites and final disposal routes for collected oil and debris have been identified.
8. The alerting and initial evaluation procedures are fully explained as well as arrangement for continual review of the progress and effectiveness of the clean-up operation.
9. The arrangement for ensuring effective communication between shore, sea and air have been described.
10. All aspects of plan have been tested and nothing significant found lacking.
11. The plan is compatible with plans for adjacent areas and other activities.
12. The above is true to the best of my knowledge and belief.
13. I undertake to keep the plan updated at all times and keep the Indian Coast Guard informed of any changes through submissions of a fresh certificate of endorsement.

Seal

Signature :

Name

Designation : Dy. Conservator

Organization: Adani Ports and SEZ Limited, Mundra

Date:

Place:

	<i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Conetnts</i>	<i>Rev.No: 03 Dt: 30th July 2022 Doc No: ENVR 2022-003-R3</i>
---	--	-----------------	--



CONTINGENCY PLANNING COMPLIANCE CHECKLIST

Port Authority: Adani Ports & SEZL

Description		Compl ied Yes/ No	Remarks
RISK ASSESSMENT			
1	Whether the facility produces/ handles/ uses/ imports/ stores any type of petroleum product	Yes	Petroleum products are directly transferred from vessels through pipelines
2	Whether risk assessment is done	Yes	Chapter-2 Page No. 17 & Chapter-4 Part-B report
3	Who did the risk assessment		Environ Software Pvt Ltd
4	Whether maximum volume of oil spill that can occur in the worst-case scenario is considered	Yes	25000 T Chap2, refer Para 2.5.3-page No: 21 & Chapter-4 Part-B report
5	Whether relative measure of the probability and consequences of various oil spills including worst case scenario are taken into account	Yes	Chapter2 refer para 2.5.3 Page No. 23 & Chapter-4 Part-B report
6	Whether all types of spills possible in the facility are considered including Grounding, Collision, Fire, Explosion, Rupture of hoses	Yes	Chapter2 refer para 2.1.1 Page No. 17 & Chapter-4 Part-B report
7	Please specify the list of oils considered for risk assessment	Crude, HSD & Fuel Oil	Chapter2 refer para 2.8 Page No. 24 & Chapter-4 Part-B report
8	Whether the vulnerable areas are estimated by considering maximum loss scenario and weather condition	Yes	Chapter2 refer para 2.12 Page No. 31
9	Whether impacts on the vulnerable areas are made after considering the Marine protected areas, population, fishermen, salt pans, mangroves, corals and other resources within that area	Yes	Chapter2 refer para 2.12- & 2.13-Page No. 31,32 & Chapter-3 Part-C report
10	Whether measures for reduction of identified high risks are included by reducing the consequences through spill mitigation measures	Yes	Chapter7 refer fig.7.1 Page No. 66
11	Whether steps have been considered to reduce risks to the exposed population by increasing safe, distances by acquiring property around the facility, if possible	Yes	Chapter 7 refer fig 7.1 Page No. 66
12	Whether risk levels are established for each month after considering the probability with tide and current and consequences of each such spill	NA	
13	Whether prevention and mitigation measures are included in the plan	Yes	Chapter8 refer para 8.1 Page No 84
14	Whether the spill may affect the shoreline. (length of the shoreline with coordinates)	Yes	Part-B report, chapter 5-OS modelling tables (Jan, July, Oct) page nos. 58-66
15	Whether time taken the oil spill to reach ashore	Yes	Part-B report, chapter 5-OS



	in each quantity of spill in various months are mentioned in the plan		modelling tables (Jan, July, Oct) page nos. 58-66
16	Whether sensitivity mapping has been carried out	Yes	Part-C report, chapter 3, refer para 3.1-page no. 5
17	Does the sensitivity mapping clearly identify the vulnerable areas along with MPAs, corals, fishermen community, salt pans, mangroves and other socio-economic elements in the area	Yes	Part-C report chapter 3, refer para 3.1-page no. 5
18	Do the sensitivity maps indicate area to be protected on priority	Yes	Part-C report Annexure-1 refer fig A.1.8-page no. 37
19	Does the map indicate boom deployment locations	Yes	Part-C report Annexure-1 refer fig A.1.1(a), (b)-page no. 35
20	Whether any Marine Protected Area will be affected	Yes	Part-C report chapter 3, refer para 3.15-page no. 17
21	Whether total number of fishermen likely to be affected is mentioned in the plan	No	
22	Whether any salt pan in the area is going to be affected	No	
23	Whether any mangroves in the area will be affected by a spill	No	
Preparedness			
24	Whether any containment equipment is available	Yes	Chapter 4, refer para 4.2 Page No. 43
25	Whether any recovery equipment is available	Yes	Chapter 4 refer para 4.2 Page No. 43
26	Whether the facility is having any temporary storage capacity	Yes	Chapter 4 refer para 4.1 Page No. 43
27	Whether location of the oil spill response equipment is mentioned in the plan	Yes	Chapter 4 refer para 4.1 Page No. 43
28	Whether suitable vessels available for deploying the boom, skimmer etc	Yes	Chapter 4 refer para 4.4 Page No. 44
29	Whether OSD held with facility	Yes	5000 Ltrs – Page No: 50
30	Whether the OSD held with the facility is approved for use in Indian waters	Yes	
31	Whether the facility has MoU with other operators for tier-1 preparedness	Yes	Oil companies, HMEL Operators
32	Whether the list of oil spill response equipment available with each agency in MoU is deliberated	Yes	Chapter 9 refer para 9.1 page no. 89
33	Whether the facility has any MoU with private OSRO	Yes	Chapter 9 refer para 9.4 page no. 91
34	Whether the procedure for evoking the mutual aid is clearly described in the plan	Yes	
35	Whether additional manpower is available	Yes	Chapter 10 refer para 10.2.3 page no. 106
36	Whether list of approved recyclers is mentioned in the plan	Yes	Chapter 10 refer para 10.2.1 Page No 105
37	Whether NEBA (Net Environmental Benefit	Yes	Part-D report, chapter 1,



	Analysis) has been undertaken		refer 1.2-page no. 2
38	Whether the areas from priority protection have identified in the plan	Yes	Part-D report, chapter 2, refer para 2.2-page no. 13
39	Whether relevant authorities and stakeholders were consulted for NEBA and during the areas for priority protection	Yes	Part-D report chapter 3
40	Whether District administration has been appraised of the risk impact of oil spills?	Yes	Part-D report
Action Plan			
41	Whether the plan outlines procedure for reporting of oil spills to Coast Guard	Yes	Chapter 2, refer para 2.6-page no. 22
42	Whether the oil spill response action is clearly mentioned	Yes	Chapter 3, refer para 3.1-page no. 36
43	Whether the action plan includes all duties to be attended in connection with an oil spill	Yes	Chapter 3, refer para 3.1 page no. 36
44	Whether the action plan includes key personnel by their names and designation viz. COO, ICO	Yes	Chapter 5-page no. 54
45	Whether alternate coverage is planned to take care of the absence of a particular person [in cases where action plan is developed basis names]	Yes	
46	Whether the plan includes assignment of all key coordinators viz. the Communication Controller, Safety Coordinator, Emergency management team, Administration and Communication Coordinator and Safety Coordinator	Yes	Chapter 10 page no. 93
47	Whether contact directory containing numbers of key response and management personnel is intimated in the plan	Yes	Chapter10 Page No. 93
48	Whether approved recyclers are identified for processing recovered oil and oily debris	Yes	Chapter10 Page No. 104
49	Whether the shoreline likely to be affected is identified	Yes	
50	Whether final report on the incident is submitted to CGHQ as per NOS-DCP 2015	NA	
51	Whether the spill incident and its consequences are informed to fishermen and other NGOs for environment protection through media	NO	
Training and Exercises			
52	Whether mock fire I emergency response drills are specified in the plan	Yes	Chapter 5 refer para 5.2, page no. 54
53	Whether the mock drills cover all types of probable oil spills	Yes	Chapter 5 refer para 5.2, page no. 54
54	Whether the plan mentions list of trained manpower	Yes	Chapter 5 refer para 5.3, page no. 55
55	Whether records for periodic mock drills are maintained in a well defined format	Yes	Quarterly
56	Whether the plan to updated according to the findings in mock-drills and exercises	Yes	



57	What is the frequency of updation / review of contingency plan?	Yes	As an when required
58	Periodicity of joint exercise with mutual aid partners	Yes	
59	Frequency of mock-drills for practice	Yes	Twice in a year Chapter 12 Page no.131
60	Whether the records for periodic mock drills are maintained in a well defined format	Yes	Chapter 5
61	Frequency of updation / review of contingency plan	Yes	As an when required
We, hereby, declare that the all information appended above and true and correct to my knowledge or belief			
Date	Chief Conservator / Installation Manager		
VERIFIED			
Date	(District Commander ICG) or his representative		
Date	Regional Commander ICG)or his representative		

This is to state that at the request of Adani Ports & SEZL (AP &SEZL), the undersigned persons have prepared the Oil Spill Contingency Plan (OSCP). This OSCP has been prepared for oil spillage assessed based on the Risk Assessment carried out for various Port activities including loading / unloading operations of Crude / HSD / FO at berths, SPM, subsea pipeline leakage and Vessel collision / Grounding.

	Adani Ports and Special Economic Zone Ltd, Mundra	Conetnts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
---	--	----------	---



CONFIDENTIALITY CLAUSE

The report has been prepared based on studies 1. Hydrodynamic, 2. Oil Spill fate and weathering characteristics 3. Environmental Sensitivity Mapping and 4. NEBA carried out for preparation of OSCP for Adani Ports & SEZL as per the work order dated 19th February, 2022 and is considered confidential. No part of this report may be release to any outside organization unless explicitly advised by the owners in writing.

Issued By:
Environ Software Pvt Ltd

Prepared by

Dr N M Anand

Dr G S Reddy

Dr. Rashmi

Reviewed by
Ms. Smitha, Environmental Engineer

Report Revision Record

Document No.	ENVR 2022-003-R1				Page:	

Introduction of

ABOUT ENVIRON

Environ Software Pvt. Ltd.

Environ Software (P) Ltd was incorporated in October 1998 and is located at Bangalore- the Silicon Valley of INDIA. It has a team of highly skilled and dedicated staff, specializing in Coastal Engineering, Hydraulics, Mechanical Engineering and Computer Science & Engineering. Environ is a multi-disciplinary software development and consulting firm focusing primarily on solutions to problems involving Air, Water and Soil pollution through the in-house, state-of-the-art computational tools. It is capable of solving a wide variety of coastal and marine pollution related problems that include prediction of currents and tides, flood forecasting, morphological changes of estuarine bed and effects on marine population due to discharge of various industrial pollutants and construction of marine structures.

The company is also capable of predicting the spread of various pollutants in air media, emitted from the industries and vehicles. Environ also provides numerical solution to the problems related to sub-surface flows and transport of pollutants. The company also provides full service on field monitoring studies to measure and assess conditions in oceans, coastal areas, lakes, rivers and in air pollution monitoring.

Apart from dealing with complex environmental issues the company is developing a sophisticated Computational Fluid Dynamics (CFD) software, with appropriately chosen numerical methods and physical models for solving Fluid flow, Heat Transfer and Radiation problems. It is capable of solving incompressible, compressible, and two phase

Hydrodyn™



flows etc, with different integrated solvers. The company is also concentrating on the development of dedicated software for a specific application because the user is more oriented in many other things than looking for new developments in numerical methods.

Environ products are absolutely user friendly which requires minimal training. The highlights of the products of Environ are interactive, high quality Pre- and Post-Processor utilities which promises enhanced performance.

Environ was developed softwares for Library Automation, Institutional Management and Company Automation etc. based on client/Server, Internet/ e-Business and Wireless Application tools.

STRATEGIC AREAS

Scientific Simulation Software

Scientific simulation software products are self-contained, absolutely user friendly and integrated with pre- and post processor utilities.

- Air Pollution Simulation Models (APSM)
- Surface Water Pollution Simulation Models (SWPSM)
- Ground Water Pollution Simulation Models (GWPSM)
- Noise Pollution Simulation Models (NPSM)
- Fluid Dynamics Simulation Models (FDSM)

Consultancy Services offered

Internet and e-Business Development

- Complete e-business solution
- Business to Customer and Business to Business Solutions
- Web Design and Consultancy
- Support & Maintenance of launched web sites
- Wireless Applications

Client/Server Applications

	<p>Adani Ports and Special Economic Zone Ltd, Mundra</p>	<p>Conetnts</p>	<p>Rev.No: 03 Dt: 30th July 2022 Doc No: ENVR 2022-003-R3</p>
--	--	-----------------	--



- Modelling of Air, Water, Ground Water Pollution & Fluid Dynamic and Heat Transfer Applications
- Environmental Modelling & Impact Assessment
- Risk Assessment/Analysis
- Hazardous Waste water Management
- Library Management System for complete library automation
- Customized Application Development viz. Inventory control, Accounts etc.
- Medical Transcription Monitoring System

1. Development of Scientific Simulation Software for

- Air Pollution, Surface Water pollution and Ground Water Pollution and Noise pollution problems

2. Consultancy Services offered for

- Modelling of Air, Water, Ground Water Pollution & Fluid Dynamic and Heat Transfer Applications
- Environmental Modelling & Impact Assessment
- Risk Assessment/Analysis, Hazardous Waste water Management

3. Internet and e-Business Development

- Complete e-business solution
- Business to Customer and Business to Business Solutions
- Web Design and Consultancy
- Support & Maintenance of launched web sites
- Wireless Applications

4. Client/Server Applications

- Library Management System for complete library automation
- Customized Application Development viz. Inventory control, Accounts etc.
- Medical Transcription Monitoring System.

Contents	Page No.
Preface	i
Executive Summary	ii
Project Team	xvi

SECTION I - STRATEGY

1. Introduction	01
1.1 Contingency plan	01
1.2 Description of operations at Adani ports and SEZ Limited, in Mundra	0
1.3 Purpose of the Plan	05
1.4 Objectives of the plan	05
1.5 Applicability and Geographical Limits of the plan	06
1.6 Authorities and Responsibilities	06
1.7 Coordinating Committee	07
1.7.1 Statutory requirements	08
1.7.2 Enforcement Agencies and Authorities	08
1.7.3 Statutory Requirements	09
1.8 Mutual aid agreement	11
1.9 Geographical Limits of the plan	12
1.10 Interface with ROSDCP and NOSDCP	12
2. Quantative Risk assessment of oil spills	14
2.1 Identification of port operational activities and risks	14
2.1.1 Sources of oil spill	17
2.2 Failure frequency of pipeline, transfer and storage tank	17
2.2.1 Quantity of, oil leaked- pipelines	18
2.3 Sub-sea pipeline Damage	18
2.4 Cargo Operations or Transfer frequencies	19
2.5 Operational Leakage	20
2.5.1 Spill due to Loading arm failure at Jetty:(pumping rate of 10000 m3/hr crude oil for 60 sec)	20
2.5.2 spill due to rupture of sub-sea crude oil pipeline from Refinery to Shore tanks: (2611 Tons of crude for 36 hrs)	20
2.5.3 spill due to tanker collision at jetty having Having capacity Between 1,00,000-3,00,000 Metric tons	21
2.5.4 Spill due to collision or grounding in the Tanker route	21
2.6 Risk assessment of oil spill in APSEZL, Mundra area	22
2.7 Spill locations and scenarios	22
2.8 Types of Oil Likely to Spilled	24
2.9 Probable Fate of Spilled Oil	25
2.10 Appearance and Thickness of Oil Slick	26
2.11 Development of oil spill scenarious including Worst case spill	27
2.11.1 spil size	27
2.12 Environmental sensitivity index mapping	31
2.13 Environmental resources, Priorities for protection	31
2.14 Net Environmental Benefit Analysis [NEBA]	33
3. Equipments, supplies and services	36
3.1 Equipment and Supplies	36
3.2 Offshore Operations	37
3.3 Shoreline operations	37
3.4 Additional equipment and response	38
3.5 Inspection, Maintenances and Testing	40
4. Oil spill management	42

	<i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Conetnts</i>	<i>Rev.No: 03 Dt: 30th July 2022 Doc No: ENVR 2022-003-R3</i>
---	--	-----------------	--



4.1	Crisis Management Team (CMT)/Chief Operating Officer(COD)	43
4.2	Incident Organization Chart	43
4.3	Financial Authorities	44
4.4	Functional Designations	44
4.5	Manpower availability (on-site, on-call)	45
4.5.1	A float Operations and Response Team/Teams	45
4.6	Availability of additional manpower	50
4.7	Advisors and experts – Spill Response, Wildlife, and Marine Environment	50
4.8	Training / Safety Schedules and drill /exercise Programmed	51
4.8.1	Training	51
4.8.2	Drill/exercise program	51
5.	Communication and control	53
5.1	Incident Control Room and Facilities	53
5.2	Field communication Equipment	54
5.2.1	Equipment	54
5.2.2	Publications	54
5.3	Reports, manuals, charts and incident logs	54

SECTION II - ACTIONS AND OPERATIONS

6.	Initial procedures	57
6.1	Notification of oil spill to concerned authorities	58
6.1.1	Reporting of Oil spill incident	59
6.2	Preliminary estimate of response tier	60
6.2.1	Preliminary assessment of the incident	60
6.2.2	Containment and control	60
6.3	Notifying key team members and authorities	60
6.4	Manning control room-MMPT marine control	61
6.5	Collecting information (oil type, sea/wind forecast, aerial surveillance, beach reports)	61
6.6	Estimating fate of oil slick (24,48 and 72 hours)	63
6.7	Identifying resources immediately at risk, informing parties	63
6.7.1	Oilspill Modeling studies	64
7.	Operation planning	65
7.1	Assembling full response team	66
7.1.1	Crises Management Team/s (CMT)	66
7.1.2	CMG	66
7.2	Identifying immediate response priorities	67
7.3	Mobilizing immediate response	67
7.4	Media briefing	78
7.5	Planning medium term operations (24-, 48- and 72-hours)	79
7.6	Deciding to escalate response to higher tier	80
7.7	Mobilizing or placing on standby resources required	81
7.8	Establishing field command post and communication	82
8.	Control of operations	83
8.1	Establishing management team with experts and advisors	84
8.2	Updating information (sea/ wind/ weather forecasts aerial surveillance, beach reports)	84
8.3	Reviewing and planning operation	85
8.4	Obtaining additional equipment, supplies and manpower	85
8.5	Preparing daily incident log and management reports	86
8.6	Preparing operations accounting and financing reports	87
8.7	Preparing releases for public and press conference	87
8.8	Briefing local and government officials	88

9. Termination of operations	89
9.1 Termination of response operations	89
9.2 Deciding final and optimal level of Beach clean up	90
9.3 Standing-down equipment, cleaning, maintaining, replacing	90
9.4 Preparing formal detailed report	91
9.5 Reviewing plans and procedures from lessons learnt	91
9.6 Investigation	91

SECTION III – DATA DIRECTORY

10. Data directory	92
10.1 Maps/ charts	92
10.1.1 Costal facilities, access roads, telephones, hotels etc	92
10.1.2 Costal charts, currents, tidal information prevailing winds	95
10.1.3 Risk locations and probable fate of oil	98
10.1.4 Sensitivity area mapping of Gulf of Kutch	100
10.1.5 Sea zones and response strategies	101
10.1.6 Coastal	101
10.1.7 Shoreline zones and clean-up strategies	101
10.1.8 Oil and waste storage disposal sites	103
10.1.9 Sensitive maps/atlas	105
10.2 Lists	105
10.2.1 Primary oil spill equipment	105
10.2.2 Sources of manpower	106
10.2.3 Local and national government contacts	108
10.2.4 Specifications of oils commonly traded	111
10.2.5 Information sources	111
11. Conclusions and recommendations	112
12. References	114
13. Appendix	120
Appendix-1: Modeling of hydrodynamic processes	120
Appendix-2: Modeling of fate and trajectory of spilled oil	120
Appendix-3: Sensitivity index mapping and atlas	121
Appendix-4: Net Environment Benefit Analysis	121
Appendix-5: Oil spill report form	122
Appendix-6: Polrep information	126
Appendix-7: Polar messages format	127
Appendix-8: Oil spill progress report	128
Appendix-9: List of important telephone numbers	129
Appendix-10: Oil spill report form	133
Appendix-11: Application for seeking coastguard approval	134
Appendix-12: Press release format	135
Appendix-13: Contingency planning compliance checklist	136
Appendix-14: Training and competency	140
Appendix-15: Compilation list of oil spill response equipment as per nos-dcp-2018 and available equipment with Adani ports & SEZL	141



SI.NO	List of Figures	Page No
Fig.1.1	Cargo berths / Jetties of Adani Ports in the Mundra region, Gulf of Kutch	1
Fig.1.2	Overall layout of the Adani Mundra port facilities showing spill locations selected	3
Fig.1.3	Zoomed portion showing marine facilities of South Basin and spill locations selected	3
Fig.1.4	Zoomed portion showing marine facilities of West Basin and spill locations selected	4
Fig.2.1	Spill Locations considered in Adani Ports and SEZ Limited at Mundra region	23
Fig.2.2	shows schematic diagram of weathering processes with time	26
Fig.2.3	Sensitive areas along the block	32
Fig.6.1	Flow chart for Incident and information	57
Fig.6.2	Schematic diagram of weathering process with time and typical fraction of Crude Oil	63
Fig.10.1	Google Map showing Adani Port & SEZ facilities in the Mundra region	92
Fig.10.1(a)	Google Map showing Adani Port West Port facilities in the Mundra region	92
Fig.10.1(b)	Google Map showing Adani Port south Port facilities in the Mundra region	93
Fig 10.2	NHO chart showing Mundra region, Gulf of Kutch	93
Fig.10.3	Map showing interpolated bathymetry of Adani Port and surrounding areas.	95
Fig.10.4(a)	The wind rose diagrams for Pre monsoon in 2021	97
Fig.10.4(b)	The wind rose diagrams for Monsoon in 2021	97
Fig.10.4(c)	The wind rose diagrams for Post monsoon season in 2021	97
Fig.10.5	Spill Locations considered in APSEZL Mundra region	99
Fig.10.6	Sensitivity Index Mapping for coast of Gulf of Kutch	101

SI.NO	List of Tables	Page NO
Table 2.1	Pipeline spill volume (m3)	18
Table 2.2	Number of oil spills occurred during 1974 to 2010 and their causes and spill quantity	19
Table 2.3	Types of oils selected for oil spill modeling studies	24
Table 2.4	Oil weathering processes	25
Table 2.5	Appearance and thickness of slick	27
Table 2.6	Details of Oil spil Scenarios	27
Table 4.1	Major functions of Crises Management Team	43
Table 7.1	Technique for oil spill sampling	70
Table 7.2	Techniques for waste disposal	77
Table 10.1	Contact details of spill information centre	93
Table 10.2	Contact details of District administrative Authorities	94
Table 10.3	Contact details of Gujarat Fisheries Development council	94
Table 10.4	State pollution Control board – Regional offices	94
Table 10.5	Application of techniques to different shoreline types	102
Table 10.6	Approved waste handling Contractors	104
Table 10.7	List of OSR Equipment/ ITEMS AT Adani Ports and SEZ Limited	105

ABBREVIATIONS

ADIOS	Automated Data Inquiry for Oil Spills
CC	Communications Coordinator
CCA	Central Coordinating Authority
CGHQ	Coast Guard Head Quarters
CIC	Chief Incident Controller
CISF	Central Industry Security Force
CMG	Crisis Management Group
CMT	Crisis Management Team
COC	Communication and Operations Center
CTTL	Chemical Terminal Trombay Ltd.
DCA	District Coordinating Authority
DCC	District Contingency Committee
DHQ	Coast Guard District Head Quarters
DNV	Det Norske Veritas
ECC	Emergency Control Center
EG	Environment Group
ESI	Environmental Sensitivity Index
HFO	Heavy Fuel Oil
HM	Harbour Master
IAP	Incident Action Plan
IC	Incident Controller
IDRN	Indian Disaster Resource Network
IM	Incident Manager
IMD	India Meteorological Department
IMO	International Maritime Organization
IMT	Incident Management Team
IOCL	Indian Oil Corporation Ltd.
IPIECA	International Petroleum Industry Environmental Conservation Association
JD	Jawahar Dweep
LAG	Local Action Group
LCA	Local Combat Agency
LO	Logistics Officer
LST	Local Action Group Support Team
MARPOL 73/78	International Convention for the Prevention of Pollution from ships 1973 as modified by the protocol of 1978
MMd	Mercantile Marine Department
MoU	Memorandum of Undertaking
MPC	Marine Pollution Coordinator
MRU	Marine Response Unit
NEBA	Net Environmental Benefit Analysis
NFPA	National Fire Protection Association
NOS-DCP	National Oil Spill Disaster Contingency Plan
NRT	National Response Team
OPRC Convention	International Convention on Oil Pollution Preparedness, Response and Co-operation 1990
OSC	On screen Coordinator

	<p>Adani Ports and Special Economic Zone Ltd, Mundra</p>	<p>Conetnts</p>	<p>Rev.No: 03 Dt: 30th July 2022 Doc No: ENVR 2022-003-R3</p>
---	--	-----------------	--

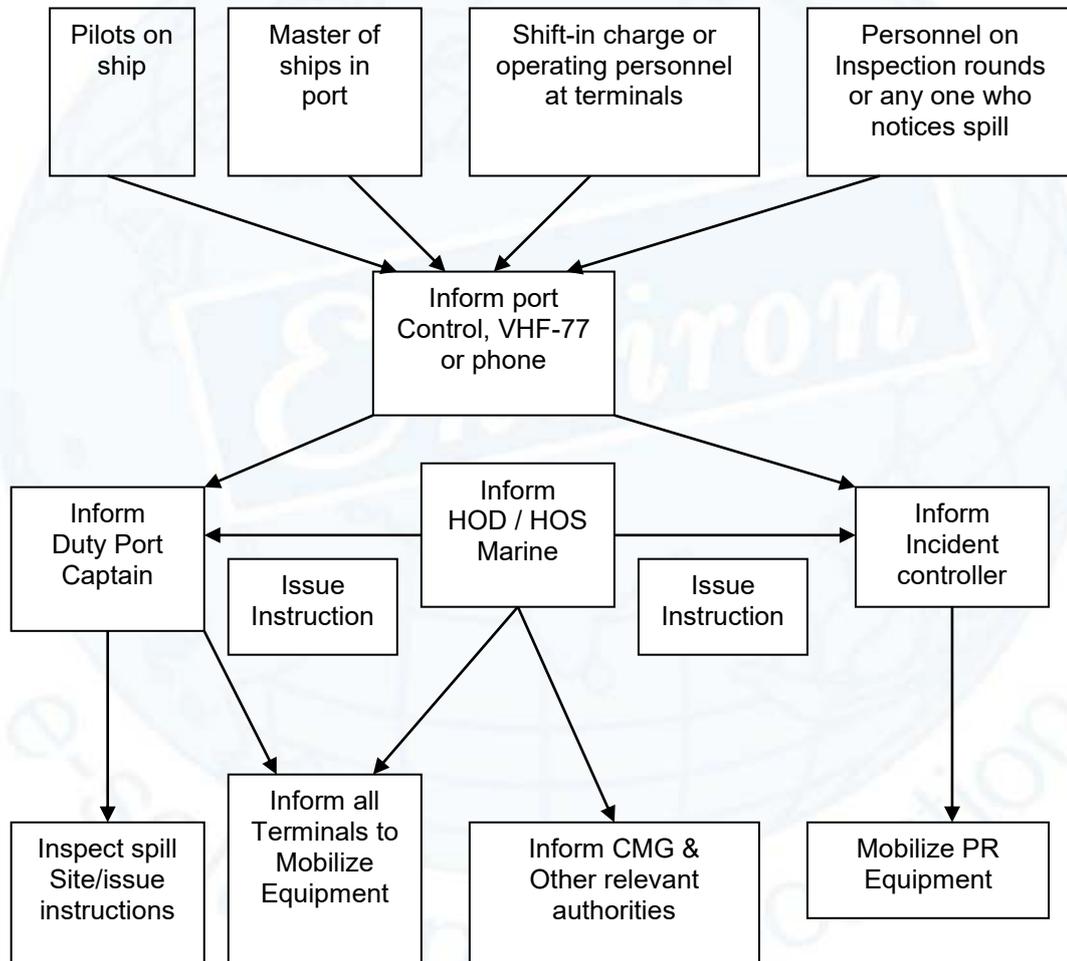


OSD	Oil Spill Dispersant
OSR	Oil Spill Response
OSRO	Oil Spill Response Organization
OSRO-M	Oil Spill Response Organization-Manager
OSRO-S	Oil Spill Response Organization-Specialist
PC	Port Control
POC	Participating Oil Company
POL	Petroleum, Oil and Lubricants
SA	Statutory Agency
SC	Shoreline Coordinator
SCBA	Self-Contained Breathing Apparatus
SRV	Spill Response Vessel
UNCLOS	United Nations Convention on Laws of the Sea
VHF	Very High Frequency



OILSPILL CONTINGENCY PLAN

Contingency Chart to deal with Oil Spill



FINAL MEASURES

- Coordinate at District, State, National level including MOST if crisis level 2 or 3
- Informs Coast Guard-clean up contractors
- Restore berth operational
- Question witnesses
- Complete maritime accident report
- Give press reports
- Survey and cost damage to port installation
- Hold meeting of all concerned parties
- Seek compensation
- Distribute final report to concerned authorities.



PREFACE

Adani Ports and SEZ Limited, Mundra has been awarded the project to M/s Environ Software Pvt Ltd to carry out the Risk Assessment Study, Sensitivity area mapping and preparation of Oil Spill Contingency Plan for Tier-1 Oil Spill Response (OSR) facility for Adani Mundra Ports & SEZL. This report contains the Strategy Plan & operation plan which describes the scope of the plan including geographical coverage, oil spill modeling studies, perceived risks, spill response and clean-up strategy, equipment, storage facilities, responsibilities and action plans, communication, etc.

The report also presents the characteristics and weathering processes of oil, the impact of oil spills on the marine environment and agencies to be informed in case of emergency. The report elaborates on the strategy plan for the oil spill as per IMO guidelines as well as the responsibilities of regional and national oil spill combating agencies.

Marine stability Atlas has been prepared for areas all along the coasts of Gulf of Kutch region. Environmental sensitivity mapping also done based on the available data of environmental, biological and industrial information.

The report also includes specific instructions for responders, once the spill occurs, response plan based on NEBA studies for combating operations for spilled oil. This is to ensure that emergency action by responders gets underway promptly and in an orderly manner. The statutory regulations, area operations, training and competence also included in the report.

We express our gratitude to Mr. Yogesh Nandaniya, Mr. Sudhakar Singh, Capt. Sachin Srivastava Head-Marine Services, Mr. Sanjay Kewalramani COO-TAHSL, Capt. Rajat Garg, Mr. Mangal Choudhary of Adani Ports & SEZ Ltd for their assistance and suggestions during the preparation and successful completion of this project. We are thankful to the above officers for providing information on oil spill contingency plan and acknowledge the valuable information provided by them.

Dr. G. S. Reddy
(Managing Director)

 <i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Executive Summary</i>	<i>Rev.No: 03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
		<i>Page No:i</i>



EXECUTIVE SUMMARY

Adani Port and SEZ Limited, Mundra handles the majority of its Cargo and Liquid products traffic through the South and West port terminals. There are several berths and Jetties at Mundra for berthing of cargos. Two subsea pipelines connect the onshore to the IOCL, HEML SPMs. There are 11 Container Berths, 16 Multi-purpose Berths, 1 LNG Jetty and two SPMs with back-up facilities at Mundra for berthing cargo vessels and oil tankers. Two subsea pipelines connect the SPMs (IOCL and HEMEL) to onshore oil terminals at Mundra.

The location of Cargo Berths, SPMs and marine facilities are situated at AP &SEZL at approximately Easting (m) Easting (m) 572000 and Northing (m) 2515500. The berths are Located in the North bank of Gulf of Kutch at Mundra. The berths are operating for cargo operability and potential to meet the future trends. Sufficient clearance to the existing surroundings has been maintained, including a minimum encroachment into the greenbelt and adequate distance to populated areas. The layout of the complex allows space for future extension, without compromising desired safety separation distances within the complex or to adjacent port activities.

The main objective of the study to carryout risk analysis of oil spills for various activities of port operations and to the assess the impact of major accidental hazards from the facilities on the marine population and property within and outside the battery limit of the facilities and on coastal environment. Results of the study will be useful in preparation of response plan for containment of oil spills, in case of that may occur during loading / unloading operations / accidents. The results will also be useful in developing a meaningful emergency and response plan.

At present Adani Port and SEZ Limited, Mundra has responsibility to deal with Tier-1 oil spill within port limits. The Adani Port and SEZ Limited, Mundra has entered into MOU with neighboring ports and others to deal with Oil spills. The funding is by ports and others. The Consultant assessed the OSR Equipment available with the Port and agencies in the vicinity of Adani Port and SEZ Limited, Mundra. The existing mechanism to deal with Tier-1 oil spill response through a specialist agency (where there is no capital cost and manpower by the Adani Port and SEZ Limited, Mundra is appropriate in the present circumstances.

Based on Gap Analysis a new Equipment list is suggested which incorporates some of the recommendations of NOS DCP-2018 and a comparative chart provides justification for the variance from NOS DCP-2018.

 Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:ii



The following studies were carried out as integral part of Oil Spill Contingency Plan

A. Quantitative Risk Assessment of oil spill for AP & SEZL

The oil spill risks at Adani Port and SEZ Limited, Mundra are evaluated consideration of probability of a spill occurring and the consequences. The risk assessment has been made considering many factors i.e. Frequency of vessel movement, Operation time of the port, Vessel condition, Performance of vessel crew, Traffic density, Weather conditions, Type of oils handling, relevant past data, identification of Hazard, Frequency, Consequence and risk estimation.

After carrying out the detailed study of offshore facilities which include the surface facilities viz., platforms, berths / Jetties, vessels and subsurface pipelines and all other associated infrastructure required for port operations of Adani Port and SEZ Limited, Mundra the following are the causes of spill scenarios are identified.

- Operations at Berth
- Spills due to Collision/Grounding in the Tanker route
- Bunker/ fuelling operations
- Ship distress / sinking
- Spill due to rupture in subsea pipeline corridor (size of crack-1")
- Rupture of export line due to movement and landing along the coast.
- Bunkering of HSD / Crude for vessels

Based on the above factors and failure frequency of port operation facilities, the following spill quantity are estimated.

- Spill due to Loading arm failure at Jetty: (167 m³, at pumping rate of 10000 m³/h crude oil for 1 min)
- Spill due to rupture of sub-sea crude oil pipeline from refinery to shore tanks: (2611 tons of crude for 36 hrs)
- Spill due to Tanker Collision at Jetty having capacity between 1,00,000-3,00,000 metric tons (25000 tons)
- Spill due to collision or grounding in the Tanker route (25000 tons)

The following spill locations were identified based on port operations.

- Crude oil spill of 700t at selected SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 700t at selected West Port(S5), Vessel route(S7), LNG Jetty(S8), South basin (S9), Mundra Ports(S11), MICT/AMCT(S12)
- Crude oil spill of 10000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Crude oil spill of 25000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 100t at selected West Port (S5, S6), LNG Jetty(S8), South basin (S9,

	Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:iii



S10), Mundra Ports(S11), MICT/AMCT(S12), East Basin(S13), North Basin(S14)

- HSD oil spill of 50t at selected West Port(S5), LNG Jetty(S8), South basin (S9), Mundra Ports(S11)
- HSD oil spill of 20t at selected West Port(S6), South basin (S10)

Continuous Spills

- Crude oil spill of 10000 m3/hr for 1 min at selected SPM-HMEL(S1), SPM-IOCL(S2)
- Crude oil spill of 10000 m3/hr for 1 min at selected VLCC Jetty (S15)
- Crude oil spill of 10000 m3/hr for 1 min at sub-sea pipeline route (S3)

The details for estimating the quantitative risk assessment at spill locations are discussed in **PART-B-OILSPILL MODELING STUDIES** of the report.

B. Assess Oil Spill trajectory in the worst-case scenario in different weather and sea conditions;

The prediction of fate and transport of oil spill plays a major role in the analysis of risks due to oil spills. It is computed based on the surface water currents and wind speed

Modeling the hydrodynamic processes is an integral part of modeling of fate and transport of oil spills. The basic oil-spill model developed at Environ Software (P) Ltd was used in the present work to estimate risk assessment due to oil spills for various weathering and meteorological conditions.

Hydrodynamic modeling studies carried out using the Hydrodyn-FLOSOFT for predicting tidal levels and current for various seasons (Pre-monsoon (January), SW Monsoon (May) and Post Monsoon (October). For all possible port facilities, spring and neap tide conditions has been simulated. The details for Hydrodynamic modeling studies are discussed in **PART-A-HYDRODYNAMIC MODELING STUDIES** of the report.

Fifteen spill locations at and around Adani Port and SEZ Limited, Mundra regions and 33 oil spill scenarios are considered for oil spill simulations.

 Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:iv



Details of Oil Spill Scenarios

Table. 4.4. Details of Oil Spill Scenarios

Comp. Runs	Spill Location	WD (m)	Spill Qty	Type of oil	Spill Location Co-ordinates
A SPMs					
1	SPM-HMEL (S1)	29.50	700 tons	Crude	69° 37' 23.19" E,
2			10000 tons	Crude	22° 40' 59.06" N
3			25000 tons	Crude	
4			10000 m ³ /h for 1 min	Crude	
5	SPM-IOCL (S2)	28.45	700 tons	Crude	69° 39' 14.05" E,
6			10000 tons	Crude	22° 40' 47.21" N
7			25000 tons	Crude	
8			10000 m ³ /h for 1 min	Crude	
B VLCC Jetty					
9	Spill Location (S15)	15.71	700 tons	Crude	69° 40.78' E,
10			10000 tons	Crude	22° 43.6' N
11			25000 tons	Crude	
12			10000 m ³ /h for 1 min	Crude	
C Pipeline					
13	Crude oil spill of 2611 tons at the pumping rate of 12500 m ³ /hr (2611 Tons of crude for 36 hrs) along the pipeline corridor at a select (midway) point of subsea pipeline in the pipeline routes. -- Spill point: (S3)	21.20	12500 m ³ /hr for 3hr	Crude	69° 39' 43.35" E, 22° 42' 36.39" N
D Tanker Route					
14	Instantaneous crude oil spill of 25000t along the tanker route at select location. Spill point: S4	22.54	25000 tons	Crude	69°32'11.38" E, 22°36'1.13" N
E West Basin (berths)					
15	100 tons (due to Berthing incident/ collision) at the West Basin berths (FO) Spill point: S5	14.61	100 tons	FO	69°34'13.99" E, 22°45'15.54" N
16	50 Tons (due to Berthing incident/ collision (diesel oil tanks) at the West Basin berths (HSD)		50 tons	HSD	69°34'13.99" E, 22°45'15.54" N

 Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:v



	Spill point: S5				
17	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berths -- Spill point: S5		700 tons	FO	69°34'13.99" E, 22°45'15.54" N
18 & 19	In the maneuvering basin: <ul style="list-style-type: none"> ○ 20 Tons of HSD oil due to Tug Impact (HSD) ○ 100 Tons of FO due to Tug Impact Spill point: S6	14.48	20 Tons 100 Tons	HSD FO	69°34'22.75" E, 22°45'5.33" N
20	Along the vessel route at one location: Instantaneous oil spill of 700t along the tanker route at a select location. (FO): Spill point: S7	17.08	700 tons	FO	69°33'40.66" E, 22°43'36.31" N
F	LNG berth				
21	100 tons (due to Berthing incident/ collision) at the LNG berth (FO) -- Spill point: S8		100 tons	FO	69°33'40.66" E, 22°43'36.31" N
22	50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the LNG berth (HSD) --Spill point: S8	13.76	50 tons	HSD	69°33'40.66" E, 22°43'36.31" N
23	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth-- Spill point: S8		700 Tons	FO	69°33'40.66" E, 22°43'36.31" N
G	South Basin (berths)				
24	100 tons (due to Berthing incident/ collision) at the LNG berth (FO) -- Spill point: S9		100 Tons	FO	69°39'38.08" E, 22°43'32.54" N
25	50 Tons (due to Berthing incident/ collision (diesel oil tanks) at the South Basin berths (HSD) – Spill point: S9	14	50 Tons	HSD	69°41'3.53" E, 22°43'50.33" N
26	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth -- Spill point: S9		700 Tons	FO	69°41'3.53" E, 22°43'50.33" N
27 & 28	At the turning circle: <ul style="list-style-type: none"> ○ 20 Tons of HSD oil 	17	20 Tons 100 Tons	HSD FO	69°41'33.62" E, 22°44'6.49" N



	<p>due to Tug Impact</p> <ul style="list-style-type: none"> 100 Tons of FO due to Tug Impact <p>Spill point: S10</p>				
H	MMPT				
	At the existing MPT1 berth: : Spill Point S11				69°42'20.45" E, 22°43'32.17" N
29	100 tons (due to Berthing incident/ collision) at the berth(FO) -- Spill point: S11	20.80	100 Tons	FO	69°42'20.45" E, 22°43'32.17" N
30	50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the berth (HSD) – Spill point: S11		50 Tons	HSD	69°42'20.45" E, 22°43'32.17" N
31	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth : Spill point S11		700 Tons	FO	69°42'20.45" E, 22°43'32.17" N
I	MICT / AMCT Berths:				
	At the existing MICT / AMCT Berths: : Spill point S12				69°42'56.30" E, 22°44'36.69" N
32	100 tons (due to Berthing incident/ collision) at the (FO) - Spill point S12	15.12	100 Tons	FO	69°42'56.30" E, 22°44'36.69" N
33	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth - Spill point S12		700 Tons	FO	69°42'56.30" E, 22°44'36.69" N

Hydrodyn-OILSOFT, a dedicated software for oil spill trajectory modeling was used for prediction of oil spill scenarios at selected locations in and around Adani Ports & SEZL facilities for various meteorological and hydrological conditions considering the worst-case oil spill scenario of instantaneous / continuous. The output of the model shall indicate the amount of spill that can take place and time taken by the spill (Hourly/Day basis) to reach the shoreline or protected areas such as mangroves, environmentally sensitive receptors, eco-sensitive zones, etc.). From the oil spill modelling studies, the following conclusion could be drawn.

- The spill volume and time taken to reach the coast and losses during its movement have been calculated.

	Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No: vii



- The percentage of spill volume reaching the coast, extent of oiling on the coast in metres, likely vulnerable areas, spill analysis, have been calculated.
- Resources such as tidal flats, islands and coastal areas which are likely to be threatened from oil spills have been identified.
- It can be concluded that the spills would move towards Sikka coast, Kalubar Island, Mundra Port and Vadinar coastal Zones during early of January.
- During the early of July, spills would move towards towards Kandla, Adani Port boundaries within 2 hours from spill start. Some spill scenarios such as Tanker Entry shows the spill staying in open ocean for long period of time.
- It can be noticed that the spill oil would reach Sikka and Vadinar coast. Some spill scenarios such as Tanker Entry, shows the spill staying in open ocean for long period of time.

The details for Oil spill trajectory and weathering studies are discussed in **PART-B- OIL SPILL FATE AND TRAJECTORY MODELING STUDIES** of the report.

C Environmental Sensitivity mapping of the areas likely to be affected by the oil spill

The objective of the study is to produce a tool for oil spill responders by providing an overview of resources vulnerable to oil spills, i.e. natural resources (Mangroves, Mudflats, Reef flats, Sandy Area, Sea Birds/Birds Nesting Area, Marine Mammals (Dolphins, Dugongs, Whales), Turtle Nesting Areas, Marine National Park, Marine Sanctuary, Forest Area) and Human activities (Fishing zones, Industrial sea water Intakes, outfall, Ports, jetties etc.)

The Environmental Sensitivity Index has been prepared based on the latest satellite information as well as available secondary data information of Gulf of Kutch region. This study is made as a part of the preparations for Risk Analysis study of oil spills in the Mundra region, Gulf of Kutch. The study covers the region between latitude Lat 22° 44' 18.89" N and longitude 69° 46' 42.67" is in Mundra region. The entire area of Gulf of Kutch has been divided into 12 zones and collected all marine sensitive information and prepared the Environmental sensitivity Index Mapping and Atlas based on IMO guidelines for the Adani Port and SEZ Limited, Mundra area.

Identified the most sensitive site and resources potentially exposed to oil spills due to the handling of crude oil in the Adani Port and SEZ Limited, Mundra region. The coastal sensitive areas including biological, industrial and socio-economic resources are identified and prepared Environmental Sensitivity Index (ESI) mapping of the areas likely to be affected by the oil spill. The details of ESI are discussed in **PART-C: SENSITIVITY INDEX MAPPING** of the report

 Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:viii



D. Oil Spill Response equipment and manpower to deal with the assessed quantity of the oil spill

Various response options (Mechanical equipment's, in-situ burning, dispersants and shoreline booming) have been discussed based on various spill scenarios of Adani Port and SEZ Limited, Mundra considering coastal marine sensitivity analysis of Gulf of Kutch region. The Net Environmental Benefit Analysis (NEBA) has been formulated considering all available response options for oil spills and selected the techniques that will provide the best opportunities to minimize consequences for the environment.

The study has been divided the potential relative Impact ranging from 1 (None) to 4(High). Likewise, the impact modification factor was also divided from 1 (None) to 4 (High) for four categories of response options (Mechanical equipment's, in-situ burning, dispersants and shore line booming). The intermediately ranges for both axes were then further divided to provide some more definition to the matrix. The risk ranking matrix for this NEBA was based on Environmental, Industrial and Biological sensitive areas risk assessment matrices generated.

Th NEBA process is to evaluate the consequences of Natural Attenuation, which serves as a baseline. All subsequent rankings are relative to the baseline, i.e., are conditions better or worse for each resource when using each individual response options. Using the risk ranking matrix requires estimating the proportion of the resource affected, and how long it will take the resource to recover. Based on the total impact mitigation score and ranking of High (4), Low (- 4) was assigned.

Based on the NEBA analysis selected best multiple response options are mechanical and dispersants among other response options available for APSEZL Mundra

NEBA studies has been carried out based on available response options to be prepared as a part of Oil Spill Contingency Plan for Adani Port and SEZ Limited, Mundra region. The details of NEBA studies are discussed in **PART-D: NET ENVIRONMENT BENEFIT ANALYSIS** of the report.

In accordance with the National Oil Spill Disaster Contingency Plan (NOSDCP) all the Ports are required to maintain Tier-I Oil Spill Response (OSR) facilities. Accordingly, Adani Port and SEZ Limited, Mundra has to set up and sustain Tier-I (up to maximum spill volume of 700 Tonnes) OSR facilities in Mundra in co-ordination with neighboring companies operating at these Ports. For this purpose, Adani Port and SEZ Limited, Mundra and other Participating Companies (HMEL) has executed a Memorandum of Understanding (MOU) for sustenance of Tier-1 OSR facilities for combating oil spills at and surrounding area within Mundra region. The following oil spill response facilities and required manpower are estimated based on risk assessment study

 Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:ix



and oil weathering condition to deal with expected quantity of spill and should be placed in the vicinity of Adani Ports & SEZ Limited.

Sr. No.	ITEM	Minimum No. of operators/ workmen deployed on the equipment	Quantity / Unit
(1)	(2)	(3)	(4)
1	Operation and Management of OSR Centre at Adani Ports & SEZL as mentioned in column (3) including 2 VHF and 3 walkie talkie sets, computers & printers with furniture etc. and operating at 24 x 7 x 365 days	Operation Manager with Level 3 – 1 No. OSR I/c with Level 3 – 3 No. Shift I/c – 1 No. Radio Operator – 1 No. Responders – 10 Nos. Total Man power – 16 Nos.	1 3 1 1 10 Total: 16 Nos
2a	OSR Work Boat with crew as per column (3) as per detailed specifications		1
2b	Tugs		1
3a	inflatable boom with accessories (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of about 440mm, overall height 1200 mm and skirt of about 500 mm and length of 100/200 m in a bag/reel complete including 4 nos hydraulic air blowers etc complete as per Specifications.	NA	2000m
3b	Fence Boom (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of 450mm and over all height of 1200mm and length of 100m etc. complete as per specifications	NA	235m

4a	Weir type oil skimmer of 50 m ³ /hr capacity oil recovery free floating skimmer along with suitable pump and hydraulic Power Pack complete with all accessories.	NA	2 Nos.
4b	Drum/ brush type oil skimmer 50 m ³ /hr capacity oil recovery free floating skimmer, along with suitable pump and hydraulic Power Pack complete with all accessories etc. complete as per specifications.	NA	2 Nos.
4c	Vacuum type oil skimmer 30 m ³ /hr capacity oil recovery pump coupled to a diesel engine complete with all accessories etc. complete as per specifications.	NA	2 Nos
5a	Bio Remediation (L)	NA	2000 L
5b	Oil Spill Dispersant, concentrate type-3 combined, approved by the	NA	3 KL

 Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:x



	Indian Coast Guard		
6	Flex Barge of about 10 KLtrs. along with its accessories.	NA	2 Nos
7a	Absorbent (oil only) 80 L Kit for quick oil spill response	NA	2 Nos
7b	Sorbent pads 20-inch x 20 inch (nos)	NA	2000 Nos
7c	Sorbent Boom size min 5inch dia, min length 5 feet	NA	500 Nos
8	Protective Equipment (PPE) kit for oil spill response.	NA	15 Nos
9	VOC Portable Monitor	NA	0

F. Adani Port - IMO level trained Responders

(IMO OPRC) Level - 3

Sr No.	Name	Course Institute	Issued on	Valid till
1	Capt. Sachin Srivastava (HOD- Marine Services, Adani Mundra Port).	OSCT India 01-04 Mar 2022		
2	Capt. Aditya Gaur (HOD- Marine Services Adani, Kattupalli Port)	OSCT India 01-04 Mar 2022		
3	Capt. Ajit Mahapatra (HOD- Marine services, Adani Dhamra Port)	OSCT India 01-04 Mar 2022		

(IMO OPRC) Level - 2

Sr No.	Name	Course Institute	Issued on	Valid till
1	Sudhakar Singh	OSCT India 18 -22 April 2022	22-Apr-22	21-Jun-25
2				

(IMO OPRC) Level - 1

Sr No.	Name	Institute	Issued on	Valid till
Marine Services				
1	Mr.Ramdas Pawale	ICG	10-Aug-18	9-Aug-23
2	Mr Leelu Singh	ICG	10-Aug-18	9-Aug-23
3	Mr Amod Pandey	ICG	10-Aug-18	9-Aug-23

	Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVN 2022-003-R3
			Page No:xi



4	Mr Santosh Rasam	ICG	10-Aug-18	9-Aug-23
5	Saket Kumar	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
6	Ashok Singh	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
7	Chandra Shekhar Kumar	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
8	Upinder Samkaria	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
9	Yugal Kishor Sharma	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
10	Arapn Chowdhury	ICG	Course 04-08 April 2022	7-Apr-27
11	Mehul Makwana	ICG	Course 04-08 April 2022	7-Apr-27

G. Other Departments

1	Mr Amrendra Tiwari, LQD	ICG	10-Aug-18	9-Aug-23
2	Haresh Patel, LT Ops	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
3	Sachin Patel, LT Ops	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
4	Ravindra Parikh, Lqd	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
5	Mr Nikul Kasta, CT4	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
6	Mr Ajay Kumar Bhatt CT4	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
7	Vimal Chhabhaiya CT-4	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
8	Mr. Kamlashankar Joshi CT Planner	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
9	Laxmikant Limbani, AICTPL ICD	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
10	Rajesh Makwana, AICTPL	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22



11	Farhan Khan, AICTPL	Sea Care Marine Services	Course 28th to 31st Aug 2019	27-Aug-22
12	Mukesh Pushkarna, ES CT-3	Sea Care Marine Services	Course 28th to 31st Aug 2019	27-Aug-22
13	Vijay Chavda, HSE	Sea Care Marine Services	Course 28th to 31st Aug 2019	27-Aug-22

First Aid Post

Post Number	Location
First Aid Post No:1 – with ambulance service	Occupational Health Centre, MMPT
First Aid Post No:2 – with ambulance service	Occupational Health Centre, WB
First Aid Post No: 3	Adani Hospital

H. Gap analysis between required and available resources and provide detailed specification of the required additional equipment/ facilities along with detailed justification for the recommended additional facilities.

Sr. No.	ITEM	As per NOS-DCP 2018	Available in the present
(1)	(2)	(3)	(4)
1	Operation and Management of OSR Centre at Adani Ports & SEZL as mentioned in column (3) including 2 VHF and 3 walkie talkie sets, computers & printers with furniture etc . and operating at 24 x 7 x 365 days	Operation Manager with Level 3 - No. OSR I/c with Level 3 - No. Shift I/c - No. Radio Operator - Nos. Responders - Nos. Total Man power – Nos	1 3 1 1 10 Total: 16 Nos
2a	OSR Work Boat with crew as per column (3) as per detailed specifications	4 Nos	4 Nos
2b	Tugs	4 Nos	4 Nos
3a	inflatable boom with accessories (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of about 440mm, overall height 1200 mm and skirt of about 500 mm and length of 100/200 m in a bag/reel complete including 4 nos hydraulic air blowers etc complete as per Specifications.	2000 m	2000m
3b	Fence Boom (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of 450mm and over all height of 1200mm and length of 100m etc. complete as per specifications	1000 m	235 m
3c	Current buster room -fasflo-75 (for response in fast		2 Nos

	Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No: xiii



	current)		
4a	Weir type oil skimmer of 50 m ³ /hr capacity oil recovery free floating skimmer along with suitable pump and hydraulic Power Pack complete with all accessories.	3 Nos	2 Nos
4b	Drum/ brush type oil skimmer 50 m ³ /hr capacity oil recovery free floating skimmer, along with suitable pump and hydraulic Power Pack complete with all accessories etc. complete as per specifications.	3 Nos	2 Nos.
4c	Vacuum type oil skimmer 30 m ³ /hr capacity oil recovery pump coupled to a diesel engine complete with all accessories etc. complete as per specifications.	5 Nos	2 Nos.
5a	Bio Remediation (KL)	2 KL	2 KL
5b	Oil Spill Dispersant, concentrate type-3 combined, approved by the Indian Coast Guard	3 KL	5 KL
6	Flex Barge of about 10 KLtrs. along with its accessories.	4 Nos	2 Nos
7a	Absorbent (oil only) 80 L Kit for quick oil spill response	0	1 Nos
7b	Sorbent pads 20-inch x 20 inch (nos)	2000 Nos	2000 Nos
7c	Sorbent Boom size (12.5cm*4m)	500 Nos	500 Nos
8	Protective Equipment (PPE) kit for oil spill response.	Lev-A – 5 Nos Lev-B -10 Nos Lev-C -20 Nos Lev-D -30 Nos	15 Nos
9	VOC Portable Monitor	4 Nos	0



Additional equipment and location

LIST OF RESOURCES AVAILABLE-ADANI PORTS and SEZ LIMITED, MUNDRA						
Tugs Available for Oil Spill Containment						
Name of Tug	Type	BHP	OSD	AFFF	Capacity (cum/Hr)	BP
Dolphin No. 4	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 7	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 10	ASD	3000 X 2	3000 ltr	-	-	70
Dolphin No. 11	ASD (DSV)	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 14	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 15	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 16	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 17	ASD	3000 X 2	3000 ltr	-	-	70
Dolphin No. 18	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Brahmini	ASD	2000 x 2	3000 ltr	2000 ltr	1200	65
Bitarni	ASD	2000 x 2	3000 ltr	2000 ltr	1200	65
Khushboo	Fixed screw	401 X 2	-	-	-	10

Dolphin No. 4, 7, 11, 14, 15, 16, 17, 18, Brahmini and Bitarni are fitted with Oil Spill Dispersant boom and proportionate pump to mix OSD and Sea water as required. The tugs are also fitted with a fire curtain and remote-controlled fire monitors.

All above ten Tugs have class notation as Harbour Tugs and are certified to work within the Harbour limits only.

2. Reception Facility: 12" pipe line, connected to a slop tank at chemical tank farm.

Dolphin 11 has firefighting system of 1200 m3/hr along with 20 ton lifting "A" frame and diving support facility.

Location of Oil Spill Equipment: The Oil Spill Equipment stored in SPM Store.

I. Comprehensive oil spill contingency plan (OSCP) for the Adani Ports and SEZ Limited, Mundra

The report consists of the following sections

Strategy section

This part consists of oil spill risk assessment, response objectives and strategies, organization and details of response equipment's. This section is designed to help responders understand in advance the expected oil spill scenarios, the ways and means to respond effectively and to minimize pollution of the environment. This part of the plan is from **Chapter 2** to **Chapter 6**.

Action and operation section

This section includes specific instructions for responders, once the spill occurs, on what to do and how to do, for each oil spill incident. This is to ensure that emergency action by responders gets

 Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: xv



underway promptly and in an orderly manner. This part is from **Chapter 7 to Chapter 10**.

Data directory

This part includes information on Coastal facilities, Access roads, Telephones, Hotels, shoreline resources available with various organizations, Sensitivity area Mapping, primary oil spill equipment available, communication facilities etc., statutory regulations, area of operation, training and competence, weathering data on Hydrodyn-OILSOFT, Mud flat shore cleanup techniques, OSD Specifications, Oil Spill Management plan of Adani Ports & SEZL, oil spill response decision tree, IMO Guidelines on OSR to areas full of. This part is Chapter 11.

	Adani Ports and Special Economic Zone Ltd, Mundra	Executive Summary	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:xvi



PROJECT TEAM OF ENVIRON SOFTWARE (P) LTD

Name of the Person Involved	Project Designation	Role and Responsibility
Dr G S Reddy	Project Leader	Assessing the data required Managing the team and Supervision of data inputting the model Analyzing the output data Report preparation
Ms. Smitha Dr Rashmi	Team Members	Data interpretation & Simulation runs Prepare the tools for report preparation Preparing the input data for model Simulation runs Digitizing the satellite Maps Graphical outputs preparation Report preparation

1. INTRODUCTION

1.1 Contingency Plan:

Oil spill contingency planning is the process of developing a suitable spill response capability that is in compliance with the local regulatory framework and commensurate with the oil spill risks of an organization or facility. This document provides guidance on the contingency planning process for potential oil spills in or on water following an accidental release of oil to a marine or aquatic environment, whether that be during the handling, transport, production or storage of oil products.

The intensity of marine traffic has increased tremendously along the Indian coasts, especially increase of oil tankers for transporting the petroleum products. Hence, the risk for occurrence of oil spills increasing in vessel route, Berth/Ports during terminal operations. The spills also occurring from collision/grounding of vessels. The oil spills will lead to marine environmental pollution and damaging the ecosystem including marine infrastructure facilities of Ports and Harbors. Hence, oil industries and ports should create individual capabilities to handle the response activity in case of spills. The procedures prepared at various levels for handling the spills called Contingency Plan. The study area as shown in Fig 1.1 provides a location of Adani Ports and SEZ Limited in Mundra including cargo berths / Jetties and SPMs.

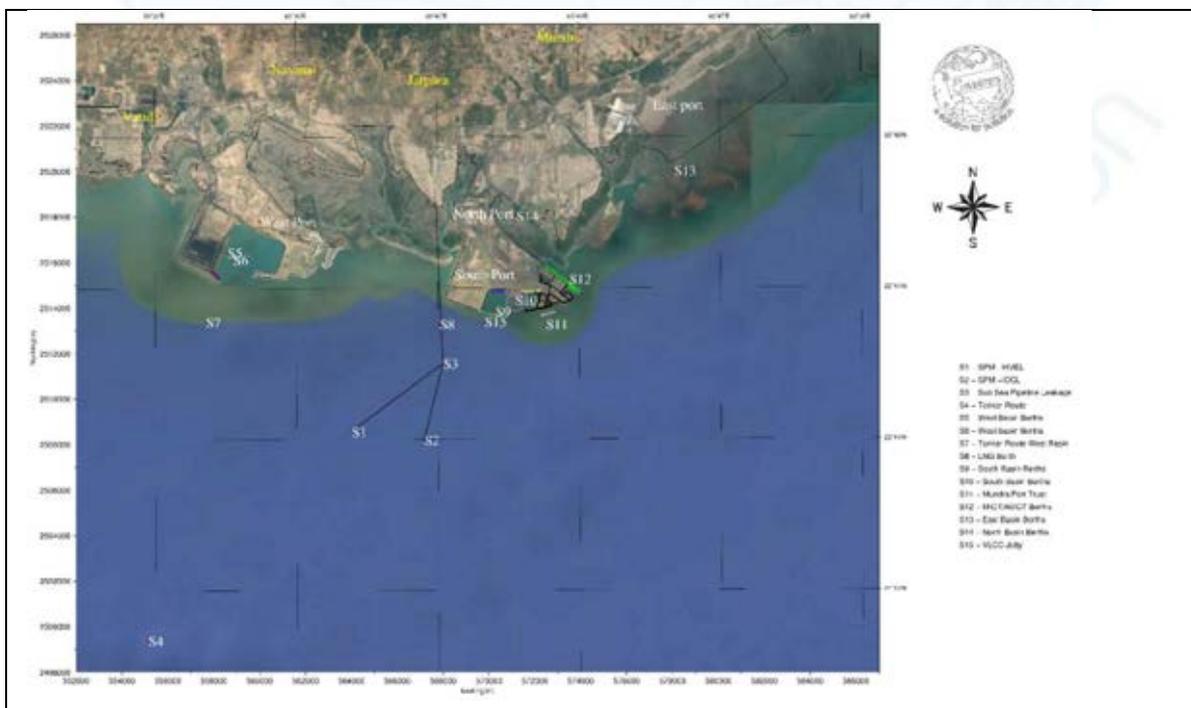


Fig.1.1 Cargo berths / Jetties of Adani Ports and SEZ Limited, in the Mundra region, Gulf of Kutch



1.2 Description of operations at Adani Ports and SEZ Limited, in Mundra

The Adani Ports and SEZ Limited, Mundra, is located (Lat 22° 44' 18.89" N, long 69° 41' 35.62" E) at Mundra in Gulf of Kutch, protected by the southern / northern coast of Gulf of Kutch. The deep waters in the Gulf provide ample shelter for shipping throughout the year. The entrance of the Ports which has approaches from the mouth of Gulf of Kutch at Okha, a distance of about 90 km from Mundra.

The approach channels to the APSEZL ports are deepened to meet the requirement of cargo vessels. With good lighting arrangements navigation is allowed at the port round the clock.

Adani Ports and SEZ Limited, Mundra has been operational since Oct 1998 when the construction of primary infrastructure and a multi-purpose terminal for Dry and Liquid Bulk cargo was completed. Presently Adani Ports and SEZ Limited, Mundra has 11 Container Berths, 16 Multi-purpose Berths, 1 - LNG, 1 - VLCC and 2 - SPMs with back-up facilities.

The location of the Berths is situated at Mundra at approximately (Lat 22° 44' 18.89" N, Long 69° 41' 35.62" E). The berths are Located in the north bank of Gulf of Kutch region. The berthing jetties are for operating vessel operability and potential to meet the future trends. APSEZL has developed Cargo berths, approaches and turning circles to handle vessels at the Berth.

Adani Ports and SEZ Limited, Mundra, currently owns and operates several marine facilities located at Mundra, Gulf of Kutch. The Mundra port facility is located on the West Coast of India in Gulf of Kutch about 50 Km west of Kandla in District Bhuj of Gujarat state.

The Adani Ports and SEZ Limited, Mundra handles the majority of its Dry and Liquid products traffic through the South, West terminals. There are several berths and Jetties at Mundra for berthing of cargos. Two subsea pipelines connect the onshore to the IOCL, HEML SPMs (Fig.1.1).

APSEZL, Mundra has developed various marine facilities which include four mega scale basins i.e. South Basin and West Basin at Mundra in last five years. Fig.1.2 gives the overall layout of the Mundra port facilities and, Fig.1.3, Fig.1.4 gives the zoomed-up portion of the port layout considered for this study.

 Adani Ports and Special Economic Zone Ltd, Mundra	Introduction	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:2



Fig.1.2 Overall layout of the APSEZL, Mundra port facilities showing spill locations selected



Fig.1.3 Zoomed portion showing marine facilities of South Basin and spill locations selected

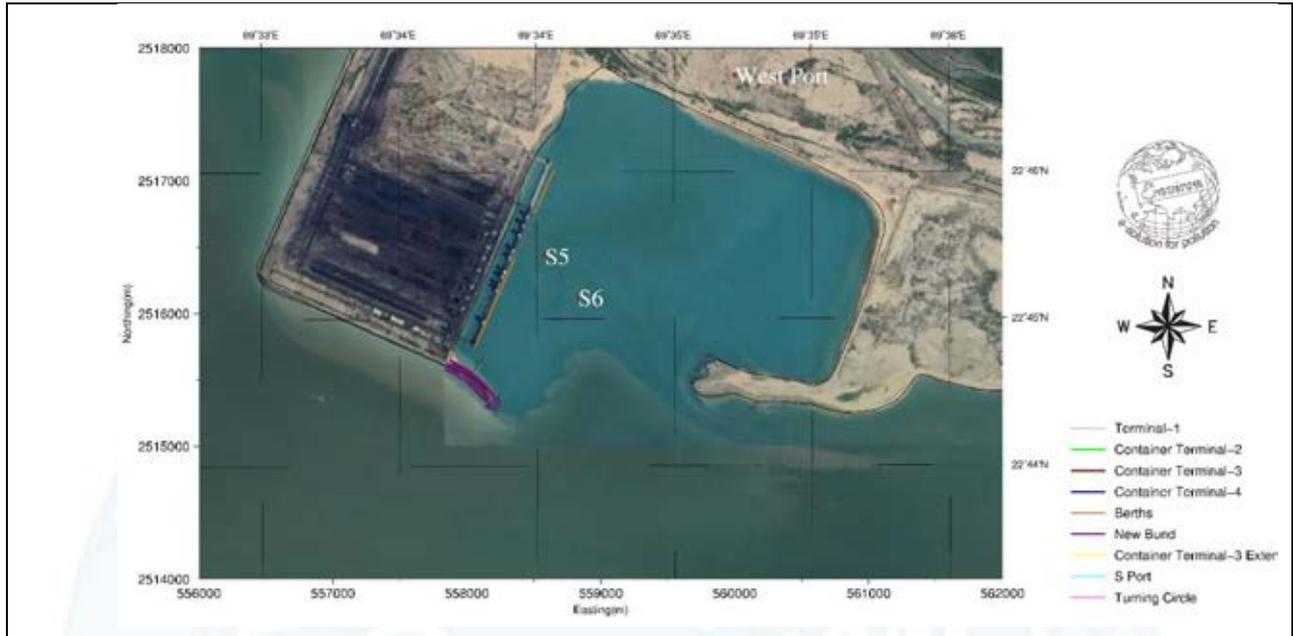


Fig.1.4 Zoomed portion showing marine facilities of West Basin and spill locations selected

Existing berths and Proposed Jetties

There are 16 existing berths at MMPT 1, MMPT 2, MMPT 3, MICT, AMCT catering to liquid, Container as well as General cargo. Adani Ports and SEZ Limited, Mundra is under progress for expanding the Terminal-2 and Terminal-3 for handling container and dry cargos.

West Basin

West Basin is about 10 Nautical miles west of the existing terminals of Mundra port. Four Berths are located at approx. 22° 45' 14.82" E and 69° 34' 6.23" N, off Tunda Wandh falling in Taluka Mundra. The basin is also planning to expand with 3 more additional berths for handling dry cargo. Two power plants are located North of these berths, in barren waste land. National Highway 8A extension passes through north side of the power plant sites at a distance of approximately 6 km.

South Basin

The south basin is in western side of the existing port on Navinal Island. Six berths are located at approx. Lat 22° 44' 18.89" N, Long 69° 41' 35.62" E. It has presently 6 operational berths. It has an enclosed turning basin and necessary back up area. The basin is also planning to expand with two container berths (CT-5) for handling Container cargo.



VLCC Jetty:

The development of jetty facilities is in progress for handling VLCC at Mundra for Crude oil operations.

The oil spill risk analysis studies is to be carried out for all these facilities within the Mundra port limit facilities which comprise of the SPMs, West basin, South basin, LNG Jetties, proposed VLCC jetty and existing berths as shown in Fig.1.1, Fig.1.2, Fig.1.3, Fig.1.4 and Fig.1.5. Hence, mathematical modeling studies for predicting the fate and oil spill trajectory due to spills if any at Port operations facilities for various seasons is mandatory for OSCP. Oil spill modeling to be carried out as a part of Oil Spill Contingency Plan to identify the suitable combating operations for controlling the spills.

1.3 Purpose of the Plan

Adani Ports and SEZ Limited, Mundra (APSEZL, Mundra) is committed to properly manage any oil spill incident that may arise during the course of the port operational activities in order to minimize the impact on personnel, environment, ecology, socio-economy, property, company's financial position and its reputation. As part of regulatory requirements, APSEZL, Mundra is mandated to establish an Oil Spill Contingency Plan (OSCP) for Tier-1 response capabilities and duly approved by the regulatory authorities, and which includes an effective response system with trained personnel and a pre-established organization structure as well as the capability to mobilize and respond to the spill incident in the least amount of time. The primary purpose of the plan is to facilitate the implementation of the necessary actions to stop or minimize the discharge of oil/ chemicals and to mitigate its effects using best response facilities and use of oil spill dispersants (OSD).

1.4 Objectives of the Plan

The objectives of the OSCP are:

- To establish a rapid and effective system for detection and reporting of spills, with adequate measures for preparedness for oil and chemical pollution;
- To facilitate rapid and effective response to spill events with adequate measures to protect the health and safety of personnel, community, socio economic resources and protection of the marine environment;
- To establish appropriate response techniques to prevent, control, and combat oil and chemical pollution during spills, and disposal of contained material in an environmentally sound manner;
- To establish the communication channels essential for the coordination of tasks needed to deal with a pollution incident, and

 Adani Ports and Special Economic Zone Ltd, Mundra	Introduction	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:5



- To ensure that the plan provides an integrated response together with the National Oil Spill Disaster Contingency Plan (NOS-DCP 2015).

1.5 Applicability and Geographical Limits of the Plan

This OSCP provides the response procedures and arrangements available for oil spill incidents during the port operations in the APSEZL, Mundra limits. It assigns roles and responsibilities for different personnel during an emergency.

The plan covers all spill incidents that occur within the block area and are likely to affect the marine environment and coastline along the block area. It must be noted that this document is not restrictive in nature and is developed in order meet requirements specified under statutory requirements presented for handling oil spill emergencies. The level of response will be guided by the response strategies defined in this document and will be governed by the severity of the spill event, its effect on the health and safety of the employees and contractors, impacts on the environment and Port reputation.

The scope of this plan extends to the entire area and beyond depending upon the trajectory of the spill. The geographical coordinates of the spill locations in the Mundra region as shown in Figure.1.1. The locations within the limits of study domain are Ports, Port operational facilities at South / West / MPT port facilities etc. The sensitive areas including berths / jetties, Mangrove vegetation, biological resources are to be protected with better response plan adopting well-planned tactical response methods.

1.6 Authorities and Responsibilities

Prevention of accidental oil spillage is APSEZL, Mundra first priority. Port operating facilities will be designed, installed and operated in such a manner so as to minimize possibility of oil spills. Facilities, resources and support provided by third parties are also required to meet international pollution prevention design and operation standards.

The Oil Spill Contingency Plan (OSCP) has been prepared based on National Oil Spill – Disaster Contingency Plan (NOS-DCP) and the provision of Merchant Shipping Act, 1958 and Major Port Trusts Act, 1963.

Risks of oil spills associated with APSEZL, Mundra operations are and as such several measured for oil spill contingency planning were taken by port.

APSEZL, Mundra shall be responsible for any clean-up responses and all other incidental and consequential costs of whatsoever nature resulting from oil spills due to their activities/ operations. APSEZL, Mundra Man (Manager) is incident Response Coordinator. The Port is committed to integrate in its operations ways to identify oil spill risks, prevent oil spills, and to implement appropriate changes in its contingency plan for spill response and clean-up strategies.

 Adani Ports and Special Economic Zone Ltd, Mundra	Introduction	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:6



To achieve this, APSEZL, Mundra policy will be to:

- Respond immediately to any oil spill incident with the objective of protecting Marine & Human life and to minimize environmental impacts;
- Work and consult with appropriate government bodies and the local community to address any issues relating to oil spills in a timely manner;
- Provide adequate training and information to enable employee and contractors to adopt environmentally responsible work practices and to be aware of their responsibilities in the prevention and clean-up of oil spill.
- Develop emergency plans and procedures so that incidents (accidental releases) can be responded to in a timely manner.
- Develop and maintain management system to identify, control and monitor risks and to comply with Statutory Regulations and Industry Guidelines.
- Assess the situation and take timely and appropriate action where third-party interests are involved, such as products or chartered vessels from nearby ports / agencies etc.
- Ascertain that each identified employee is responsible for the implementation of this policy in association with his specific duties. This includes contractors and employees.

1.7 Coordinating Committee

Crisis Management Group (CMG) will be the coordinating committee for oil spill response operations under Facility level oil spill contingency plan for APSEZL, Mundra. Oil spill response plan identifies the APSEZL, Mundra spill response organization, team responsibilities, communications and the procedures to respond all possible oil spill emergencies within the Port limits.

The assigned duties with respect to conduct of operation as mentioned here under will accordingly be required to be discharged by each On Scene Commander (OSC) (in the event of multiple ops). On Scene Coordinator (OSCo)/ Chief OSCo is responsible for undertaking all possible and feasible actions to respond to spill and direct the response team / teams at site. He is to decide the best response action required to be adopted as per situation and guide the response team/ teams accordingly.

The callout system for an oil spill incident is identical to any other emergency as contained in disaster management plan of APSEZL, Mundra. Emergency Control Team (ECT) will arrange mobilization of additional resources like Emergency Response Team (ERT) as when, required.

Emergency Control Team

The ECT will comprise the following members

- Chief Operating Officer APSEZL, Mundra

 Adani Ports and Special Economic Zone Ltd, Mundra	Introduction	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:7



- Incident Control Officer (HOS – Marine / Duty Port Captain)
- Site Emergency Coordinator (Senior Pilot and Duty Radio Officer)
- Fire Coordinator (HOS – Fire / HOS -Safety)
- HOS – Security / Duty Security officer
- Medical Superintendent
- Marine Pollution Coordinator – Manager (Marine /Pollution Control)
- Traffic Coordinator - Duty Port Captain
- Communications Officer (Duty Port Captain / Marine Control in-Charge)
- Chief Emergency Controller (Head -HSE)
- Civil Coordinator (HOS – Environment Cell / HOS Estate)
- Marine Engineering Coordinator (HOS – SPM / Diving Team in-Charge)
- HOD – Corporate Affairs
- HOS-Legal & HOD Estate

1.7.1 Statutory Requirements

As a part of this Plan, the port, facility or the identified ECT (Emergency Control Team) is responsible to undertake spill mitigation operations apart from managing, acquiring and maintaining oil spill response equipment and resources appropriate for response as per the Risk Category-A (NOSDCP-2018). Equipment, resources and personnel will be stockpiled at one or more suitable location/s as necessary to meet response requirements within shortest period.

The ECT is responsible for executing all the response mechanisms and procedures identified by the Plan and maintain trained personnel to undertake the operations.

An oil spill contingency plan is based on the understanding of the regulatory framework in which the assets and operations are located and in which the planning and response actions will be carried out.

This section summarizes the relevant national and international legislations related to oil spill response.

1.7.2 Enforcement Agencies and Authorities

At national level, various regulations have been formulated to ensure that oil spills are adequately notified and handled with least impacts on the aquatic and terrestrial environment along with public health and safety.

 Adani Ports and Special Economic Zone Ltd, Mundra	Introduction	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:8



- Merchant Shipping Act 1958 and Amendment in 2003: This Act requires oil companies to clean up any oil spill from offshore petroleum related activities whether at sea or ashore.
- Environment Protection Act 1986 and EIA Notification, 2006: The Ministry of Environment and Forests and Climate Change (MoEF&CC) while granting environmental clearance to oil and gas projects requires the company to establish oil spill control capabilities.
- Section 32 of the Water (Prevention and Control of Pollution) Act 1974: The Gujarat State Pollution Control Board (GPCB) holds the power to prevent discharge of hazardous and polluting materials into the sea or tidal waters.
- Coast Guard Act, 1978: The Act requires every owner, operator of a port facility, oil installation, and offshore installation to prepare and implement oil spill disaster contingency plan.
- Petroleum and Natural Gas (Safety in Offshore Operations) Rules, 2008 (PNGSOOR), G.S.R. 469(E): These Rules have been formulated through Sections 5, 6 and 7 of the Oilfields (Regulation and Development) Act, 1948 (53 of 1948). It requires operators to undertake risk assessment related to activities and prepare safety management systems and emergency response plans pursuant to the provisions of the Rules.

Indian Coast Guard

The Indian Coast Guard is the national coordinating authority for marine oil spills. Under the Coast Guard Act, 1978, the CG is responsible for control of pollution at sea and protection of marine environment. Indian Coast Guard has prepared and implemented a National Oil Spill Disaster Contingency Plan (NOS-DCP). As per the Act, all spills are required to be reported to the Coast Guard. In the event of a spill, the nearest Coast Guard station will be notified. When a spill is reported, the Coast Guard will monitor the movement of spill while Adani Ports and SEZ Limited, Mundra takes the response measures.

Oil Industry Safety Directorate (OISD)

Oil Industry Safety Directorate (OISD) is a technical directorate under the Ministry of Petroleum and Natural Gas that formulates and coordinates the implementation of a series of self-regulatory measures aimed at enhancing the safety in the oil and gas industry in India. OISD maintains a database of accidents taking place in the oil industry and also investigates the major incidents, therefore has to be notified of incidents in offshore installations.

1.7.3 Statutory Requirements

International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)

 Adani Ports and Special Economic Zone Ltd, Mundra	Introduction	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:9



MARPOL 73/78 is the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978. The Protocol desires to achieve the complete elimination of intentional pollution of the marine environment by oil and other harmful substances and the minimization of accidental discharge of such substances. The Convention includes regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations - and currently includes six technical Annexes.

- Annex I: Regulations for the Prevention of Pollution by Oil;
- Annex II: Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk;
- Annex III: Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form;
- Annex IV: Prevention of Pollution by Sewage from Ships;
- Annex V: Prevention of Pollution by Garbage from Ships; and
- Annex VI: Prevention of Air Pollution from Ships.

Regulation 37 of MARPOL Annex-I require that oil tankers of 150 gross tonnage and above and all ships of 400 gross tonnage and above carry an approved Shipboard Oil Pollution Emergency Plan (SOPEP). Regulation 17 of MARPOL Annex-II makes similar stipulations that all ships of 150 gross tonnage and above carrying noxious liquid substances in bulk carry an approved shipboard marine pollution emergency plan for noxious liquid substances. The latter may be combined with a SOPEP and should be referred to as a Shipboard Marine Pollution Emergency Plan (SMPEP).

The SOPEP/ SMPEP must include:

- Procedures for reporting oil pollution incidents.
- List of authorities and persons to be contacted in the event of an incident.
- Detailed description of immediate action to be taken to reduce or control discharge of oil following an incident.
- Procedures and point of contact for coordinating spill response actions with national and local authorities.

The International Maritime Organization (IMO) has produced the following guidelines to facilitate the preparation of such plans:

- Guidelines for the Development of Shipboard Marine Pollution Emergency Plans, 2010 Edition which includes Guidelines for the development of Shipboard Oil Pollution Emergency Plans (SOPEP) (resolution MEPC.54 (32), as amended by resolution MEPC.86(44)).
- Guidelines for the development of Shipboard Marine Pollution Emergency Plans of Oil and/or Noxious Liquid Substances (Resolution MEPC.85 (44), as amended by resolution MEPC.137 (53)).

 Adani Ports and Special Economic Zone Ltd, Mundra	Introduction	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:10



MARPOL also gives guidelines for reporting pollution incidents to the authorities and outlines standard report formats.

International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990

The IMO's Marine Environment Protection Committee developed this Convention to provide a framework for international cooperation for combating major oil pollution incidents. The Convention has the following key elements:

- precautionary and preventative measures are important in the avoidance of oil pollution in the first instance;
- prompt and effective action is essential to minimize possible damages in the event of pollution;
- contingency planning needs to be emphasized and the role of the oil and shipping industries should be included within these plans;
- the need for mutual assistance, international cooperation and information exchange (on response capabilities and reporting incidents);
- the 'polluter pays' principle; and
- the importance of related international instruments on liability and compensation, including the 1992 Civil Liability Convention (1992 CLC) and the 1992 Fund Convention.

Article-3 of the International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990, also requires operators of offshore units under the jurisdiction of Parties to have oil pollution emergency plans or similar arrangements which must be coordinated with national systems for responding promptly and effectively to oil pollution incidents.

1.8 Mutual aid Agreement

For the port activities suitable agency will be hired for supporting logistics for port operations. As a part of the service, necessary emergency services will also be sought from the port authority.

As per the National Oil Spill Disaster Contingency Plan (NOS-DCP), all Ports or facilities handling oil and oil products are required to maintain Tier-I Oil Spill Response (OSR) capabilities to undertake response activity within their area of operation.

Accordingly, the ports of Adani Ports and SEZ Limited, Mundra is required to set up and sustain Tier-I OSR facilities in Mundra region in co-ordination with HMEL operating at these Port. For this purpose, APSEZL, Mundra and other Participating viz. HMEL, Mundra have executed a Memorandum of Understanding (MOU) for sustenance of Tier-1 OSR facilities for combating oil spills at and in surrounding area within Adani Mundra / GOK.

 Adani Ports and Special Economic Zone Ltd, Mundra	Introduction	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:11



Under the said MOU, it has been decided to put in place Tier-1 Oil Spill Response Services in Mundra Region for conduct of Oil Spill Operations and mitigation of Pollution within the identified area of operation.

1.9 Geographical Limits of the Plan:

The scope of this plan extends to following locations facilities stretched and facilities over a geographical area of more than 100 Sq Km with multiple operations going on same time.

Ports of Adani

Transshipment facilities at Adani Ports and SEZ Limited, Mundra

Adani West and South Ports

Kandla Port, Essar Port at Vadinar, Coast Guard Jetty

Intake and outfalls

1.10 Interface with ROSDCP and NOSDCP

National Oil Spill Disaster Contingency Plan is aimed at coordination of resource agencies to combat an oil spill in Indian waters and also spells the actions required of oil handling facilities i.e. to prepare contingency plans for respective facilities and to develop Tier-I response capabilities and also to report oil spills.

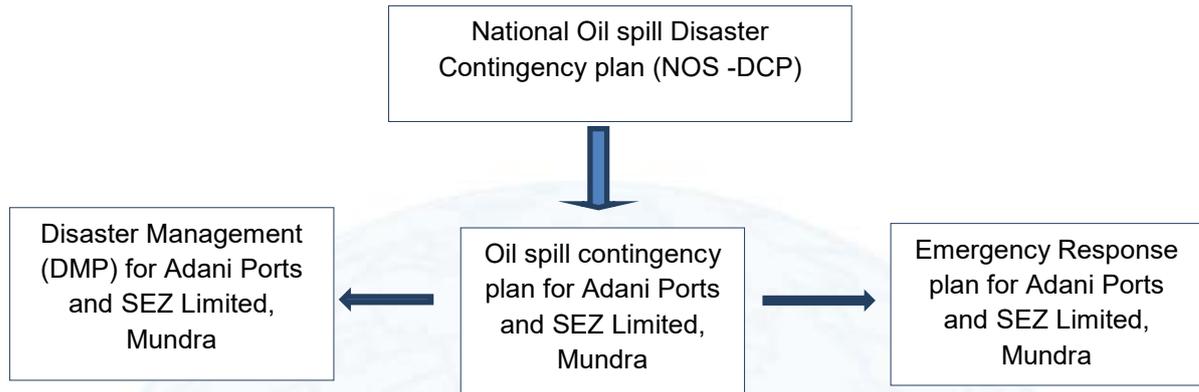
Render resources for pollution response when called for, Report Oil Spills, prepare contingency plans for respective spill scenario, set up Tier I response facilities and Use of Oil Spill dispersants (OSD) in accordance with Plan.

Of the three tiers of response envisaged and planned to handle a spill situation in consonance with quantum of spill, Tier-1 is the primary and first step of responses, to be mounted by the facility where the spill takes place.

While, NOS-DCP outlines the response activities as per Tier system of addressable of spill, the facility plan is the instrument to address the spill scenario at local level. Tier-1 being the first and primary response level has to be executed and undertaken by the facility handling polluting cargo, for which purpose drafting of a CP is the primary requirement.

A spill situation could arise out of an incident or a number of incidents that could be either natural or man-made leading to emergencies. In the event of multiple emergencies, while the spill response will be undertaken as per this Plan, response to other emergencies will be as per Adani Ports and SEZ Limited, Mundra Emergency Response Plan. This plan interfaces with following documents as illustrated below:

 Adani Ports and Special Economic Zone Ltd, Mundra	Introduction	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:12



This Oil Spill Contingency Plan has the direct interface with the following plans, manual, guideline and standards of APSEZL, Mundra and Port Operational program:

- APSEZL, Mundra – Disaster Management Plan
- Regional Oil Disaster Contingency Plan (ROSDCP)
- National Oil spill Disaster Contingency plan (NOS -DCP)



2. QUANTITATIVE RISK ASSESSMENT OF OIL SPILLS

The oil spill may occur generally during either from transportation or from offshore facilities which include the surface facilities viz., platforms, berths / Jetties, vessels and subsurface pipelines and all other associated infrastructure required for the transport / port operations. The spilled oil moves in the directions of resultant of wind and current and finally either stranded in the coast or in the sea. If spill reaches the coast, it will damage the coastal sensitive areas, which are to be protected with proper response equipment in a planned response manner.

The risk is to be assessed that are posed to sensitive areas in and around of Adani Ports and SEZ Limited, Mundra regions and then address those problems by identifying suitable response methods to prevent Biological / industrial / socio-economic sensitive areas from exposure to oil spill and how best to advise the local authority of the dangers that could be posed by the spill and how to address them and to repair the damage done by the spill.

2.1 Identification of Port Operational activities and Risks

APSEZL, Mundra currently owns and operates several marine facilities located at Mundra, Gulf of Kutch. The Mundra port facility is located on the West Coast of India in Gulf of Kutch about 50 Km west of Kandla in District Bhuj of Gujarat state.

The APSEZL, Mundra handles the majority of its Dry and Liquid products traffic through the South, West, terminals. There are several berths and Jetties at Mundra for berthing of cargos. Two subsea pipelines connect the onshore to the IOCL, HEML SPMs.

The location of the Adani Ports and SEZ Limited is situated at Mundra at approximately Lat 22° 44' 18.89" N, long 69° 41' 35.62" E. The berths are Located in the North bank of Mundra region. The berthing jetties are for operating vessel operability and potential to meet the future trends. APSEZL, Mundra has developed berths, approaches and turning circles to handle vessels at the Berth.

Existing berths and Jetties

There are 21 existing berths at MMPT 1, MMPT 2, MMPT 3, MICT, AMCT catering to liquid, Container as well as General cargo. M/s Adani also planning to expand MPT-T2 for handling dry cargos.

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 14



West Basin

West Basin is about 10 Nautical miles west of the existing terminals of Mundra port. Four Berths are located at approx. 22° 45' 14.82" E and 69° 34' 6.23" N, off Tunda Wandh falling in Taluka Mundra. The basin is also planning to expand with 3 more additional berths for handling dry cargo. Two power plants are located North of these berths, in barren waste land. National Highway 8A extension passes through north side of the power plant sites at a distance of approximately 6 km.

South Basin

The south basin is in western side of the existing port on Navinal Island. Six berths are located at approx. Lat 22° 44' 18.89" N, Long 69° 41' 35.62" E. It has presently 6 operational berths. It has an enclosed turning basin and necessary back up area. The basin is also planning to expand with two container berths for handling liquid cargo.

VLCC Jetty:

The development of jetty facilities is in progress for handling VLCC at Mundra for Crude oil operations.

Hence, mathematical modeling studies for predicting the fate and oil spill trajectory due to spills if any at Port operations facilities for various seasons is mandatory for OSCP. Oil spill modeling to be carried out as a part of Oil Spill Contingency Plan to identify the suitable combating operations for controlling the spills.

Oil Spill Scenarios Including Worst Case Discharge

Evaluating oil spill risks requires consideration of two factors, namely the probability of a spill occurring, and the consequences.

The potential oil spill scenarios from the APSEZL, Mundra marine facilities and associated activities are summarized in the next sections. In practice, due to preventive actions such as training, operating procedures and engineered solutions, potential spills are likely to be smaller. Larger oil spills being extremely unlikely.

The events and scenarios presented here are indicative only. Though accounting every eventuality is not practicable, however the above scenarios represent a broad cross section of

	<p>Adani Ports and Special Economic Zone Ltd, Mundra</p>	<p>Risk Assessment</p>	<p>Rev.No:03 Dt: 30th July 2022 Doc No: ENVR 2022-003-R3</p>
			<p>Page No: 15</p>

possible oil spill incidents. The credible release quantities given are only an indication and an actual oil spill may vary significantly.

Risk Assessment Methodology

Risk Assessment exercise is primarily for the concern of environmental pollution caused by accidental spillage of Oil at and around the APSEZL, Mundra Port facilities. The factors which may influence the risk will include the followings:

- Exposure time of the port due to transit of ship
- Performance of ship's crew, including pilot
- Hydrographic and meteorological conditions;

The present Risk Assessment exercise has been carried out in stages as follows:

- ✓ Gathering of relevant information and data;
- ✓ Hazard Identification;
- ✓ Frequency Estimation;
- ✓ Consequence Estimation;
- ✓ Risk Estimation.

The oil spill may occur generally during transportation of crude/Fuel oil from the offshore facilities which include the surface facilities viz., platforms, berths / Jetties, vessels and subsurface pipelines and all other associated infrastructure required for the transport operations. The causes of oil spill during operations of APSEZL in the Mundra region along the North Coast of Gulf of Kutch are broadly defined under the following sections.

2.1.1 Sources of oil spill:

At various port operational facilities that can lead to the oil spill are given below: Also, worst case scenario i.e. Worst case volume and likely volume can be mentioned.

- Operations at Jetty / berth - loading / unloading
- Spills due to Collision/Grounding in the Tanker route
- Bunker/ fuelling operations
- Ship distress / sinking
- Spill due to rupture in subsea pipeline corridor (size of crack-1")
- Rupture of export line due to movement and landing along the coast.

 <i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Risk Assessment</i>	<i>Rev.No:03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
		<i>Page No: 16</i>



2.2 Failure frequency of pipeline, transfer and storage tank

The damage of pipelines is subjected number of factors such as corrosion, age of pipeline, life of pipeline and length. The reliability data of pipelines are presented here from the international database and hence these can be taken as indicative.

The probabilities of pipe ruptures are presented below:

$d \leq 50$ mm	$1 \times 10^{-10}/m$ hr.
$50 < d \leq 150$ mm	$3 \times 10^{-11}/m$ hr.
$d > 150$ mm or greater	$1 \times 10^{-11}/m$ hr.
Sub-Sea pipeline failure	$6.1 \times 10^{-12}/m$ hr.

where 'd' is the diameter of pipe

The probability of hose failures is presented below:

Loading arm failure	$3 \times 10^{-8}/hr.$
Flexible hose pipe failure	$4 \times 10^{-5}/hr.$
Atmospheric storage tank failure rate	$3 \times 10^{-4}/yr$

Flow lines	Partial rapture	$1.25 \times 10^{-5} /$ year
Flow lines	Total rapture	$1.25 \times 10^{-5} /$ year
Block value		3-11" – $1.08 \times 10^{-4}/year$
Flange Joints		3-11" -- $5.56 \times 10^{-5}/year$

Based on the above failure frequency, it is apparent that the failure rate of the flexible hose pipe ranks higher. The failure rate of above ground pipeline depends on the pipe size and its length. As the pipe diameter increases, the failure rate decreases and as the length increases, the failure rate increases. The failure rate of underground pipeline is relatively much lesser compared to that of above ground pipeline. The underground pipelines are well designed to take care of corrosion etc.

Based on the past 10 years accidental data, it is observed that the frequency of oil spills is around 1.7×10^{-6} per cargo vessel transferred.

2.2.1 Quantity of oil leaked – pipelines

The quantity of oil spilled can be calculated based on size of the rupture and also for hole leaks taking account the diameter of hole and flow rate. The formula for total calculation is

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 17

Volume of spill = $2\pi rLv$

r = radius of pipeline

L = length of pipeline

v = flow velocity

2.3 Sub-sea Pipeline Damage

There was pipeline leakage at Bombay high and observed the flow and pressures monitored continuously at platform and Uran terminal after the pumping has been stopped. Before stopping pumping, the leak rate is high due to higher pressure than hydrostatic pressure and leak rate would reduce gradually after stopping the pumping. The details of spill volumes are furnished in Table 2.1.

Table 2.1 Pipeline spill volume (m3)

Time in hours after rupture	Spill Size
1	1900
3	3400
6	5300
12	9000
24	13500
36	14100

In case of total rupture of the 48" pipeline running from SPM to onshore oil terminal, the pump will be shutdown automatically within few minutes and the volume of spill would be around 20 m3 only.

The failure rate of loading arm is extremely low because of the sophisticated safety systems incorporated in the design.

2.4 Cargo Operations or Transfer frequencies

Since 1974, International Tanker Owners Pollution Federation Limited (ITOPF), London has maintained a database of oil spills from tankers, combined carriers and barges. This covers all accidental spillages except those resulting from acts of war. The database (Table.2.6) contains information on both the spill itself (amount and type of oil spilt, cause and location) and the vessels involved. For historical reasons, spills are generally categorized by size (<7 tons, 7-700 tons and >700 tons) although the actual amount spilt is also recorded. Information based on nearly 10,000 incidents, found that the vast majority (85%) fall into the smallest category i.e. <7 tons. Information is gathered from both published sources, such as the shipping press and other specialist publications, and also from vessel owners and their insurers. Not surprisingly,

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 18



information from published sources generally relates to large spills, often resulting from collisions, groundings, structural damage, fires and explosions, whereas the majority of individual reports relate to small operational spillages. The details of the spills occurred based on the ITOPF data collected are presented in Table. 2.2

Table- 2.2: Number of oil spills occurred during 1974 to 2010 and their causes and the spill quantity

	<7 Tones	7-700 Tones	>700 Tones	TOTAL
OPERATIONS				
Loading/Discharging	3157	385	37	3579
Bunkering	562	33	1	596
Other Operations	1250	61	15	1326
ACCIDENTS				
Collisions	180	337	132	649
Groundings	237	269	160	666
Hull Failures	198	57	55	310
Equipment Failures	202	39	4	245
Fires & Explosions	84	33	34	151
Other/Unknown	1975	121	22	2118
TOTAL	7845	1335	460	9640

Table-2.2 gives the number of oil spills occurred along with quantity of oil spilled and the operations associated during 1974 to 2010. It is found that, most spills from tankers result from routine operations such as loading, discharging and bunkering which normally occur in ports or at oil terminals, the majority of these operational spills are small with some 81% involving quantities of less than 7 tons and accidents involving collisions and groundings generally give rise to much larger spills, with at least 4% involving quantities in excess of 700 tons.

The exact quantity of spill from each of the above incident is difficult to predict due to the variables of operating conditions and the length of risk exposure. Maximum risks associated with the events may be considered while devising the oil spill contingency plan. The spill scenarios range from extremely negligible quantities to enormous quantities in rare catastrophic events. The simulation of oil spills does not vary significantly in various scenarios except for the magnitude of impact zone and the quantity involved in such impacts. The software is intended to use for specific scenarios, through a few simulations are made in this report considering the worst-case scenarios.

The failure rate of loading arm is extremely low because of the sophisticated safety systems incorporated in the design. Accidental release of any chemical due to catastrophic rupture of tanks and ship collision are also relatively very low. The impact due to failure of storage tanks

Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 19



and ship collisions on environment are very high because of the large quantity released when compared to the pipe failure.

For the purpose of simulation, the below given scenarios are taken into account considering the above spill risks.

2.5 Operational Leakage

2.5.1 Spill due to Loading arm failure at Jetty: (pumping rate of 10000 m³/hr crude oil for 1 min)

Crude pumping rate from the tanker will be around 6500 m³/hr to 10000 m³/hr. In the present study, maximum pumping rate of 10000 m³/hr has been considered to assess the risk on a higher side. The Safety Break Away Coupling in the crude oil transfer hose will be activated within few seconds in the event of hose rupture or failure. Again, for the sake of assessing higher risk, a response time of 1 min is considered to estimate the amount of oil that would spill at the Jetty. Thus, the quantity of crude oil spill has been estimated as 167 m³ in the event of loading arm failure.

2.5.2 Spill due to rupture of sub-sea crude oil pipeline from refinery to shore tanks: (2611 Tons of crude for 36 hrs)

Crude oil pumping rate from the tanker will be in the range of 12500m³/hr – 6500 m³/hr. In the present study, to assess the maximum risk the pumping rate of 12500 m³/hr has been considered to be on higher risk side. The minimum wall thickness of sub-sea crude oil pipeline is 15.6 mm and the maximum thickness is 24 mm. Moreover, all along, 5 inches concrete cladding is provided on the surface of the pipeline. Hence crude oil pipelines designed, constructed and laid as per the international norms are safe and leakages are extremely rare during its designed life. However, a rupture of size 1” has been assumed for assessing the quantum of oil spill through sub-sea pipeline.

Pump discharge pressure on-board will be 10 kg/cm² at tanker manifold and crude oil thus will be pumped to the COT tanks without any boosting device in-between. As the level in the tanker depletes, discharge pressure would also be reduced. Moreover, with the distance the crude oil pressure inside the pipe drops. For the sake of assessing the amount of oil spill in case of rupture of sub-sea pipeline, a pressure of 10 kg/cm² and a water column height of 20 m have been considered.

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 20



In the present study, for the sake of assessing the amount oil spill in case of rupture the response has been considered as 36 hr for quantification of oil spill. Accordingly, the quantity of Crude oil spill has been estimated to-be 2611 tons-

2.5.3 Spill due to Tanker Collision at Jetty having capacity between 1,00,000-3,00,000 metric tons

Crude Oil is received at Jetty by ocean tankers having capacity between 1,00,000 - 3,00,000 metric tons. Crude Oil is pumped to shore tanks by pipeline from the SPM. In the present scenario, collision of the vessel at the jetty or tanker route with another vessel enroute to other terminals can cause partial damage to the vessel's cargo tanks (not more than 3 Nos. Cargo tanks) leading to a maximum oil spill of about 700 tons to 25,000 tons of crude oil. Hence, in the present study the probable quantities of crude oil spills due collision at Jetty is considered as 700 tons, 10000 tons and 25,000 tons.

2.5.4 Spill due to collision or grounding in the Tanker route

Tankers are expected to call at the Jetty frequently to load these oil products. These tankers may meet accidents like collision with other vessels or grounding in the vicinity of the Jetty. In case of such accidents the spillage may vary depending on the size of the tanker, the extent of damage and number of cargo tanks ruptured. In the present study the probable quantity of spills in the tanker route considered for modelling is about 25000 tons.

As can be seen above the spill scenarios mentioned above range from extremely negligible quantities to enormous quantities in rare catastrophic events. The simulation of oil spills does not vary significantly in various scenarios except the magnitude of impact zone and the quantity involved in such impacts. The software is intended for use by the Client for specific scenarios, through a few hypothetical simulations are made in this report considering the worst-case scenarios.

The failure rate of loading arm is extremely low because of the sophisticated safety systems incorporated in the design. Accidental release of any chemical due to catastrophic rupture of tanks and ship collision are also relatively very low. The impact due to failure of storage tanks and ship collisions on environment are very high because of the large quantity released when compared to the pipe failure.

2.6 Risk assessment of oil spill in APSEZL, Mundra area

- a) Oil spill risk analysis and modeling studies for Adani Ports and SEZ Limited at operating facilities in Mundra Region, Gulf of Kutch (**Part-A & B of the report**)

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 21

b) Mapping of Marine Sensitive areas in the Coastal areas of Gulf of Kutch region (**Part-C of the report**)

The two documents mentioned above deal extensively with oil spill risk analysis & trajectory and Mapping of marine sensitive areas based on the available data information. These two studies follow the structure of and are compliance with the "IPIECA-A guide to contingency planning for oil spills on water and are aligned with the Indian coast guard "National Oil Spill Disaster Contingency plan" These important documents provide all details of the local environment, risks of the oil spill Tier-I credible spill, fate of the spills, sensitivity mapping of the area and local, regional and country wide response capabilities.

These documents shall be used in the conjunction with the oil spill response plan.

2.7 Spill locations and scenarios

Based on above oil spill risk analysis the following 15 oil spill scenarios are considered for simulations as shown in Fig. 2.1.



Fig.2.1 Spill Locations considered in Adani Ports and SEZ Limited at Mundra region

- SPMs(S1, S2)
- VLCC Jetty (S15)
- Sub-sea pipeline(S3)



- Tanker entry into the Ports (S4)
- Adani West Port berths (S5, S6, S7)
- LNG Berth (S8)
- Adani South Port berths (S9, S10)
- Mundra Port (S11)
- MICT / AMCT Berths (S12)

The following are oil spill risks identified in terms of quantities and spill types

- Crude oil spill of 700t at selected SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 700t at selected West Port(S5), Vessel route(S7), LNG Jetty(S8), South basin (S9), Mundra Ports(S11), MICT/AMCT(S12)
- Crude oil spill of 10000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Crude oil spill of 25000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 100t at selected West Port (S5, S6), LNG Jetty(S8), South basin (S9,S10), Mundra Ports(S11), MICT/AMCT(S12)
- HSD oil spill of 50t at selected West Port(S5), LNG Jetty(S8), South basin (S9), Mundra Ports(S11)
- HSD oil spill of 20t at selected West Port(S6), South basin (S10)

Continuous Spills

- Crude oil spill of 10000 m3/hr for 1 min at selected SPM-HMEL(S1), SPM-IOCL(S2)
- Crude oil spill of 10000 m3/hr for 1 min at selected VLCC Jetty (S15)
- Crude oil spill of 10000 m3/hr for 1 min at sub-sea pipeline route (S3)

2.8 Types of Oil Likely to Spilled

Oil Type

The oil handling at Port area majority will be crude oil. The International Tank Owners Pollution Federation (ITOPF) classifies oil into four (4) groups based on their specific gravity. Typically, crude oils will fall into Group 2 (with specific gravity 0.8 – 0.85, API 35 – 45) or Group 3 (with specific gravity 0.85 – 0.95, API 17.5 -35). The behaviour of a particular crude oil may differ from the general pattern depending on its properties and environmental conditions at the time of the spill.

The other oils that will be used for Cargo / tankers are fuel oils. The specific gravity of Fuel oil is typically in the range of 0.9-0.95 (API 25 – 35) and viscosity 6.5 cst / 50°C. Fuel oil will spread slowly on water and should evaporate less quantity within a few days upon release onto the sea

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 23

surface. Evaporation can be enhanced by higher wind speeds, warmer water and air temperatures. A small percentage may also dissolve.

The following characteristics of oils are used for modelling study

Table.2.3 Type of oils selected for oil spill modelling studies

Chemical and Physical Properties	Fuel Oil	Crude Oil	HSD
Sp. Gr	0.9	0.85	0.86
API	25.72	41.27	25.72
Surface Tension	0.0028Nm ⁻¹	0.003Nm ⁻¹	0.0028Nm ⁻¹
Viscosity of Oil	6.5X10 ⁻⁶ m ² /s	3.822X10 ⁻⁶ m ² /s	3.822X10 ⁻⁶ m ² /s
Molar Volume	0.0002 m ³ /mol	0.0002 m ³ /mol	0.00023 m ³ /mol
Wax content (%)	912-19%	12-19%	03-44%
Pour point (°C)	35 deg C	18 to 30 deg C	60 C - 180 C

2.9 Probable Fate of Spilled Oil

The physical and chemical characteristics of spilled oil change almost immediately when spilled in the marine environment due to evaporation, dispersion, emulsification, dissolution, oxidation, sedimentation and biodegradation. All of these processes that set in together are collectively referred to as oil weathering and decide the final fate of spilled oil and quantities that would need to be removed physically. If the oil is persistent and does not vaporizes immediately or disperses and comes ashore, then the costs in terms of clean up, damages and economic loses can be considerable. Some of the weathering processes that spilled oil goes through and the time duration of these processes which are important for emergency response and need to be taken into account by the responders, are provided in Table 2.8 below:

Table.2.4: Oil Weathering Processes

Process	Description	Importance	Time Frame
Evaporation	Conversion of liquid to gaseous state. Lighter fractions are lost first.	Major process accounting for loss of oil. At 15°C gasoline will evaporate completely over a 2-day period, 80% of diesel fuel and 40% of light crude, 20% of heavy crude and about 5- 10% of Bunker C fuel.	< 5 days
Emulsification	Small water droplets get mixed into liquid oil. Water content will	Will increase the amount of pollutant to be recovered by a factor of 2 - 4.	Onset may be delayed but emulsification



Process	Description	Importance	Time Frame
	reach 50-80%.		process will start rapidly.
Natural Dispersion	Breakup of an oil slick into small droplets	Removes oil from water surface	< 5 days
Dissolution	Mixing of soluble oil components into water	Water soluble components are most toxic	< 5 days
Biodegradation	Breaking of oil by microbes into smaller compounds and finally to water and carbon dioxide	Rate depends on oil type, temperature, nutrients, oxygen and amount of oil	Weeks to months
Formation of tar balls	Breakup of heavy crudes and refined oils into small patches with long persistence	Hard to detect	Days to weeks

In this present study, the oil type considered is ‘weathering’ type which is typically used for all the oil spill trajectory prediction studies. Non weathering oil is an oil type that does not change chemically or physically over time in the marine environment. Weathering Processes like evaporation, emulsification etc., affect spills and no-weathering oils doesn’t considered these processes hence the trajectory oil spill analysis for non-weathering type represents worst case scenario.

The processes of spreading, evaporation, dispersion, emulsification and dissolution are most important during the early stages of a spill whilst oxidation, sedimentation and biodegradation are long term processes which determine the ultimate fate of oil. Fig.2.2 shows schematic diagram of weathering processes with time.

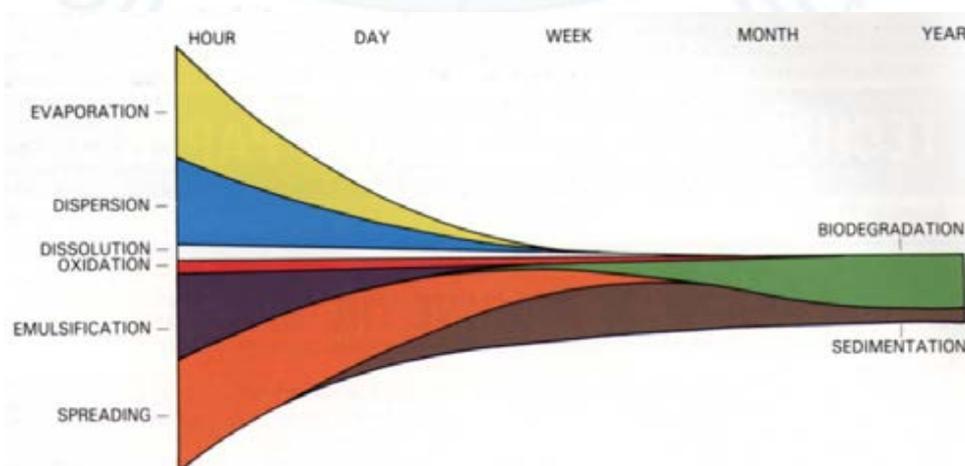


Fig.2.2 shows schematic diagram of weathering processes with time.

Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 25

2.10 Appearance and Thickness of Oil Slick

Depending on the properties of the spilled oil, the thickness of oil slick can range from a tenth of a micron to hundreds of microns. The colour of oil film post spreading is a good measure of quantity of oil that may be contained within the slick.

- When direct light from the sun contacts a very thin oil film (<0.1 micron; μm), much of the light is reflected back to the observer as grey or silver sheen.
- If the film is thicker (perhaps 0.1 to 3 μm), the light passes through the film and is reflected off the oil-water interface and back to the viewer. The observer will then see a film that can range from rainbow to darker-colored sheens.
- For very thick films (> 3 μm), the light is absorbed and the slick appears dark coloured (i.e., black or brown) to the observer. However, the viewer can no longer determine film thickness based on colour. If the slick is dark-coloured, the observer cannot tell whether the film is 3 μm or 100 μm thick.

In order to quantify oil thickness, the following thumb rules are used:

Table.2.5: Appearance and Thickness of Slick

Appearance	Thickness
Silver Sheen	0.0001mm
Rainbow sheen	0.003 mm
Light brown/ Black slick	0.1 mm
Dark brown/ Black slick	> 1 mm

To determine an approximate quantity of spilled oil in the event of a spill, the following formula is used:

$$V = L \times W \times T / 100$$

Where, L = Length of slick (in metres)

W = Width of slick (in metres)

T = Thickness of slick (in mm)

V = Volume of spilled oil (in cubic metres)



2.11 Development of oil spill scenarios including worst case spill

2.11.1 Spill Size

In the present study, series of scenarios considered based on operational activities, a worst-case scenario and logarithmic multiple to up to 25000 tons (instantaneous) and 550 m3 (continuous) has been considered for the model study.

Simulations were made for the following scenarios at Adani Mundra region:

Table.2.6 Details of Oil Spill Scenarios

Comp. Runs	Spill Location	WD (m)	Spill Qty	Type of oil	Spill Location Co-ordinates
A SPMs					
1	SPM-HMEL (S1)	29.50	700 tons	Crude	69° 37' 23.19" E, 22° 40' 59.06" N
2			10000 tons	Crude	
3			25000 tons	Crude	
4			10000 m ³ /h for 60 sec	Crude	
5	SPM-IOCL (S2)	28.45	700 tons	Crude	69° 39' 14.05" E, 22° 40' 47.21" N
6			10000 tons	Crude	
7			25000 tons	Crude	
8			10000 m ³ /h for 1 min	Crude	
B VLCC Jetty					
9	Spill Location (S15)	15.71	700 tons	Crude	69° 40.78' E, 22° 43.6' N
10			10000 tons	Crude	
11			25000 tons	Crude	
12			10000 m ³ /hr for 1 min	Crude	
C Pipeline					
13	Crude oil spill of 2611 tons at the pumping rate of 12500 m ³ /hr for 60 sec (2611 Tons of crude for 36 hrs) along the pipeline corridor at a select (midway) point of subsea pipeline in the pipeline routes. -- Spill point: (S3)	21.20	12500 m ³ /hr for 3hr	Crude	69° 39' 43.35" E, 22° 42' 36.39" N
D Tanker Route					
14	Instantaneous crude oil spill of 25000t along the tanker route at select location. Spill point: S4	22.54	25000 tons	Crude	69°32'11.38" E, 22°36'1.13" N
E West Basin (berths)					

Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 27



15	100 tons (due to Berthing incident/ collision) at the West Basin berths (FO) Spill point: S5	14.61	100 tons	FO	69°34'13.99" E, 22°45'15.54" N
16	50 Tons (due to Berthing incident/ collision (diesel oil tanks) at the West Basin berths (HSD) Spill point: S5		50 tons	HSD	69°34'13.99" E, 22°45'15.54" N
17	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berths -- Spill point: S5		700 tons	FO	69°34'13.99" E, 22°45'15.54" N
18 & 19	In the maneuvering basin: <ul style="list-style-type: none"> ○ 20 Tons of HSD oil due to Tug Impact (HSD) ○ 100 Tons of FO due to Tug Impact Spill point: S6	14.48	20 Tons 100 Tons	HSD FO	69°34'22.75" E, 22°45'5.33" N
20	Along the vessel route at one location: Instantaneous oil spill of 700t along the tanker route at a select location. (FO): Spill point: S7	17.08	700 tons	FO	69°33'40.66" E, 22°43'36.31" N
F	LNG berth				
21	100 tons (due to Berthing incident/ collision) at the LNG berth (FO) -- Spill point: S8	13.76	100 tons	FO	69°33'40.66" E, 22°43'36.31" N
22	50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the LNG berth (HSD) --Spill point: S8		50 tons	HSD	69°33'40.66" E, 22°43'36.31" N
23	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth-- Spill point: S8		700 Tons	FO	69°33'40.66" E, 22°43'36.31" N
G	South Basin (berths)				
24	100 tons (due to Berthing incident/ collision) at the LNG berth (FO) -- Spill point: S9	14	100 Tons	FO	69°39'38.08" E, 22°43'32.54" N
25	50 Tons (due to Berthing		50 Tons	HSD	69°41'3.53" E, 22°43'50.33" N



	incident/ collision (diesel oil tanks) at the South Basin berths (HSD) – Spill point: S9				
26	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth -- Spill point: S9		700 Tons	FO	69°41'3.53" E, 22°43'50.33" N
27 & 28	At the turning circle: <ul style="list-style-type: none"> 20 Tons of HSD oil due to Tug Impact 100 Tons of FO due to Tug Impact Spill point: S10	17	20 Tons 100 Tons	HSD FO	69°41'33.62" E, 22°44'6.49" N
H	Mundra Port				
	At the existing MPT1 berth: : Spill Point S11				69°42'20.45" E, 22°43'32.17" N
29	100 tons (due to Berthing incident/ collision) at the berth (FO) -- Spill point: S11		100 Tons	FO	69°42'20.45" E, 22°43'32.17" N
30	50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the berth (HSD) – Spill point: S11	20.80	50 Tons	HSD	69°42'20.45" E, 22°43'32.17" N
31	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth: Spill point S11		700 Tons	FO	69°42'20.45" E, 22°43'32.17" N
I	MICT / AMCT Berths:				
	At the existing MICT / AMCT Berths: : Spill point S12				69°42'56.30" E, 22°44'36.69" N
32	100 tons (due to Berthing incident/ collision) at the (FO) - Spill point S12		100 Tons	FO	69°42'56.30" E, 22°44'36.69" N
33	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth - Spill point S12	15.12	700 Tons	FO	69°42'56.30" E, 22°44'36.69" N

Results of scenario:

Hydrodyn-OILSOFT is a dedicated software for oil spill trajectory modeling. This software is used for the prediction of oil spill scenarios in the Mundra region for various meteorological and hydrological conditions.

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 29



Knowledge of probable movement of an oil slick gives a distinct advantage while planning response strategies. Thus, for instance, no major clean-up operation is necessary if the modeling results indicate that the spilled oil would remain at sea thereby sparing the shore ecology. On the contrary, if modeling results are suggestive of shoreward drift and predict that particular ecologically sensitive or important areas would be hit, effective counter measures such as deployment of deflection booms, containment and recovery of oil etc. can be effectively taken. The results of various numerical runs are discussed in the following sections. The detailed results of the simulations are available in the tabular form in the oil spill risk analysis (**PART-B of the OSCP**).

During the year representative spill locations in Adani Mundra would move towards coastal areas during all seasons depending on the spill residence time as delineated in **Part-B of the OSCP**.

The behavior of slick movement is more or less similar in various scenarios irrespective of quantities of oil spilled. The area of oil spread differs depending on the source quantities. The details of spill losses during its movement and time taken to reach the coast boundaries from all locations have been discussed in **Part-B of the OSCP**.

2.12 Environmental sensitivity index mapping

The mapping of the sensitivity of the environment to accidental oil pollution is an essential step in oil pollution preparedness, response and coordination efforts. ‘Sensitivity’ relates to the efforts of accidental marine pollution involving hydrocarbons. Sensitivity mapping has been prepared which provides a basis for the definition of priorities for protection and clean-up to the On-scene commander, on-site responders and information to plan the best suited response strategy to the decision makers. Sensitivity mapping has been used to support the development of the response strategy for oil spill contingency plan. Elements which have been considered sensitive to oil spill are: protected areas, important areas for biodiversity, sensitive ecosystems, critical habitats, endangered species, and key natural resources.

Sensitivity maps prepared has covered the areas of coast at risk of spillage originating from the facilities and provide information about the various types of environments that may be affected by a spill (sand beached, rocky coast, marshes, etc.) for which the clean-up equipment should be suited. Sensitivity maps prepared also included the mapping of coastal, sub-tidal habitats and information on the potential impact of dispersed oil in the water column so as to support the decision on the use of oil spill dispersant.

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 30



The shorelines are of the high priority areas for protection because they are difficult to clean once the spill washed to shore. According to the sensitivity and importance of the shoreline, the following order of priority is set in shoreline cleaning:

- Marshes and mangroves.
- Coral reef flats which are exposed at low tide.
- Raised fossil reefs with undercuts which allow the floating oil to penetrate boulder and Cobble beaches.
- Pebble and cobble beaches.
- Beaches of mixtures of sand, pebbles and cobbles.
- Exposed beach rock.
- Port harbour/Jetty/Berth

The details of the environmental sensitivity map including ecologically sensitive areas and economic resources for the APSEZL, Mundra have been provided as Part-C of the OSCP.

2.13 Environmental resources, priorities for protection

Amenity areas, economically important tourist and recreation facilities, bathing beaches, ecologically sensitive areas, industrial or drinking water intakes, fisheries, Marine culture, sea birds, marine mammals and other resources likely to be threatened shall be identified. In most of the oil spill incident, it may not be possible to prevent some oil coming ashore, and in some circumstances, it might be advantageous to deflect the oil to a another less important chosen place onshore. It is therefore necessary to decide in advance which areas are to be given priority for protection. Before making such decisions, a wide variety of interested parties should be consulted.

The environmental sensitivity with key ecologically sensitive areas and economic infrastructures Mundra surrounding areas are

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 31

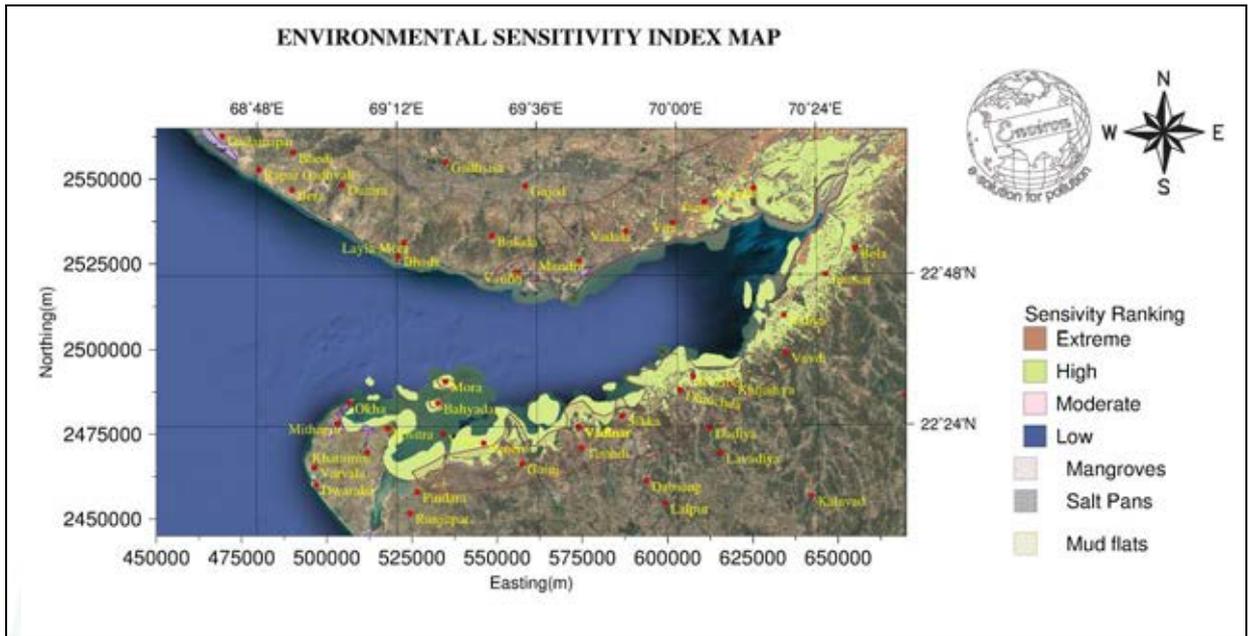


Fig 2.3: Sensitive areas along the block

It is endowed with a great diversity of natural ecosystems, of which the major systems are salt pans, intertidal zones, sand dunes, mangroves, creeks and Open Ocean. The biological sensitive resources are discussed in detail below.

Biological Resources

Various Biological resources are discussed in Part-C (Sensitivity Mapping Studies) of the report which are sensitive to oil spills. As per the IMO standards, each species indicated with symbol and color. Species that are especially vulnerable to the effects of oil spills are Bird, Fish, and Marine Mammal. The Biological resources, which are vulnerable to the effects of oil spills are categories are then further divided by grouping species together by similar taxonomy, morphology, life history, and/or sensitivity to spilled oil.

When a biological resource exists in a small area (such as a bird nesting site), it is indicated by a symbol. When a biological resource encompasses a larger area, it is represented by a polygon with a specific pattern and color.

The information of all categories of biological resources is displayed on shoreline sensitivity maps are placed at Annexure-2 of Part-C of the report.

Industrial Resources

Various industrial resources i.e. Intake, outfalls, Port /Jetty, salt pans that are vulnerable to oil spills is discussed in Part-C of the report and also shown in Annexure-2. They are indicated by a

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 32



symbol with specific pattern and color.

Human Use Resources

Human-use resources that may be either negatively impacted by an oil spill or used as access points for oil spill cleanup are typically marked with a symbol. Most human-use features (such as public beaches and aquaculture facilities) exist in a small area and are represented by human – use point symbols. Larger areas such as parks, preserves, protected areas, and wildlife refuges are shown as polygons.

The area from Okha to Kandla is marked by number of creeks, mangrove vegetation, Mudflats, salt pans, APSEZL installations and number of landing points etc. The coastline from Positra to Bedi stretching south into Gulf of Kutch is highly developed in terms of manmade structures and has large extends of mudflats with mangrove vegetation and marine sensitive areas. The further stretch up to Navalakki is the hub of commercial activity and includes Adani, Kandla Port Installations.

All categories of sensitive zones along the coastal areas of APSEZL region as well as creeks are displayed on ESI maps which are to be protected and placed at Annexure-2 of Part-C of the report.

2.14 NET ENVIRONMENTAL BENEFIT ANALYSIS (NEBA)

The objective of a NEBA is to consider all available response options for an oil spill and select those techniques that will provide the best opportunities to minimize consequences for the environment. This section of the report provides an overview of the approach used to prepare the NEBA in support of oil spill response planning for Adani Ports and SEZ Limited, Mundra. The analysis is largely based on information discussed in **Oil spill Modeling Studies (Part-B of the OSCP)** and **Marine Sensitivity Area Mapping (Part-C of OSCP)**.

This qualitative, NEBA analysis was conducted for oil spill contingency planning purposes, and is dependent upon a variety of input sources. It is intended to address the overall risk for the oil spills. Because it is intended to be a broad analysis of a large-scale event, there is no specific season or trajectory analysis that will account for every possible spill scenario. However, it should represent likely exposure risks and levels of concern.

To conduct this study, the following important factors were considered and/or employed:

- The comprehensive trajectory modeling using state-of-the-art models and including oil spill scenario carried out (**PART-B** of the project report)

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 33



- Risk matrix which has been prepared based numerous other studies;
- Design of a scenario representing a high-volume discharge incident for this area; and
- Use of the above assumptions that were conservative and evaluated maximum extent of the impact.

Recommendations Concerning Response Options

All of the response options evaluated offer the potential for a net improvement over natural attenuation, and none have material adverse consequences. All of them should be discussed and considered when developing an oil spill response plan. It is always assumed that a combination of response techniques will be used, as appropriate, to minimize oil exposure to sensitive resources and to promote rapid recovery of the ecosystem as a whole. The OSRP provides information on the integration and activation of multiple response options for this Project Area.

However, the response options vary greatly in their potential effectiveness in association with a large-scale scenario, as summarized below (from least to most beneficial):

- **On-water In-situ Burning (ISB)** – This response option is severely restricted by seasonal day length, year-round weather conditions and strong tidal currents and large tidal ranges, most of spill trajectories reached the coast before proper weathering and logistical constraints. As a result, it is unlikely to offer substantial Net Environmental benefits.
- **On-water mechanical recovery** – On-water mechanical recovery resources are generally easier to obtain and deploy in larger numbers. The option is viable for open waters in the Mundra Port region. This option is effective for smaller, confined spills, the estimated oil recovery for large-volume scenarios is generally associated with low ecological benefit.
- **Shoreline protection and recovery** – As a result of the high probability of shoreline contact indicated in trajectory spill modeling studies (**PART-B**), this response option will have more overall effect, except in the cases where spills are moving away from the shore. The deployment of shore line protection and recovery gears are quite difficult due to the fact that the existence of very strong tidal currents as well as large tidal ranges and most of the coastal zonal areas the west coast are inaccessible by road. Due to the above reasons, this is not showing much Net benefit over Natural attenuation.
- **Dispersant application** – This response option was shown to be effective in substantially reducing surface oil in treated areas. While it can be very effective in treating fresh oil, surface oil reduction is predicted to be 40-60% in the first 4 days of the spill. Crude oil concentrations in the upper 10 to 20 m of the water column would increase in treated areas for a very short period, but would rapidly dilute and therefore not pose a

 Adani Ports and Special Economic Zone Ltd, Mundra	Risk Assessment	Rev.No:03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 34



long-term risk to the ecosystem. Quick application of dispersants within an hour is highly recommended offering Net environmental Benefit to the Higher Deg



 <i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Risk Assessment</i>	<i>Rev.No:03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
		<i>Page No: 35</i>



3. EQUIPMENT, SUPPLIES AND SERVICES

There are a number of techniques to remove the oil floating on the sea. The spill combating equipment's should be selected in relation to the assessment of the risk of spills and to the defense of agreed priorities for protection. The equipment must be chosen for the anticipated range of weather conditions and oil types. Various equipment's used are: use of booms, skimmers, absorbents, dispersants/bioremediates and burning. NEBA Studies has been carried out based on Adani Ports and SEZ Limited, Mundra facilities, coastal geo-information and port operational conditions. Recommended multiple response methods i.e Mechanical equipment or dispersants /bioremediates based on NEBA studies, put into use in case of oil spill.

3.1 Equipment and Supplies

The response equipment required for mounting an operation consists of equipment for offshore and shoreline operations and could include following spill equipment's

Offshore & shoreline Equipment's

- Booms, Skimmers, Absorbents, boats / tugs / response vessel
- Protective clothing for everybody (including boots and gloves), spare clothing.
- Cleaning material, rags, soap, detergents, brushes.
- Equipment to clean clothes, machinery, etc., with jets of hot water.
- Plastic bags (heavy duty) for collecting oily debris.
- Heavy duty plastic sheets for storage areas especially for the lining of temporary storage pits.
- Spades, shovels, scrapers, buckets, rakes
- Ropes and lines
- Anchors, buoys
- Lamps and portable generators
- Whistles
- First Aid material.

Other special equipment which may be used are:

- Workboats
- Trucks / cars (four-wheel drive)
- Radio transmitter / receivers
- Workshop / repair facilities
- Bulldozers, mechanical scrapers and similar earthmoving
- Equipment

	Adani Ports and Special Economic Zone Ltd, Mundra	Equipment, Supplies and Services	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:36

- Vacuum trucks
- Tank trailers
- Life vests
- Explosive meters

The response operations carried out for both offshore and onshore as discussed below.

3.2 Offshore Operations:

The minimum oil spill equipment required for response in terms of containment, recovery and disposal will be maintained at Adani Ports and SEZ Limited at Mundra and onboard the tugs fitted with fire contain remote controlled fire monitors. The equipment maintained at marine control room will be the first to be deployed for containment and would be augmented by movement of additional equipment as required by the situation. The details of total equipment required for response operations as follows.

Sr. No	ITEM	QTY	CAPACITY
1	Inflatable boom for Fast Response	2000 m	
2	Weir Type Skimmer	2	50m3/hr
3	Multi Skimmer	2	50 m3/hr
4	Vacuum Skimmer	2	30 m3/hr
5	Floating storage tank	2	10 m3
6	Oil spill Applicator with spray arms type with 2 nozzles	1	
7	Bio Remediation (lit)	2000L	
8	Dispersants-type-III	3000L	
9	Personnel Protective Kit	30	
10	Oil Absorbent Kit	2	

The list of equipment available with Adani Ports and SEZ Limited, Mundra is given in Data directory

3.3 Shoreline operations

Shoreline operations will be undertaken by local civil administrative as per their contingency Plan. Taking into account the spill movement and area sensitivity, the Equipment will be mobilized along with manpower to the site by the local administrative authority. The procedures laid down in Operations Manual will be available for reference to clean up teams along with expertise held with responders. The details of spill equipment for shore cleanup are as follows.

 Adani Ports and Special Economic Zone Ltd, Mundra	Equipment, Supplies and Services	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:37



Sr. No	ITEM	QTY	CAPACITY
1	Shoreline Cleanup Equipment's Mini Vacuum pumps capacity (25 m3)	2	
2	Floating storage tank (10T)	2	
3	Absorbent (oil only) 80 L Kit for quick oil spill response	1	
4	Sorbent pads 20-inch x 20 inch (nos)	500	
5	Sorbent Boom size min 5inch dia, min length 5 feet	250	

Based on the oil spill modeling study, it has been observed that an oil spills at berth locations / SPM / tanker route will reach the coast within hours (Part-B: Report). Accordingly, the resources required for Tier-1 response plan are estimated as below:

3.4 Additional equipment and response

While, the equipment held with response team will be available for initial and first response, the additional requirements would be met from equipment held by participating companies being addressed by this Plan. As per the NOS-DCP18 (Appendix-17), the ports are under Category-A as per the risk Category, hence, additional equipment's are to be procured listed in Appendix-16 for compliance with NOSDCP.

In the event of a decision being taken by the team managing the spill, the equipment held with the participating units will be made available to response teams. The details of equipment held at different locations are placed as follows.

Additional equipment and location

LIST OF RESOURCES AVAILABLE-ADANI PORTS and SEZ LIMITED, MUNDRA						
Tugs Available for Oil Spill Containment						
Name of Tug	Type	BHP	OSD	AFFF	Capacity (cum/Hr)	BP
Dolphin No. 4	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 7	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 10	ASD	3000 X 2	3000 ltr	-	-	70
Dolphin No. 11	ASD (DSV)	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 14	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 15	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 16	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 17	ASD	3000 X 2	3000 ltr	-	-	70
Dolphin No. 18	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Brahmini	ASD	2000 x 2	3000 ltr	2000 ltr	1200	65
Bitarni	ASD	2000 x 2	3000 ltr	2000 ltr	1200	65
Khushboo	Fixed screw	401 X 2	-	-	-	10

Dolphin No. 4, 7, 11, 14, 15, 16, 17, 18, Brahmini and Bitarni are fitted with Oil Spill Dispersant boom and proportionate pump to mix OSD and Sea water as required. The tugs are also fitted with a fire curtain and remote-controlled fire monitors.

All above ten Tugs have class notation as Harbour Tugs and are certified to work within

Adani Ports and Special Economic Zone Ltd, Mundra	Equipment, Supplies and Services	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:38



the Harbour limits only.

2. Reception Facility: 12" pipe line, connected to a slop tank at chemical tank farm.

Dolphin 11 has firefighting system of 1200 m³/hr along with 20 ton lifting "A" frame and diving support facility.

Location of Oil Spill Equipment: The Oil Spill Equipment stored in SPM Store.

RESOURCES/EQUIPMENTS WITH AVAILABLE APSEZL, MUNDRA

Item	quantity
Canadine fence boom (reel model 7296/8496 with power pack,towing bridles and tow lines-235 meter)	1 no
Power pack with boom reel with hydraulic hoses	2no
Power pack-20kv with boom reel with hydraulic hoses	2no
Lamor side collector system (recovery capacity 123 m ³ /hr (side collector LSC-3C/2300(01C02-P536). Oil transfer pump OT A 50 with oil transfer hose set	2no 2sets
Lamor minimax 12m ³ skimmer	2sets
Power pack for skimmers with hydraulic hoses	4no
Power pack -20 KV for skimmers with hydraulic hoses	1no
Floating tank(25m ³)	1no
Foot pumps for floating tank	6no
Oil spill dispersants	5000ltr
Portable dispersant storage tank: 1000 ltr capacity	1no
Portable pumps	2no
Two -way hydraulic maneuvering panel	2no
Oil containment boom -length 2000 meters, height-1500 mm, draft-900mm, free board-600mm	2000 mtr
Current buster room -fasflo-75 (for response in fast current)	2no
Skimmer -KOMARA 15 duplex skimmer system with floating IMP 6 PUMP	4no
12.5T flexible floating storage tank (PUA).	3no
Diesel driven transfer pump for flex barge	2no
Site hose kit for the transfer pump for flex barge	2no
3" and 2" hose adaptor for transfer pump and hose	2no
Shoreline cleanup equipment	
Mini vac system	5no
OSD applicator =oil dispersant spry unit (20 ltr) for use on beach and inter tidal zones	2no
Startank with capacity 1000 liter(10m ³)	2no
Sorbent boom pack (12.5cm*4m)	500 mtr
Sorbent pad	2000 nos

Facilities in the marine control room

1. Tidal stream guage: this can accurately read the prevalent rate of flow and direction of current.
2. Tide guage: for accurately calculating the height of tide at any given time.
3. Wind guage: for direction and speed of wind
4. VHF sets (fixed and portable) with complete range of marine frequencies to be used for field operations.

Adani Ports and Special Economic Zone Ltd, Mundra	Equipment, Supplies and Services	Rev.No: 03 Dt: 30 th July 2022
		Doc No: ENVR 2022-003-R3
		Page No:39



In the event of an ongoing spill or a spill that requires declaring of Tier 2 or 3 responses, the additional equipment and manpower held with any other OSRO or facility will be sourced in an accelerating manner including resourcing from the National / international spill handling companies. Contact details of companies holding equipment in India and International OSROs are listed below.

LIST OF ADDITIONAL RESOURCES AND INTERNATIONAL OSROs

1. **Australian Marine Oil Spill Centre**
 PO Box 305
 Victoria 3214
 Australia
 Tel + 61 3 5272 1555 Fax + 61 3 5272 1839
 Mail: amose@amosc.com.au
 Web: <http://www.aip.com.au>
2. **Fast Oil Spill Team**
 C/o PIM 40 G 23 Tour Elf
 92078 Paris- La Defense Cedex France
 Tel: + 33 1 4744 5636 Fax : + 33 1 4744 2677
 Mail : giefost@club-internet.fr
3. **Oil Spill Response Ltd**
 Oil Spill Services Centre
 Lower William Street Northam
 Southampton SO1 1 QE, UK
 Tel: + 44 1703 331 551 Fax: + 44 1703 331 972
 Mail: osrl@osrl.co.uk
 Web: <http://www.oilsillresponse.com>
4. **Petroleum association of Japan**
 Oil Spill response Department
 Keidanren Building
 9-4, 1 – Chome, Ohtemachi
 Chiyoda- Ku,
 Tokyo 100, Japan
 Tel: + 81 3 3279 3819 Fax: + 81 3 3242 5688
 Mail: mail@pcs.gr.jp
 Web : <http://www.pcs.gr.jp>

3.5 Inspection, maintenances, and Testing

The oil spill response equipment will be maintained in highest state of operational readiness. This is achieved through a planned maintenance, inspection and testing program. A record of inspection, maintenance and test will be maintained.

The response team will be responsible for regular testing and mock drills. All personal assigned with the task of operation of this equipment are adequately trained and their level of competency will be maintained by conducting regular exercises.

 Adani Ports and Special Economic Zone Ltd, Mundra	Equipment, Supplies and Services	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:40



Hands on training to personnel will be given by actually deploying the equipment and checking their effectiveness. Similarly, crew of support vessels will also be kept trained by regular, periodic training and exercises.

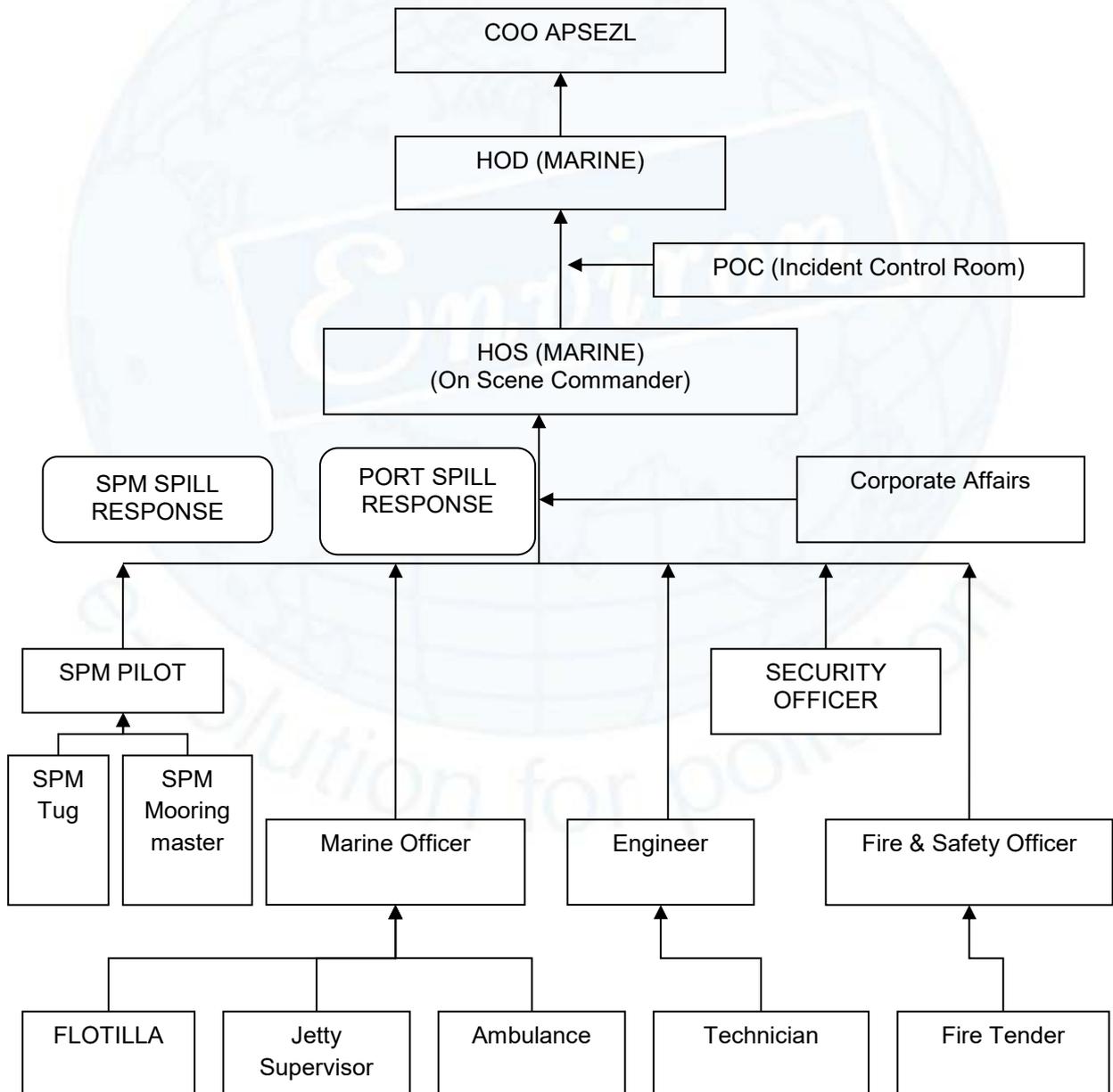


	<i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Equipment, Supplies and Services</i>	<i>Rev.No: 03 Dt: 30th July 2022</i>
			<i>Doc No: ENVR 2022-003-R3</i>
			<i>Page No:41</i>



4. OIL SPILL MANAGEMENT

Management of the oil spill response operations will be undertaken by a Spill Management Team involving personnel and having various levels of responsibilities in their exiting operational areas. The Organization Chart for Oil Spill Response is giving below.



4.1 Crisis Management Team (CMT) / Chief Operating Officer (COO)

CMT is the primary unit for incident management and is composed of senior manager from various departments for providing advice and resources and take on the spot decision to meet any immediate requirements arising during the response operation.

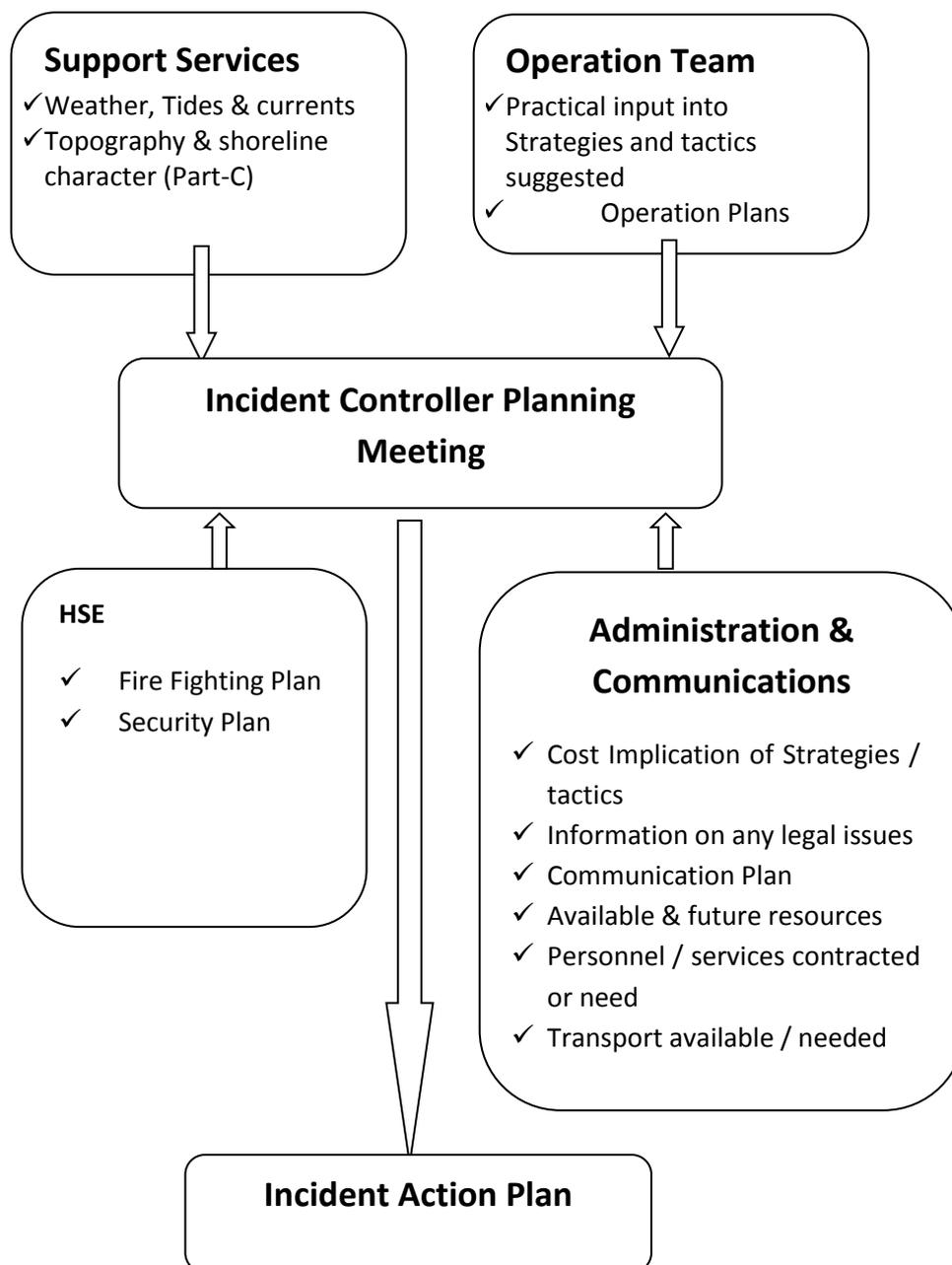
The major functions that would need to be carried out by CMT to discharge the Plan are as per table 4.1

Table.4.1: Major functions of Crises Management Team

Field operations	✓ Initiation, Control of Operations and response activity
	✓ Emergency Control room functions
	✓ Implementing tired response and disposal
	✓ Shoreline cleaning (when initiated through this CP)
	✓ Planning and strategy
Admin and logistics	✓ Victuals
	✓ Transport
	✓ Additional manpower and equipment
	✓ Security
Technical matters	✓ Cargo ops, availability of response items, repairs
Liaison	✓ Communication- operational and with other
	✓ Government / non govt. authorities, Media
Legal	✓ Documentation of damages, claims and
	✓ compensation, notifications
Health and safety	✓ Medical assistance

4.2 Incident Organization Chart

CMT is the primary unit for incident management and is composed of senior manager from various departments for providing advice and resources and take on the spot decision to meet any immediate requirements arising during the responses. Organizational chart as follows



4.3 Financial Authorities

The financial Authorities of APSEZL, Mundra is as per the existing organization structure. At the time of the crises, the need of the hour will be understood and requirements of OSC / ERT will be met at a faster rate than normal. Since all head of Department (HODs / HOS marine) would be available, immediate on the spot approval will be accorded.

4.4 Functional Designations

Following functional designations stand identified and notified through the Plan, to give effect to this Plan:

	<i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Oil Spill Management</i>	<i>Rev.No: 03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
			<i>Page No:44</i>

- i. Chief Operating Officer APSEZL Mundra
- ii. Incident Control Officer (HOS – Marine / Duty Port Captain)
- iii. Site Emergency Coordinator (Senior Pilot and Radio Officer)
- iv. Fire Coordinator (HOS – Fire / HOS -Safety)
- v. HOS – Security / Duty Security officer
- vi. Medical Superintendent
- vii. Marine Pollution Coordinator – Manager (Marine /Pollution Control)
- viii. Traffic Coordinator - Duty Port Captain
- ix. Communications Officer (Duty Port Captain / Duty Radio Officer)
- x. Chief Emergency Controller (Head -HSE)
- xi. Civil Coordinator (HOS – Environment Cell / HOS Estate)
- xii. Marine Engineering Coordinator (HOS – SPM / Diving Team in-Charge)
- xiii. HOD – Corporate Affairs
- xiv. HOS-Legal & HOD Estate

4.5 Manpower availability (on-site, on-call)

As per the policy of port, the marine department would be providing required man power for all the OSR activities. However, various departments providing assistance of water craft, vehicles, cranes etc. for movement of men and material: would provide necessary manpower and their departments, as required, so as to continue the OSR operations uninterrupted.

4.5.1 A float Operations and Response Team/ Teams

In an emergency, the personnel available at or near the incident site play vital role. This concept is made use of in nominating the Key Persons. It is necessary to nominate a functionary as the Incident Controller who is invariably a shift-in-charge of the facility. The Incident Controller tackling the emergency in real times requires the support from various other services i.e. Fire & Safety, Medical Services covering communication, transport and personal functions etc. A key person for each of these services therefore, should be nominated.

Overall in charge of these activities is Chief Operating Officer – Mundra Port. The different functional coordinators, designated, will co-ordinate with Chief Controller in their respective functional areas. It is suggested that key personal chart be developed, giving the names, designation, telephone nos. of top-level personnel who will act as coordinators in different disciplines/services. The duties and the responsibilities of various Key Persons and Coordinators need to be written down on a chart and should be made available across the organization at the site / location.

 <i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Oil Spill Management</i>	<i>Rev.No: 03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
		<i>Page No:45</i>

Roles & Responsibilities of key persons

Incident Control Officer – (HOS – Marine / Duty Port Captain)

- Directs and co-ordinates all field operations at the scene of the accident
- Assess incident/crisis at site, nature, location, severity, casualties, resource requirement
- Classifies incident - Advises Exe. Controller, Civil Defense, Dy. Conservator, Traffic Manager - regarding crisis severity status and emergency level, wind direction, temperature, casualties and resource requirements.
- Conducts initial briefing to Chairman
- Activates elements of the terminal emergency plan/ site response actions
- Protect port personnel and the public
- Directs security/firefighting/oil spillage/gas leakage/vessel accidents/natural calamities, cargo operations shutdown
- Search for casualties and arrange first aid and hospitalization
- Brief or designate a person to brief, personnel at the incident scene
- Determine information needs and inform Crisis Management Group
- Coordinates all functional heads in field operations group to take action
- Manages incident operations to mitigate for re-entry and recovery
- Coordinate search and rescue operations
- Arrange evacuation of non-essential workers to assembly points –outside port
- Arranges tugs, mooring boats and pilot(s) for sailing vessel(s)
- Co-ordinates actions, requests for additional resources and periodic tactical and logistical briefings with Site Emergency Coordinator
- Coordinate incident termination and cleanup activities
- Instructs various emergency squads as necessary

Site Emergency Coordinator – (Senior Pilot and Radio Officer)

- Direct operations from the emergency control center with assistance from Crisis Management Group
- Take over central responsibility from the Site incident controller (SIC)
- Decide level of crisis and whether to activate off site emergency plan
- Instruct SIC to sound appropriate alarm
- Direct the shutting down, evacuation and other operations at the port
- Monitor onsite and off-site personal protection, safety and accountability
- Monitor that casualties if any are given medical aid and relatives informed
- Exercise direct operational control of the works outside the affected works
- Monitor control of traffic movements within the port

 <i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Oil Spill Management</i>	<i>Rev.No: 03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
		<i>Page No:46</i>

- Coordinate with the senior operating staff of the fire, police and statutory authorities
- Issue authorized statements to the news media
- Review and assess possible developments to determine the most probable course of events
- Authorize the termination of the emergency situation by sounding the all clear siren-continuous long single tone siren for one minute
- Control rehabilitation of affected areas after emergency
- Arrange for a log of the emergency

Fire Coordinator – (HOS - Fire / HOS -Safety)

- (Under the direction of the Incident Control Officer)
- Announces fire incident point over the public address system and evacuates workers to the assembly points
- Informs fire station immediately and leads firefighting team to the incident location
- Informs SIC if external fire tender / fire-fighting equipment / materials/mutual aid is required
- If necessary, arranges and activates other fire-fighting equipment
- Arranges safety equipment e.g. fire suits, protective gloves and goggles, breathing apparatus
- In liaison with Civil Engineering Department, ensures that adequate water pressure is maintained in the fire hydrant system/at the area supply
- Maintains adequate records

HOS - Security / Duty Security Officer

- Directs, gate security and facilitates evacuation, transport, first aid, rescue
- Controls the entry of unauthorized persons and vehicles-disperses crowd
- Permits the entry of authorized personnel and outside agencies for rescues operations without delay. Liaises with State police
- Allows the entry of emergency vehicles such as ambulances without hindrances
- Ensures that residents within port area are notified about disaster and instructs to evacuate if necessary
- Ensure that all people are aware of the assembly points, where the transportation vehicles are available
- Ensure that the people are as per the head count available with the assembly point section of that area
- Liaise with the Chief Medical Officer to ensure first aid is available at the assembly points
- Carry out a reconnaissance of the evacuated area before declaring the same as evacuated and report to SIC.

 <i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Oil Spill Management</i>	<i>Rev.No: 03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
		<i>Page No:47</i>

Medical Superintendent

- Direct medical team
- Set up casualty collection center arrange first aid posts
- Arrange for adequate medicine, antidotes, oxygen, stretchers etc.
- Contact and cooperate with local hospitals and ensure that the most likely injuries can be adequately treated at these facilities e.g. burns
- Advise Chief Emergency Controller on industrial hygiene and make sure that the facility personnel are not exposed to unacceptable levels of toxic compounds
- Make arrangements for transporting and treating the injured
- Inform the hospitals of the situation in case of a toxic release and appraise them of the antidotes necessary for the treatment
- Maintain a list of blood groups of each employee with special reference to rare blood groups
- Liaise with Govt. Hospitals/Red Cross

Marine Pollution Coordinator – Manager (Marine / pollution control)

- Minimizes the impact of an accident on the environment for which it would develop methodologies to control hazardous spills
- Monitors cooperation with emergency response squads to conduct the actual cleanup work during and after the emergency.
- In case of fire and specially if the fire involves toxic/flammable materials, to ensure responsible actions for containing the run off fire water and other water from the damaged units
- Determines the level of contamination of the site as a result of the accident
- During cyclones/floods arranges sand bags and transfers important plans and documents to higher levels

Traffic Coordinator – Duty Port Captain

- Directs operation staff
- Prepares vessels to vacate from berth
- Arranges to protect cargo in vicinity from damage
- Arranges to segregate and shift cargo in sheds
- Submits consolidated list of dangerous goods in port including tankers in port and tank farms in port area
- Coordinates with ship owners / agents/C & F agents/stevedores

 <i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Oil Spill Management</i>	<i>Rev.No: 03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
		<i>Page No:48</i>

Communications Officer – (Duty Port Captain / Duty Radio Officer)

- Ensure telephone operator/signal room advises entire emergency team
- On receipt of instructions from the chief Incident controller, notifies the fire brigade/police/hospitals/district collector/mutual aid partners
- Keep the switchboard open for emergency calls and transmit the same to the concerned personnel effectively
- Refrain from exchanging any information with authorized persons unless authorized to do so by the Chief Incident Controller
- Maintains contact with other vessels through VTMS

Chief Emergency Controller – (Head - HSE)

- Inform district emergency authorities-District Collector, Medical Officer-Coast Guard Pollution control -Inspector of factories-Inspector of Dock Safety & Health,
- Activate the off-site plan if necessary
- Liaise with Jt. Secy./Director MOST (Ministry of Shipping) or relevant Govt. authority
- Inform the media

Civil Coordinator – (HOS – Environment cell / HOS - Estate)

- Inform Gujarat Pollution Control Board and other environmental agencies about the incident for getting necessary guidance
- Instruct the contractors to carry out urgent civil works if required
- Hire the barges for collecting the spilled oil, if required

Marine Engineering Coordinator – (HOS – SPM / Diving Team in-charge)

- Organize the tugs for combating the pollution
- Start the rigging of pollution combating equipment on tugs/launches
- Hire additional crafts if required

HOD- Corporate affairs:

- Collect detailed information periodically and liaise with press about the incident
- Arrange transport facilities, if required
- Inform local authorities/District Collector about the incident (as per EAP)

HOS - Legal & HOD - Estate:

- Issue notice under Major Port Trusts Act, Indian Ports Act(Prevention & Control of Pollution) Rules, etc; to the defaulting master/owner/agent
- Arrange for settlement of claims related to the pollution (as per EAP)

 <i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Oil Spill Management</i>	<i>Rev.No: 03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
		<i>Page No:49</i>

The functions of response team can be assigned to an identified and qualified OSRO also. In such an event of nomination, all functions with respect to response team and On Scene Co-coordinator will be carried out by the OSRO or OSRO representative, while, CMT and CIC will continue to function hitherto.

Response resources like equipment to be deployed having been identified in terms of quantity and location, additional resources like Spill Response Vessel (SRV) and work boat etc along with responders would be as per identification and notification by CMT leader. In the event of an OSRO being assigned the responsibility to provide resources, OSRO will have to mobilize the different units.

4.6 Availability of additional manpower

The response team is to comprise of a Manager, Specialists, responders, response workers apart from the crew of the vessel or work boat assigned to response duties. The team and additional resource composition are

- (i) Incident Manager / OSRO Manager
- (ii) OSC- Incident Controller/On Scene Coordinator
- (iii) SR Vessel and Captain
- (v) Responders
- (v) Vessel crew
- (vi) Work boat, master and crew

Additional responders or additional teams could be assembled during response ops as the requirement demands.

4.7 Advisors and experts – Spill Response, Wildlife, and Marine Environment:

Advices as felt necessary is to be sought from the commanding officer, ICG, Jamnagar, who look after such affairs related to oil spill response of Gujarat State Commander Coast Guard Region, Jamnagar may be approached in case, any need arises or as directed by CO, ICG

Advice on wild life and marine environment is provided Ministry Environment and Forest and Gujarat State Government Department

In Case, it is felt that private consultant / advisor opinion is required, Clean Sea Enterprise at Mumbai may be contacted in consultation with the component authority

 <i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Oil Spill Management</i>	<i>Rev.No: 03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
		<i>Page No:50</i>

4.8 Training / Safety schedules and drill / exercise programmed

4.8.1 Training:

Adani Ports and SEZ Limited, Mundra personnel, who have a role / responsibility for oil spill response and emergency management, shall undergo training appropriate to their role / responsibilities

Adani Ports and SEZ Limited, Mundra will ensure that their emergency response personnel, who are required to operate oil spill equipment, undergo training for effective deployment of equipment and devices.

Masters of Tugs and Adani Ports and SEZ Limited, Mundra Vessels are to ensure that their crews are fully trained in department of equipment and devices held on board.

4.8.2 Drill / exercise program

The purpose of exercises and drills is to test the knowledge of persons and members associated with response activity and maintain them in the highest state of readiness and professional competence. The exercises would aim to assess acquaintance of response teams with operation ability and initiation of Plan and also the knowledge of operational parameters.

For this purpose, it is required to conduct both in house training and evaluation exercises and also multi agency co-ordination exercises.

In addition to classroom training, the responders would need to go through regular internal and external exercises that would include deployment of equipment to demonstrate level of proficiency. With respect to management of operations in consonance with the plan, it is desirable to conduct real time CP exercises with all industrial stack holders involved. Such an exercise conducted at a large magnitude would need to incorporate the staff from Adani Ports and SEZ Limited, Mundra Participating Companies and the Indian Coast Guard and scheduled as mutually agreed.

The purpose of exercises and drills would be to check the following:

1. Organizational and Planning

- a. Knowledge of Contingency Plan and Procedures
- b. Personnel Notifications and Staff Mobilization

 <i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Oil Spill Management</i>	<i>Rev.No: 03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
		<i>Page No:51</i>

- c. Ability to operate as per CP and Operations Manual

2. Operational Response

- a. Oil spill assessment
- b. Response equipment selection
- c. Containment strategies
- d. Spilled oil recovery techniques
- e. Disposal of recovered oily water and contaminated material

3. Response Support

- a. Communications
- b. Logistics
- c. Personnel support
- d. Documentation

Types of exercise

Exercise requirement as per contract is to conduct internal and external exercise. In addition to classroom training exercise are include deployment of equipment to demonstrate satisfactory of proficiency. External exercises are to incorporate with the staff from Adani Ports and SEZ Limited, Mundra, participating companies and the Indian Coast Guard.

Type A: Internal exercises lasting approx. one day for ensuring OSR readiness of all equipment, services and personnel.

Type B: Emergency response exercise (Tier-1) is to be conducted twice in a year

Type C: This exercise designed to test either specific scenarios or emergency plans includes external participation (i.e. mutual aid, govt. agencies)



5. COMMUNICATION AND CONTROL

5.1 Incident Control Room and Facilities

The core operational team discharging the functions of incident control, administration and management is designated as Crisis Management Team/s (CMT) operating from the identified persons unless the magnitude of operations dictates manning of any particular operation by one operator only. (As far as practicable, both functions should be located at same site.)

Any person who observes a spill or gets an information of a spill or observes a situation that could lead a potential spill, may pass the available information with maximum possible details to any one control centre located in the Port Administrative building.

In the event, the response activity is assigned by the Adani Ports and SEZ Limited to an OSRO, the OSRO will appoint a manager in addition to incident manager to undertake the responsibility of meeting the demands of response teams.

A permanent location is to be designated as Communication and Ops Centre (COC) by the authority responsible for execution of this plan. Both functions are to be manned by different of – port control, control and operations Room, Harbour master, by fastest means available (All incidents of soil whatever magnitude are to be reported to HM by Port Control Room or COC)

Contact Details

Port Control (MMPT Marine Control)	Landline- Adani Ports and SEZ Limited, Mundra	02838-255739
	VHF – Adani Ports and SEZ Limited, Mundra	VHF Channel -77 & 16
COC (MMPT Marine Control)	Landline No	02838-255739
	Mobile	98252 28673
	VHF	VHF Channel -77 & 16
Harbour Master / CIC	Landline – Adani Ports and SEZ Limited, Mundra	02838-277727
	Mobile	6359883102

 Adani Ports and Special Economic Zone Ltd, Mundra	Communication and Control	Rev.No: 03 Dt:30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:53



5.2 Field Communication Equipment

An effective inter-facility communication system among various departments/ agencies will be maintained with Operators. Communication will be established during the port operation in Mumbai and with the Operators.

5.2.1 Equipment

The communication centre is to be provided the following equipment

- VHF - 3 Nos.
- Walkie talkies – as per the number of response teams and functional team leaders
- Telephone (Landline or wireless) – 2 Nos,
- Computer and printer with internet and projector facility

5.2.2 Publications

- Copy of CP and appendixes
- Details of CMT, OSRO organization and their contact details
- Charts of Mundra harbor, Tide Table
- Large scale charts showing layout of POL and cargo berths
- GA plan of a typical oil tanker
- Location map of jetties, berthing and landing facilities available in Mumbai estuary along with facilities available
- Telephone contact directory of all emergency aid and medical services, port offices and local administration authority
- OSRP of Adani Ports, SEZ Limited Mundra and HMEL

5.3 Reports, Manuals, Charts and Incident Logs

The log incident Report from (as per sample below) has been developed to ensure that the basic information required to formulate a response to an Oil Spill Emergency is obtained during the notification (if Required). Port Control / Harbour Master / Communication and Ops Centre will complete the form and dispatch to the concerned authorities by the fastest means. In all cases, the original status report forms will be handed over to ECT, who in turn would maintain the fastest means. In all cases, the original status report forms will be handed over to ECT, whom turns, would maintain record of all such documents.

 Adani Ports and Special Economic Zone Ltd, Mundra	Communication and Control	Rev.No: 03 Dt:30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:54



The personal Log forms and the Continuation Sheets are to be used during the emergency response to record the contacts and actions carried out during the emergency. After "stand-down" the Personal Log Form and the Continuation Sheets, are numbered, signed and handed over to the Harbour Master. All incident logs and records will be maintained.

INCIDENT LOG

INCIDENT INFORMATION

INCIDENT TITLE (Name of Vessel) -----

Incident Number (Sq number/ dd /mm/ yyyy)-----

1.DETAILS

Time of recording (24 hr format) Date

Day.....

Person / Organization reporting incident

Name Designation

Contact number

2. INCIDENT

Name of VESSEL Location

Position (if not alongside) Latitude

Longitude

Sounding.....

Incident details

Time (Of incident, 24 hrs format) Date

Cause of spill

Type of oil

Estimated quantity of spill

Details of damage to vessel / installation

3. COMMENTS

1. Recorded by
Name -----

	Adani Ports and Special Economic Zone Ltd, Mundra	Communication and Control	Rev.No: 03 Dt:30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:55



Time -----

Note: FOUR COPIES OF INFORMATION ARE TO BE RECORDED. RETAINING ONE FOR OFFICE RECORD, THREE COPIES ARE TO BE CIRCULATED ONE EACH TO CHIEF INCIDENT CONTROLLER OSC / RESPONDER/ INCIDENT CONTROLLER VESSEL MASTER

The personal log form (and continuation sheets) has been developed to allow all personnel involved on the emergency response to maintain a personal log of event. The personal log forms and the continuation sheets are to be used during the oil spill response to record the contacts and activities carried out during such emergency.

Incident Logs are must for logging of all the events taking place. This will help in preparation a comprehensive incident report on a day to day basis as well as on completion of operation.

After the repose work is over, the personnel log form (as per sample below) and the continuation sheet are to be numbered, signed and handed over to the Deputy Conservator.

PERSONAL LOG (ALL MEMBERS OF SPILL RESPONSE ORGANISATION)

Incident Title -----Number----- (as per)

Date -----

Name -----Designation (as per C P) -----

Time of Rx / Forwarding Info	Activity requested by/ demanded of other Member/s
Observations on days operations	

Note – Copy of Personal Log is to be handed over to COC daily or as earliest as possible on completion of a schedule

 Adani Ports and Special Economic Zone Ltd, Mundra	Communication and Control	Rev.No: 03 Dt:30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:56

6. INITIAL PROCEDURES

Oil spill being one of the emergencies in the potential list of emergencies in the port operations, the initial activation of emergency plans commences from the site level irrespective of the magnitude of the event. Since not all the emergencies lead to oil spills, the activation of emergency response is oriented towards the required technical and operational mitigation. Adani Ports and SEZ Limited, Mundra Emergency Response Plans at the site, project and port level (Tier-1) takes precedence to the oil spill response plans in the initial events.

The initial actions that will be taken by Adani Ports and SEZ Limited, Mundra in the event of an oil spill will comprise of following procedures, as detailed subsequently:

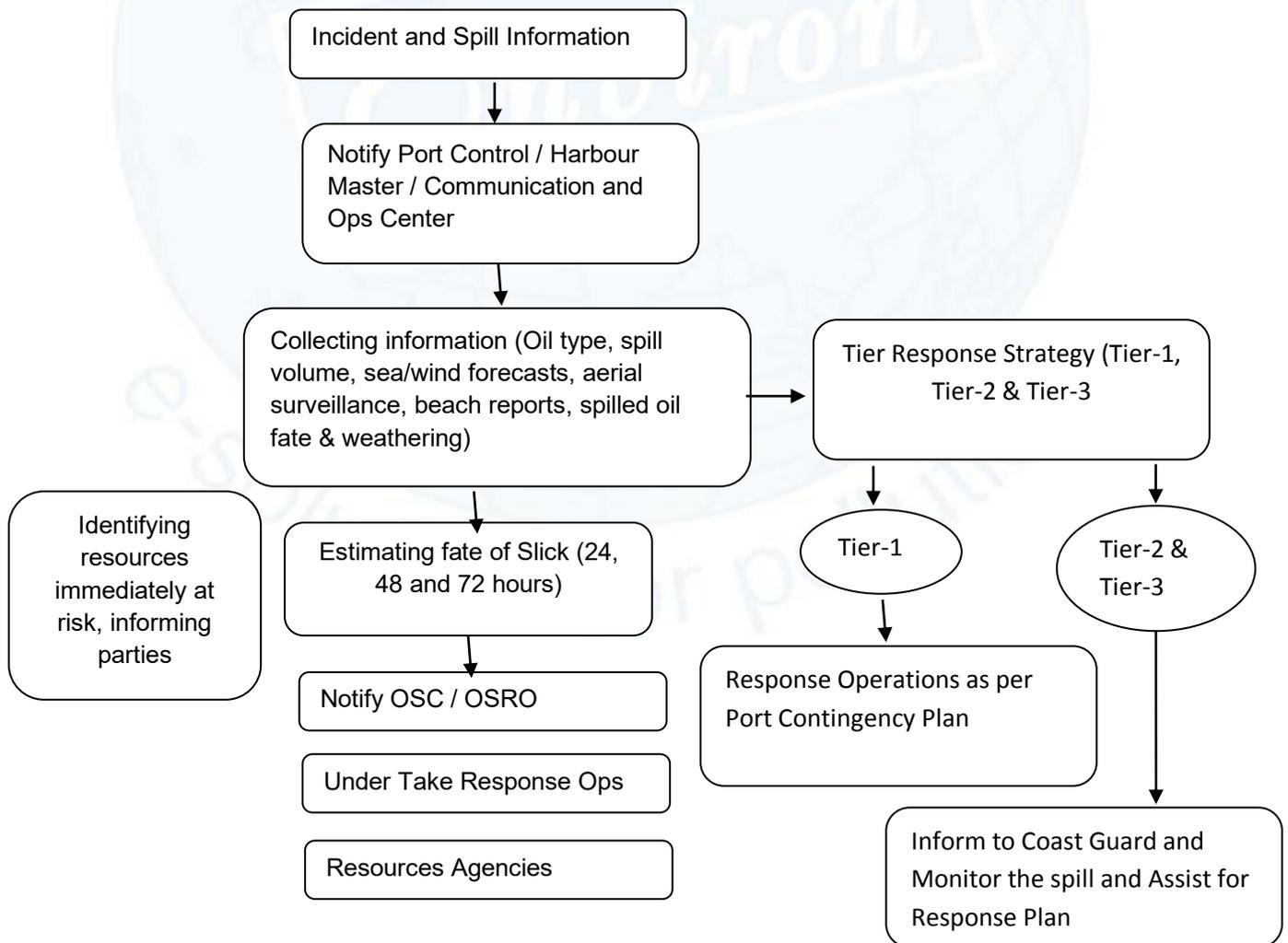


Fig.6.1 Flow chart for Incident and information



6.1 Notification of oil spill to Concerned Authorities

A trigger to activate emergency response can be done by any individual either working in Port Administrative roles or in contractual arrangements based on his initial observations or inferred potential threats in the process or hazards involved in operations. The escalation of emergency from the observer to the Port Control / Harbour master must be fast and unhindered. Following communication channels shall be used by the individuals at the work site to communicate emergency:

- **Shout about the event** – viz., leak, spill, fire, gas release, collapse, fall, etc. depending on the event so as to catch the attention of others in the vicinity.
- **Hand signals:** When there is no other means of communication, hand signals shall be used to convey the above events.
- **Walkie-talkies and other marine communications:** when the individuals have proper communication facilities viz. walkie talkie, VHF or mobile phones, the details of the incident shall be communicated to Port Control / Harbour master.

Once the nature, source & quantity of oil spill is assessed then the following procedure to be followed for notifying the oil spill

- 1) In the event of an oil spill, the spill observer will alert and notify the Port authorities of the spill. The spill will be reported to the Port Control / Harbour master. Preliminary information on the location of the spill, spill size, oil type, release rates and any injuries will be provided to the Port Control / Harbour master (**Appendix – 10 Prescribed Formats**). The Port Control / Harbour master will thereafter notify the Agent / response Agencies. In case the Port Control / Harbour master is activated, the Crisis Management Team Leader will be notified.
- 2) A preliminary estimate of the response Tier will be undertaken by the OSC. The OSC will allocate appropriate Tier level using guidelines given in earlier sections. ECT will be activated for Tier-1 spills while EMT will be activated for Tier 2/3 spills.
- 3) The spill event will also be reported to the Adani Ports and SEZ Limited, Mundra Authority, Indian Coast Guard and other relevant authorities by the CMT Leader, in the prescribed formats. The CMT Leader and OSC will also have the responsibility to manage and mobilize external resources. If required, the CMT Leader will liaise with ECT for information and support requests.
- 4) The OSC will also need to collect information on the oil type and sea/ wind forecasts of the region which will assist in handling the spill. Aerial surveillance will be initiated if required to assess the extent of the spill and record the size and location of the slick. The response team deployed onshore in case of spill reaches the shore will also be instrumental in generating reports

 Adani Ports and Special Economic Zone Ltd, Mundra	Initial Procedures	Rev.No: 03 Dt:30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:58



- 5) The fate and movement of the slick will be estimated as part of the initial response actions. Assessment of oil slick trajectory will be undertaken as per the following:
 - a. Obtain information on tides, direction / speed of current and wind.
 - b. Using the information on current and wind, predict the trajectory and speed of the spill movement.
 - c. Draw the slick on a chart (map) with co-ordinates, showing position and predicted the movement of the oil
 - d. Record observations on form provided in **Appendix - log Book Format**.
- 6) The colour of the oil on water will indicate its thickness. The volume of oil will be calculated based on the area and colour of oil visible from the aerial observation.
- 7) Once the size and movement of the spill are known, it is possible for the Incident Controller to assess the potential danger to people and nearby installations, and if necessary, to set safety exclusion zones. The predicted movement of the slick is also important for guiding responders to the right locations for clean-up. The Incident Controller must also gather additional key information about the incident from the On-Scene Commander.

6.1.1 Reporting of oil spill incident

In case of reporting of oil spill incidents, the following information is to be provided by the incident observer.

- Location of the spill
- Likely source of the spill
- Area impacted at the time of observation
- General observation of movement of slicks (based on winds and currents)

Upon receipt of such first information report, the same should be forwarded to the CMT leader through the fastest means of communication through the channels defined above. The person intimating about the incident (including near miss) shall not be made responsible for any actions relevant to spill response unless he is a member of the team relevant to the response. Prompt intimation of such incidents and near misses shall be encouraged by Mundra Port as a part of incident reporting and management system. Concerned authorities will be intimated according to the statutory requirements.

6.2 Preliminary Estimate of Response Tier

6.2.1 Preliminary Assessment of the Incident

 Adani Ports and Special Economic Zone Ltd, Mundra	Initial Procedures	Rev.No: 03 Dt:30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:59



The OSC along will make a preliminary assessment of the incident by contacting the person reporting the spill. If needed, the OSC may take assistance/ guidance from ICG Coordinator and other Government Agency. The following will be the broad objectives:

- Evaluating the magnitude and impact of the discharge or threat of discharge on the public health, welfare, and the environment
- Determining in which jurisdiction the incident occurred
- Determining or confirming the responsible party
- Determining or confirming the source of the spill
- Assessing the need for state assistance; and
- Assessing the feasibility of removal and determining the equipment needed to remove the oil.

6.2.2 Containment and Control

Clean-up actions must begin as soon as possible to minimize the effect on natural and other resources. These actions shall include locating the source of the discharge and preventing any further spillage, placement of containment boom to control the spread of oil and to protect sensitive areas, measuring and sampling, physical removal of the oil from water and land, the use of chemicals to herd or disperse the oil, and in-situ burning. The official coordinating response to the spill must address many questions, including:

- How large an area will the spill cover?
- How thick will the slick be?
- How fast and in what direction will the slick drift?
- When and where will the oil hit the shoreline?
- What will happen to the oil if it is not removed?
- What is the value and sensitivity of the resources at risk?
- The answers to these questions will determine what response actions are taken.

6.3 Notifying Key Team Members and Authorities

The port authorities such as, HOD-Marine, Fire Officer and other HODs will be informed over phone /Mobile phone, and same be also logged at ECR. Upon confirmation of the incident with Authority reporting spill, inform to CMG and initiate notifications to the CG for all larger spills of more than 700 tons and intimation to international experts for response reediness.

6.4 Manning Control Room – MMPT Marine Control

The Emergency Control Room (ECR) would function with the members of Emergency Control Team (ECT) and they will consist of following:

 Adani Ports and Special Economic Zone Ltd, Mundra	Initial Procedures	Rev.No: 03 Dt:30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:60



- HOD-Marine Services
- HOS-Marine Services
- SPM In-Charge
- Duty Port Captain
- Security In-charge
- Radio Officer

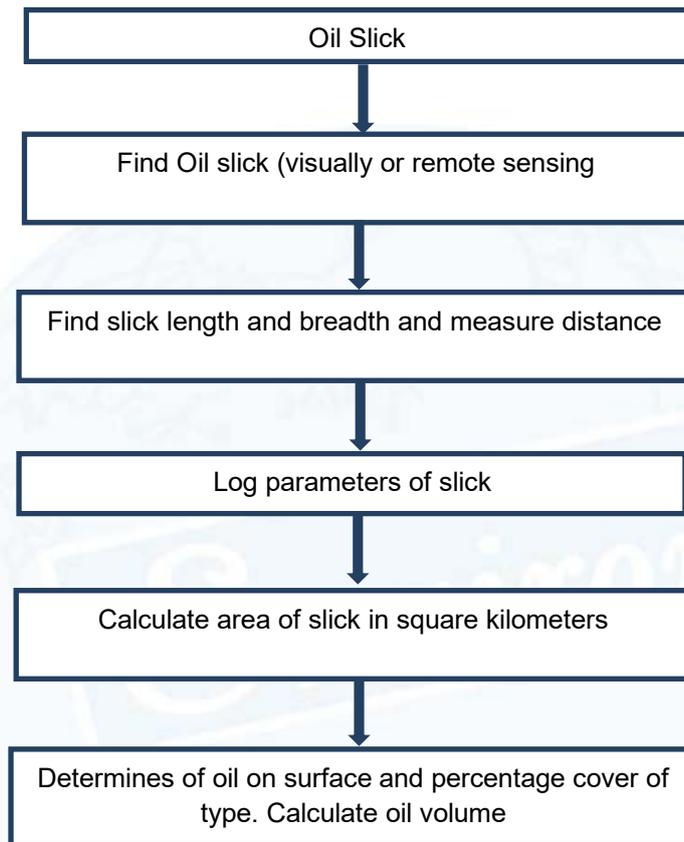
6.5 Collecting Information (oil type, sea/ wind forecasts, aerial surveillance, beach reports)

In case of oil spill reported, intimate to various department of Port Organization. The department will notify the following information to OSRO / Agencies

- i. Marine department will provide all the relevant data i.e. Tide conditions at that time, Tide timings, Current, Wind direction / speed, Weather forecast for 3 days next to that day to ECR. The Vessel movements, Vessel position in harbour, Water crafts availability for pollution response activities. Relevant Navigation Charts and any other important data / information available may also be provided to ECR. Also, number of Security personnel available at that time will be made available.
- ii. Security department to provide information regarding availability of type and number of vehicles available for transportation of men and equipment's. Also, number of Casual labors available at that time will be made available.
- iii. Fire department to indicate readiness about FIRE CONTINGENCY including OILFIRE and also number of spare Life Jackets available.
- iv. ECT is ensure that no individual working/supervising/observing OSR operations/Exercise without life jackets "ON"
- v. OSC is to collect following information immediately in case of oil spill

Surveillance and tracking of oil at sea immediately after the spill, carry out the surveillance for assessing the quantity and of spilled oil:

	Adani Ports and Special Economic Zone Ltd, Mundra	Initial Procedures	Rev.No: 03 Dt:30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:61



The OSC is to collect the following information immediately in case of oil spill, with the help of Master of the vessel/aircraft.

- Time spill occurred
- Position in Latitude/ Longitude and also with reference to any prominent land mark
- Visual appearance, apparent thickness of oil and extent of area covered
- Percentage cover of various thickness of oil
- Existing weather condition and weather forecast
- Current, tide and wind conditions;
- Immediate availability of support vessels, equipment and man power specifying time factor as well
- Estimate oil spill trajectory and likely area and time of its landfall;
- Volume of each oil type.
- General comments on oil appearance (shape, direction of movement).
- General comments on weather.
- Appearance of oil at sea.

Code	Colour	Oil Type	Thickness	Volume/km ²
1	Silvery	Sheen	0.0001mm	0.1m ³
2	Iridescent	Sheen	0.0003mm	0.3m ³
3	Black/dark brown	Crude/Fuel Oil	0.1mm	100m ³
4	Brown/Orange	Emulsion	1mm	1000m ³

Movement of oil on the sea surface: Oil will move at 100% of the current speed and approximately 3% of the wind speed.

6.6 Estimating fate of Oil Slick(24,48and72hours)

While predicting the movement of the oil spill, state of tide and currents along with prevailing wind must be taken in to account. Schematic diagram of weathering process with time and typical fraction of Crude Oil is shown the following figure.

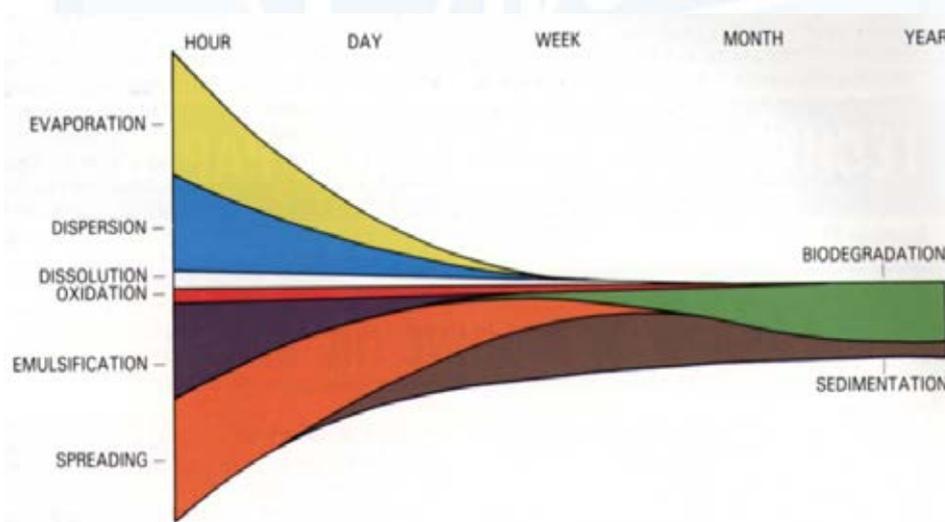


Fig.6.2: Schematic diagram of weathering process with time and typical fraction of Crude Oil

6.7 Identifying Resources Immediately at Risk, Informing Parties

The resources immediately at risk can be mangroves adjacent to the Port area, nearby Port Area. Depending upon the place of spill, the resources at risk will be found out.

Based on initial observations & assessment of oil spill and inputs from oil spill modelling studies, the resources at risk is to be identified by OSC. Relevant stakeholders/ parties to be informed to take appropriate action.

Continuous watch on working frequencies used by ships, port and terminal for POL cargo ops

	Adani Ports and Special Economic Zone Ltd, Mundra	Initial Procedures	Rev.No: 03 Dt:30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:63



- Watch on Ch 16 at all times
- Log all information on in respect of an oil spill (with maximum details) received through keeping watch or from any other source
- In case of first receipt of information, pass all the details regarding spill to CMT leader to facilitate complete or partial activation of team or response actions by OSRO
- Pass all information regarding spill to OSRO and duty vessel or Tug assigned response duties
- Remain in constant touch with designated response team leader and response/support vessels as per working channel decided for operations
- Collect weather information on from MET dept on weather conditions in the area including wind direction & speed, tide condition and other weather parameters (all received information is to be logged)
- Provide weather data to operational teams as demanded

6.7.1 Oil Spill Modeling Studies

The fate weathering characteristics of spilled oil is predicted for various hydrological, Meteorological and oceanographical conditions. The details of computational various sceneries are presented in detail (Report-Part-B)

	Adani Ports and Special Economic Zone Ltd, Mundra	Initial Procedures	Rev.No: 03 Dt:30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:64

10. DATA DIRECTORY

10.1 MAPS/CHARTS

10.1.1 Coastal facilities, Access roads, Telephones, Hotels, etc.

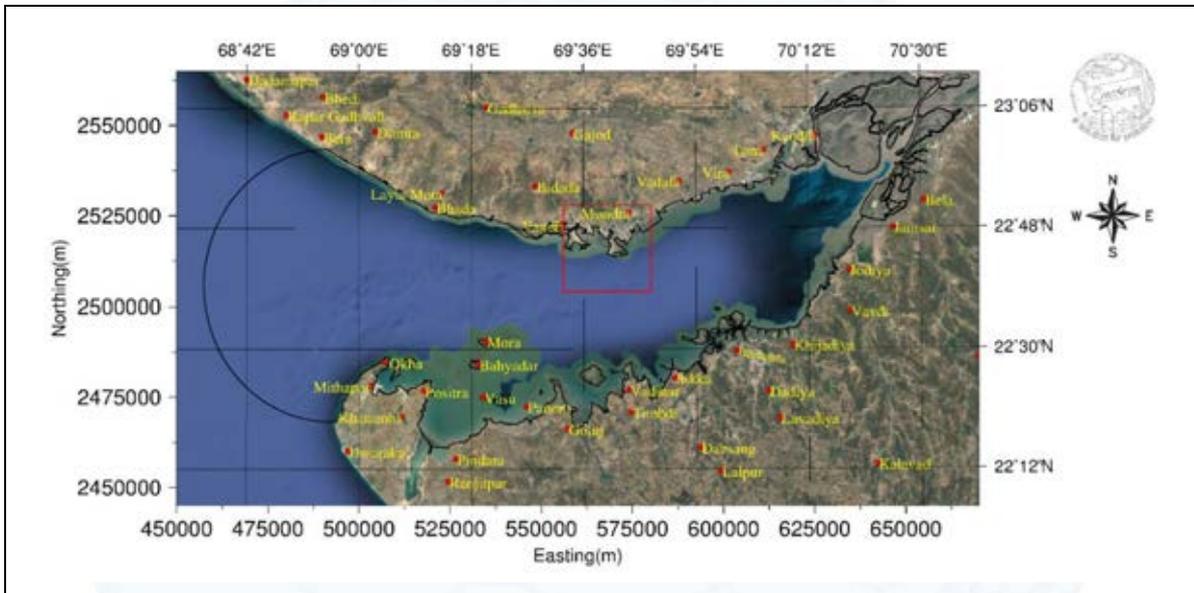


Fig.10.1 Google Map showing Adani Port & SEZ facilities in the Mundra region

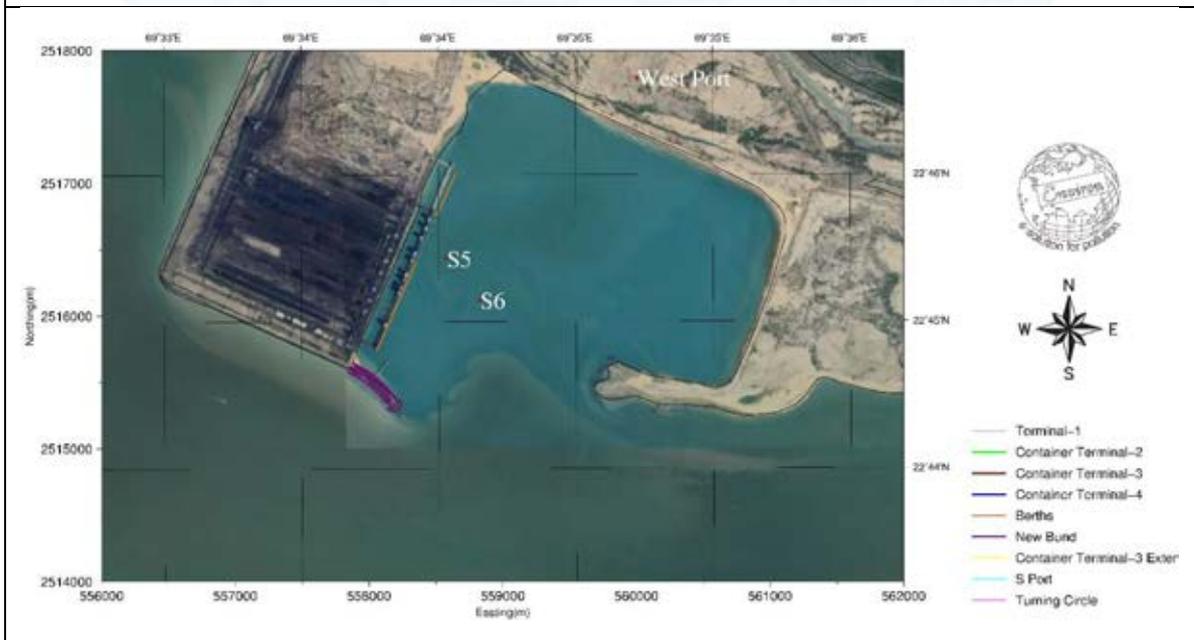


Fig.10.1(a) Google Map showing Adani West Port facilities in the Mundra region

	Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:92



Fig.10.1(b) Google Map showing Adani south Port facilities in the Mundra region

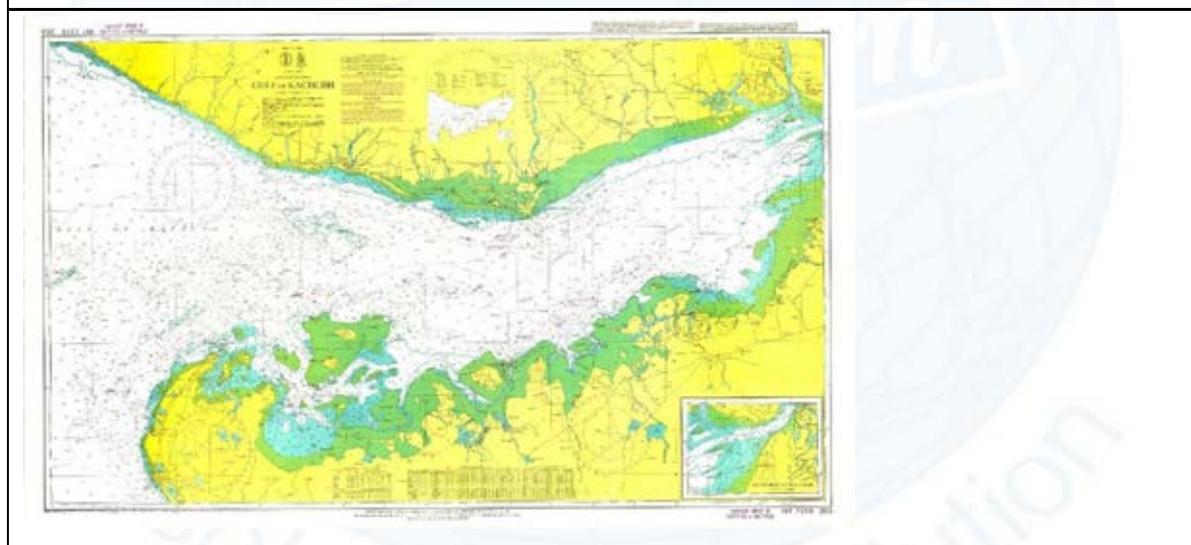


Fig.10.2 NHO Chart Showing Mundra region, Gulf of Kutch

Table.10.1 Contact Details of Spill Information Center

SI No	Address of Centre	Contact Details
1	Indian Coast Guard Headquarters. National Stadium Complex Coast Guard DHQ -1(GJ). Near RGT College ... Okha Port, Gujarat – 361 350	Tel: 02892 263421. Fax: 0-22 24333727
2	Indian Coast Guard Headquarters. CP25+RRF, Vadinar, Gujarat 361010	Tel: 0-22 – 24222696 Fax: 0 – 22 - 24222696
	Indian Coast Guard Headquarters. gh-4 garden, udhyog bhavan, Sector 11, Gandhinagar, Gujarat 382011	

Table.10.2 Contact Details of District Administrative Authorities

Place Name	Address of Centre	Contact Details
Bhuj (Kutch)	District Collector Office Near Circuit House, Mandvi Road, Nr. Mota Bandh, Bhuj (Kachchh) Gujarat – 370001	Phone: +91 2832 250650 Fax: +91 2832 250430 Email: collector-kut@gujarat.gov.in
Jamnagar	District Collector Office, Jilla Seva Sadan, Sharu Section Road, Jamnagar - 361002	Collector, Jamnagar <ul style="list-style-type: none"> • +91 288 2555869 • +91 288 2555899 • collector-jam@gujarat.gov.in
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	<ul style="list-style-type: none"> ☐ 91 2833 232805 ☐ +91 2833 232102 ☐ collector-devbdwarka@gujarat.gov.in

Table.10.3 Contact Details of Gujarat Fisheries Development Council

SI No.	Address of Centre	Contact Details
1	Commissioner of Fisheries 3rd Floor, Block no-10, Jivraj Mehta Bhavan, Gandhinagar, Gujarat 382010	Phone No: -079- 232-53729 Fax No:- 079-232-53730

Table.10.4 State Pollution Control Board – Regional Offices

	Address of Centre	Contact Details
Gandhi nagar	Gujarat Pollution Control Board Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	Phone: (079) 2323 2152 Fax : (079) 2323 2156, 2322 2784, 2323 2161 gpcbchairman@gmail.com , chairman-gpcb@gujarat.gov.in Member Secretary:
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : 02822 228 001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	Telephone (0288) 2752366 Fax: (0288) 2753540 Email: ro-gpcb-jamn@gujarat.gov.in
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	Telephone: (02832) 250620 Fax: - Email: ro-gpcb-kutw@gujarat.gov.in

10.1.2 Coastal Charts, Currents, Tidal Information Prevailing Winds

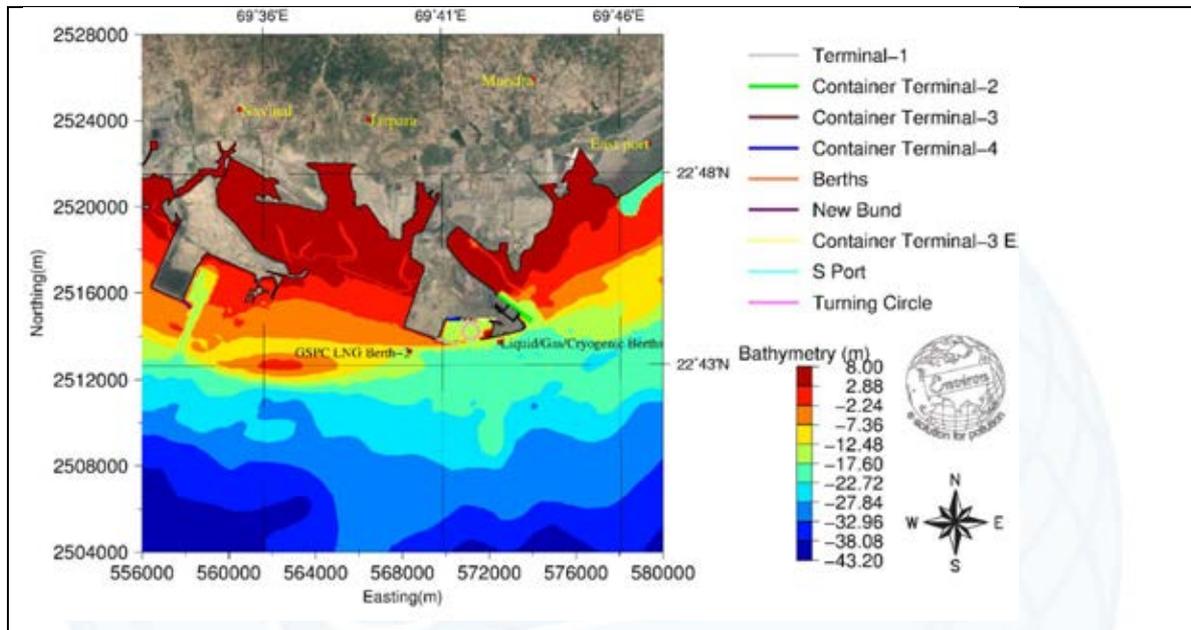


Fig.10.3 Map showing interpolated bathymetry of Adani Ports and surrounding areas.

Tide and Current information

Tide:

The tidal planes were assessed and shown in Table below

The Highest Astronomical Tide (HAT) is estimated to be about +6.4 m above chart datum (CD), and the Lowest Astronomical Tide (LAT) to be at 0.0 m CD.

Table: Tidal information at Mundra

Tide	Height (m) above CD
Mean High Water Springs	5.8
Mean High Water Neaps	4.6
Mean Low Water Neaps	2.1
Mean Low Water Springs	1.0

Currents

Currents in the approaches to the port are dominated by the tidal flows, with predictable variations over diurnal, monthly and annual time scales. Currents in this part of the Gulf flow parallel to the natural sea-bed contours. Currents can be relatively strong, with speeds in excess of 3.0 Knots reported at sometimes of the year. The Admiralty Chart shows currents off Navinal point to be 3.0

Knots East & West bound. It is observed that the currents are usually aligned with the bed contours and are stronger in deeper waters off the coast. The impact of future development over the existing coast-line can be determined by the change in current speed resulting from the proposed developments.

Waves

In past HR Wallingford (HRW) has studied the wave climate considering wave energy from locally generated waves and swell propagating in to the Gulf of Kachchh from the Arabian Sea. The results of the study carried out by HRW are presented in the Table below.

Design Waves at Mundra

Direction Sector (°N)	Return Period (years)	Inshore Direction (°N)	Hs (m)	T2 (sec)
210	1	222	1.2	5.0
	5	222	1.4	5.3
	20	221	1.6	5.8
	100	221	1.8	6.1
240	1	226	1.5	5.4
	5	226	1.7	5.8
	20	225	1.8	6.1
	100	225	2.0	6.5
270	1	239	1.4	5.5
	5	236	1.7	6.3
	20	236	1.8	6.7
	100	235	2.0	7.4
300	1	240	0.8	5.2
	5	240	0.9	5.6
	20	239	1.0	6.2
	100	238	1.2	6.7

Cyclones

Cyclonic disturbances strike North-Gujarat, particularly the Kachchh and Saurashtra regions, periodically. These disturbances generally originate over the Arabian Sea. Generally during June, the storms are confined to the area north of 15°N and east of 65°E. In August, the initial stages, they move along the northwest course and show a large latitudinal scatter. West of 80°E, the tracks tend to curve towards north. During October the direction of movement of a storm is to the west in the Arabian Sea. However, east of 70°E some of the storms move north-northwest and later recurves northeast to strike Gujarat-north Mekran coast.

 Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:96

Wind

There are strong winds at times at Mundra Port. The wind directions are shown in Figure below. In the period lasting over months March to May the wind direction is generally SWW (225° - 250°) and velocity varies from 20 to 25 Knots. June through August the wind direction is predominantly SW and velocity varies from 25 to 30 Knots with short gusts going up to 35 to 40 Knots. Towards end of September and through October wind direction changes to NE with velocities ranging from 7 to 10 Knots. Direction remaining same the velocity varies 10 knots to 25 Knots in the period November to January. February is the calm period when wind direction is southerly with velocity in the range of 7 Knots. Stormy weather may generate winds having velocity up to 100 Knots which should be taken as the worst-case scenario for design of tall structures and heavy-duty cranes.

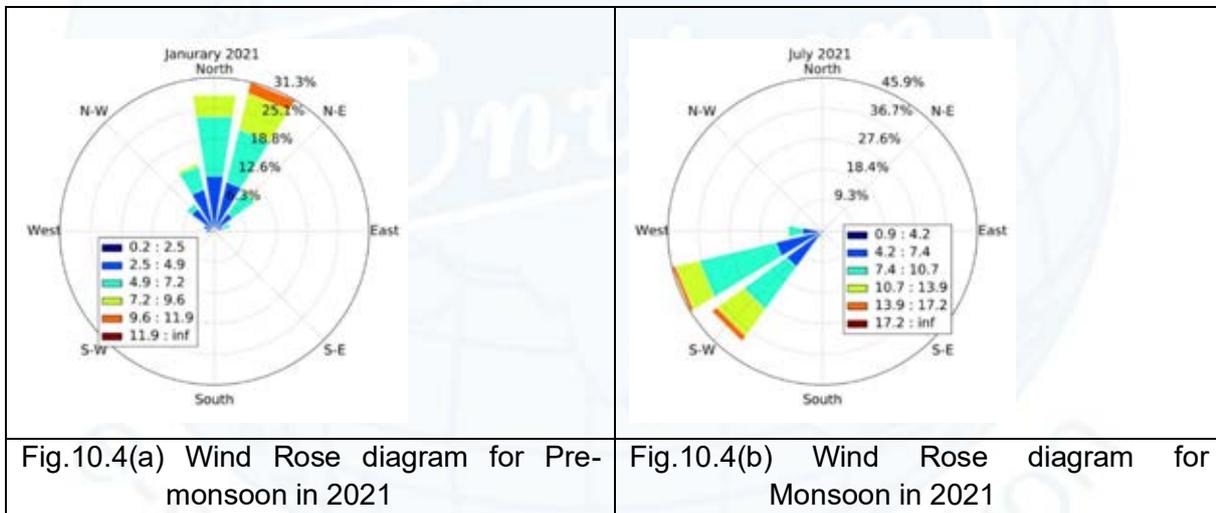


Fig.10.4(a) Wind Rose diagram for Pre-monsoon in 2021

Fig.10.4(b) Wind Rose diagram for Monsoon in 2021

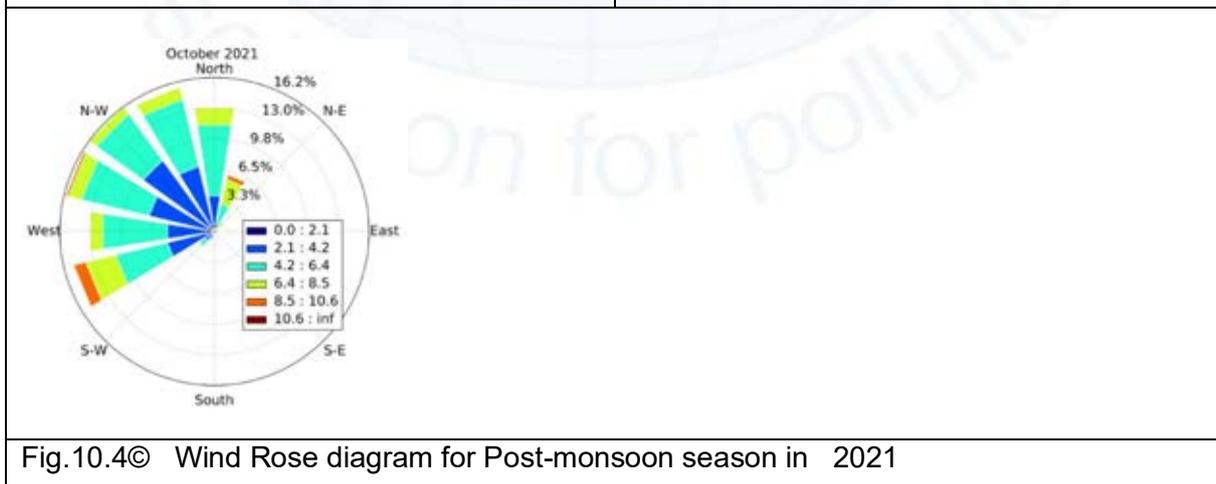


Fig.10.4(c) Wind Rose diagram for Post-monsoon season in 2021

Rainfall:

The climate of the region has a regular seasonal variation determined by the occurrence of 2 Annual monsoons. The southwest monsoon period extends from June to September. November



to March is the period for the North East monsoon. Most of the Annual rainfall occurs during the south west monsoon, the average monthly rainfall being about 45 cm. The average annual rainfall over 20 years is 193 cm.

Humidity & Temperature:

Relative humidity ranges from 61% to 87% being the highest in the monsoon period. During the winter months (Nov-Jan) relative humidity ranges from 61% to 72%. Mean daily temperature ranges from 24 Degrees C to 33 Degrees C except during the winter period when the minimum temperature may fall to about 19 Degrees. The hotter months are March, April, May and June.

10.1.3 Risk Locations and probable Fate of Oil

As with any oil transportation, oil spill risks are associated with Adani port operations. They may vary from a few litres of accidental spill of crude oil / Fuel Oil from offshore vessels to several thousands of tons of oil during collision / grounding situations. In line with the standard industry practice, APSEZL, Mundra is also prepared to mitigate spills of importance from routine operations (Tier-1), while oil spill situations of higher magnitude are dealt with industry co-operation and external intervention. However, it is required to have a fair understanding of the risks and probability of spills arising out of its operations and their consequences due to movement and landing along the coast.

The operations of APSEZL, Mundra are broadly defined under the following:

- Vessel operations- loading / unloading
- Vessel collision, or grounding
- Bunker/ fuelling operations
- Vessel distress / sinking
- Pipeline ruptures /accidental spills from sub-sea/over the sea/shore approach (in the tidal zone) pipelines
- Rupture of export line

The exact quantity of spill from each of the above incident is difficult to predict due to the variables of operating conditions and the length of risk exposure. Maximum risks associated with the events may be considered while devising the oil spill contingency plan. The spill scenarios range from extremely negligible quantities to enormous quantities in rare catastrophic events. The simulation of oil spills does not vary significantly in various scenarios except for the magnitude of impact zone and the quantity involved in such impacts. The software is intended to use for specific scenarios, through a few hypothetical simulations are made in this report considering the worst-case scenarios.

 Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:98

Instantaneous spills (Ref. Fig.11.5)

- Crude oil spill of 700t at selected SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 700t at selected West Port(S5), Vessel route(S7), LNG Jetty(S8), South basin (S9), Mundra Ports(S11), MICT/AMCT(S12)
- Crude oil spill of 10000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Crude oil spill of 25000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 100t at selected West Port (S5, S6), LNG Jetty(S8), South basin (S9,S10), Mundra Ports(S11), MICT/AMCT(S12)
- HSD oil spill of 50t at selected West Port(S5), LNG Jetty(S8), South basin (S9), Mundra Ports(S11)
- HSD oil spill of 20t at selected West Port(S6), South basin (S10)

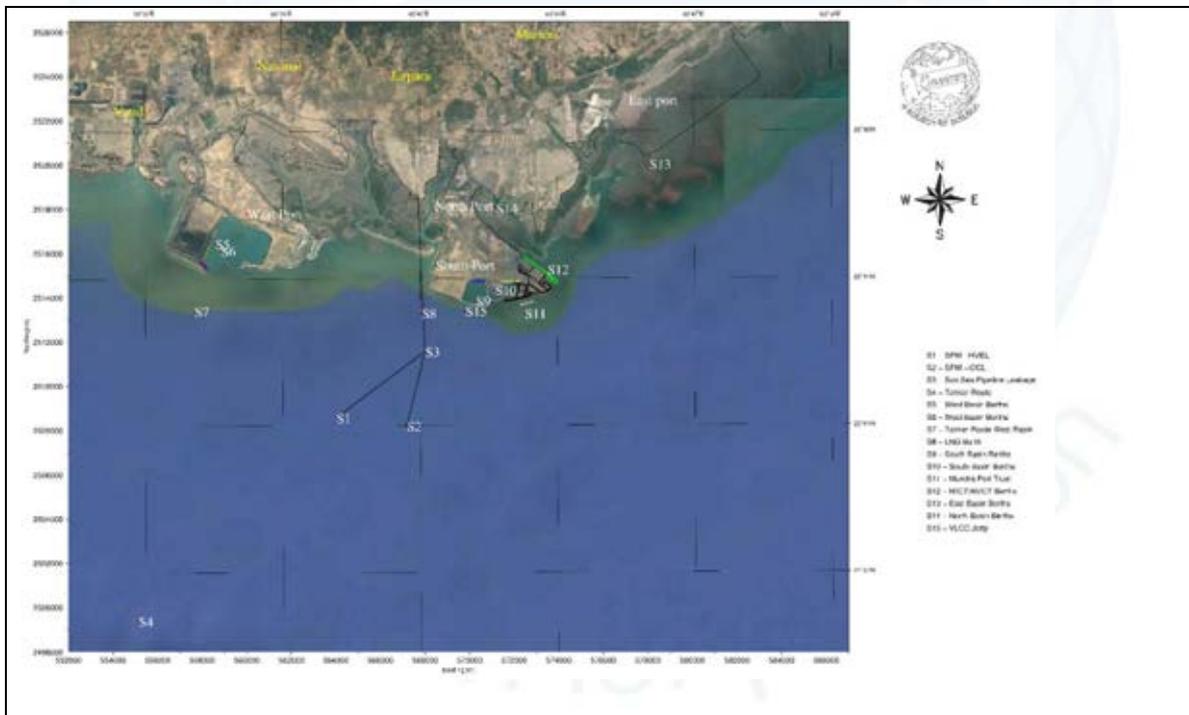


Fig.10.5 Spill Locations considered in APSEZL Mundra region

Continuous spills (Ref. Fig.11.5)

- Crude oil spill of 10000 m3/hr for 1 min at selected SPM-HMEL(S1), SPM-IOCL(S2)
- Crude oil spill of 10000 m3/hr for 1 min at selected VLCC Jetty (S15)
- Crude oil spill of 10000 m3/hr for 1 min at sub-sea pipeline route (S3)

The spill scenarios range from extremely negligible quantities to enormous quantities in rare catastrophic events. The simulation of oil spills does not vary significantly in various scenarios except the magnitude of impact zone and the quantity involved in such impacts.

Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:99



Detailed Maps and charts for all spill scenarios including probable fate of oil are discussed extensively in PART-B of the report (PART-B: OIL SPILL FATE AND TRAJECTORY MODELING STUDIES)

The following are the risk locations in the Harbour zones of APSEZL, Mundra

- RIL Ports & Terminals, New Bedi Port, Essar Jetties in southern side of Gulf
- Bedi Port, Kalubar Tapu, mora island, Narara Reff, Pirotan Island
- Vadinar Oil Terminal, Borl, Mandvi Beach, Modhva Beach, Tata power Limited (CGPL) intake and outfalls, Adani West Port, Adani South Port, Tuna Port, Kandla Ports, BTC Port Navlakhi
- Sikka coast
- Adani Ports (South, East, West and North)

10.1.4 Sensitivity Area Mapping of Gulf of Kutch

The coast of Gulf of Kutch has tidal flats, mangroves and sand bars etc (Fig.11.6). There is a need to protect the ecosystem and marine environment during the oil handling activities.

The resources likely to be threatened discussed in the PART-C of the Report:

The coastal areas of Gulf of Kutch coast abound in marine wealth and industrial activities. It is endowed with a great diversity of natural ecosystems, of which the major systems are salt pans, intertidal zones, sand dunes, mangroves, creeks and Open Ocean. Vulnerability index of shores in order of increasing vulnerability to oil spill damages as per Gundlach and Hayes 1978.

 Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:100

SENSITIVE AREAS

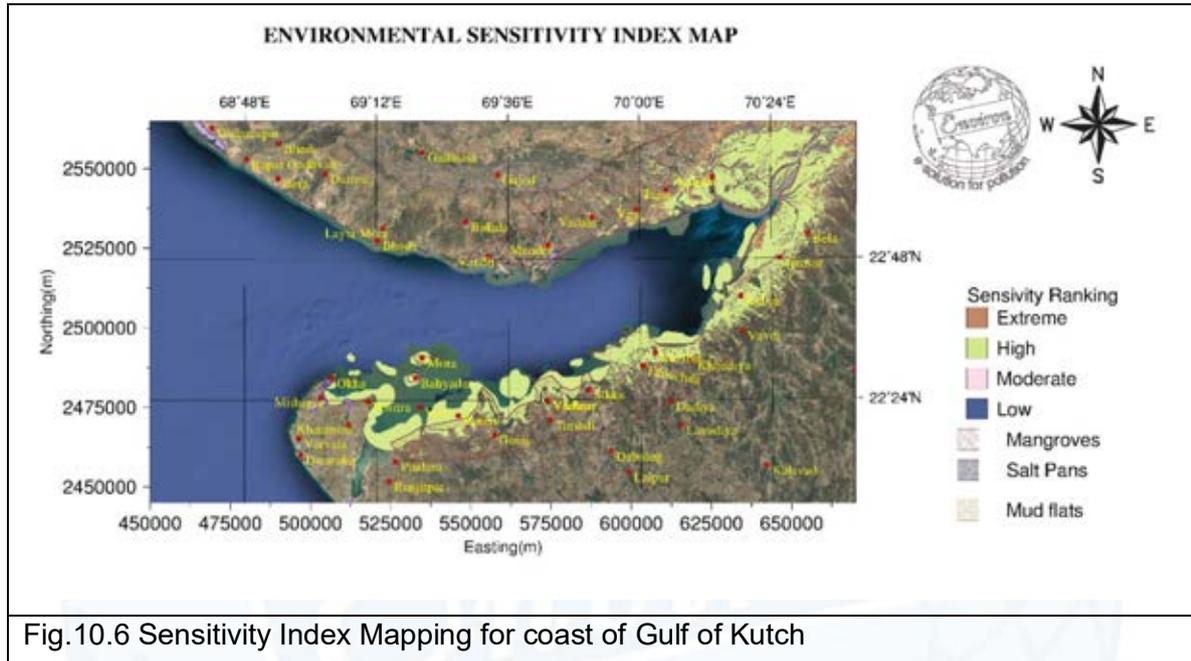


Fig.10.6 Sensitivity Index Mapping for coast of Gulf of Kutch

10.1.5 Sea Zones and Response Strategies

Sea zones can be classified based on depth of water i.e. deep water and shallow water zones. The response strategy will be different for different sea zones. The response options i.e. dispersant and burning can be done for deep water zones where there are not much marine life and the same response options cannot be used for shallow water since the marine activities will be exist along the coasts.

Response strategy for sea zones has been discussed in section 3.3

10.1.6 Coastal

Response strategy for coastal zones has been discussed in section 3.5

10.1.7 Shoreline zones and clean-up strategies

A number of shoreline response strategies are available as per table below, but shorelines should be assessed so see whether these are suitable. This will depend on:

- Rate and likelihood of natural cleaning
- Access for personnel and machinery

	Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:101



- Nature and distribution of the Oil/HNS
- Shoreline character
- Availability of personnel and machinery
- Safety issues
- Environmental sensitivity to Oil/HNS and cleanup methods

Table 10.5: Application of techniques to different shoreline types

PRIMAY CLEANUP					
	Pumping / skimming	Mechanical removal	Manual removal	Natural recovery	Comments
Rocks, Boulders and Artificial structures	V	NA	V	+	Poor access may prevent pumping /skimming. Exposed/ remote shorelines best left to natural recovery
Cobbles, Pebbles and shingle	V	X	V	+	Exposed / remote Shorelines best left to natural recovery
Sand	V	+	V	+	Heavy equipment only applicable on firm beaches
Mud flats marshes and mangroves	+	X	+	V	Operation preferably carried out on the water from small, shallow draught vessels.

FINAL CLEANUP							
	Low pressure flushing	High Pressure washing/Sand	Dispersants	Natural organic sorbents	Batch recovery	Natural recovery	Comments
Rocks, Boulders and Artificial structures	NA	V	+	+	NA	V	Avoid excessive abrasion of rocks/artificial structures. Cleanup of boulders difficult and often gives poor results.
Cobbles, Pebbles and shingle	V	X	+	+	+	+	If load bearing character good, consider pushing oiled material to surf zone to enhance natural recovery



Sand	V	X	+	NA	+	+	Solid oil can be recovered using beach cleaning machines. Enhance natural recovery by ploughing/harrowing
Mud flats marshes and mangroves	+	X	X	+	NA	V	Operations should preferably be carried out on the water from small, shallow-drought vessels.

V : Viable + = Possibly useful X = Not recommended NA : Not Applicable

10.1.8 Oil and Waste storage disposal sites

An efficient and monitored disposal of waste includes immediate classification, segregation, packing and labelling source.

	Packaging	Storage Capacity(m ³)
ON WATER	On board Storage	100 to >1,000
	Barges	10 to 10000
	Flexible / towards bladders or tanks	500 to 15000
SHORELINE	Plastic bags or sacks	0.25 to 15,000
	Super sacks	0.5 to 2.5
	Barrels or drums	~0.2
	Portable tanks	1 to 5
	Skips or dumpsters	10 to 40
	Lined pits	Up to 200
	Vacuum trucks	7.5 to 20

WASTE DISPOSAL OPTIONS

WASTE	PRIMARY OPTION	SECONDARY OPTION	ALTERNATE OPTION
Fresh Oil	Refining	Fuel blending	Ex-Situ burning
Weathered	Fuel blending	Land Treatment	Landfill
Emulsions	Fuel Blending	Land Treatment	Landfill
Hydraulic Fuels	Refining		
Oil debris	Incineration	Open burning	Landfill
Oil y PPE	Incineration	Landfill	

Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:103

Oily Sand / Gravel	Ex-situ burning	Land treatment	Landfill
Oily sorbents	Fuel blending	Incineration	Landfill
Oily Wastewater	Electrocoagulation treatment		
Animal car cases	For research	Incineration	
Domestic c waste	Incineration	Landfill	
Non oily debris	Incineration	Landfill	
Pallets	Recycle/reuse	Open burning	Landfill
Paper board	Recycle/reuse	Open burning	Landfill
Drums	Recycle/reuse	Landfill	
Hazardous wastes	Social handling storage treatment		

Table 10.6: Approved Waste Handling Contractors:

Sl. No.	Name	Waste Permitted and Quantity allowed
1	M/s. Daya Lubricants Pvt. Ltd. Bldg. No. 11, Waliv Phata, Prime Industrial Estate, Sativali Road, Village Valiv Phata, Vasai (E), Thane 401208	Used Oil 3000 KLA Waste Oil 14400 KLA
2	M/s. North East Lubrica Pvt. Ltd. S. No. 404, Abitghar, Tal- Vada, Dist. Thane – 421 303	Used Oil 9000 KLA Waste Oil 9000 KLA
3	M/s. Deepak & Company B 20, Road No. 16, Wagle Industrial Estate, Thane – 400 604	Used Oil 18500 KLA
4	M/s. Tax Oil Lubricants Pvt. Ltd. R-591, MIDC Industrial Area, Rabale, Navi Mumbai – 400 701	Waste Oil 12960
5	Chemicals Pvt. Ltd. Plot No. A-10, MIDC Industrial Area, Ambernath, Dis. Thane	Used Oil 6000 KLA Waste Oil 8550 KLA
6	M/s. Meghani Enterprises H-14, Shah & Diwan Industrial Complex, Udyognagar Chintupada, Mahim Village, Palghar, Dist. Thane	Used Oil 4500 KLA
7	M/s. Al Ali Mohammed Industrial Sr. No. 57-1/2, Village Ghatesh Khurd Khanivali Road, Tal- Wada, Dist – Thane - 421303	Used Oil 6000 KLA Waste Oil 18000 KLA
8	M/s. Tribo Lubes Pvt. Ltd. Takai Adoshi Road, Village Honad, Post- Saigaon Survey No. 13/7A, 14/3, 15/16, Tal – Khalapur, Dist – Raigad	Used Oil 7500 KLA Waste Oil 9000 KLA
9	M/s. Spear Petroleum Pvt. Ltd. 152, A, 15 th Floor Maker Chamber No. III, Nariman Point, Mumbai – 400 021	Waste Oil 11000 KLA

 Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:104



10	M/s. Balaji Rang Udyog Pvt. Ltd. Plot No. 44, MIDC Talaja Industrial Area Talaja, 410 208 Dist. Raigad	Waste Oil 15000 KLA
11	M/s. Shiva Petrochem Synth Specialists Ltd. Plot No. 2/3, Shah & Divan Indl Area, Opp. BIDCO Studio, Vill – Mahim, Palghar, Dist. Thane	Used Oil 10800 KLA

10.1.9 Sensitive Maps / Atlas

Environmental Sensitive Maps has been prepared based on available data of environmental, biological and industrial sensitive areas of various seasons covering the entire coast of Gulf of Kutch and Adani port regions. The study covers the region between longitudes of 68°E and 71°E and the latitudes of 22°N and 23°N. The sensitivity map as shown in Fig.11.6.

The detailed description of mapping of sensitive areas has been discussed in Part-C of report **(PART-C: OF THE OSCP)**

10.2 LISTS

10.2.1 Primary oil spill equipment

Table 10.7: LIST OF OSR EQUIPMENT/ITEMS AT Adani Ports & SEZL

SL No	Description of Resources	Qty
1	Canadine fence boom (reel model 7296/8496 with power pack, towing bridles and tow lines-235 meter)	1 no
2	Power pack with boom reel with hydraulic hoses	2no
3	Power pack-20kv with boom reel with hydraulic hoses	2no
4	Lamor side collector system (recovery capacity 123 m ³ /hr (side collector LSC-3C/2300(01C02-P536). Oil transfer pump OT A 50 with oil transfer hose set	2no 2sets
5	Lamor minimax 12m ³ skimmer	2sets
6	Power pack for skimmers with hydraulic hoses	4no
7	Power pack -20 KV for skimmers with hydraulic hoses	1no
8	Floating tank(25m ³)	1no
9	Foot pumps for floating tank	6no
10	Oil spill dispersants	5000ltr
11	Portable dispersant storage tank: 1000 ltr capacity	1no

Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:105



12	Portable pumps	2no
13	Two -way hydraulic maneuvering panel	2no
14	Oil containment boom -length 2000 meters, height-1500 mm, draft-900mm, free board-600mm	2000 mtr
15	Current buster room -fasflo-75 (for response in fast current)	2no
16	Skimmer -KOMARA 15 duplex skimmer system with floating IMP 6 PUMP	4no
17	12.5T flexible floating storage tank (PUA).	3no
18	Diesel driven transfer pump for flex barge	2no
19	Site hose kit for the transfer pump for flex barge	2no
20	3" and 2" hose adaptor for transfer pump and hose	2no
21	Shoreline cleanup equipment	
22	Mini vac system	5no
23	OSD applicator =oil dispersant spry unit (20 ltr) for use on beach and inter tidal zones	2no
24	Startank with capacity 1000 liter(10m3)	2no
25	Sorbent boom pack (12.5cm*4m)	500 mtr
26	Sorbent pad	2000 nos

In the event of oil spill, Traffic, Mechanical as well as Civil department of APSEZL Mundra shall provide required facility with regard to catering, housing, transportation, field sanitation and shelter etc

Additional support equipment's shall be hired as per requirement by emergency coordinator and Mumbai Port will be delegated this duty.

10.2.2 Sources of manpower

Sources of Manpower:

The following are the sources of manpower to combat any oil spill incident in APSEZL, Mundra:

- A. OSR Manpower
- B. Adani Port Fire Department
- C. Adani Port Employees and Workers
- D. Adani Crisis Management Team
- E. Volunteers from Colleges and Other Maritime Colleges near to shore.

Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:106

A: OSR Manpower:

MANPOWER		
1	IMO Level 3	3
2.	IMO Level 2	1
3.	IMO Level 1	24
4.	Other	

1. Adani Ports SEZ Limited, Mundra:

DESIGNATION	APPOINTED MEMBER
Chief Incident Controller (C IC)	Head-Marine
Commander	HOS Marine & DPC
Member Admin & Finance	Head Admin and Head Finance
Member HSE & Media	Head HSE and Head Corporate
Member legal	Head Legal
Member Tech	Head ES

2. DISTRICT ADMINISTRATION

Place Name	Address of Centre	Contact Details
Bhuj (Kutch)	District Collector Office Near Circuit House, Mandvi Road, Nr. Mota Bandh, Bhuj (Kachchh) Gujarat – 370001	Phone: +91 2832 250650 Fax: +91 2832 250430 Email: collector-kut@gujarat.gov.in
Jamnagar	District Collector Office, Jilla Seva Sadon, Sharu Section Road, Jamnagar - 361002	Collector, Jamnagar <ul style="list-style-type: none"> • +91 288 2555869 • +91 288 2555899 • collector-jam@gujarat.gov.in
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	<ul style="list-style-type: none"> ☐ 91 2833 232805 ☐ +91 2833 232102 ☐ collector-devbdwarka@gujarat.gov.in

Contact Details of Gujarat Fisheries Development Council

SI No.	Address of Centre	Contact Details
1	Commissioner Of Fisheries 3rd Floor, Block no-10, Jivraj Mehta Bhavan, Gandhinagar, Gujarat 382010	Phone No: -079- 232-53729 Fax No:- 079-232-53730

	Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:107



State Pollution Control Board – Regional Offices

	Address of Centre	Contact Details
Gandhi nagar	Gujarat Pollution Control Board Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	Phone : (079) 2323 2152 Fax : (079) 2323 2156, 2322 2784, 2323 2161 gpcbchairman@gmail.com , chairman-gpcb@gujarat.gov.in Member Secretary :
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : 02822 228 001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	Telephone (0288) 2752366 Fax: (0288) 2753540 Email: ro-gpcb-jamn@gujarat.gov.in
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	Telephone: (02832) 250620 Fax: - Email: ro-gpcb-kutw@gujarat.gov.in

10.2.3 Local and National Government contacts

Emergency Contact Directory

Note: Below is the contact detail for Emergency Contact directory. Radio officer will circulate the emergency contact detail through email for any changes in contact details. Final update copy of contact detail will available in Radio Room. Entire document will not be revised due to change in contact details.

VHF CHANNELS		
	VTMS VHF CH	16/73
	MUNDRA VHF CH	16/77

	Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:108



List of Important Telephone Numbers of Govt. Officials and other neighboring Organizations (Expert and Advisors) related to Spill Combating Plan

SN.	Company	Name and Designation	Telephone Numbers
1.	APSEZL, Mundra	Chief Operating Officer Head Marine Pollution Response Officer Port Control	02838-6272602838-255727 02838-255727 02838-255761 02838-255739
2.	Kandla Port Trust	Chairman Dy. Conservator Harbor Master Signal Station	02836-233001 / 234601 02836-223585 / 220235 02836-270201 02836-270194 / 549
3	Indian Oil Corporation, Mundra	CM (Ops) Manager (Ops) Control Room	02838- 222194 02838- 222197 02838- 224444
4	Indian Oil Corporation, Vadinar	DGM (Ops) Manager Tech Services Port Control	02833-256527 02833-256464 02833-256555
5	Reliance Petroleum Ltd Jamnagar	Marine Chief Senior Port Captain Port Control	0288-4013607 0288-4013750 0288-4012600 / 4012610
6	The Commanding Officer Indian Coast Guard Station, Mundra	ICGS, Mundra Station Ops Officer	02838 - 271402 & 03 (Tel) 02838 – 271404 (Fax)
7	The Commander Coast Guard Region (North West), Gandhinagar	COMCG (NW) Regional Ops & Plans Officer	079-23243241 (Tel) 079-23243283 (Fax)
8	The Commander No.1 Coast Guard District (Guj), Porbandar	COMDIS-1 District Ops & Plans Officer	0286-2214422 (Tel) 0286-2210559 (Fax)
9	The Commander Coast Guard Region (West) Mumbai	COMCG (W) Regional Ops & Plans Officer	022-24376133 (Tel) 022-24333727 (Fax)
10	The Officer-in-Charge Coast Guard Pollution Response Team (West), Mumbai	PRT (W) Officer-in-Charge	022-23722438 (Tel) 022-23728867 (Fax)
11	Gujarat Maritime Board	Vice Chairman & CEO Chief Nautical Officer	079-23238346 / 23238363 079-23234716
12	Ministry of Environment	Director (Environment)	079-23252154 / 23251062

	Govt. of Gujarat		079-23252156 (Fax)
13	Gujarat Pollution Control Board	Environmental Engineer	079-232 22756 079-232 22784 (Fax)

List of Important Telephone Numbers of Adani Group Personnel

S.No.	Description / contact person / designation	Telephone Nos.	
		Landline	Mobile
01	Capt. Sachin Srivastava, Head – Marine	02838 - 255727	+91 6359883102
02	Head of Section 1 - Marine	02838 – 255730	+91 6359631088
03	Head of Section 2 - Marine	02838- 255947	+91 6357160037
04	Mr. Sanjay Kewalramani, Head-Marine Technical	02838- 255844	91 9925150056
05	Mr. Yogesh Nandaniya, Manager-SPM	02838- 2562379	91 6359775168
06	Mr. Hari Govindan V	91-2838 - 285072	91 9879104805
07	Marine control, APSEZL	02838 – 255333 / 255761	91 9825228673
08	Port Operation center, APSEZL	02838 –255762	91 9825000949
09	Port security Control, APSEZL	02838 – 289322	91 9825000933
10	Head - Security, APSEZL		+91 9109988165
11	Head - Health, safety & Environment, APSEZL	02838 - 255718	+91 9884869471
12	Head - Fire Dept. APSEZL	02838 – 255857	91 7069083035
13	Occupational Health Centre	02838 - 255710	91 8980015070
14	Head-Admin Department	02838 – 255159	+91 8660183841
15	Head Finance	02838 – 255711	+91 9879114993
16	Head Corporate	NA	+91 6358940500

10.2.4 Specification of Oil commonly traded:

OIL HANDLED AT APSEZL, MUNDRA

1. Qatar Crude
2. Persian Gulf Crude
3. Motor Spirit
4. High Speed Diesel Oil
5. Naphtha
6. Furnace Oil
7. Light Diesel Oil
8. Industrial Furnace Oil
9. Reformate / Benzene
10. Maya Crude Oil
11. Arabian Crude Oil
12. Russian Crude Oil

CHARACTERISTICS OF DIFFERENT CLASS OF OILS

OIL TYPE	DENSITY	Viscosity	Pour point C	Flash point C
	(kg/l) At 15C	mPas at 20C		
Crude oil	0.8- 0.95	1-100	+10 to – 35	Variable
Gasoline	0.70 – 0.78	0.5	NA	Less than 0
Kerosene	0.8	2	Less than – 40	38-60
Jet fuel	0.8	1.5-2	Less than – 40	38-60
Diesel oil	0.85	5	-5 to -30	More than 55
Light FO IFO60	0.9	60 at 50 C	+ 50 to -20	More than 60
Medium FO IFO 180	0.9	180 at 50 C	+ 30 to – 20	More than 60
Heavy FO IFO 380	0.99	380 at 50 C	+ 30 to – 20	More than 60

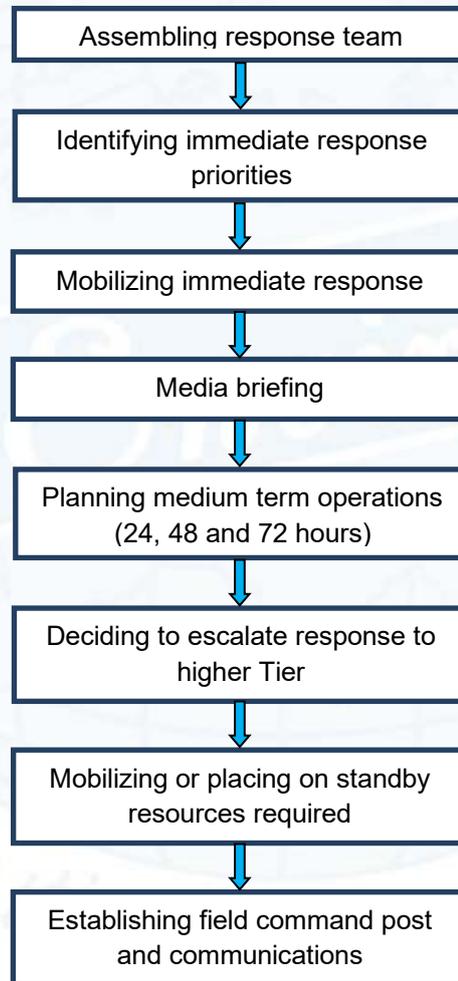
10.2.5 Information sources

APSEZL, MUNDRA OIL SPIL CONTIGENCY PLAN-2019
 NATIONAL OIL SPILL DISASTER CONTIGENCY PLAN
 IPECA GUIDELINES

 Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:111

7. OPERATION PLANNING

The response operations planning will follow the initial response actions. The procedures to be adopted have been discussed below:



- 1) After assessing the Tier of response based on the size, type and fate of spill, the CMT will initiate the response operations. The immediate response priorities will be identified and immediate response options will be mobilized. The response priorities for APSEZL, Mundra will be in the following order:

People residing in fishing villages and other establishments along the coastline and personnel on board the vessels

- a. Environmentally sensitive areas
- b. Assets i.e. rig/supply vessels
- c. Minimum reputational damages



- 2) The CMT will release a media briefing for ensuring that the information pertaining to the spill event is well communicated to the relevant authorities and coastal communities. The onshore response base at the nearest Ports (Adani) will also notify the coastal communities/stakeholders through verbal and written communication channels.
- 3) Once the spill has been assessed thoroughly, the decision on which response strategy to use is crucial in the first few hours of the spill. The preferred strategy for an offshore spill has been presented below and detailed subsequently:

RESPONSE OPS 1: Monitor, Evaluate and Sample: when spill is drifting away from coast and if the oil is headed towards the shore

RESPONSE OPS 2: Containment and Recovery

RESPONSE OPS 3: Dispersant Application

RESPONSE OPS 4: Shoreline Protection and Deflection Booming

RESPONSE OPS 5: Shoreline Clean-up: *in case the spill reaches the shore*

RESPONSE OPS 6: Waste Management

- 4) The response operations will be monitored by the OSC on continuous basis through records and hourly reports from the response team. Based on the ongoing response operations, it will be the responsibility of the CMT Leader, in consultation with OSC, to decide whether the response Tier has to be escalated to the next level and intervention of relevant authorities such as Indian Coast Guard will be required to handle the spill event.

7.1 Assembling full Response Team

Area of operation of this Plan being confined to Adani Ports and SEZ Limited, Mundra. All responses and actions would get limited to coastal zone and within the Mundra region.

7.1.1 Crises Management Team /s (CMT)

The core operating team discharging the functions of Incident control, administration and management is designated as Crises Management Team/s(CMT) operating from the identifier control center located within in the port Administrative Building.

7.1.2 CMG

Apart, from the designated CMT, another senior level team designated as Core Management Group (CMG), headed by the respective head of APSEZL, Mundra, will get activated in times of major spill crises that may require liaison with senior level state, center authorities or other

 Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:66



agencies. The functions of CMG will be same as CMT (as mentioned in 9.1) with a view to provide support to operations in terms of administrative requirements, CMG will assemble on the recommendations of Chief Incident Controller.

This Plan formulates the policies and strategies to be followed on case of a response and to be executed on the ground by CMT along with response team or Oil Spill Response Operation (OSRO)

The operational spill prevention provision of the CP will be discharged by three CMTs – headed by Chief Incident Controller, one each for the area of Jurisdiction of Adani Ports and SEZ Limited, Mundra. Duties and responsibilities of all the three teams would largely remain the same – as spelled in this Contingency Plan (CP), with additions and amendments undertaken by each team as per operational situation and requirements particular to their area of operation. Each team would be responsible for operations in their respective area of jurisdiction.

7.2 Identifying Immediate Response Priorities

Major actions that would be required to be taken when a spill occurs are mentioned below. While, some actions like containment are required to be initiated immediately following a spill, some actions like shore line clean up etc. will get initiated in due time. The purpose of fast response is to minimize hazards to human health and environment the following response is accordingly addressed through the Contingency Plan and Operational Manual.

- Stoppage of discharge and containing spill within a limited area
- Defining size, position and content of spill, direction, and speed of movement and likelihood of affecting sensitive habitats
- Notification to private companies or governments agencies responsible for cleanup actions
- Movement of trained personnel and equipment to site.
- Initiation of Responsibility
- Ensuring safety of responsible personnel and public
- Oil Removable and disposal

Crises Management Team (CMT), with the help of oil slick movement simulation data and prevailing weather condition, would priorities which are to be protected first. By selecting the appropriate strategy, the CMT can derive an indicative strategy path to mitigate the effects of an oil spill, consistent with safe practice and net environmental benefit.

7.3 Mobilizing Immediate Response

The moment oil spills detected; the actions initiated should be part standard drills carried out i.e

 Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:67



- i. Operation department to sound alert to various departments to start preparing for OSR activities.
- ii. HOD-Marine to muster ERT, carry out briefing about nature of oil spill, start preparations for the movement of OSR equipment's. Safety equipment's, teaches, lifelines life jackets working gloves rain coat, communication equipment sect be checked for their corrections
- iii. Security department to mobilize vehicles at the assembly place i.e. Near port head office building
- iv. ECT to coordinate with ECR to take stock of the situation.

The OSR equipment, both on-board vessel and onshore, have been sourced keeping in mind a Tier-1 response of 700 tons of crude that can be responded to, in one full day of ten working hours. This equipment will be operated keeping existing weather conditions in mind. For adverse conditions, no response will be effective. During normal weather conditions, advancing skimming system will be operated from the vessel that will keep on operating at 3 knots speed. Once the advancing system is in place and the recovery started, the oily water mixture will be pumped into the vessel tanks or the floating towable tank as per the availability. CMG Officers at Administrative office and OSC will exchange internal communication and keep incident appraised. Clean-up actions must begin as soon as possible to minimize the effect on natural and other resources. These actions shall include locating the source of the discharge and preventing any further spillage, placement of containment boom to control the spread of oil and to protect sensitive areas, measuring and sampling, physical removal of the oil from water and land, the use of chemicals to disperse the oil. The official coordinating response to the spill must address many questions, including:

- How large an area will the spill cover?
- How thick will the slick be?
- How fast and in what direction will the slick drift?
- When and where will the oil hit the shoreline?
- What will happen to the oil if it is not removed?
- What is the value and sensitivity of the resources at risk?
- The answers to these questions will determine what response actions are taken.

Dispersants shall be used as per the Indian Coast Guard policy and Guidelines for use of Oil Spill Dispersants (OSD) in Indian waters. The OSC must obtain clearance from the Indian Coast Guard before applying chemical dispersants.

RESPONSE OPS 1: MONITOR, EVALUATE AND SAMPLE

- 1) This is the preliminary action that must be taken once a spill has been confirmed. Following a Oil Spill on water this should be CMG first response as it must be recognized that sometimes

 Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:68



the safest and most efficient response will be to let the product naturally dissipate, whilst at the same time employing safety measures.

- 2) Aerial surveillance provides the best option for monitoring a spill; however visual observation from sea level may be the only option initially. This will not give a reliable overall picture especially for larger oil spill events. As practically possible, aerial surveillance will commence to monitor and assess the oil spill. Aerial surveillance will enable:
 - a. Determine the size, quantity and location of the slick
 - b. Determine the movement of the slick
 - c. Noting of any changes in appearance and distribution of the slick
 - d. Forecasting of areas at risk
 - e. Reporting of effectiveness of response measures

- 3) Aerial surveillance will be used to direct containment, recovery operations and offshore dispersant. It can also be used to assess and monitor the successfulness of these strategies.
 - a. Before take-off:
 - i. take the equipment: Map/Chart, polarizing sunglasses, stopwatch, calculator, notebook, pencils, GPS (handheld with remote aerial and spare batteries), digital camera and spare batteries, and multiple surveillance reporting forms,
 - ii. Obtain latest weather forecasts and current conditions
 - b. During the flight:
 - i. start observation at an altitude of >1500ft or >450m for a good overall picture
 - ii. ensure there is a good viewing window, or consider flying with door open
 - iii. ensure there are communications with the pilot

- 4) Prior to flying, obtain information last known position of slick(s) and plot on a map. Manual plotting or oil spill modelling can provide an estimation of the slick position. On water oil moves at approximately 100% of current speed and direction, and 3% of wind speed and direction. Computer modelling of oil fate and trajectory will have to be undertaken, if required.

- 5) If there is an uncertainty as to the exact location or extent of spill, a spiral pattern can be used to investigate the area of interest. The shape and thickness distribution of fairly fresh oil spills depend on the oil properties, wind and currents. The wind spreads and elongates the spill, eventually cutting it into windrows and finally fragmenting. The thickest patches move furthest downwind to what is termed the "leading edge" of the slick. Where practical, long search legs should be aligned at 90 deg. to the direction of the prevailing wind to increase the chances of oil detection as wind rows will lie parallel to the wind direction.

 Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:69



- 6) Fly the length and width of the slick and record the time taken and the aircraft speed. Once the speed and times to fly the length and width are recorded, the area can then be calculated.
- 7) The next step is to conduct an oil spill sampling. The technique for oil spill sampling has been presented below:

Table 7.1: Technique for Oil Spill Sampling

S. No.	Technique for Oil Spill Sampling	
1	Equipment	Sampling from an oil slick itself and submission of the samples require use of correct and necessary equipment (oil sample boxes). Each oil sample box contains detailed instructions with a description of sampling including gathering, referencing, labelling storage and forwarding procedure.
2	Frequency	For offshore spills a minimum of 1 sample per slick per day where possible.
3	Sample Size	<ul style="list-style-type: none"> • Un weathered oils that are liquid and subsequently free of water - 10ml; • Oil exposed to sea surface and forming water-in-oil emulsion 'chocolate mousse'-10ml; • Over size water discharge of 100 ppm from a moving tanker or 15 ppm from a fixed source is suspected- 1litre of discharge; • If such quantities cannot be collected, sampling of any quantity should still be attempted;
4	Collection method	<ul style="list-style-type: none"> • Skim the oil off the surface of the water with great care, ensuring maximum oil content and minimum water. A bucket may be required to collect the sample initially; • Avoid using metal tools containing nickel / vanadium-based alloys to collect the sample, as these are contained naturally within any crude oils and therefore may cause problems when analysed; • Any collection of lumpy tar/waxy pollutant should be placed directly into sample containers, with no attempt to hear or melt these samples; • Oil collected attached to floating debris, or seaweeds etc., should be placed along with the debris/seaweeds directly into the sampling container; • The sample containers should be sealed and labelled as soon as possible to minimize the evaporation of the oil's higher fractions.
5	Container Sealing, packing and Transporting	<ul style="list-style-type: none"> • Where possible, all samples should be securely packed, and sealed using screw topped containers and fireboard boxes to ensure safe carriage of the samples; • Sample containers should be glass with a large neck and a screw cover and a seal which would not be affected by oil, e.g. no waxed caped seals; • All sample containers should be sealed with a tamper proof seal; • Any bags should be sealed with a label which is signed with overlap on bag and label; • Plastic/metal containers are discouraged as can react with the sample and interfere with analysis; • Samples should be stored in a refrigerator/ cold room at less than 5°C in the dark; • When transporting the materials, dangerous good instructions should be followed;



S. No.	Technique for Oil Spill Sampling
	<ul style="list-style-type: none"> Vermiculite should be used to surround the samples in the box for protection and to absorb any seepage; Each sample should be clearly labelled with an identification number, date, time, location, and signature of the sampler, these details should also be recorded on a log form.

- 8) The weather conditions will be continuously monitored. Factors that should be considered when assessing oil spill movement and weathering include:
- a. Currents
 - b. Tides
 - c. Weather (including wind direction and speed)
 - d. Wave height (sea state)
 - e. Sea temperature, salinity
 - f. Spill size / volume (m³)
 - g. Spill thickness (estimated by colour e.g. sheen, rainbow)
 - h. Type of oil spill (viscosity, pour point, specific gravity, dispersion, evaporation)

RESPONSE OPS 2: OFFSHORE CONTAINMENT AND RECOVERY

- 1) Effective offshore recovery requires trained operators, suitable equipment, well maintained equipment, vessel logistics, aerial support, temporary storage, transportation and waste disposal.
- 2) Even in the most ideal conditions recovery rates will never be and are actually more likely to be around 10 — 20%. The faster the response, the better the recovery rate as the spill will have had less time to spread and fragment.
- 3) Operations are unlikely to be possible in wave heights exceeding 2m (failure of boom with oil being washed over) or in winds of more than 35 km/hr.
- 4) Vessels suitable to deploy offshore boom must have sufficient deck space to house boom reels and power packs and sufficient vessel power rating (bollard pull) to tow the boom. Typically, these vessels need to have a low smooth stern without a rail. In addition, vessels need sufficient deck space to allow safe crew movement. To accommodate these arrangements minimum deck sizes are:
 - a. Deck space to stow 2 x 10 ft containers safely and allow personnel movement
 - b. At least 2m stern to deploy and inflate the boom.
 - c. Offshore boom towing vessel at least a 1.5 tones bollard pull and 400 hp engine
- 5) Steps to carry out offshore containment and containment techniques are listed below:

Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:71



- a. Identify the thickest concentrations of oil. Aerial surveillance is the best method of directing vessels to the most concentrated area of the spill to conduct containment and recovery operations.
- b. Sites for containment and recovery operations should be selected where the collection will reduce the likelihood of the oil impacting sensitive sites.
- c. Ensure communication can be established between the aircraft and the vessel either or via the command team.
- d. Deploying containment boom will limit further of the oil and concentrate the oil for recovery. Eddies behind the booms are an indication that they are towed too fast. Maximum speed is dependent on the amount of oil contained in the boom, boom characteristics and wave conditions. Typically, a speed of 0.5 – 1.0 knots is required for effective operations.
- e. Oil lost under the boom will appear as or droplets rising 2-10m behind the boom. Sheens will often be present even when the boom is functioning well.
- f. When towing a sectioned boom that has been joined in a 'U' configuration, an odd number of sections of boom should be used to prevent having a join in the center of the boom from which oil can more easily escape.
- g. To avoid sharp stress or snatching on a towed boom, lines between boom ends and the vessel should be of sufficient length. 50 m or more would be appropriate for towing a 400 m length of boom.

6) Steps to carry out recovery of spilled oil and recovery techniques are listed below:

- a. Skimmers that are used to recover oil from the water all incorporate:
 - i. an oil recovery element
 - ii. notation or support
 - iii. pump or vacuum device to transfer recovered oil and water to a temporary storage device
- b. Skimmers will need continuous maintenance by specially trained staff with a supply of spare parts
- c. The effectiveness of a skimmer is determined by how quickly it can collect the oil, and how well it minimizes the water to oil ratio collected.
- d. Recovered oil could be pumped into an inflatable storage barge or the recovery oil tank of a standby vessel.
- e. Wave motion reduces the effectiveness of most skimmers. In calm waters better performance can be achieved if the skimmer is suited to the viscosity of the oil in question.
- f. Floating debris, both natural (e.g. sea weeds, sea grasses, trees and branches) and manmade (e.g. plastic, glass, timber) can affect a skimmer's performance. Skimmers

 Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:72



may need trash screens and regular unblocking where debris is common, such as near urban areas or the mouths of river.

RESPONSE OPS 3: DISPERSANT APPLICATION

- 1) The use of dispersants should be the primary response strategy to prevent the oil from coming onshore due to the limitations of booming operations offshore, the time taken to deploy the booms, the encounter rate due to the spreading of the oil and also sea conditions. However, dispersants will be used only on crude oils which do not disperse naturally and after obtaining the approval from the Indian Coast Guard.
- 2) The effectiveness of the dispersant on the oil slick must be monitored, and this is best done by observing the sprayed area. Where there is a coffee-colored plume in the water, this generally indicates effective dispersion of the oil. Where the oil has resurfaced there will be black patches.
- 3) Dangers to consider during dispersant operations are - fire or explosion risk, exposure of personnel to dispersant, weather conditions allow safe operation of vessels and aircraft and ability to control aircraft in the aerial spraying zone.
- 4) For effective use of dispersants, following considerations to be noted:
 - a. Dispersant should only be applied to crude and not light oils such as diesel or heavy oil such as HFO.
 - b. Dispersant effectiveness will decrease as the viscosity of oil increases.
 - c. It is unlikely that dispersant will be effective on emulsified crudes.
- 5) Steps to carry out dispersant application by vessel has been outlined below:
 - a. Aerial surveillance should be utilized for all dispersant application operations to direct operations and monitor the effectiveness. The dispersant operation must be at the thickest portion of the slick (leading edge) and not the thinner iridescent silvery sheen areas. Dispersant application should be considered in offshore and near shore to prevent oil entering environmentally sensitive areas onshore.
 - b. The following techniques should be utilized during dispersant application:
 - i. Vessel speed should normally be between 5 - 10 knots.
 - ii. The spray arms or spray nozzle should be mounted at the bow to avoid the effect of the bow wave which can push the oil beyond the spray width. The bow wave will also provide the required mixing energy. Dispersant should be applied when steaming into the wind.

	Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:73



- iii. Agitation will be required to produce the required mixing energy. In calm sea states the bow wave of the vessel should be sufficient. Applying dispersant in conditions above a Force 5 is not recommended as the turbulence will cover the oil and spray droplets will be blown away.
 - iv. Typically, the most efficient dispersant to oil ratio (DOR) is 1:20, but on fresh oils, this can be a lot less (1:100). The correct application is determined by the pump rate and the vessel speed (knots). For most modern chemical dispersants, an application rate of approximately 1:30-1:50 (DOR) should be applied. Refer to the manufacturer's information for application rates
 - v. A visual check of the Spray area will indicate dispersant effectiveness. A grey / coffee colour plume indicates successful dispersion. Spraying too much dispersant will result in a cloudy white plume, too little and there will be no effect.
- c. Below guidelines should be followed during dispersant application:
- i. Do not spray if the slick gets close to fishing boats
 - ii. Dispersant should be applied by trained operators, with proper safety equipment, and with experience in use of the spray equipment
 - iii. Do not use dispersants in water depths LESS THAN 20m. Reason: insufficient depth for adequate dilution and possible impacts on seabed (benthic) marine life
 - iv. Ensure the dispersant has been approved for use and any necessary authorization has been granted
 - v. All dispersants should be clearly labelled and stored with the appropriate supporting documents.

RESPONSE OPS 4: SHORELINE PROTECTION AND DEFLECTION BOOMING

- 1) Areas that should be protected include environmental and socio-economic sensitivities, with consideration of the time of the year. Protection booming is generally feasible across small bays, inlets and river mouths with currents (< 1 knot) and breaking waves < 1.5 ft (0.5 m) and on straight coastline areas to protect specific sites, where breaking waves <1.5 ft (0.5 m).
- 2) Deployment of shoreline protection will be supervised by trained Response Teams deployed to location that can assist in training and local personnel such as the Fire Service and volunteers. A local workforce would be to provide manpower.
- 3) Due to the long inter-tidal zone of the coastline, it will not be practical to use booms from the shoreline for protection. If any deflection booming is to be done, it has to be deployed beyond the surf zone from the coastline. This can be done by deploying the offshore booms in a

 Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:74



deflection configuration which will require two boats - however the limitation will be the area covered by a single length of boom.

- 4) For deflection booming the length of the boom has to be towed in a straight line between two vessels and angled in such a manner to deflect the oil away from the coastline concerned. Deflection booming operations must be done as far away from the shoreline as possible. Knowledge of the depth of the water is important to allow for sufficient under keel clearance for the vessels and also the draft of the boom.
- 5) Where possible, protective booms should be deployed at an angle to the approaching slick to divert oil away from any sensitive area, for example bird breeding grounds. When wave amplitude exceeds 1.5ft (0.5m) or currents exceed 3 knots, protective booms should be moved to calmer waters if possible as boom are likely to fail. Booming will be ineffective if the current speed at right angles to the face of the boom (due to water current or speed of towing vessels) exceeds 0.75 knots.
- 6) The use of oil snares strung on ropes is also a practical strategy to prevent or minimize oil from stranding on the shoreline. In order to implement this strategy, the following need to be considered.
 - a. The snares need to be deployed beyond the low water mark of the inter-tidal zone and surf zone.
 - b. Suitable shallow draft boats will be required - Using the fishermen and their boats will be the most practical approach.
 - c. The snares attached to ropes will have to be tied to stakes at intervals of about 50 meters, parallel to the coastline.

RESPONSE OPS 5: SHORELINE CLEAN-UP

- 1) The purpose of shoreline clean-up should be to produce a net environmental benefit. Clean-up techniques can be damaging and, in some circumstances, oiled shorelines are best left to recovery naturally.
- 2) In many areas, bays and other inshore areas may also be somewhat protected from the extensive contamination by the flushing action of tidal currents and the natural outflow of streams and rivers. As a result, much of the shoreline may not require a widespread active cleaning effort unless it is heavily contaminated.
- 3) Where active shoreline clean-up is required, priorities for restoration can be established based on both the environmental sensitivity and oil persistence factors. Preference should be given to in-situ cleaning techniques such as in-place washing of rocky shores, use of shoreline cleaning agents, in-situ burning and bioremediation. Use of these techniques will minimize the amount of oily material collected and subsequent hauling requirements.

 Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:75



- 4) In general, heavily contaminated areas should be cleaned first so that bulk oil is not remobilized impacting Other areas:
 - a. Stage 1: Removal of heavy contamination and floating oil
 - b. Stage 2: Clean-up of moderate contamination, stranded oil and oiled beached materials.
 - c. Stage 3: Clean-up of lightly contaminated shorelines and removal of oily stains.
- 5) Appropriate techniques to use will depend on the characteristics of both the area oiled and of the oil, but include:
 - a. Natural recovery
 - b. Low or high pressure ambient or warm water flushing
 - c. Manual clean-up
 - d. Mechanical removal, e.g. graders, scrapers, vacuum systems
 - e. Sediment relocation
 - f. Absorbents
 - g. Washing
- 6) Following options for shoreline oil recovery and temporary storage will be considered:

a. Vacuum trucks

- i. Vacuum trucks are a highly effective and rapid means of recovering and transporting liquid oil.
- ii. They are most effective when there are large volumes of oil contained in a particular location, can be used to recover oil from land or water, but may be limited by difficult access to the spill areas.
- iii. Vacuum skimmers should not to be used with volatile oil. Ideally a duckbill or manta ray skimmer head should be fitted to the suction nozzle as these provide the most efficient means of recovering a thin layer of oil.

b. Portable skimmers and pumps

- i. Portable skimmers and pumps are used to collect small to moderate concentrations of oil, or to pump larger volumes from areas where trucks are unable to go.
- ii. Hand held vacuum units are ideal for recovering oil that is floating on a very shallow layer of water.
- iii. Weir Skimmers require calm, still water and are good for all low viscosity oils. Oleophilic skimmers can be used in 'choppy' water, recover 90% oil to water, and are good for low to medium viscosity oils.
- iv. Oil should be pumped to a temporary storage location (tank, 55-gallon drums, pillow tanks, lined pit) which is safe, above flood levels, protected from rain, and sited to allow ease of access for future collection and transfer of the oil.

 Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:76



c. Manual recovery and sorbents

- i. Sorbents are produced in a variety of forms (booms, pads, sweeps, snares, granules etc.) for use in specific locations and for specific types of oil spill clean-up.
- ii. Sorbents are generally best used for absorbing minor spills of oil on hard surfaces, and for final clean-up of spills (e.g. helping to remove sheen or to wipe oily residue off solid objects).

d. Temporary storage

- i. Fast tanks can be used for collecting recovered oil/water mixtures. Containers used for temporary storage must be tough and resistant to puncturing. Free-standing containers must be adequately strong to contain the weight of oil.
- ii. Excavated pits may be used for storage and should be lined with heavy gauge plastic (PVC) sheeting to minimize soil contamination.

7) In the stage of final clean-up, the endpoint should be determined for each oiled site. Endpoints should be realistic and obtainable for the spill conditions.

RESPONSE OPS 6: WASTE MANAGEMENT

- 1) Oil spill response operations have the potential to generate liquid and solid wastes. The types and quantities of waste materials largely depends on the amount of oil that reaches the shoreline and on the specific clean-up methods employed.
- 2) Waste from an oil operation includes:
 - a. recovered oily wastes
 - b. non-oily materials generated from the operation and supporting activities
 - c. materials contaminated with solvents, dispersants and fuels, gray water and unoiled wastes.
- 3) The types and volumes of waste generated by response activities are determined by the response objectives set during the spill management.

s

Table.7.2: Techniques for Waste Disposal

Technique	Effect on waste stream	Type of Waste
At-sea response options	Recovery operations will give potentially rise to a large quantity of waste oil and water for treatment. The type of oil spilled will have an effect on resultant waste; in particular viscous and waxy oils will entrain debris and can create large volumes of waste. They can also	<ul style="list-style-type: none"> • Oiled equipment/ vessels/ PPE • Recovered oil/ oily water • Oiled vegetation • Oiled sorbent materials • Oiled flotsam and jetsam/ debris

	Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:77



	present severe handling difficulties.	<ul style="list-style-type: none"> • Animal carcasses
Dispersant Application	Waste concentrations are minimal as the oil is dispersed in the water column and allowed to biodegrade naturally.	<ul style="list-style-type: none"> • No hydrocarbon waste is generated • PPE • Empty dispersant drums/ considerations
Shoreline Clean up	The type of oil spilled will often have an effect on the amount of oily waste generated. Waste segregation and minimisation techniques are critical to ensure an efficient operation. These should be established at the initial recovery site and maintained right through to the final disposal site. Waste sites should be managed in such a way as to prevent secondary pollution.	<ul style="list-style-type: none"> • Oiled equipment/ vessels/ PPE • Animal carcasses • Recovered oil/ oily water • Oiled vegetation • Oiled sorbent materials • Oiled beach material • Oiled flotsam and jetsam/ debris

7.4 Media Briefing

Adani Ports and SEZ Limited, Mundra has designated staff that will interact with press, public, govt. and media briefing during emergency. The most important aspect of retaining the credibility of a company is to release the first press statement immediately after a major incident. As the news channels and print media are expected to react quickly to an incident for the purpose of "first reporting" and "breaking news", it is important to get prepared to issue the first press statement at the earliest possible moment. The EMT and CMT leaders shall coordinate with the site team to get as much information as possible to draft a press statement with the help of Public Affairs Coordinator. The information must be:

- Specific and accurate to the extent of the event at the time of reporting
- Activities currently hand to minimize and control
- Immediate projected plans for mitigation Information should not reflect any projections or perceptions of consequences or damage details (as they require assessment)
- No contradictory points in the statement
- Not attributing to a particular cause (as it would require investigations later)
- The key facts and messages to be included in further statements will be agreed between Group media, Business and country crisis Team leaders during conference calls.
- Group media will then distribute final statements to all crisis teams and other internal audiences as appropriate. NB: only final drafts should be used to minimize confusion.
- Additional useful facts on the specific crisis as well as relevant background information and generic Q and A's should be proactively sent to group media by Business and country communications colleagues as quickly as possible.

Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:78



- Group media will disseminate agreed answers or statements on board questions areas being asked by the media. Business and country communications colleagues will ensure the necessary information is provided as quickly as possible.
- Group media will provide a synopsis of key issues in media coverage to all crisis teams Business and country communications colleagues will provide input as appropriate.

The draft statement prepared by the Public Affairs coordinator must be vetted by the EMT/ CMT Leader (as the case may be) and seen by the Head of Departments perspective before release. As the time is the essence of the effectiveness to deal with the media, all these actions must be parallel worked out with consultations among the leaders irrespective of their locations and timelines. The authorized personnel of Corporate Communication dept. shall release the statement through the applicable outlets (viz. print/ TV or web). The format of the press release statement is placed in “APPENDIX-12”

7.5 Planning Medium-Term Operations (24-, 48- And 72-Hours)

The likelihood of oil spill taking place are from two factors mostly, during vessel operations and secondly due to collision / grounding.

Since, during vessel operation, OSRO personnel as well as vessel staff present at the site, any spill taking place could be tackled immediately as response time will be less and spill damage control could be done quickly. Therefore, quantity of oil spilling into water is expected to be minimum and the spill could be controlled easily. In this case, dispersants, sorbents may be used and whole operation is likely not to last more than 24 hours. In fact, OSR items are kept handily in OSRV to use any time.

However, in case of oil spill occurring due to collision, it is certainly going to be at a higher magnitude. As, when the collision takes place, every body’s attention is likely towards safety of the vessel i.e. to avoid vessel getting grounded, avoid colliding with other vessels, preventive actions against fire or carryout firefighting, damage control action against folding as soon. It is anticipated that in case of collision the oil spoil is likely to occur due to rupture of or crack in fuel tanks.

In case of rupture fuel tanks, a sudden gush of oils will be there, and for some time it would be incontrollable. By that time any effective damage control action is taken, a substantial amount of oil would have already gone overboard. This would necessitate immediate oil containment measures, as well as starting oil recovery action. This spill recovery action may go well beyond 48 hours, keeping weather and sea condition in mind, because one does not know at what time of

Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:79



the Day or Night accident takes place which will determine the time delay in appreciation of the situation and mobilization of OSR team and equipment's. It may clearly be understood that appreciation of oil slick between sunset and sunrise is quite difficult and at times it may be fully incorrect, hence slight time delay may be anticipated.

Such incidents don't happen quite often, but very rarely. Hence regimes of OSR and equipment's shall be maintained at all times.

li The oil spill scenario through crude fuel tank / tanks is not very different than previous one, because due to cracked / fractions / material failure occurred in the fuel oil tank / tanks, oil would continue leaking in a small /moderate rate. But it would be difficult to locate the source / point of oil leak and by the time source / point of leak is detected, suitable action is initiated and leak is arrested, a sizable quantity of oil would have already been over board. Detection of oil leak will become more difficult if the crack / fracture develops after some time due collision realter structural stress and ship is secured alongside jetty with the damaged / leaking side situated between ships ode and jetty. The problem will become more compounded if the accident takes place after sunset during sever monsoon conditions and detection of oil slick in the night would be really quite difficult. Like above aerial (i) here also one cannot deploy OSR men and equipment's preciously and reaction time to deploy OSR men and equipment, subsequently recovery of spilled oil is going to take more or less the same time.

Here are the vessels taken on consideration are visiting ships of various sizes in all weathering conditions but not the minor vessels or tug boats

7.6 Deciding to Escalate to Response to Higher Tier

When the spill response action has been initiated by ECT and ERT has started the recovery action, spill incident reporting has been made to concerned authorities, and then if OSC feels that quantum of oil spilled appears to be much more than what was reported earlier and the oil spill needs to be re-assessed and deserves a higher response, he informs the same to ECT.

At this juncture, the OSC and members of ECT should re-inspect the spill site and assess the oil slick thickness, its size, status of spilled oil and decide accordingly. If ECT is convinced that spill report deserves upwards revision and the level of Tier Response needs to be raised, it should take necessary steps to raise the oil spill reporting level. This decision will help to initiate higher oil spill response activities as well as alert other neighboring agencies, with whom Adani Ports and SEZ Limited, Mundra has the MOU with oil companies, Coast Guard Authorities, Port authorities, Pollution Control Board, Hospitals, and other organizations.

 Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:80



The procedure of informing all concerned agencies / organizations of higher spilled oil threat perception remains the same. However, care is to be taken in spill assessment and giving exact quantum of oil spilled as large difference in quantity of spilled in water and oil recovered from water may not be interpreted in a correction fashion.

7.7 Mobilizing or Placing on Standby Resources Required

When the decision to raise the Tier level of oil spill has been/ is being taken, a review of Adani Ports and SEZ Limited, Mundra own spill response capability is also to be done simultaneously. Once it is felt that additional resources are required, the concerned agencies are to be alerted immediately, and mobilization action for those equipment/ items should be initiated without losing any time. It should be borne in mind that mobilization of resources from out stations is a time consuming and cumbersome exercise, therefore it should be calculated well before the anticipated arrival time of the Pollution Response Equipment on account of:

- (i) Transportation time by rail/ road/ sea/ air.
- (ii) Time taken by Custom/ Government formalities.
- (iii) Time taken in loading/ unloading.
- (iv) Availability of specialized loading / unloading machineries and accessories.
- (v) Availability of suitable berthing facility for the craft intended to be used.

It is also very important to keep in mind as who is going to operate that pollution response equipment which are being mobilized. In case the equipment is coming with one set of man power, then from where their relief would come and in case only equipment is provided then, do we possess required trained manpower for operating this equipment? All such matters are to be deliberated upon in detail by the OSC and ECT together during operation/ exercise planning stage itself. Otherwise, it would be very difficult to mobilize desired manpower at the eleventh hour.

For obtaining additional equipment the local Oil Companies and nearby ports, with which Adani Ports and SEZ Limited, Mundra may have a contact, are to be contacted. Requirement of extra manpower to meet the requirement of running this equipment has to be thought off well in advance.

Adani Ports and SEZ Limited, Mundra has having all oil spill equipment readily placed nearby the ports, which can be mobilized at any eventuality. The Indian Coast guard is fully equipped and trained to deal with TIER II and TIER III spills.

 <i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Operational Planning</i>	<i>Rev.No: 03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
		<i>Page No:81</i>



7.8 Establishing field Command Post and Communications

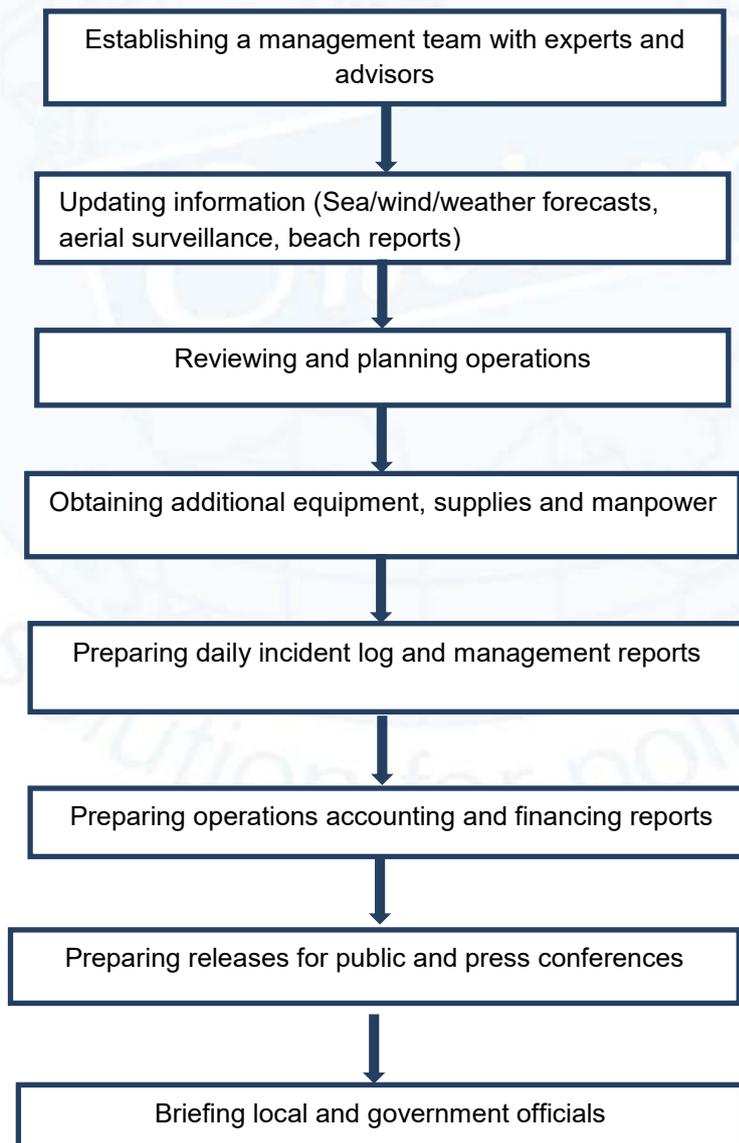
The OSC will be equipped with portable VHF and mobile phone. The OSR team leaders would also be having hand held VHF sets (They can also be provided with mobile phones). Therefore, establishing field command post is considered not necessary, unless the spill of large magnitude.



 Adani Ports and Special Economic Zone Ltd, Mundra	Operational Planning	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:82

8. CONTROL OF OPERATIONS

Local control of operation will rest with Expert selected within the Adani (OSC) and work in the coordination with Indian Coast Guard and internal Port Administration expert groups (CMT). Security aspect of the pollution area should be considered and unauthorized persons gaining access to the area to be restricted. A safety zone (Exclusion Zone) of 500mtrs surrounding oil slick will be established to avoid hindrance in the oil spill cleaning process.



- 1) Once the response action mechanism is decided, the OSC will establish a response management team with experts and advisors who will support Adani Ports and SEZ Limited, Mundra with the response operations. The team will consist of wildlife and marine experts to provide inputs with respect to ecologically sensitive areas.



- 2) The OSC will maintain updated information on sea, wind and weather forecasts, aerial surveillance, beach reports, etc. to ensure smooth response operations. Ready reckoners will be maintained for reference by the response team. The response operations will be reviewed on ongoing basis by the OSC and ECT Leader and any changes in planning will be communicated to the response team.
- 3) If case additional equipment, supplies and manpower will be required for the response operations, the OSC will notify the ECT. The Logistics Controller will be responsible for ensuring that the resources reach the contaminated site at the earliest from the resource base.
- 4) Daily incident log and management reports will be prepared and maintained by the OSC till the spill is completely under control. Subsequent accounting and financing reports will also be developed and shared with the corporate ECT.
- 5) The CMT will be responsible for preparing releases for public and press conferences on the response operations. All local and government officials will be briefed on periodic basis under the spill is controlled and the shoreline clean up works are completed.

8.1 Establishing Management Team with Experts and Advisors

Incident management team comprises of well-trained high-level professionals, experts in the field. Adani Ports and SEZ Limited, Mundra has access to the national and internal special training related to oil spill response and emergency management. Adani Ports and SEZ Limited, Mundra has MOU with HMEL for supporting Oil Spill Response operation. For attending to spills of higher magnitude (Tier-2 and above) will inform Coast Guard and support for oil spill response Plan.

The OSR have a stock of equipment available at their Base which is ready on round the clock basis for mobilization on an authorized call from the members. A list of APSEZL Advisor Committee is

1. COO 2. HOD-Marine 3. HOS-Marine 4. Duty Port Captain.

8.2 Updating information (Sea/ Wind/ Weather Forecasts, Aerial Surveillance, Beach Reports)

The Marine Control (MMPT) is entrusted the responsibility of providing initial information of area pertaining to wind direction & speed, water current, tide position at the time of oil spill, high water & low water timings, sea condition, swell and wave heights, weather forecasts & existing weather warning, navigational warnings, any Coast Guard in contact, any other relevant information

	Adani Ports and Special Economic Zone Ltd, Mundra	Control of Operations	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:84



available. All this information is to be provided to ECR automatically the moment information about the oil spill is received.

All this information is to be automatically updated as and when they are received. In addition, regular inputs on the state of coastal areas are to be obtained from local sources.

8.3 Reviewing and Planning Operations

The ongoing operations will be assessed and reviewed as, when the ECT considers it necessary or suggested by OSC. This is necessary to upgrade the level of operations or scale down the operations due to different prevailing factors. Review of operations is an ongoing process and accordingly the planning is to be reoriented to maximize the utilization of men and machinery without compromising on safety of both. Here operational rest to men and machinery should also be kept in mind, because response teams can be rotated at regular intervals but continuous running machinery also needs rest after certain stipulated continuous running hours.

8.4 Obtaining additional Equipment, Supplies and Manpower

Logistic support is one of the key functions of ECT, which work under Logistic Department of Adani Ports and SEZ Limited, Mundra, which provides and maintains personnel, materials, facilities and services as and when required by EMT. The assignment of any member of the ECT to a function will be made by OSC, of substitute, taking in consideration the sponsor competencies available at any time at site and the type of incident. These assignments will be likely to change during the action as and when additional staff becomes available. The ECT may contact any other staff and in case they are reachable, request their involvement in incident Management activities at site or elsewhere.

In the event of an ongoing spill or a spill that requires declaring of Tier 2 or 3 responses, the additional equipment and manpower held with any other OSRO or facility will be sourced in an accelerating manner including resourcing from the National / international spill handling companies. Contact details of companies holding equipment in India and International OSROs are listed below.

LIST OF ADDITIONAL RESOURCES AND INTERNATIONAL OSROs

1. Australian Marine Oil Spill Centre

PO Box 305
 Victoria 3214
 Australia
 Tel + 61 3 5272 1555 Fax + 61 3 5272 1839
 Mail: amose@amosc.com.au
 Web: <http://www.aip.com.au>

 Adani Ports and Special Economic Zone Ltd, Mundra	Control of Operations	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:85



2. Fast Oil Spill Team

C/o PIM 40 G 23 Tour Elf
92078 Paris- La Defense Cedex France
Tel: + 33 1 4744 5636
Fax : + 33 1 4744 2677
Mail : giefost@club-internet.fr

3. Oil Spill Response Ltd

Oil Spill Services Centre
Lower William Street Northam
Southampton SO1 1 QE, UK
Tel: + 44 1703 331 551 Fax: + 44 1703 331 972
Mail: osrl@osrl.co.uk
Web: <http://www.oilsillresponse.com>

4. Petroleum association of Japan

Oil Spill response Department Keidanren Building
9-4, 1 – Chome, Ohtemachi Chiyoda- Ku,
Tokyo 100, Japan
Tel: + 81 3 3279 3819
Fax: + 81 3 3242 5688
Mail: mail@pcs.gr.jp
Web : <http://www.pcs.gr.jp>

8.5 Preparing Daily Incident Log and Management Reports

OSR is overall in-charge of operations, he will delegate suitable and available persons to carry out the above function. Log sheets are to be filled for running of all operations and equipment as early as possible, since filling it later increases the chances of vital information getting missed. However at the end of the day, preferably time ending at 20:00 hours starting from 20:01 hours of the previous day, (or it may be from 08:01 hours to 08:00 hours of the previous day) a Daily Summary of events is to be prepared and submitted to the leader of ECT, who in turn would prepare the report consulting all the members of the ECT and forward it to management.

This report should cover following details as minimum:

- (a) Manpower deployed
- (b) Equipment deployed
- (c) Weather conditions encountered
- (d) Amount of oil recovered from sea
- (e) Amount of oil transferred for storage & disposal
- (f) Progress on shore cleaning efforts (as the case may be)
- (g) Difficulties encountered
- (h) Lessons learnt

	Adani Ports and Special Economic Zone Ltd, Mundra	Control of Operations	Rev.No: 03 Dt: 30 th July 2022
			Doc No: ENVR 2022-003-R3
			Page No:86



The details of log sheet to mention action taken daily and observations made is furnished in “APPENDIX-5”

8.6 Preparing Operations Accounting and Financing Reports

ECT Leader is overall in charge of operation. It will be financial responsibility to prepare accounting and financing report. Claims should be based on expenses actually incurred that these are made as a direct expense of an incident and that the expense incurred are reasonable. The following aspects are to be considered while assessing cost of an oil spill combating, operating and prepare of claims:

- a) Delineation of the area affected describing the extent of pollution and identifying the most heavily contaminated. This may be best presented as a map or chart accompanied with photographs.
- b) Summary of events including a description of work carried out in different areas and the working methods chosen in relation to the circumstantial evidence linking as pollution with the ship involved in the incident (e.g. chemical analysis).
- c) Labour costs (numbers and categories of workers, rates of pay days, hours worked, total Costs etc.).
- d) Data on which work was carried out (daily or weekly costs).
- e) Material costs (consumable materials, utilized fuel, food shelter facilities, etc.).
- f) Finance shall assist ECT Leader in (preparing /scrutinizing) settling claims under the Guidance of CFO.

8.7 Preparing Releases for Public and Press Conferences

Information to media is to be release by the person identified through respective Media policy of the Organization. In the event of non-authorization of any one person, the Media release will be made by person nominated by him after authorization of the Organization.

The daily report of actions taken on a particular day as prepared by COC and OSC is to be shared with the person nominated to brief the media. Each press brief is too cleared by authorized person prior being provided to media.

While, providing factual details and information to media assists in passing the situation reports to public likely to be affected by a spill, it is advisable not to sensualize information with unwanted figures or actions that could shock or distress the public.

	Adani Ports and Special Economic Zone Ltd, Mundra	Control of Operations	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:87



Most of the factual information like precautions required by public to be taken with respect to fishing activity, closure of beaches, demand for beach cleaning volunteers could be disseminated through media.

8.8 Briefing Local and Government Officials

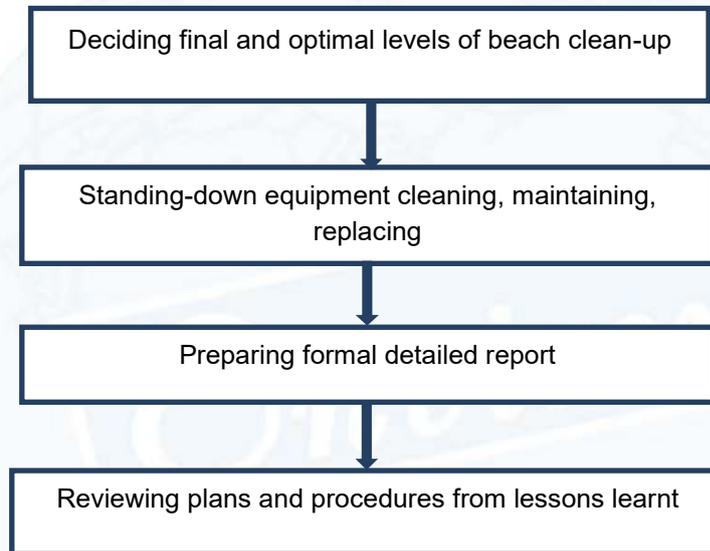
Port has designated staff who will interact with press, public, Govt. and media briefing the details of emergency after clearance from ECT. In case of oil spill designation will be addressed to Incident Commander for managing the Media some of the General Guidelines that need to be followed:

- Ensure that in all communication care for Human Life and welfare is demonstrated Above everything else;
- Provide as much information as possible based upon facts only and refrain from Assigning any cause or speculation towards the incident;
- In case a suitable reply cannot be framed for the caller take a number and offer to call back later or transfer to an individual who would be able to answer;
- Avoid any comments or statement that could be constructed as anger or distaste for a person or persons or any particular policy;
- Treat the media with respect – they need to be on our side.
- Be precise and to the point.
- Ensure that the Media is aware that they would be able to get accurate information only from the Company and that they would like the facts to be known.
- Anticipate in advance what queries may come and be prepared.
- The ECT or any other authorized personnel, must issue press releases and statements only.
- Ensure that relatives are advised prior to the names of any personnel being made public.
- Prior to the Next of Kin being informed by the police DO NOT release the names of any casualties to next of kin, the press or the public.

 Adani Ports and Special Economic Zone Ltd, Mundra	Control of Operations	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:88

9. TERMINATION OF OPERATIONS

9.1 Termination of response operations



- 1) After obtaining the mutually agreed & desired outcome of the spill operations, the response operations will be terminated. A post spill evaluation will be conducted. The final and optimal levels of beach clean-up will be decided and recorded.
- 2) All the equipment used for the spill response operations will be cleaned and maintained accordingly. An inventory of items that has been consumed will be prepared and list of supplies that need to be replaced will be made.
- 3) The OSC in consultation with the CMT Leader and onsite response team will prepare a formal detailed report including the details of the spill, actions taken, levels of clean up, etc. The report will be used for internal reference purpose within the organization. The current OSCP and related procedures will be reviewed and updated based on lessons learnt.

9.2 Deciding final and optimal level of Beach Clean-up

The coastal stretches of Gulf of Kutch are varied in terms of biologically, industrially and socio-economically sensitive. The coast also having large stretches of Mangroves with mud flats. The tidal flats will be exposed during low tide conditions and currents are stronger during flood and ebb in the central channel. Hence, the hydrological features of the estuary will influence the distribution / spread of spilled oil and rapidly moves towards the coastal stretches.

 Adani Ports and Special Economic Zone Ltd, Mundra	Terminations of Operations	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:89



The cleaning up of shoreline beaches are the most important in view of public interventions. Since, the clean-up of shoreline is very tedious and complex in execution alone, Adani Ports and SEZ Limited, Mundra will coordinate the local administration, to involve local authorities (e.g. PCB and other civic bodies) in decision making process.

It would always be borne in mind that while in effort to clean up it should not end up doing more harm than good. It will be also be prudent to seek the advice of ecology experts from State Pollution Control Board and from other authorities/ agencies i.e. Indian Coast Guard, Central Pollution Control Board, State Forest and Fisheries department officials.

NEBA (Net Environmental Benefit Analysis) shall be taken into account deciding on selecting the best response option or optimal clean-up of beaches, Mangroves and other environmentally sensitive locations. Inspect segments/ section of shoreline that Clean-up Operations team declare ready for sign-off before final approval. Some stretches are required booms for protections of Adani Ports, SEZ Limited Mundra and marine sensitive area along the Gulf of Kutch.

Responsibility: Shoreline Assessment Team.

Methods:

- Operations notify the Shoreline Assessment Team Coordinator that a segment is ready for inspection.
- Inspect the segment against agreed-upon clean-up endpoints (preferably using the same team that did the original survey). The original field sketch can be very helpful for evaluating effectiveness of the clean-up.
- Identify additional clean-up needed using standard shoreline assessment terminology forms and sketches, or develop special forms for this purpose
- Recommend segment for final inspection.
- Recommend any longer-term monitoring or iterative procedures needed.

9.3 Standing-down equipment, cleaning, maintaining, replacing

It is important to remember that emergencies can be immediately followed by another one, hence it is of utmost importance to maintain the inventory of equipment. Hence, used equipment will be cleaned and maintained, if required to be replaced at the earliest. It will be the direct responsibility of the operators of the equipment to restore after the operations. All the spill equipment and machines are to be cleaned as per the OEM's guidelines, necessary maintenance to be carried out and then equipment stored in in their respective places.

 Adani Ports and Special Economic Zone Ltd, Mundra	Terminations of Operations	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:90



9.4 Preparing formal Detailed Report

After the operations are complete, the OSC is to prepare the detailed report covering all the aspects of the oil spill cleanup, which will include success and failures as well as per the prescribed format. The report contains all detailed elements of incidents, including daily actions, response and Communication, parties involved, equipment used also containing financial and strategy report summary. The report is to be forwarded to HOD-Marine for submission to CMT.

9.5 Reviewing Plans and Procedures from Lessons Learnt

A detailed and comprehensive review of plans will be carried out in the light of the incident will immensely help in improving standards of safety quality of response and quickness of the response. A through debriefing, brain storming and lesson learning session will be held under the guidance of CMT Leader. The report received from IC/OSC and gives its recommendations to the CMT of port administration for further action.

9.6 Investigation

Every oil pollution incidence is followed by investigation both by the Port as well as Nodal agencies in order to assist such investigations complete and accurate records, as specified below, shall be maintained

1. Certificates and records of equipment issued by regulatory authorities.
2. Log Book showing weather and details of the incidents.
3. Chronological record of loading / discharging bunkering including agreed plans of such loading/ discharging/ bunkering.
4. Brief report on spill including: i) Time, ii) Location, iii) Cause and, iv) Type of oil.
5. Samples of spilled oil shall be taken as per procedures described.
6. Estimate of amount spilled and the process of such estimation
7. Copies of notification & update reports
8. Record relating to direction and rate of spread
9. Weather reports and recorded weather in log book and
10. Where possible photographic evidence shall also be collected. Such photograph records shall be identified with date, time and location.

Where any original evidence is demanded by Nodal Authorities, photocopies of such evidence be retained and the concerned authority shall request to certify the same as true copy of the original.

 Adani Ports and Special Economic Zone Ltd, Mundra	Terminations of Operations	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:91

10. DATA DIRECTORY

10.1 MAPS/CHARTS

10.1.1 Coastal facilities, Access roads, Telephones, Hotels, etc.

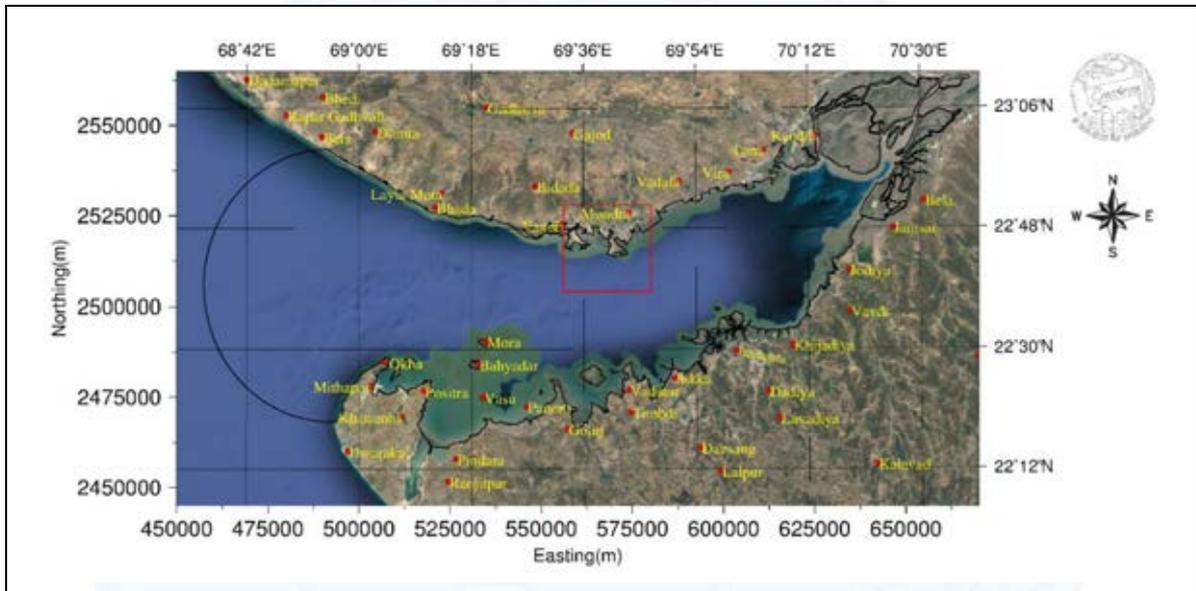


Fig.10.1 Google Map showing Adani Port & SEZ facilities in the Mundra region



Fig.10.1(a) Google Map showing Adani West Port facilities in the Mundra region



Fig.10.1(b) Google Map showing Adani south Port facilities in the Mundra region

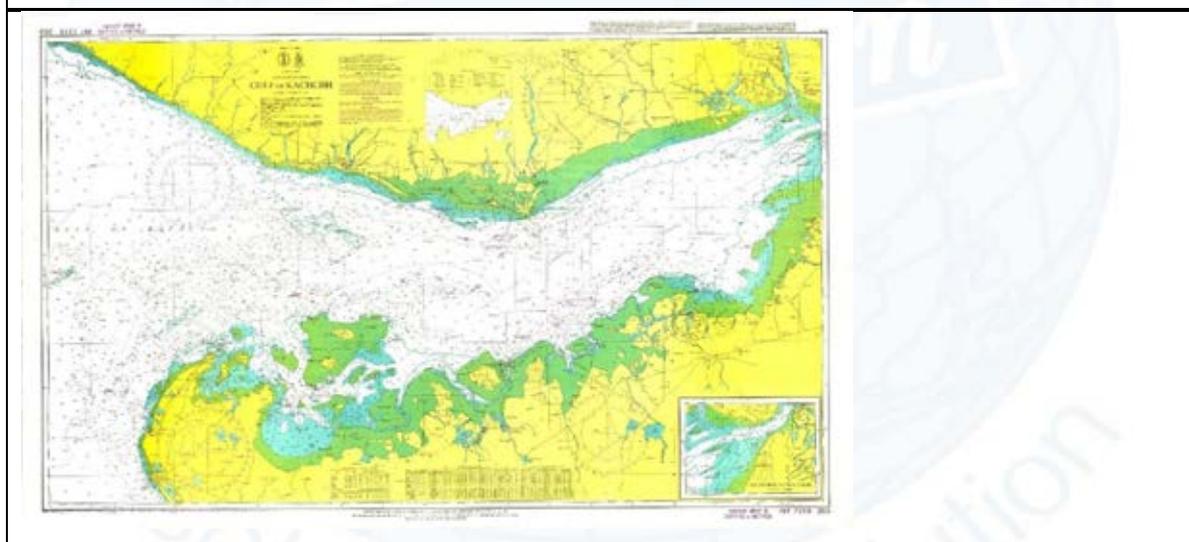


Fig.10.2 NHO Chart Showing Mundra region, Gulf of Kutch

Table.10.1 Contact Details of Spill Information Center

SI No	Address of Centre	Contact Details
1	Indian Coast Guard Headquarters. National Stadium Complex Coast Guard DHQ -1(GJ). Near RGT College ... Okha Port, Gujarat – 361 350	Tel: 02892 263421. Fax: 0-22 24333727
2	Indian Coast Guard Headquarters. CP25+RRF, Vadinar, Gujarat 361010	Tel: 0-22 – 24222696 Fax: 0 – 22 - 24222696
	Indian Coast Guard Headquarters. gh-4 garden, udhyog bhavan, Sector 11, Gandhinagar, Gujarat 382011	

Table.10.2 Contact Details of District Administrative Authorities

Place Name	Address of Centre	Contact Details
Bhuj (Kutch)	District Collector Office Near Circuit House, Mandvi Road, Nr. Mota Bandh, Bhuj (Kachchh) Gujarat – 370001	Phone: +91 2832 250650 Fax: +91 2832 250430 Email: collector-kut@gujarat.gov.in
Jamnagar	District Collector Office, Jilla Seva Sadan, Sharu Section Road, Jamnagar - 361002	Collector, Jamnagar <ul style="list-style-type: none"> • +91 288 2555869 • +91 288 2555899 • collector-jam@gujarat.gov.in
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	<input type="checkbox"/> 91 2833 232805 <input type="checkbox"/> +91 2833 232102 <input type="checkbox"/> collector-devbdwarka@gujarat.gov.in

Table.10.3 Contact Details of Gujarat Fisheries Development Council

SI No.	Address of Centre	Contact Details
1	Commissioner of Fisheries 3rd Floor, Block no-10, Jivraj Mehta Bhavan, Gandhinagar, Gujarat 382010	Phone No: -079- 232-53729 Fax No:- 079-232-53730

Table.10.4 State Pollution Control Board – Regional Offices

	Address of Centre	Contact Details
Gandhi nagar	Gujarat Pollution Control Board Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	Phone: (079) 2323 2152 Fax : (079) 2323 2156, 2322 2784, 2323 2161 gpcbchairman@gmail.com , chairman-gpcb@gujarat.gov.in Member Secretary:
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : 02822 228 001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	Telephone (0288) 2752366 Fax: (0288) 2753540 Email: ro-gpcb-jamn@gujarat.gov.in
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	Telephone: (02832) 250620 Fax: - Email: ro-gpcb-kutw@gujarat.gov.in

10.1.2 Coastal Charts, Currents, Tidal Information Prevailing Winds

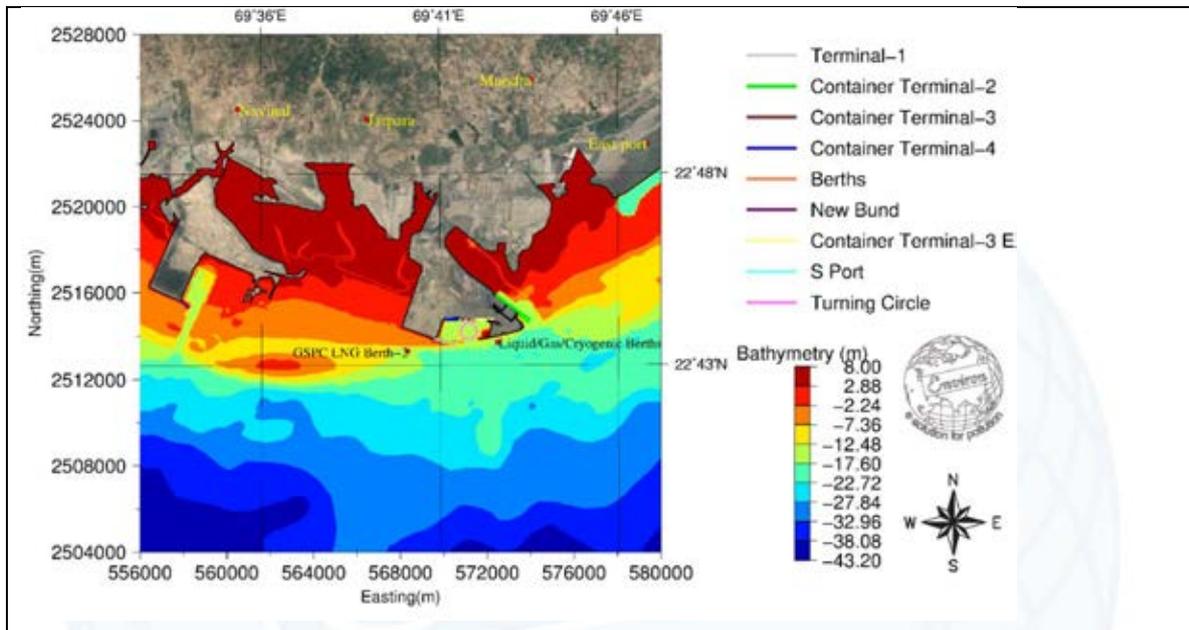


Fig.10.3 Map showing interpolated bathymetry of Adani Ports and surrounding areas.

Tide and Current information

Tide:

The tidal planes were assessed and shown in Table below

The Highest Astronomical Tide (HAT) is estimated to be about +6.4 m above chart datum (CD), and the Lowest Astronomical Tide (LAT) to be at 0.0 m CD.

Table: Tidal information at Mundra

Tide	Height (m) above CD
Mean High Water Springs	5.8
Mean High Water Neaps	4.6
Mean Low Water Neaps	2.1
Mean Low Water Springs	1.0

Currents

Currents in the approaches to the port are dominated by the tidal flows, with predictable variations over diurnal, monthly and annual time scales. Currents in this part of the Gulf flow parallel to the natural sea-bed contours. Currents can be relatively strong, with speeds in excess of 3.0 Knots reported at sometimes of the year. The Admiralty Chart shows currents off Navinal point to be 3.0

Knots East & West bound. It is observed that the currents are usually aligned with the bed contours and are stronger in deeper waters off the coast. The impact of future development over the existing coast-line can be determined by the change in current speed resulting from the proposed developments.

Waves

In past HR Wallingford (HRW) has studied the wave climate considering wave energy from locally generated waves and swell propagating in to the Gulf of Kachchh from the Arabian Sea. The results of the study carried out by HRW are presented in the Table below.

Design Waves at Mundra

Direction Sector (°N)	Return Period (years)	Inshore Direction (°N)	Hs (m)	T2 (sec)
210	1	222	1.2	5.0
	5	222	1.4	5.3
	20	221	1.6	5.8
	100	221	1.8	6.1
240	1	226	1.5	5.4
	5	226	1.7	5.8
	20	225	1.8	6.1
	100	225	2.0	6.5
270	1	239	1.4	5.5
	5	236	1.7	6.3
	20	236	1.8	6.7
	100	235	2.0	7.4
300	1	240	0.8	5.2
	5	240	0.9	5.6
	20	239	1.0	6.2
	100	238	1.2	6.7

Cyclones

Cyclonic disturbances strike North-Gujarat, particularly the Kachchh and Saurashtra regions, periodically. These disturbances generally originate over the Arabian Sea. Generally during June, the storms are confined to the area north of 15°N and east of 65°E. In August, the initial stages, they move along the northwest course and show a large latitudinal scatter. West of 80°E, the tracks tend to curve towards north. During October the direction of movement of a storm is to the west in the Arabian Sea. However, east of 70°E some of the storms move north-northwest and later recurves northeast to strike Gujarat-north Mekran coast.

Wind

There are strong winds at times at Mundra Port. The wind directions are shown in Figure below. In the period lasting over months March to May the wind direction is generally SWW (225° - 250°) and velocity varies from 20 to 25 Knots. June through August the wind direction is predominantly SW and velocity varies from 25 to 30 Knots with short gusts going up to 35 to 40 Knots. Towards end of September and through October wind direction changes to NE with velocities ranging from 7 to 10 Knots. Direction remaining same the velocity varies 10 knots to 25 Knots in the period November to January. February is the calm period when wind direction is southerly with velocity in the range of 7 Knots. Stormy weather may generate winds having velocity up to 100 Knots which should be taken as the worst-case scenario for design of tall structures and heavy-duty cranes.

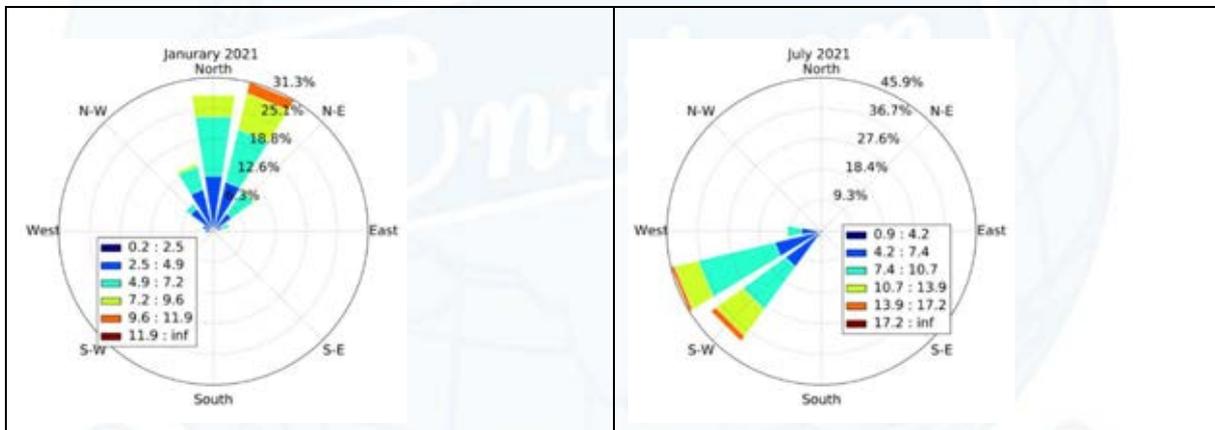


Fig.10.4(a) Wind Rose diagram for Pre-monsoon in 2021

Fig.10.4(b) Wind Rose diagram for Monsoon in 2021

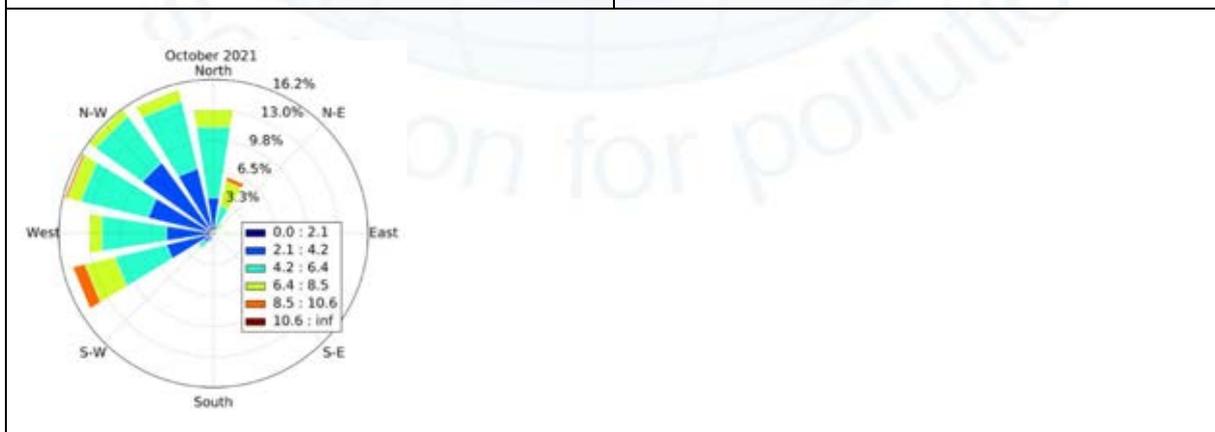


Fig.10.4(c) Wind Rose diagram for Post-monsoon season in 2021

Rainfall:

The climate of the region has a regular seasonal variation determined by the occurrence of 2 Annual monsoons. The southwest monsoon period extends from June to September. November

	Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:97



to March is the period for the North East monsoon. Most of the Annual rainfall occurs during the south west monsoon, the average monthly rainfall being about 45 cm. The average annual rainfall over 20 years is 193 cm.

Humidity & Temperature:

Relative humidity ranges from 61% to 87% being the highest in the monsoon period. During the winter months (Nov-Jan) relative humidity ranges from 61% to 72%. Mean daily temperature ranges from 24 Degrees C to 33 Degrees C except during the winter period when the minimum temperature may fall to about 19 Degrees. The hotter months are March, April, May and June.

10.1.3 Risk Locations and probable Fate of Oil

As with any oil transportation, oil spill risks are associated with Adani port operations. They may vary from a few litres of accidental spill of crude oil / Fuel Oil from offshore vessels to several thousands of tons of oil during collision / grounding situations. In line with the standard industry practice, APSEZL, Mundra is also prepared to mitigate spills of importance from routine operations (Tier-1), while oil spill situations of higher magnitude are dealt with industry co-operation and external intervention. However, it is required to have a fair understanding of the risks and probability of spills arising out of its operations and their consequences due to movement and landing along the coast.

The operations of APSEZL, Mundra are broadly defined under the following:

- Vessel operations- loading / unloading
- Vessel collision, or grounding
- Bunker/ fuelling operations
- Vessel distress / sinking
- Pipeline ruptures /accidental spills from sub-sea/over the sea/shore approach (in the tidal zone) pipelines
- Rupture of export line

The exact quantity of spill from each of the above incident is difficult to predict due to the variables of operating conditions and the length of risk exposure. Maximum risks associated with the events may be considered while devising the oil spill contingency plan. The spill scenarios range from extremely negligible quantities to enormous quantities in rare catastrophic events. The simulation of oil spills does not vary significantly in various scenarios except for the magnitude of impact zone and the quantity involved in such impacts. The software is intended to use for specific scenarios, through a few hypothetical simulations are made in this report considering the worst-case scenarios.

 Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:98

Instantaneous spills (Ref. Fig.11.5)

- Crude oil spill of 700t at selected SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 700t at selected West Port(S5), Vessel route(S7), LNG Jetty(S8), South basin (S9), Mundra Ports(S11), MICT/AMCT(S12)
- Crude oil spill of 10000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Crude oil spill of 25000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 100t at selected West Port (S5, S6), LNG Jetty(S8), South basin (S9,S10), Mundra Ports(S11), MICT/AMCT(S12)
- HSD oil spill of 50t at selected West Port(S5), LNG Jetty(S8), South basin (S9), Mundra Ports(S11)
- HSD oil spill of 20t at selected West Port(S6), South basin (S10)

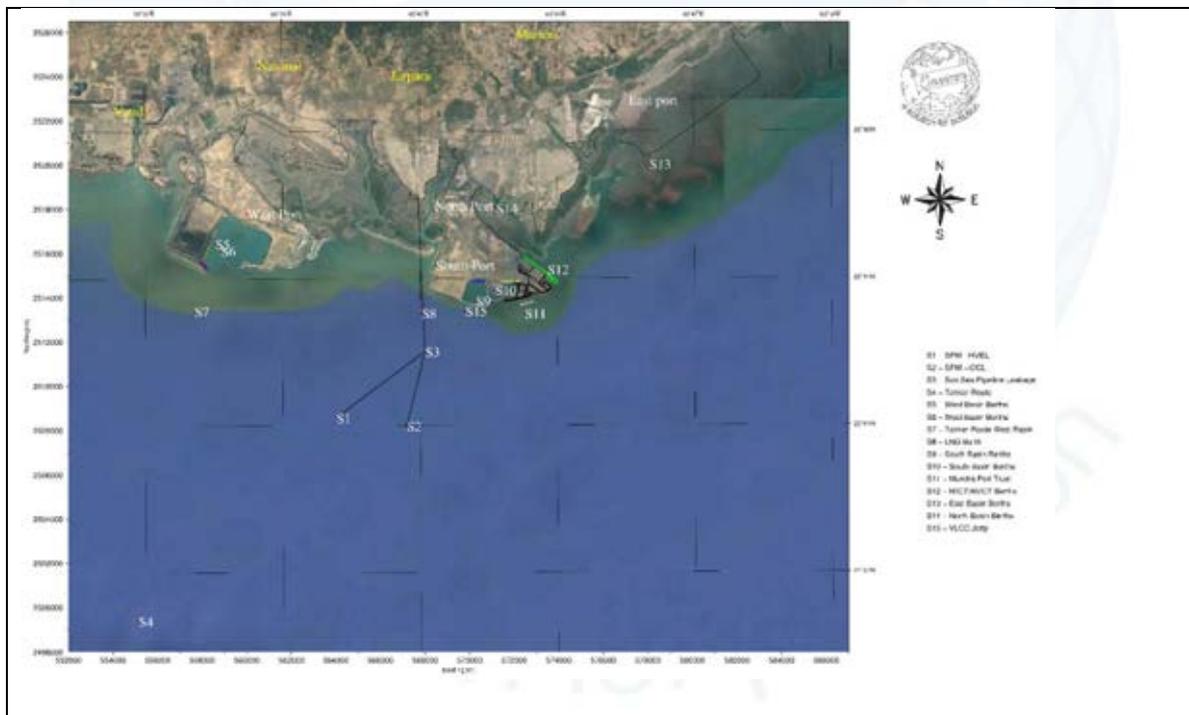


Fig.10.5 Spill Locations considered in APSEZL Mundra region

Continuous spills (Ref. Fig.11.5)

- Crude oil spill of 10000 m3/hr for 60 sec at selected SPM-HMEL(S1), SPM-IOCL(S2)
- Crude oil spill of 10000 m3/hr for 60 at selected VLCC Jetty (S15)
- Crude oil spill of 10000 m3/hr for 60 sec at sub-sea pipeline route (S3)



The spill scenarios range from extremely negligible quantities to enormous quantities in rare catastrophic events. The simulation of oil spills does not vary significantly in various scenarios except the magnitude of impact zone and the quantity involved in such impacts.

Detailed Maps and charts for all spill scenarios including probable fate of oil are discussed extensively in PART-B of the report (PART-B: OIL SPILL FATE AND TRAJECTORY MODELING STUDIES)

The following are the risk locations in the Harbour zones of APSEZL, Mundra

- RIL Ports & Terminals, New Bedi Port, Essar Jetties in southern side of Gulf
- Bedi Port, Kalubar Tapu, mora island, Narara Reff, Pirotan Island
- Vadinar Oil Terminal, Borl, Mandvi Beach, Modhva Beach, Tata power Limited (CGPL) intake and outfalls, Adani West Port, Adani South Port, Tuna Port, Kandla Ports, BTC Port Navlakhi
- Sikka coast
- Adani Ports (South, East, West and North)

10.1.4 Sensitivity Area Mapping of Gulf of Kutch

The coast of Gulf of Kutch has tidal flats, mangroves and sand bars etc (Fig.11.6). There is a need to protect the ecosystem and marine environment during the oil handling activities.

The resources likely to be threatened discussed in the PART-C of the Report:

The coastal areas of Gulf of Kutch coast abound in marine wealth and industrial activities. It is endowed with a great diversity of natural ecosystems, of which the major systems are salt pans, intertidal zones, sand dunes, mangroves, creeks and Open Ocean. Vulnerability index of shores in order of increasing vulnerability to oil spill damages as per Gundlach and Hayes 1978.

 Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:100

SENSITIVE AREAS

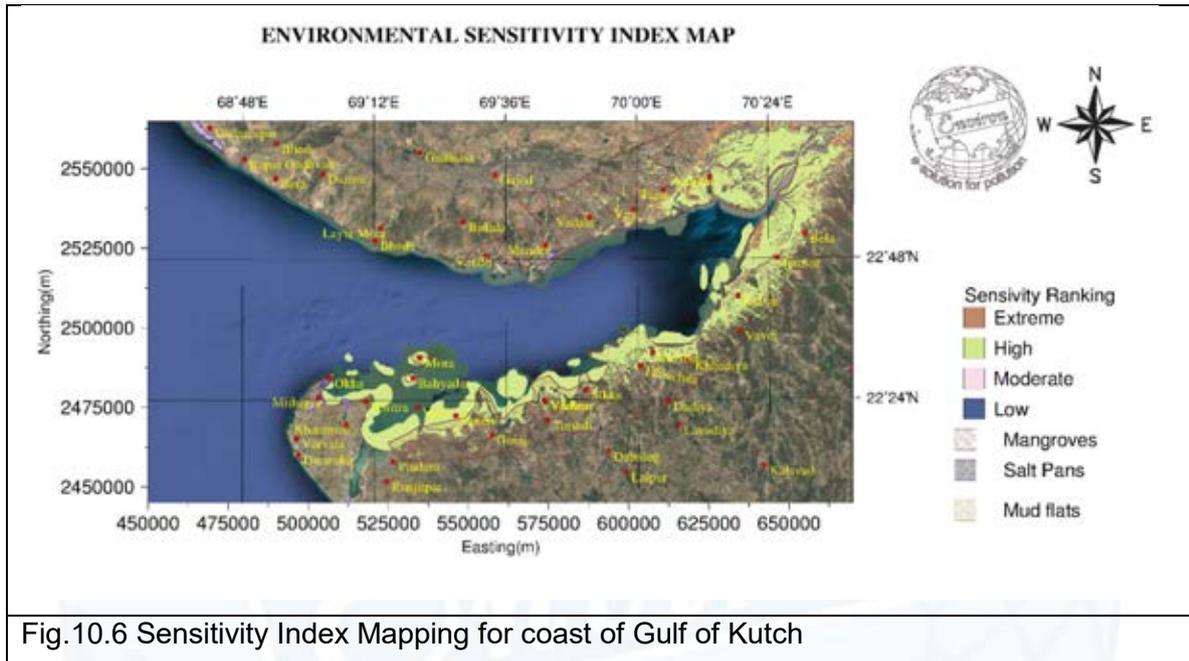


Fig.10.6 Sensitivity Index Mapping for coast of Gulf of Kutch

10.1.5 Sea Zones and Response Strategies

Sea zones can be classified based on depth of water i.e. deep water and shallow water zones. The response strategy will be different for different sea zones. The response options i.e. dispersant and burning can be done for deep water zones where there are not much marine life and the same response options cannot be used for shallow water since the marine activities will be exist along the coasts.

Response strategy for sea zones has been discussed in section 3.3

10.1.6 Coastal

Response strategy for coastal zones has been discussed in section 3.5

10.1.7 Shoreline zones and clean-up strategies

A number of shoreline response strategies are available as per table below, but shorelines should be assessed so see whether these are suitable. This will depend on:

- Rate and likelihood of natural cleaning
- Access for personnel and machinery

 Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:101

- Nature and distribution of the Oil/HNS
- Shoreline character
- Availability of personnel and machinery
- Safety issues
- Environmental sensitivity to Oil/HNS and cleanup methods

Table 10.5: Application of techniques to different shoreline types

PRIMAY CLEANUP					
	Pumping / skimming	Mechanical removal	Manual removal	Natural recovery	Comments
Rocks, Boulders and Artificial structures	V	NA	V	+	Poor access may prevents pumping /skimming. Exposed/ remote shorelines best left to natural recovery
Cobbles, Pebbles and shingle	V	X	V	+	Exposed / remote Shorelines best left to natural recovery
Sand	V	+	V	+	Heavy equipment only applicable on firm beaches
Mud flats marshes and mangroves	+	X	+	V	Operation preferably carried out on the water from small, shallow draught vessels.

FINAL CLEANUP							
	Low pressure flushing	High Pressure washing/Sand	Dispersants	Natural organic sorbents	Batch recovery	Natural recovery	Comments
Rocks, Boulders and Artificial structures	NA	V	+	+	NA	V	Avoid excessive abrasion of rocks/artificial structures. Cleanup of boulders difficult and often gives poor results.
Cobbles, Pebbles and shingle	V	X	+	+	+	+	If load bearing character good, consider pushing oil material to surf zone to enhance natural recovery



Sand	V	X	+	NA	+	+	Solid oil can be recovered using beach cleaning machines. Enhance natural recovery by ploughing/harrowing
Mud flats marshes and mangroves	+	X	X	+	NA	V	Operations should preferably be carried out on the water from small, shallow-drought vessels.

V : Viable + = Possibly useful X = Not recommended NA : Not Applicable

10.1.8 Oil and Waste storage disposal sites

An efficient and monitored disposal of waste includes immediate classification, segregation, packing and labelling source.

	Packaging	Storage Capacity(m ³)
ON WATER	On board Storage	100 to >1,000
	Barges	10 to 10000
	Flexible / towards bladders or tanks	500 to 15000
SHORELINE	Plastic bags or sacks	0.25 to 15,000
	Super sacks	0.5 to 2.5
	Barrels or drums	~0.2
	Portable tanks	1 to 5
	Skips or dumpsters	10 to 40
	Lined pits	Up to 200
	Vacuum trucks	7.5 to 20

WASTE DISPOSAL OPTIONS

WASTE	PRIMARY OPTION	SECONDARY OPTION	ALTERNATE OPTION
Fresh Oil	Refining	Fuel blending	Ex-Situ burning
Weathered	Fuel blending	Land Treatment	Landfill
Emulsions	Fuel Blending	Land Treatment	Landfill
Hydraulic Fuels	Refining		
Oil debris	Incineration	Open burning	Landfill
Oil y PPE	Incineration	Landfill	

Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 103

Oily Sand / Gravel	Ex-situ burning	Land treatment	Landfill
Oily sorbents	Fuel blending	Incineration	Landfill
Oily Wastewater	Electrocoagulation treatment		
Animal car cases	For research	Incineration	
Domestic waste	Incineration	Landfill	
Non oily debris	Incineration	Landfill	
Pallets	Recycle/reuse	Open burning	Landfill
Paper board	Recycle/reuse	Open burning	Landfill
Drums	Recycle/reuse	Landfill	
Hazardous wastes	Social handling storage treatment		

Table 10.6: Approved Waste Handling Contractors:

Sl. No.	Name	Waste Permitted and Quantity allowed
1	M/s. Daya Lubricants Pvt. Ltd. Bldg. No. 11, Waliv Phata, Prime Industrial Estate, Sativali Road, Village Valiv Phata, Vasai (E), Thane 401208	Used Oil 3000 KLA Waste Oil 14400 KLA
2	M/s. North East Lubrica Pvt. Ltd. S. No. 404, Abitghar, Tal- Vada, Dist. Thane – 421 303	Used Oil 9000 KLA Waste Oil 9000 KLA
3	M/s. Deepak & Company B 20, Road No. 16, Wagle Industrial Estate, Thane – 400 604	Used Oil 18500 KLA
4	M/s. Tax Oil Lubricants Pvt. Ltd. R-591, MIDC Industrial Area, Rabale, Navi Mumbai – 400 701	Waste Oil 12960
5	Chemicals Pvt. Ltd. Plot No. A-10, MIDC Industrial Area, Ambernath, Dis. Thane	Used Oil 6000 KLA Waste Oil 8550 KLA
6	M/s. Meghani Enterprises H-14, Shah & Diwan Industrial Complex, Udyognagar Chintupada, Mahim Village, Palghar, Dist. Thane	Used Oil 4500 KLA
7	M/s. Al Ali Mohammed Industrial Sr. No. 57-1/2, Village Ghatash Khurd Khanivali Road, Tal- Wada, Dist – Thane - 421303	Used Oil 6000 KLA Waste Oil 18000 KLA
8	M/s. Tribo Lubes Pvt. Ltd. Takai Adoshi Road, Village Honad, Post- Saigaon Survey No. 13/7A, 14/3, 15/16, Tal – Khalapur, Dist – Raigad	Used Oil 7500 KLA Waste Oil 9000 KLA
9	M/s. Spear Petroleum Pvt. Ltd. 152, A, 15 th Floor Maker Chamber No. III, Nariman Point, Mumbai – 400 021	Waste Oil 11000 KLA



10	M/s. Balaji Rang Udyog Pvt. Ltd. Plot No. 44, MIDC Taloja Industrial Area Taloja, 410 208 Dist. Raigad	Waste Oil 15000 KLA
11	M/s. Shiva Petrochem Synth Specialists Ltd. Plot No. 2/3, Shah & Divan Indl Area, Opp. BIDCO Studio, Vill – Mahim, Palghar, Dist. Thane	Used Oil 10800 KLA

10.1.9 Sensitive Maps / Atlas

Environmental Sensitive Maps has been prepared based on available data of environmental, biological and industrial sensitive areas of various seasons covering the entire coast of Gulf of Kutch and Adani port regions. The study covers the region between longitudes of 68°E and 71°E and the latitudes of 22°N and 23°N. The sensitivity map as shown in Fig.11.6.

The detailed description of mapping of sensitive areas has been discussed in Part-C of report **(PART-C: OF THE OSCP)**

10.2 LISTS

10.2.1 Primary oil spill equipment

Table 10.7: LIST OF OSR EQUIPMENT/ITEMS AT Adani Ports & SEZL

SL No	Description of Resources	Qty
1	Canadine fence boom (reel model 7296/8496 with power pack,towing bridles and tow lines-235 meter)	1 no
2	Power pack with boom reel with hydraulic hoses	2no
3	Power pack-20kv with boom reel with hydraulic hoses	2no
4	Lamor side collector system (recovery capacity 123 m ³ /hr (side collector LSC-3C/2300(01C02-P536). Oil transfer pump OT A 50 with oil transfer hose set	2no 2sets
5	Lamor minimax 12m ³ skimmer	2sets
6	Power pack for skimmers with hydraulic hoses	4no
7	Power pack -20 KV for skimmers with hydraulic hoses	1no
8	Floating tank(25m ³)	1no
9	Foot pumps for floating tank	6no
10	Oil spill dispersants	5000ltr
11	Portable dispersant storage tank: 1000 ltr capacity	1no

 Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:105



12	Portable pumps	2no
13	Two -way hydraulic maneuvering panel	2no
14	Oil containment boom -length 2000 meters, height-1500 mm, draft-900mm, free board-600mm	2000 mtr
15	Current buster room -fasflo-75 (for response in fast current)	2no
16	Skimmer -KOMARA 15 duplex skimmer system with floating IMP 6 PUMP	4no
17	12.5T flexible floating storage tank (PUA).	3no
18	Diesel driven transfer pump for flex barge	2no
19	Site hose kit for the transfer pump for flex barge	2no
20	3" and 2" hose adaptor for transfer pump and hose	2no
21	Shoreline cleanup equipment	
22	Mini vac system	5no
23	OSD applicator =oil dispersant spry unit (20 ltr) for use on beach and inter tidal zones	2no
24	Startank with capacity 1000 liter(10m3)	2no
25	Sorbent boom pack (12.5cm*4m)	500 mtr
26	Sorbent pad	2000 nos

In the event of oil spill, Traffic, Mechanical as well as Civil department of APSEZL Mundra shall provide required facility with regard to catering, housing, transportation, field sanitation and shelter etc

Additional support equipment's shall be hired as per requirement by emergency coordinator and Mumbai Port will be delegated this duty.

10.2.2 Sources of manpower

Sources of Manpower:

The following are the sources of manpower to combat any oil spill incident in APSEZL, Mundra:

- A. OSR Manpower
- B. Adani Port Fire Department
- C. Adani Port Employees and Workers
- D. Adani Crisis Management Team
- E. Volunteers from Colleges and Other Maritime Colleges near to shore.

 Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:106

A: OSR Manpower:

MANPOWER		
1	IMO Level 3	3
2.	IMO Level 2	1
3.	IMO Level 1	24
4.	Other	

1. Adani Ports SEZ Limited, Mundra:

DESIGNATION	APPOINTED MEMBER
Chief Incident Controller (C IC)	Head-Marine
Commander	HOS Marine & DPC
Member Admin & Finance	Head Admin and Head Finance
Member HSE & Media	Head HSE and Head Corporate
Member legal	Head Legal
Member Tech	Head ES

2. DISTRICT ADMINISTRATION

Place Name	Address of Centre	Contact Details
Bhuj (Kutch)	District Collector Office Near Circuit House, Mandvi Road, Nr. Mota Bandh, Bhuj (Kachchh) Gujarat – 370001	Phone: +91 2832 250650 Fax: +91 2832 250430 Email: collector-kut@gujarat.gov.in
Jamnagar	District Collector Office, Jilla Seva Sadon, Sharu Section Road, Jamnagar - 361002	Collector, Jamnagar <ul style="list-style-type: none"> • +91 288 2555869 • +91 288 2555899 • collector-jam@gujarat.gov.in
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	<ul style="list-style-type: none"> ☐ 91 2833 232805 ☐ +91 2833 232102 ☐ collector-devbdwarka@gujarat.gov.in

Contact Details of Gujarat Fisheries Development Council

SI No.	Address of Centre	Contact Details
1	Commissioner Of Fisheries 3rd Floor, Block no-10, Jivraj Mehta Bhavan, Gandhinagar, Gujarat 382010	Phone No: -079- 232-53729 Fax No:- 079-232-53730

	Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No:107

State Pollution Control Board – Regional Offices

	Address of Centre	Contact Details
Gandhi nagar	Gujarat Pollution Control Board Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	Phone : (079) 2323 2152 Fax : (079) 2323 2156, 2322 2784, 2323 2161 gpcbchairman@gmail.com , chairman-gpcb@gujarat.gov.in Member Secretary :
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : 02822 228 001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	Telephone (0288) 2752366 Fax: (0288) 2753540 Email: ro-gpcb-jamn@gujarat.gov.in
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	Telephone: (02832) 250620 Fax: - Email: ro-gpcb-kutw@gujarat.gov.in

10.2.3 Local and National Government contacts

Emergency Contact Directory

Note: Below is the contact detail for Emergency Contact directory. Radio officer will circulate the emergency contact detail through email for any changes in contact details. Final update copy of contact detail will available in Radio Room. Entire document will not be revised due to change in contact details.

VHF CHANNELS		
	VTMS VHF CH	16/73
	MUNDRA VHF CH	16/77



List of Important Telephone Numbers of Govt. Officials and other neighboring Organisations (Expert and Advisors) related to Spill Combating Plan

SN.	Company	Name and Designation	Telephone Numbers
1.	APSEZL, Mundra	Chief Operating Officer Head Marine Pollution Response Officer Port Control	02838-6272602838-255727 02838-255727 02838-255761 02838-255739
2.	Kandla Port Trust	Chairman Dy. Conservator Harbor Master Signal Station	02836-233001 / 234601 02836-223585 / 220235 02836-270201 02836-270194 / 549
3	Indian Oil Corporation, Mundra	CM (Ops) Manager (Ops) Control Room	02838- 222194 02838- 222197 02838- 224444
4	Indian Oil Corporation, Vadinar	DGM (Ops) Manager Tech Services Port Control	02833-256527 02833-256464 02833-256555
5	Reliance Petroleum Ltd Jamnagar	Marine Chief Senior Port Captain Port Control	0288-4013607 0288-4013750 0288-4012600 / 4012610
6	The Commanding Officer Indian Coast Guard Station, Mundra	ICGS, Mundra Station Ops Officer	02838 - 271402 & 03 (Tel) 02838 – 271404 (Fax)
7	The Commander Coast Guard Region (North West), Gandhinagar	COMCG (NW) Regional Ops & Plans Officer	079-23243241 (Tel) 079-23243283 (Fax)
8	The Commander No.1 Coast Guard District (Guj), Porbandar	COMDIS-1 District Ops & Plans Officer	0286-2214422 (Tel) 0286-2210559 (Fax)
9	The Commander Coast Guard Region (West) Mumbai	COMCG (W) Regional Ops & Plans Officer	022-24376133 (Tel) 022-24333727 (Fax)
10	The Officer-in-Charge Coast Guard Pollution Response Team (West), Mumbai	PRT (W) Officer-in-Charge	022-23722438 (Tel) 022-23728867 (Fax)
11	Gujarat Maritime Board	Vice Chairman & CEO Chief Nautical Officer	079-23238346 / 23238363 079-23234716
12	Ministry of Environment	Director (Environment)	079-23252154 / 23251062

	Govt. of Gujarat		079-23252156 (Fax)
13	Gujarat Pollution Control Board	Environmental Engineer	079-232 22756 079-232 22784 (Fax)

List of Important Telephone Numbers of Adani Group Personnel

S.No.	Description / contact person / designation	Telephone Nos.	
		Landline	Mobile
01	Capt. Sachin Srivastava, Head – Marine	02838 - 255727	+91 6359883102
02	Head of Section 1 - Marine	02838 – 255730	+91 6359631088
03	Head of Section 2 - Marine	02838- 255947	+91 6357160037
04	Mr. Sanjay Kewalramani, Head-Marine Technical	02838- 255844	91 9925150056
05	Mr. Yogesh Nandaniya, Manager-SPM	02838- 2562379	91 6359775168
06	Mr. Hari Govindan V	91-2838 - 285072	91 9879104805
07	Marine control, APSEZL	02838 – 255333 / 255761	91 9825228673
08	Port Operation center, APSEZL	02838 –255762	91 9825000949
09	Port security Control, APSEZL	02838 – 289322	91 9825000933
10	Head - Security, APSEZL		+91 9109988165
11	Head - Health, safety & Environment, APSEZL	02838 - 255718	+91 9884869471
12	Head - Fire Dept. APSEZL	02838 – 255857	91 7069083035
13	Occupational Health Centre	02838 - 255710	91 8980015070
14	Head-Admin Department	02838 – 255159	+91 8660183841
15	Head Finance	02838 – 255711	+91 9879114993
16	Head Corporate	NA	+91 6358940500

10.2.4 Specification of Oil commonly traded:

OIL HANDLED AT APSEZL, MUNDRA

1. Qatar Crude
2. Persian Gulf Crude
3. Motor Spirit
4. High Speed Diesel Oil
5. Naphtha
6. Furnace Oil
7. Light Diesel Oil
8. Industrial Furnace Oil
9. Reformate / Benzene
10. Maya Crude Oil
11. Arabian Crude Oil
12. Russian Crude Oil

CHARACTERSTICS OF DIFFERENT CLASS OF OILS

OIL TYPE	DENSITY	Viscosity	Pour point C	Flash point C
	(kg/l) At 15C	mPas at 20C		
Crude oil	0.8- 0.95	1-100	+10 to – 35	Variable
Gasoline	0.70 – 0.78	0.5	NA	Less than 0
Kerosene	0.8	2	Less than – 40	38-60
Jet fuel	0.8	1.5-2	Less than – 40	38-60
Diesel oil	0.85	5	-5 to -30	More than 55
Light FO IFO60	0.9	60 at 50 C	+ 50 to -20	More than 60
Medium FO IFO 180	0.9	180 at 50 C	+ 30 to – 20	More than 60
Heavy FO IFO 380	0.99	380 at 50 C	+ 30 to – 20	More than 60

10.2.5 Information sources

APSEZL, MUNDRA OIL SPIL CONTIGENCY PLAN-2019
 NATIONAL OIL SPILL DISASTER CONTIGENCY PLAN
 IPECA GUIDELINES

 Adani Ports and Special Economic Zone Ltd, Mundra	Maps and Charts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:111

11. CONCLUSIONS AND RECOMMENDATIONS

Based on the relevant studies, carried out Risk Assessment of spills, Contingency Plan for Adani Ports and SEZ Limited, Mundra the following conclusions can be drawn:

- The hydrodynamic model runs have been made for prediction of tides and currents for Pre-monsoon, SW-monsoon and Post-monsoon seasons.
- Sensitivity mapping has been done for the study area considering environmental, ecological, social, economic and other factors.
- Oil Spill Modeling studies have been carried for various spill scenarios for fortnight computational for Pre-monsoon, SW-monsoon and Post-monsoon seasons.
- NEBA Study has been carried for selecting best response options based on coastal information and spill scenarios.
- The details of spill volume and time taken to reach the coast and losses during its movement have been furnished in the report for preparedness.
- The percentage of spill volume reaching the coast, extent of oiling on the coast in metres, likely vulnerable areas, spill analysis, have been furnished in the report to estimate the fate of the spill.
- Oil spill contingency plan has been prepared as per NOS-DCP 2018 guidelines and presented in Strategy Plan. Strategy plans have been discussed in detail and formulated based on the risk analysis. Resources required to combat oil spills have been identified and furnished along with specifications.
- Prepared the environmental sensitivity Maps based on biological, environmental and socio-economic sensitive areas.
- Sensitivity Atlas has been prepared for coastal areas of Gulf of Kutch.
- Adani Ports and SEZ Limited, Mundra will be placed an Oil Spill Response Plan and is equipped with certain items like adsorbents / absorbents etc for combating small spills in case of any accidental leakages if any. Certain additional combating equipment's are suggested in the report to cater for the oil spill risk.
- Strategy plan has been discussed in detail and formulated based on the risk assessment study.
- Response plan has been formulated based on the contingency plan.

	<i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Conclusions and Recommendations</i>	<i>Rev.No: 03 Dt: 30th July 2022</i> <i>Doc No: ENVR 2022-003-R3</i>
			<i>Page No:112</i>



General Recommendations

- Priority should be given to combat the oil spills by physical means such as booms and skimmers. Oil Spill dispersants should be used only if necessary, depending on the clean-up situation and assessment of damage that is likely to occur to the environment. Only those dispersants recommended and approved by Indian Coast Guard (ICG) should be put into use only after obtaining permission from ICG.
- Training as per IMO guidelines should be given to the concerned operating staff involved in oil spill combating.
- Mock drills should be conducted twice in a year.

	<i>Adani Ports and Special Economic Zone Ltd, Mundra</i>	<i>Conclusions and Recommendations</i>	<i>Rev.No: 03 Dt: 30th July 2022</i>
			<i>Doc No: ENVR 2022-003-R3</i>
			<i>Page No:113</i>

12. REFERENCES

No	Title	Year	Client_Name
1	Oil spill contingency plan for offshore oil & gas exploration and appraisal in KG_DWHP_2017/1 & KG_OSHP_2017/1 Blocks in Bay of Bengal, East Godavari District, Andhra Pradesh, Gulf of Kutch, Gujarat, Gulf of Khambhat, Maharashtra and Tamil Nadu Blocks	2019	ABC Techno Labs Pvt Ltd, Chennai
2	Oil spill modeling studies for oil field development in KS Block, East Coast and West Coast of India for ONGC, Mumbai	2019	Oil and Natural Gas Corporation (ONGC), Mumbai
3	Modeling studies for predicting the changes in flow regime, sedimentation and in water qualities for the proposed laying of sub-sea pipelines off Modhva Coast, Gulf of Kutch, Gujarat	2019	Eco Chem Sales and Services-Surat, Gujarat
4	Modeling studies for change in flow regime, and oil spill for the proposed Laying of sub-sea Pipelines from Mumbai Refinery to Rasayani through Thane Creek, Maharashtra	2019	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & BPCL
5	Numerical modeling studies for the hydrodynamic behavior, ship navigation simulation studies and oil spill contingency management plan due to the proposed LNG Terminal at Port Blair, Andaman & Nicobar Islands, India	2018	Vimta Labs, Hyderabad & SEIL Nellore
6	Hydrodynamic modeling studies for predicting the changes in flow regime, erosion / deposition due to the proposed development of marine facilities for conveyor belt at Virpur Village, Devbhoomi Dwarka	2017	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
7	Oil spill risk analysis and modeling studies for GSPC LNG Ltd (GLL), at Mundra in Gujarat State, India.	2017	Vimta Labs, Hyderabad
8	Numerical modeling studies for the hydrodynamic behavior, ship navigation simulation studies and oil spill contingency management plan due to the proposed LNG Terminal at Port Blair, Andaman & Nicobar Islands, India	2017	Vimta Labs, Hyderabad
9	Modeling of fate and trajectory of oil spill	2016	BG Exploration and Production (India) Limited, Mumbai
10	Hydrodynamic modeling studies for changes in the flow regime, erosion / deposition due to the proposed development of Cargo Jetty at Vadinar, Gulf of Kutch	2016	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
11	Numerical modelling studies for predicting the impacts on the flow regime & morphology due to the proposed development of cargo berth at MbPT, Thane Creek	2016	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
12	Mathematical modeling for simulation of trajectory, fate and weathering characteristics of HSD oil spill in the coastal waters of Bedi, Gulf of Kutch	2016	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
13	Oil spill modeling studies for an offshore oil & gas exploratory drilling project in the Palar Block in the Bay of Bengal	2016	AECOM & Cairn India Limited, Noida
14	1. Stochastic oil spill modelling, net environment benefit analysis studies and response plan for Adani Hazira Port, Hazira, Surat 2.	2015	Adani Hazira Port Private Limited, Hazira

	Adani Ports and Special Economic Zone Ltd, Mundra	References	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
			Page No: 114



	Mapping of marine sensitive areas in the coastal areas of Hazira, Gujarat 3. Net environment benefit analysis studies and response plan for Adani Hazira Port, Hazira, Surat		
15	Oil spill response plan development for Cairn CB/OS-2 Suvali onshore and offshore facility, Gulf of Khambhat , Gujarat	2015	Cairn Energy Pvt. Ltd., Suvali
16	1. Oil spill risk assessment, net environment benefit analysis studies and response plan for Reliance Industries Limited SPM at Hazira, Surat.2. Mapping of marine sensitive areas in the coastal areas of Hazira, Gujarat. 3. Net environment benefit analysis studies and response plan for Reliance Industries Limited SPM at Hazira, Surat	2015	Reliance Industries Ltd., Hazira
17	1. Oil spill risk analysis and modelling studies for ESSAR Bulk Terminal Ltd at Hazira in Gulf of Khambhat, Gujarat 2. Mapping of marine sensitive areaa in the coastal areas of Hazira, Gujarat 3. Net environment benefit analysis studies and response plan for ESSAR Bulk Terminal Limited, Hazira	2015	ESSAR Bulk Terminal Limited, Hazira.
18	Oil spill risk assessment study and contingency planning for Panna-Mukta Oil Fields of BGEFIL, West Coast of India	2015	BG Exploration and Production (India) Limited, Mumbai
19	Oil spill risk assessment for Panna Field	2015	BG Exploration and Production (India) Limited, Mumbai
20	Risk analysis of fuel oil spills during service vessel operations at and around the proposed jetty in the offshore of Bhogat, Arabian Sea	2015	Bhagavathi Anna Lab Pvt. Ltd. Hyderabad
21	Numerical modeling studies for predicting the impacts on flow regime and morphology due to the marine facilities for LNG Jetty, oil spill contingency planning and ship navigation studies at Krishnampatnam, Eastcoast of India	2014	Vimta Labs Pvt. Ltd., Hyderabad
22	Oil spill risk assessment study and contingency planning for Panna-Mukta Oil Fields of BGEFIL, West Coast of India	2014	BG Exploration and Production (India) Limited, Mumbai
23	1. Modeling studies for changes in the flow regime, sedimentation processes due to the proposed development of marine facilities in Chhara Port 2. Mathematical modelling for simulation of trajectory, fate and weathering characteristics of oil spills in the coastal waters off Chhara	2014	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
24	Modelling and simulation of oil spill trajectory for Ravva Oil Field, East Coast of India	2013	Cairn India Limited, Noida
25	1. Oil spill modeling studies for oil field development in Andaman Nicobar Basin in East Coast of India for ONGC, Mumbai. 2. Oil spill modeling studies for oil field development in Cauvery Basin in East Coast of India for ONGC, Mumbai. 3. Oil spill modeling studies for oil field development in Mahanadi Basin in East Coast of India for ONGC, Mumbai.	2013	Oil and Natural Gas Corporation (ONGC), Mumbai
26	Oil spill risk assessment and contingency planning for the marine facilities of Adani Ports and Special Economic Zone Limited, Mundra	2013	Adani Port & Special Economic Zone Limited, Mundra
27	Oil spill risk assessment study and contingency planning for Panna-Mukta Oil Fields of BGEFIL, West Coast of India	2013	BG Exploration and Production (India) Limited, Mumbai
28	Oil spill risk assessment study and contingency planning for Krishna	2013	Oil and Natural Gas

 Adani Ports and Special Economic Zone Ltd, Mundra	References	Rev.No: 3 Dr: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 115



	- Godavari Basin, East Coast of India - oil spill trajectory and weathering characteristics for spills at well locations GS-15 -1, GS-15-4 and G-1.		Corporation (ONGC), Eastern Offshore Asset
29	Oil spill risk assessment and contingency planning for the coal jetty facility of RIL at Dahej, Gujarat	2013	Reliance Industries Ltd., Mumbai
30	Numerical modeling studies for predicting the impacts on the shore line and morphology due to proposed marine infrastructure activities at Sikka, Gulf of Kutch and validating the changes / impacts with respect to CRZ Regulations 2011	2012	Reliance Industries Ltd., Mumbai
31	Mathematical modeling for simulation of trajectory, fate and weathering characteristics of oil spills and pesticide spills in the coastal waters off Mumbai / Dahanu	2012	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & ICMAM, Chennai
32	Mathematical modeling for simulation of trajectory, fate and weathering characteristics of oil spill and pesticide dispersion in the coastal waters of Thane	2012	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & Maharashtra Pollution Control Board (MPCB)
33	Oil spill risk assessment and contingency planning for the existing marine facilities of Reliance Industries Limited Jamnagar , Gujarat	2012	Reliance Industries Ltd., Jamnagar
34	Risk assessment study of marine oil spills for KPT SPMs and Product Jetty, Vadinar, Gulf of Kutch	2012	CSIR-National Institute of Oceanography (NIO) , Goa & Kandla Port Trust (KPT), Vadinar
35	Oil spill risk assessment study and contingency planning for Krishna - Godavari Basin, East Coast of India	2012	Asian Consultant Engineers Ltd & Oil & Natural Gas Corporation (ONGC)
36	Oil spill risk assessment study and contingency planning for Panna-Mukta Oil Fields of BGEPIIL, West Coast of India	2012	BG Exploration and Production (India) Limited, Mumbai
37	Oil spill risk assessment and contingency planning for KG Basin, East Coast of India	2012	Senes consultants India Limited, Hyderabad & Oil and Natural Gas Corporation (ONGC), Mumbai
38	Oil spill risk assessment and contingency planning for KG , East Coast of India	2012	Oil and Natural Gas Corporation, Mumbai
39	Oil spill risk assessment study for the accidental pipeline ruptures of the 203 km long 30" dia trunk line.	2012	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
40	Oil spill risk assessment and contingency planning for the augmented marine facilities of RDMT Jetty, Dahej, Gujarat	2012	Reliance Industries Ltd., Mumbai
41	Report on numerical modeling studies for predicting the oil spill trajectories & weathering for select cases of spill at FPSO location in KG Basin, East Coast of India for RIL	2012	Reliance Industries Ltd., Mumbai
42	Mathematical modeling for simulation of trajectory, fate and weathering characteristics of oil spills and pesticide spills in the coastal waters off Mumbai / Dahanu- Phase I & II	2012	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & ICMAM, Chennai

 Adani Ports and Special Economic Zone Ltd, Mundra	<i>References</i>	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 116



43	Oil spill risk assessment due to crude oil leak from the ruptures in the 30" oil trunk pipeline from Mumbai High to Uran	2012	Oil and Natural Gas Corporation (ONGC), Mumbai
44	Oil spill risk assessment due to oil spill in the offshore waters off Mumbai Port	2012	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
45	Numerical modelling studies for oil spill risk assessment and response plan for RIL Jamnagar marine facilities	2012	Reliance Industries Ltd.
46	Risk assessment study of marine oil spills for existing & proposed extension of jetties & SPMs of Vadinar Oil Terminal Limited at pathfinder inlet, Gulf of Kutch, Jamnagar	2011	Vadinar Oil Terminal Limited (VOTL), Jamnagar
47	Oil spill risk assessment study for IOCL at Vadinar Coast, Gulf of Kutch, Jamnagar	2011	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & Indian Oil Corporation Limited
48	Risk assessment study of marine oil spills for KPT SPMs and Product Jetty, Vadinar, Gulf of Kutch	2011	CSIR-National Institute of Oceanography (NIO), Goa & Kandla Port Trust, Vadinar
49	Comprehensive risk analysis study of existing SPM facilities of IOCL in Gulf of Kutch at Vadinar, Gujarat	2011	Indian Oil Corporation Limited, Pipelines Division, Noida
50	Oil spill risk analysis and contingency plan for Multi Cargo Port by Adani Hazira Port Private Limited, Hazira, Surat	2011	Adani Hazira Port Pvt. Ltd., Surat
51	Oil spill risk analysis and contingency plan for ESSAR Bulk Terminal Limited, Hazira	2010	ESSAR Bulk Terminal Limited, Hazira.
52	Oil spill assessment studies for the oil spill occurred at SPM in the Panna Oil Field	2009	BG Exploration and Production India Limited, Mumbai
53	Oil spill risk assessment study for the extension of proposed marine facilities of Vadinar Oil Terminal Limited product jetties at Vadinar coast of Kutch Jamnagar.	2009	Vadinar Oil Terminal Limited (VOTL), Jamnagar
54	Oil spill assessment studies for the oil spill occurred at coastal waters of Goa	2009	CSIR-National Institute of Oceanography (NIO), Goa
55	Oil spill risk analysis and contingency plan for GMB Ports	2009	Gujarat Maritime Board, Gujarat
56	Oil spill risk analysis and contingency plan for single point mooring off Mundra	2008	CSIR-National Institute of Oceanography (NIO), Goa & HPCL-Mittal Pipelines Limited, New Delhi
57	Oil spill risk analysis for all the operational facilities of Cairn Energy, Gulf of Kutch	2008	Cairn Energy India Pvt. Ltd. (CEIL), Rajasthan
58	Risk analysis of Algeria crude oil spills during unloading operations at and around SPM and pipeline corridor in the offshore of Bhogat, Arabian Sea.	2008	CSIR-National Institute of Oceanography (NIO), Goa & Cairn Energy India Pvt. Ltd (CEIL)
59	Oil spill risk analysis and contingency plan for all the operational facilities of ONGC and its associated operations with respect to oil spill in Bombay High	2008	CSIR-National Institute of Oceanography (NIO), Goa & Oil and Natural Gas Corporation (ONGC)
60	Oil spill risk analysis and contingency plan for container berths at	2008	CSIR-National Institute of

 Adani Ports and Special Economic Zone Ltd, Mundra	<i>References</i>	Rev.No: 3 Dr: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 117



	JNPT, Navi Mumbai		Oceanography (NIO), Goa & Jawaharlal Nehru Port Trust, Navi Mumbai
61	Oil spill risk analysis and contingency plan for all the operational facilities of BG Exploration and Production India Limited and its associated operations with respect to oil spill in Panna-Mukta Oilfield	2007	BG Exploration and Production India Limited, Mumbai
62	Oil spill risk analysis and contingency plan for proposed SPM of HPCL Visakhapatnam	2007	CSIR-National Institute of Oceanography (NIO), Goa & Hindustan Petroleum Corporation Ltd., Mumbai
63	Oil spill risk analysis and contingency plan for liquid cargo jetty at JNPT, Navi Mumbai	2007	CSIR-National Institute of Oceanography (NIO), Goa & Bharat Petroleum Corporation Limited, Mumbai
64	Oil spill risk assessment study and predicting the shoreline impact due to RIL's SPM operations at Hazira	2007	Reliance Industries Ltd., Hazira
65	Oil spill risk analysis and preparation of oil spill contingency plan for Paradip Port, Bhubaneswar	2006	CSIR-National Institute of Oceanography (NIO), Goa & Indian Oil Corporation Limited, Bhubaneswar
66	Oil spill risk analysis and oil spill contingency plan for IOCL, Port Blair Port	2006	CSIR-National Institute of Oceanography (NIO), Goa & Indian Oil Corporation Limited, Port Blair, Andaman
67	Oil spill risk analysis and preparation of oil spill contingency plan for Budge-Budge Port of Indian Oil Corporation, Kolkata	2006	CSIR-National Institute of Oceanography (NIO), Goa & Indian Oil Corporation Limited, Kolkata
68	Oil spill risk assessment study for marine facilities of ESSAR Oil Ltd at Vadinar Coast off Gulf of Kutch, Jamnagar	2005	Essar Oil Limited, Refinery Division, Jamnagar
69	Oil spill risk analysis and contingency plan for CB/OS-2 block, Gulf of Khambhat	2004	Cairn Energy Pvt. Ltd., Chennai
70	Oil spill risk analysis and contingency plan for Hazira Port, Hazira	2004	Hazira Port Trust Private Limited (HPPL), Hazira
71	Oil spill risk analysis and contingency plan for Ravva Oil Field, East Coast of India	2004	Cairn Energy Pvt. Ltd., Chennai
72	Oil spill risk analysis and contingency plan for BPCL, Mumbai	2003	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & Bharat Petroleum Corporation Ltd., Mumbai
73	Quantitative oil spill risk analysis studies and Oil spill contingency planning for HPCL	2003	CSIR-National Institute of Oceanography (NIO), Goa & Hindustan Petroleum Corporation Ltd. Visakh Refinery
74	Marine emergency management plan for Crude Oil and Pol Jetty of CPCL	2002	CSIR-National Institute of Oceanography (NIO), Goa &

 Adani Ports and Special Economic Zone Ltd, Mundra	References	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 118



			Chennai Petroleum Corporation Ltd., Nagapattinam, Tamilnadu
75	Oil spill risk assessment study for IOCL operations at SBMS at Vadinar Coast, Gulf of Kutch, Jamnagar	2002	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & IOCL, Vadinar
76	Oil spill modelling and shoreline sensitivity mapping	2001	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & Dabhol Power company, Dabhol





14. APPENDIX

APPENDIX-1: MODELING OF HYDRODYNAMIC PROCESSES

Modeling the hydrodynamic processes is an integral part of modeling of fate and transport of oil spills. The basic oil-spill model which was used earlier for risk analysis of oil spills (Ref. Projects completed : www.environsoftware.com) and to track the oil-spill trajectories has been further improved to be used in the present work to estimate risks due to oil spills for various weathering and meteorological conditions.

Adani Ports bounded on the coast of Gulf of Kutch, on the north, south and east by Navalakhi. The currents of the region are tide-driven and assumed the water column is well mixed. These features make the numerical modeling task, as a 2-D hydrodynamical model is sufficient to accurately reproduce the tides and currents of the Gulf of Kutch.

The computational runs in order to obtain better accuracy in the prediction of oil spill trajectory and weathering processes, a finer mesh is adopted to represent the study area for modeling purpose. The study covers the region between latitude 22° N and 23°N and longitude 68° 42' E and 70°30' E is in Gulf of Kutch, West coast of India. The model simulated for all months and results are presented graphically. The detailed description of Hydrodynamic Processes is discussed in the report (**PART-A: REPORT ON HYDRODYNAMIC MODELING STUDIES**)

APPENDIX-2: MODELING OF FATE AND TRAJECTORY OF SPILLED OIL

Knowledge of probable movement of an oil slick gives a distinct advantage while planning response strategies. Thus, for instance, no major clean-up operation is necessary if the modeling results indicate that the spilled oil would remain at sea thereby sparing the shore ecology. On the contrary, if modeling results are suggestive of shoreward drift and predict that particular ecologically sensitive or important areas would be hit, effective counter measures such as deployment of deflection booms, containment and recovery of oil etc. can be effectively taken.

Hydrodyn-OILSOFT dedicated software for oil spill trajectory modeling is used for prediction of oil spill scenarios at i) Undetected pipeline leakage (ii)Hose-failure (iii) Spills at Oil Jetties (iv)Collision / Grounding (v)Leakages in creeks (vi)Major accident at oil Jetty / collision & Grounding in the channel route for various meteorological and hydrological conditions. The detailed description of Fate and weathering characteristics of spilled oil for various hydrodynamic and meteorological conditions are discussed in the report (**PART-B: REPORT ON OIL SPILL FATE AND TRAJECTORY MODELING STUDIES**)

 Adani Ports and Special Economic Zone Ltd, Mundra	Appendix	Rev.No: 03 Dt: 30 th July 2022
		Doc No: ENVR 2022-003-R3
		Page No:120



APPENDIX-3: SENSITIVITY INDEX MAPPING AND ATLAS

There is a pressing need of having marine sensitive area Atlas of coastal areas of Gulf of Kutch, West coast of India which can fulfill the requirement of various organizations including the state governments in taking policy decisions. **Environ Software Pvt. Ltd** has been prepared marine sensitive area Atlas of the Gulf of Kutch regions as well as Adani ports with technical inputs from the available data sources. Latest satellite data has been used to map various coastal lands, biological, environmental and geographical features and prepared the sensitivity index mapping with regards to oil spill risk assessment and management. The detailed description of marine sensitive areas discussed in the report (**PART-C: REPORT ON SENSITIVITY INDEX MAPPING AND ATLAS**)

APPENDIX-4: NET ENVIRONMENT BENEFIT ANALYSIS

Net Environmental benefit Analysis Table for selecting suitable response equipment's & Strategy. The spills at selected locations stranded the coast of Gulf of Kutch, West coast of India for various seasons of year 2021. The weathering will take place based on oil on surface.

Zonal representation of the spill standard to the coast or at open sea, volume of oil floating on the surface and oil losses for various tidal conditions are furnished in the Appendix-2 (**Part-B of the report**). The suitable response equipment's will be selected based on NEBA studies discussed in the report (**PART-D: NET ENVIRONMENT BENEFITS ANALYSIS**)

 Adani Ports and Special Economic Zone Ltd, Mundra	Appendix	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:121



APPENDIX -5: OIL SPILL REPORT FORM

INITIAL OIL SPILL REPORT FORM PARTICULARS OF PERSON / ORGANIZATION REPORTING INCIDENT

OIL SPILL REPORT FORM
<p>Particular of Person/Organization</p> <p>Reporting Incident</p> <p>Title: Risk Assessment Study, Sensitivity Area Mapping and Preparation of Oil Spill Contingency Plan and Allied Works for Tier-1 Oil Spill Response (OSR) Facility For Adani Port & SEZ Limited</p> <p>Organization: APSEZL, Mundra</p> <p>Telephone/ Mobile / Telex / Fax number: Date / Time: ...</p> <ul style="list-style-type: none"> ➤ Spill Location: SPMs (S1, S2) ➤ VLCC Jetty (S15) ➤ Sub-sea pipeline(S3) ➤ Tanker entry into the Ports (S4) ➤ Adani West Port berths (S5, S6, S7) ➤ LNG Berth (S8) ➤ Adani South Port berths (S9, S10) ➤ Mundra Port (S11) ➤ MICT / AMCT Berths (S12) <p>Type and quantity of oil spill: ... Type: HSD, Fuel oil and crude oil</p> <p>Scenarios: Instantaneous and continuous</p> <p>Quantity: 700t, 10000t and 25000t and 10000 m³/h for 60 sec, 10000m³/h for 1 min..</p> <p>Cause of oil spill : . By accidents involving loading and unloading operations at berth, VLCC, barges, pipelines, storage facilities, Vessel breaking down, transportation, handling, routine maintenance activities etc....</p> <p>Response to spillage, if any :</p> <p>Any other information :</p> <p>.....</p>

	Adani Ports and Special Economic Zone Ltd, Mundra	Appendix	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3 <hr/> Page No:122
--	---	----------	--



DAILY INCIDENT LOG

DAILY INCIDENT LOG - TEAM LEADER - OIL SPILL RESPONSE GROUP

Name..... Rank

Notification received. ONSHORE / OFFSHORE / INSIDE HARBOUR

Time Date

Day Shift

LOCATION OF THE INCIDENT

Name of the VESSEL / PLACE Area.....

Latitude Longitude

Distance from North BreakwaterNM Sounding

.....

Incident occurred Incident Severity (tick one)

Time Date Minor / Major / Tier I / Tier II / Tier III

Brief details of incident and action taken

.....

.....

WEATHER DATA

Wind Speed Wind Direction Sea State

Current Speed Current Direction Visibility

Sea Temperature..... Air Temperature Fog / Mist.....

Rain / Precipitation Humidity Cloud cover



<p>OPERATION DATA</p> <p>Type of Boom / Booms deployed..... Total LengthIn Depth</p> <p>Power Pack Running hrs Skimmer Running hrs</p> <p>Oil Recovered from water Liters / Tons Oil transferred ashoreLitres/Tons</p> <p>Oil / Sludge cleared from shoreKg Sorbents pads useNos.</p> <p>O.S.D usedLiters Saw Dust usedKg</p>
<p>LOGISTICS AND MANPOWER</p> <p>Name and type of the vessel / boats available for assistance</p> <p>Name and type of the vehicles available for assistance</p> <p>Manpower utilized ...</p> <p>Fireman Security Services men Casual LabourersOthers.....</p>
<p>FORM COMPLETED BY</p> <p>Name</p> <p>Rank / Designation.....</p> <p>Signature</p> <p>Time Date</p>
<p>On completion, this form is to be handed over to OSC, who in turn after his comments would hand over this form to ECR Team Leader. In absence of any OSC it may be handed over to ECR Team Leader directly</p>



PERSONAL LOG FORM (To be forwarded to HSE Manager)

Form Completed By:

Name

Designation

Signed Date/...../.....

TIME (24 hour Clock)	COMMUNICATION (To / From)	ACTION / MESSAGE

APPENDIX -6: POLREP INFORMATION

The following information must be provided to the coast guard as and when the facts when becomes available. The information is required to generate POLREP reports to government through the coast guard.

1. Identity of informant
2. Time of information receipt
3. Source of spill
4. Probable Cause of spill
5. Type of oil
6. Color code information
7. Configuration
8. Radius
9. Tail
10. Volume
11. Quantity
12. Weathered or fresh
13. Density
14. Viscosity
15. Wind
16. Wave height
17. Current
18. Layer thickness
19. Ambient air temperature
20. Ambient sea temperature
21. Predicted slick movement
22. Confirm classification of spill size



APPENDIX -7: POLAR MESSAGES FORMAT

Address		
Date		From To
Identification		Time Group
Serial Number		
Part I (POLAR WARN)	1	Date and time
	2	Position
	3	Incident
	4	Overflow
	5	Acknowledge
Part ii (POLINF)	1	Date and Time
	2	Position
	3	
	4	
	5	Characteristic of Pollution
	6	Source and Cause of pollution
	7	Wind direction and speed
	8	Current or tide
	9	Sea state and visibility
	10	Drift of pollution
	11	Forecast
	12	Identify of observer and ships on scene
	13	Action taken
	14	Photograph or samples
	15	Name of other agencies informed
Part iii (POLFAC)	1	Date and time
	2	Request for assistance
	3	Cost
	4	Pre-arrangements for the delivery
	5	Assistance to where and how
	6	Other agencies requested
	7	Change of command
	8	Exchange of information
	9	Names and number of personnel
	10	Description of equipment
	11	ETA and arrival information
	12	Place of embarkation
	13	Place of disembarkation



APPENDIX – 9: LIST OF IMPORTANT TELEPHONE NUMBERS

List of Important Telephone Numbers of Adani Group Personnel

SN.	Company	Name and Designation	Telephone Numbers
1.	APSEZL, Mundra	Chief Operating Officer Head Marine Pollution Response Officer Port Control	02838-6272602838-255727 02838-255727 02838-255761 / 289170 (Fax) 02838-255739
2.	Kandla Port Trust	Chairman Dy. Conservator Harbor Master Signal Station	02836-233001 / 234601 02836-223585 / 220235 02836-270201 02836-270194 / 549
3	Indian Oil Corporation, Mundra	CM (Ops) Manager (Ops) Control Room	02838- 222194 02838- 222197 02838- 224444
4	Indian Oil Corporation, Vadinar	DGM (Ops) Manager Tech Services Port Control	02833-256527 02833-256464 02833-256555
5	Reliance Petroleum Ltd Jamnagar	Marine Chief Senior Port Captain Port Control	0288-4013607 0288-4013750 0288-4012600 / 4012610
6	The Commanding Officer Indian Coast Guard Station, Mundra	ICGS, Mundra Station Ops Officer	02838 - 271402 & 03 (Tel) 02838 – 271404 (Fax)
7	The Commander Coast Guard Region (North West), Gandhinagar	COMCG (NW) Regional Ops & Plans Officer	079-23243241 (Tel) 079-23243283 (Fax)
8	The Commander No.1 Coast Guard District (Guj), Porbandar	COMDIS-1 District Ops & Plans Officer	0286-2214422 (Tel) 0286-2210559 (Fax)
9	The Commander Coast Guard Region (West) Mumbai	COMCG (W) Regional Ops & Plans Officer	022-24376133 (Tel) 022-24333727 (Fax)
10	The Officer-in-Charge Coast Guard Pollution Response Team (West),	PRT (W) Officer-in-Charge	022-23722438 (Tel) 022-23728867 (Fax)

 Adani Ports and Special Economic Zone Ltd, Mundra	Appendix	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No: 129



	Mumbai		
11	Gujarat Maritime Board	Vice Chairman & CEO Chief Nautical Officer	079-23238346 / 23238363 079-23234716
12	Ministry of Environment Govt. of Gujarat	Director (Environment)	079-23252154 / 23251062 079-23252156 (Fax)
13	Gujarat Pollution Control Board	Environmental Engineer	079-232 22756 079-232 22784 (Fax)

List Of Important Telephone Numbers Of Adani Group Personnel

S.No.	Description / contact person / designation	Telephone Nos.	
		Landline	Mobile
01	Capt. Sachin Srivastava, Head – Marine	02838 - 255727	+91 6359883102
02	Capt. Divya Gupta, HOS-Marine	02838 – 255730	+91 6359631088
03	Capt. Rajat Garg. , HOS-Marine	02838- 255947	+91 6357160037
04	Mr. Sanjay Kewalramani, Head-Marine Technical	02838- 255844	91 9925150056
05	Mr. Yogesh Nandaniya, Manager-SPM	02838- 2562379	91 6359775168
06	Mr. Hari Govindan V	91-2838 - 285072	91 9879104805
07	Marine control, APSEZL	02838 – 255333 / 255761	91 9825228673
08	Port Operation center, APSEZL	02838 –255762	91 9825000949
09	Port security Control, APSEZL	02838 – 289322	91 9825000933
10	Head - Security, APSEZL		+91 9109988165
11	Head - Health, safety & Environment, APSEZL	02838 - 255718	+91 9884869471
12	Head - Fire Dept. APSEZL	02838 – 255857	91 7069083035
13	Occupational Health Centre	02838 - 255710	91 8980015070

14	Head-Admin Department	02838 – 255159	+91 8660183841
----	-----------------------	----------------	----------------

Agencies for Supplying Shore Cleanup Equipment and Safety Gears		
Agency	Address	Contact Number
M/s Envirocare Systems	4-B, Apeejay surrendra House, 4 th Floor, 24, Baroda Street, Mumbai – 400009 Email: envirocaresystems1@gmail.com Web: www.envirocaresystems.net	Phone: (022)23486637.23485474, 23487400. Fax: (022) 23488284
M/s HiTech Elastomers Ltd. Works	798, Rankapur, Nr. Santej Sola-Kalol State Highway, Ta. Kalol Dist. Gandhinagar – 384002. Email: sales@hitechelastomers.com	Phone: +91-2764-286010, 286806,268112. Cell: 9824654669 Fax: +91-2764-286010
M/s Sadhav Shipping Limited	521, Loha Bhavan, P. D'Mello Road, Masjid (East), Mumbai – 400 009. Email: shipping@sadhav.com , osv@sadhav.com Web: www.sadhav.com	Tel: 022-2348 25/24 Fax: 022-2348 25/26

CONTACT DETAILS OF LOCAL ADMINISTRATIVE AUTHORITIES

1. DISTRICT ADMINISTRATION

Place Name	Address of Centre	Contact Details
Bhuj (Kutch)	District Collector Office Near Circuit House, Mandvi Road, Nr. Mota Bandh, Bhuj (Kachchh) Gujarat – 370001	Phone: +91 2832 250650 Fax: +91 2832 250430 Email: collector-kut@gujarat.gov.in
Jamnagar	District Collector Office, Jilla Seva Sadan, Sharu Section Road, Jamnagar - 361002	Collector, Jamnagar <ul style="list-style-type: none"> • +91 288 2555869 • +91 288 2555899 • collector-jam@gujarat.gov.in
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	<input type="checkbox"/> 91 2833 232805 <input type="checkbox"/> +91 2833 232102 <input type="checkbox"/> collector-devbdwarka@gujarat.gov.in

2. FISHERIES

SI No.	Address of Centre	Contact Details
1	Commissioner of Fisheries 3rd Floor, Block no-10, Jivraj Mehta Bhavan, Gandhinagar, Gujarat 382010	Phone No: -079- 232-53729 Fax No:- 079-232-53730

3. STATE POLLUTION CONTROL BOARD – REGIONAL OFFICES

	Address of Centre	Contact Details
Gandhinagar	Gujarat Pollution Control Board Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	Phone: (079) 2323 2152 Fax : (079) 2323 2156, 2322 2784, 2323 2161 gpcbchairman@gmail.com , chairman-gpcb@gujarat.gov.in Member Secretary:
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : 02822 228 001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	Telephone (0288) 2752366 Fax: (0288) 2753540 Email: ro-gpcb-jamn@gujarat.gov.in
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	Telephone: (02832) 250620 Fax: - Email: ro-gpcb-kutw@gujarat.gov.in



APPENDIX-10: OIL SPILL REPORT FORM

Complete the oil spill report form as under using the details of notifications and information known and report to the Adani Ports & SEZL.

Spill Notification Pro Forma

Fax To:

Tele No:

IDENTITY OF OBSERVER / REPORTER		
Full Name:		Organization Company:
Contact Telephone No.:		Contact E-mail:
INCIDENT DETAILS		
Operator / organization / company responsible for incident:		
Date of Incident:		Time of incident:
Installation / facility:	Fixed/Mobile(delete as applicable)	Field Name:
Latitude:	Longitude:	Quad & Block no:
Oil release / Chemical release or permitted discharge Notification (tick below and complete column details as applicable).		
Oil release	Chemical release Notification	Permitted discharge Notification
Max Released (tones):	Quantity Released (kgs):	Max oil discharged (tones):
Min released (tones):	Chemical Name:	Min oil discharged (tones):
Type of oil:	Chemical Use:	Type of oil:
Tier of response (1,2 or 3): (as per Oil pollution emergency Plan)	%Oil if OBM or base oil:	Oil conc. In discharge:
	Warning Label:	Discharge rate M3 / hr
Appearance:	Appearance:	Appearance:
Approx. release area on sea surface (m2 or km2):	Approx. release area on sea surface (m2 or km2):	Approx. release area on sea surface (m2 or km2):
Is release ongoing? YES/NO (if YES notification must be updated & reported each 24 hr period unless otherwise directed by Indian Coast Guard)		
Release since last report (tones):		Total Release till date (tones):
Source of pollution		
Cause of pollution:		
Steps taken to prevent re occurrence / respond to incident:		
Release likely to reach Median Line YES/NO: Shore YES/NO If YES approx location/ time:		
Photograph Taken: YES/NO		Samples taken for analysis:
WEATHER CONDITIONS		
Wind Speed (knots):		Wind Direction (0-360):
Beaufort scale (1-12):		Wave Height (Meters):

 Adani Ports and Special Economic Zone Ltd, Mundra	Appendix	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:133



APPENDIX-11: APPLICATION FOR SEEKING COASTGUARD APPROVAL

FOR OSD APPLICATION

Fax To:

Tele No:

IDENTITY OF OBSERVER / REPORTER			
Full Name:		Organization Company:	
Contact Telephone No		Contact E-mail:	
DETAILS OF SPILLS			
Quantity	Particulars of oil	Date of incident	Time of Incident
LOCATION			
Latitude:	Longitude:	Depth of Water	
LOCATION			
Landmark			
Oil Type:			
QUANTITIES OF OIL SPILLED AND SOURCE:			
DESCRIPTION OF SLICKS			
Dimensions		Color	
OTHER METHODS OF RESPONSE BEING APPLIED OR CONSIDERED			
WEATHES CONDITIONS			
Wind Speed (Knots):		Wind Direction (0-360)	
Beaufort scale (1-12):		Wave Height (Meters):	
SENSITIVE AREAS IN PROXIMITY AND TYPE			
PARTICULARS OF OSD			
Name of OSD Held with	Quantity held with	Whether the OSD approved for use in Indian waters-	
Toxicity (LC50 value for 96 hours)	Efficiency	Solubility	



APPENDIX – 12 : PRESS RELEASE FORMAT

INITIAL PRESS STATEMENT FORM - POLLUTION INCIDENT

Public Statement Number 1.

An oil spill occurred at hours of date in the facilities of Adani port, West coast of India.

The location of the incident is/..... in the offshore of Adani facilities.

.....

The situation is under control / not yet under control / out of control. The installation involved in the incident / accident is in a stable and safe / unstable and unsafe condition. The Oil spill Response Team in being / has already mobilized to deal with the situation. So far litres/ tonnes of Oil has been recovered.

Further statement will be issued in light of any further developments. The news media should contact **HSE Manager** of the Adhani for any additional information.

Signature

Name of the installation Manager

Date Time

Place:

NOTE: When, Typed, this Form must be signed by the installation Manager / Emergency Control Team Leader and forwarded to General Manager. Under no circumstances the press statement be released to the NEWS Media without the approval of the concerned authority.

 Adani Ports and Special Economic Zone Ltd, Mundra	Appendix	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3
		Page No:135



APPENDIX-13: CONTINGENCY PLANNING COMPLIANCE CHECKLIST

Port Authority: **Adani Ports & SEZL**

Description		Complie d Yes/ No	Remarks
RISK ASSESSMENT			
1	Whether the facility produces/ handles/ uses/ imports/ stores any type of petroleum product	Yes	Petroleum products are directly transferred from vessels through pipelines
2	Whether risk assessment is done	Yes	Chapter-2 Page No. 17 & Chapter-4 Part-B report
3	Who did the risk assessment		Environ Software Pvt Ltd
4	Whether maximum volume of oil spill that can occur in the worst-case scenario is considered	Yes	25000 T Chap2, refer Para 2.5.3-page No: 21 & Chapter-4 Part-B report
5	Whether relative measure of the probability and consequences of various oil spills including worst case scenario are taken into account	Yes	Chapter2 refer para 2.5.3 Page No. 23 & Chapter-4 Part-B report
6	Whether all types of spills possible in the facility are considered including Grounding, Collision, Fire, Explosion, Rupture of hoses	Yes	Chapter2 refer para 2.1.1 Page No. 17 & Chapter-4 Part-B report
7	Please specify the list of oils considered for risk assessment	Crude, HSD & Fuel Oil	Chapter2 refer para 2.8 Page No. 24 & Chapter-4 Part-B report
8	Whether the vulnerable areas are estimated by considering maximum loss scenario and weather condition	Yes	Chapter2 refer para 2.12 Page No. 31
9	Whether impacts on the vulnerable areas are made after considering the Marine protected areas, population, fishermen, saltpans, mangroves, corals and other resources within that area	Yes	Chapter2 refer para 2.12- & 2.13-Page No. 31,32 & Chapter-3 Part-C report
10	Whether measures for reduction of identified high risks are included by reducing the consequences through spill mitigation measures	Yes	Chapter7 refer fig.7.1 Page No. 66
11	Whether steps have been considered to reduce risks to the exposed population by increasing safe, distances by acquiring property around the facility, if possible	Yes	Chapter 7 refer fig 7.1 Page No. 66
12	Whether risk levels are established for each month after considering the probability with tide and current and consequences of each such spill	NA	
13	Whether prevention and mitigation measures are included in the plan	Yes	Chapter8 refer para 8.1 Page No 84
14	Whether the spill may affect the shoreline.	Yes	Part-B report, chapter 5-OS

 Adani Ports and Special Economic Zone Ltd, Mundra	Appendix	Rev.No: 03 Dr: 30 th July 2022
		Doc No: ENVR 2022-003-R3
Page No:136		



	(length of the shoreline with coordinates)		modelling tables (Jan, July, Oct) page nos. 58-66
15	Whether time taken the oil spill to reach ashore in each quantity of spill in various months are mentioned in the plan	Yes	Part-B report, chapter 5-OS modelling tables (Jan, July, Oct) page nos. 58-66
16	Whether sensitivity mapping has been carried out	Yes	Part-C report, chapter 3, refer para 3.1-page no. 5
17	Does the sensitivity mapping clearly identify the vulnerable areas along with MPAs, corals, fishermen community, salt pans, mangroves and other socio- economic elements in the area	Yes	Part-C report chapter 3, refer para 3.1-page no. 5
18	Do the sensitivity maps indicate area to be protected on priority	Yes	Part-C report Annexure-1 refer fig A.1.8-page no. 37
19	Does the map indicate boom deployment locations	Yes	Part-C report Annexure-1 refer fig A.1.1(a), (b)-page no. 35
20	Whether any Marine. Protected Area will be affected	Yes	Part-C report chapter 3, refer para 3.15-page no. 17
21	Whether total number of fishermen likely to be affected is mentioned in the plan	No	
22	Whether any salt pan in the area is going to be affected	No	
23	Whether any mangroves in the area will be affected by a spill	No	
Preparedness			
24	Whether any containment equipment is available	Yes	Chapter4, refer para 4.2 Page No. 43
25	Whether any recovery equipment is available	Yes	Chapter4 refer para 4.2 Page No. 43
26	Whether the facility is having any temporary storage capacity	Yes	Chapter4 refer para 4.1 Page No. 43
27	Whether location of the oil spill response equipment is mentioned in the plan	Yes	Chapter4 refer para 4.1 Page No. 43
28	Whether suitable vessels available for deploying the boom, skimmer etc	Yes	Chapter4 refer para 4.4 Page No. 44
29	Whether OSD held with facility	Yes	5000 Ltrs – Page No: 50
30	Whether the OSD held with the facility is approved for use in Indian waters	Yes	
31	Whether the facility has MoU with other operators for tier-1 preparedness	Yes	Oil companies, HMEL Operators
32	Whether the list of oil spill response equipment available with each agency in MoU is deliberated	Yes	Chapter 9 refer para 9.1 page no. 89
33	Whether the facility has any MoU with private OSRO	Yes	Chapter 9 refer para 9.4 page no. 91
34	Whether the procedure for evoking the mutual aid is clearly described in the plan	Yes	
35	Whether additional manpower is available	Yes	Chapter 10 refer para 10.2.3 page no. 106

36	Whether list of approved recyclers is mentioned in the plan	Yes	Chapter 10 refer para 10.2.1 Page No 105
37	Whether NEBA (Net Environmental Benefit Analysis) has been undertaken	Yes	Part-D report, chapter 1, refer 1.2-page no. 2
38	Whether the areas from priority protection have identified in the plan	Yes	Part-D report, chapter 2, refer para 2.2-page no. 13
39	Whether relevant authorities and stakeholders were consulted for NEBA and during the areas for priority protection	Yes	Part-D report chapter 3
40	Whether District administration has been appraised of the risk impact of oil spills?	Yes	Part-D report
Action Plan			
41	Whether the plan outlines procedure for reporting of oil spills to Coast Guard	Yes	Chapter 2, refer para 2.6- page no. 22
42	Whether the oil spill response action is clearly mentioned	Yes	Chapter 3, refer para 3.1- page no. 36
43	Whether the action plan includes all duties to be attended in connection with an oil spill	Yes	Chapter 3, refer para 3.1 page no. 36
44	Whether the action plan includes key personnel by their names and designation viz. COO, ICO	Yes	Chapter 5-page no. 54
45	Whether alternate coverage is planned to take care of the absence of a particular person [in cases where action plan is developed basis names]	Yes	
46	Whether the plan includes assignment of all key coordinators viz. the Communication Controller, Safety Coordinator, Emergency management team, Administration and Communication Coordinator and Safety Coordinator	Yes	Chapter 10 page no. 93
47	Whether contact directory containing numbers of key response and management personnel is intimated in the plan	Yes	Chapter10 Page No. 93
48	Whether approved recyclers are identified for processing recovered oil and oily debris	Yes	Chapter10 Page No. 104
49	Whether the shoreline likely to be affected is identified	Yes	
50	Whether final report on the incident is submitted to CGHQ as per NOS-DCP 2015	NA	
51	Whether the spill incident and its consequences are informed to fishermen and other NGOs for environment protection through media	NO	
Training and Exercises			
52	Whether mock fire I emergency response drills are specified in the plan	Yes	Chapter 5 refer para 5.2, page no. 54
53	Whether the mock drills cover all types of probable oil spills	Yes	Chapter 5 refer para 5.2, page no. 54
54	Whether the plan mentions list of trained manpower	Yes	Chapter 5 refer para 5.3, page no. 55



55	Whether records for periodic mock drills are maintained in a well defined format	Yes	Quarterly
56	Whether the plan is updated according to the findings in mock-drills and exercises	Yes	
57	What is the frequency of updation / review of contingency plan?	Yes	As and when required
58	Periodicity of joint exercise with mutual aid partners	Yes	
59	Frequency of mock-drills for practice	Yes	Twice in a year Chapter 12 Page no.131
60	Whether the records for periodic mock drills are maintained in a well defined format	Yes	Chapter 5
61	Frequency of updation / review of contingency plan	Yes	As and when required

We, hereby, declare that the all information appended above are true and correct to my knowledge or belief

Date

Chief Conservator / Installation Manager

VERIFIED

Date

(District Commander ICG)
or his representative

Date

Regional Commander
ICG) or his representative



APPENDIX-14: TRAINING AND COMPETENCY

The Installation Manager in consultation with the Head, HSE shall determine the oil spill training needs and priorities on a regular basis.

Attendance

All the Site ERT members shall attend oil spill response awareness training. Personnel having specific roles to play in the plan shall be trained in areas specific to their needs. IMO divides the OSR training in three different levels, as given below

Level-1

To provide field personnel and Supervisor, responsible for undertaking on site cleanup operations, an overview of the techniques available for recovering spilled oil and cleaning polluted shorelines.

Level-2

Supervisor | On-scene Commander | Incident Controller: To provide senior personnel with the skills necessary to co-operate and supervise response operations, in a timely, organized and effective manner.

Level-3

Administrators and Senior Managers: to provide senior personnel with an awareness of the role and responsibilities requires in the management of spills of national signification.

Training courses are required to meet both statutory and Adani Ports and SEZ Limited, Mundra requirements for oil spill response preparedness and safe operations.

Records

Records demonstrating that personnel have satisfactorily completed the designated training course shall be maintained.

 Adani Ports and Special Economic Zone Ltd, Mundra	Appendix	Rev.No: 03 Dt: 30 th July 2022
		Doc No: ENVR 2022-003-R3
		Page No:140



APPENDIX-15: COMPILATION LIST OF OIL SPILL RESPONSE EQUIPMENT AS PER NOS-DCP-2018 AND AVAILABLE EQUIPMENT WITH Adani Ports & SEZL

Sr. No.	ITEM	As per NOS-DCP 2018	Available in the present
(1)	(2)	(3)	(4)
1	Operation and Management of OSR Centre at Adani Ports & SEZL as mentioned in column (3) including 2 VHF and 3 walkie talkie sets, computers & printers with furniture etc . and operating at 24 x 7 x 365 days	Operation Manager with Level 3 – 1 No. OSR I/c with Level 3 – 3 No. Shift I/c – 1 No. Radio Operator – 1 No. Responders – 10 Nos. Total Man power – 16 Nos.	1 3 1 1 10 Total: 16 Nos
2a	OSR Work Boat with crew as per column (3) as per detailed specifications	4 Nos	4 No
2b	Tugs	4 Nos	4 No
3a	inflatable boom with accessories (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of about 440mm, overall height 1200 mm and skirt of about 500 mm and length of 100/200 m in a bag/reel complete including 4 nos hydraulic air blowers etc complete as per Specifications.	2000 m	2000m
3b	Fence Boom (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of 450mm and over all height of 1200mm and length of 100m etc. complete as per specifications	1000m	235 m
3c	Current buster room- fasflo-75 (for response in fast current)		2 Nos
4a	Weir type oil skimmer of 50 m ³ /hr capacity oil recovery free floating skimmer along with suitable pump and hydraulic Power Pack complete with all accessories.	3 Nos	2 Nos

4b	Drum/ brush type oil skimmer 50 m ³ /hr capacity oil recovery free floating skimmer, along with suitable pump and hydraulic Power Pack complete with all accessories etc. complete as per specifications.	3 Nos	2 Nos.
4c	Vacuum type oil skimmer 30 m ³ /hr capacity oil recovery pump coupled to a diesel engine complete with all accessories etc. complete as per specifications.	5 Nos	2 Nos.
5a	Bio Remediation (lit)	2KL	0
5b	Oil Spill Dispersant, Concentrate type-3 combined, approved by the Indian Coast Guard	3 KL	5 KL
6	Flex Barge of about 10 KLtrs. along with its accessories.	4 Nos	2 Nos
7a	Absorbent (oil only) 80 L Kit for quick oil spill response	0	1 Nos
7b	Sorbent pads 20 inch x 20 inch (nos)	2000 Nos	2000 Nos
7c	Sorbent Boom size min 5inch dia, min length 5 feet	500 Nos	500 Nos
8	Protective Equipment (PPE) kit for oil spill response.	Lev-A – 5 Nos Lev-B -10 Nos Lev-C -20 Nos Lev-D -30 Nos	15 Nos
9	VOC Portable Monitor	4 Nos	0

Additional equipment and location

LIST OF RESOURCES AVAILABLE-ADANI PORTS and SEZ LIMITED, MUNDRA						
Tugs Available for Oil Spill Containment						
Name of Tug	Type	BHP	OSD	AFFF	Capacity (cum/Hr)	BP
Dolphin No. 4	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 7	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 10	ASD	3000 X 2	3000 ltr	-	-	70
Dolphin No. 11	ASD (DSV)	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 14	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 15	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 16	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70

 Adani Ports and Special Economic Zone Ltd, Mundra	Appendix	Rev.No: 03 Dr: 30 th July 2022
		Doc No: ENVR 2022-003-R3
		Page No:142



Dolphin No. 17	ASD	3000 X 2	3000 ltr	-	-	70
Dolphin No. 18	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Brahmini	ASD	2000 x 2	3000 ltr	2000 ltr	1200	65
Bitarni	ASD	2000 x 2	3000 ltr	2000 ltr	1200	65
Khushboo	Fixed screw	401 X 2	-	-	-	10

Dolphin No. 4, 7, 11, 14, 15, 16, 17, 18, Brahmini and Bitarni are fitted with Oil Spill Dispersant boom and proportionate pump to mix OSD and Sea water as required. The tugs are also fitted with a fire curtain and remote-controlled fire monitors.

All above ten Tugs have class notation as Harbour Tugs and are certified to work within the Harbour limits only.

2. Reception Facility: 12" pipe line, connected to a slop tank at chemical tank farm.

Dolphin 11 has firefighting system of 1200 m³/hr along with 20 ton lifting "A" frame and diving support facility.

Location of Oil Spill Equipment: The Oil Spill Equipment stored in SPM Store.



Environ Software Pvt. Ltd.

Corporate Office:

**Environ Towers, 60/4, 4th Floor,
Hosur Road, Konappana Agrahara,
Electronic City, Bangalore-560 100. India.
Tel:+91-80-2852 2191, +91-94497 50282
Fax:+91-80-2852 2192
E-mail:environ@environsoftware.com, environ@environcs.com**

Branch Office:

**T.R Residency, No.A/T-1,
3rd Floor,Sao Paulo,
Taleigao, GOA-403 002. India.
Tel:+91-832-2452069**

www.environsoftware.com

www.environinfotech.com

www.environtechnologies.com

Annexure – 14

AREA LEVEL POLLUTION RESPONSE TRAINING/EXERCISE- 2024 REPORT
02-03rd MAY 2024

Date: 02-03 May 2024	Exercise: Area Level PR Exercise
Name: Mr. Shashank Badola	Position: Radio Officer
Contact Number: 9825228673	Location: APSEZL, Mundra

Date: 02 May 2024: Final Planning and Tabletop Exercise

0930-1230 hrs: Tabletop Exercise carried out at Indian Coast Guard Station Mundra. Participants- APSEZ Mundra and HMEL.

Date: 03 May 2024- Mock OSR drill

Location- Near IOCL SPM (22° 41' N 069° 39.2' E)/APSEZL, Mundra

Drill Activity Timeline:

1000 hrs.: ICGS Informed regarding commencement of drill.

1005 hrs.: Tug Ocean Citrine immediately reported to Marine Control and Diving Supervisor that due to internal explosion observed two 6 inches hole in 1st Wing starboard tank but no injury, no casualty and no fire occurred. Maneuvering capability is intact. There are 33 crew on board, head count taken and all present.

1006 hrs.: Marine Control informed Marine HOD/HOS and all concerned departments.

1007 hrs.: Ocean Citrine team was asked to take the sounding of damaged tanks and all other tanks.

1009 hrs.: Ocean Citrine commenced boom deployment.

1010 hrs.: Commenced internal transferring of oil from damaged tank to 3rd Wing starboard tank.

1011 hrs.: Ocean Citrine informed her company DPA about the incident.

1011 hrs.: Marine Control informed all vessels at anchor regarding oil spill near IOCL SPM area. The control room requested all underway vessels to pass 5 miles from IOCL SPM. Unberthing operations suspended.

1012 hrs.: Ocean Citrine requested Marine Control for Barge BB-10, tug and additional boom standby in case more support required.

1013 hrs.: Dredging head informed for the deployment of BB10 and make ready.

1014 hrs.: Marine Control informed Tug Dol 17 & 18 to standby with OSD for spraying.

1015 hrs.: Informed commercial team (Mr. Jagdish Rabadia), environment cell (Mr. Radhe Shyam Singh) and Liquid Control Room by Mr. Sudhakar Singh about the drill/incident to be in immediate readiness.

1016 hrs.: Marine Control informed Barge BB-10 along with Tug Dol 10 to be stand by.

1017 hrs.: Security department were informed to allow entry of authorized persons, emergency vehicles without any delay and OHS/Adani hospital to be on alert.

1018 hrs.: Barge BB-10 underway with Tug Dol 10 to IOCL SPM.

1019 hrs.: Ocean Citrine informed internal transferring in progress and spillage rate getting reduced and hole came up to half meter above water level.

1020 hrs.: Ocean Citrine reported 150m boom deployed and continued to deploy the remaining 100 meters and reported wind speed 12-14 knots and direction westerly.

1021 hrs.: Capt. Girish Chandra informed Commandant Konark Sharma ICGS Mundra about the incident through phone.

1023 hrs.: Marine Control informed jetty team to be stand by with crew for mooring the Barge BB-10 at B-6 berth. Jetty supervisor also informed to deploy one hydra for loading/unloading of OSR equipment at SPM Store and jetty.

1025 hrs.: Ocean Citrine informed that spill is spread in an area of around 35-50 m².

1039 hrs.: Ocean Citrine reported 250 m boom deployment completed and commenced J-formation.

1040 hrs.: Mr. Mahendra Singh Solanki from Corporate affairs informed DM Bhuj office about the incident.

1041 hrs.: Initial intimation mail sent to GMB/MMD Kandla/Coast Guard Station/MRCC.

1050 hrs.: Ocean Citrine reported J-formation completed, and oil containment is in progress and commenced skimmer deployment. And this is HSD so it is volatile in nature, hence deploying resources to contain.

1052 hrs.: Barge BB-10 arrived at IOCL SPM with Tug Dol 10.

1053 hrs.: Skimmer lowered and commenced recovering of spilled oil to floating tank.

1054 hrs.: Barge BB-10 secured P/S of Ocean Citrine and commenced transferring of oil in barge BB-10.

1055 hrs.: Liquid team informed Marine Control that motor pump and other equipment is standby at berth B-6.

1056 hrs.: Liquid team informed Marine Control that 6 no. of Tanker/bowser arrived and standby at berth B-6.

1100 hrs.: Ocean Citrine reported approx. 1 T of recovered oil loaded in barge BB-10.

1105 hrs.: Recovery of spilled oil completed (1 T).

1118 hrs.: Drill called off and at the same time informed all concerns.

1119 hrs.: BB-10 cast off and proceed to B-6 berth for transfer of oil for disposal.

1120 hrs.: Boom recovery started.

1125 hrs.: Area assessed by diving team for recovered oil and confirmed all clear.

1128 hrs.: Informed environment team for water sampling of spillage area.

1145 hrs.: Environment team informed that area is clear of oil and no harm for sea.

1147 hrs.: BB-10 arrived at B-6 berth.

1155 hrs.: Liquid team started loading oil from BB-10 to tankers for disposal.

1210 hrs.: Tanker loaded with oil departed from B-6 for disposal of oil at Oil Water Separator unit.

1235 hrs.: Tanker reached Oil Water Separator unit.

1240 hrs.: Recovered oil transfer from tanker to OWS unit completed.

1255 hrs.: Environment team informed that GPCB approved recycler has executed disposal.

1315 – 1330 hrs.: De-briefing carried out at Adani House in presence of Capt. Santosh Kumar Darokar, Principal Officer MMD Kandla.

Personnel & Boats Participated in Drill

Off Shore

1. Capt. Hemant Dhruv-APSEZL
2. Capt. Sonu Yadav-APSEZL
3. Capt. Lalji Meena - Harbor Master DPA
4. Mr. Vikram Pratap Singh-APSEZL
5. Mr. Ashok Tiwari - HMEL
6. Mr. MP Choudhary, APSEZL
7. Mr. Shashikant Padave-APSEZL
8. Mr Ayush Jha, APSEZL Mundra
9. Mr. Narayan -APSEZL
10. Mr. Dharamveer Yadav-APSEZL
11. Members from M/s Sea Care – 04
12. Crew of Tug Ocean Citrine
13. Crew of Tug KB 48
14. Tug Dol 10 and BB10
15. ICGS Mundra – 02

16. Mr. Abhishek -APSEZL/Environment

Onshore:

1. Capt. Girish Chandra
2. Sudhakar Singh
3. Mr. Shashank Badola
4. Mr. Rajeev Kumar
5. Mr. Om Prakash Yadav

Drill Performance Monitoring:

Sl. No	Activity	Time Taken
1.	Time taken to shift OSR equipment from SPM Store to load on DSV tugs	NA / 200-meter Fence boom and 1- skimmer is kept 24 x 7 on Tug Ocean citrine.
2.	Time taken for Tug cast off from time information given.	NA
3.	Time taken from tug cast off to Reach at Location.	NA
4.	Time taken for deploying 250-meter boom and skimmer after reaching at site.	30 min.
5	Time taken for J/U formation and deployment of skimmer.	11 min.

Observations:

SR. NO	POINTS	ACTION TAKEN	TARGET DATE	RESPONSIBILITY	REMARKS
1	Internal communication on tug should be streamlined specially between deck and bridge.	Point discussed during de-brief	10.05.2024	HMEL	
2	There should be pads on the roller to avoid chafing against metal at aft end of deck where lowering of boom deployment is done.	Point discussed during de-brief	31.07.2024	HMEL	
3	Bow thruster must be made readily available immediately in such emergencies.	Point discussed during de-brief	04.05.2024	HMEL	

Tabletop Exercise- 02 May 2024

Drill Scenario presented by ICG



Table top Discussion with the participants



PR Drill snap – 03 May 2024

Area Level Pollution Response Exercise at IOCL SPM

Boom laying from Tug Ocean Citrine



J formation making in progress



Skimmer Operations



Area Level Pollution Response Team on Tug Ocean Citrine



De-briefing at Adani House



Annexure – 15

ON SITE EMERGENCY PLAN

AUGUST 2023

— ■ PRODUCER ■ —



ADANI PORTS AND SEZ LTD

**P.O Box No: 1, Mundra - 370421
(KUTCHH)**

:: COMPILED BY ::

M.J.PATEL & ASSOCIATES

HAPPY ASSOCIATES

DISH approved Comp.Persons & Safety Professionals

**6-A, NEW RANGSAGAR SOCIETY, NEAR GOVT. TUBE
WELL, BOPAL, AHMEDABAD - 380058, MOB: 9825060783**

	ADANI PORTS AND SEZ LTD MUNDRA	AUGUST - 2023
	ON SITE EMERGENCY PLAN (PORT AREA)	

INDEX
SECTIONS: 1 CHAPTERS - I TO VI

CHAPTER	TITLE	PAGE
	Preface	
1.0	1.0 Introduction of Emergency Plan	5
	1.1 Identification of the factory	6
	1.2 Map of the area	8
	1.3 Some important definitions	9
	1.4 About objectives of emergency plan	
2.0	2.0 Introduction of risk & environmental impact assessment	13
	2.1 Factory Lay-out	
	2.2 Identification of hazards in storage & control measures	14
	2.3 Identification of hazards in process	17
	2.4 Process description	18
	2.5 Other hazards and controls	19
	2.6 Trade waste disposal	20
	2.7 Records of past incidents	20
	2.8 Gas dispersion concentration	20
	2.9 Risk assessment	21
	2.10 Environmental impact assessment	
3.0	3.0 Emergency organization	73
	3.1 Scope & Purpose	74
	3.2 The Need of Disaster Planning at APSEZ	75
	3.3 Emergencies : Classification of Emergencies	76
	3.4 Emergency Response Organization	77
	3.5 Emergency Reporting Line	79
	3.6 Assembly Points	81
	3.7 Categories Of Emergencies	82
	3.8 Duties & Responsibilities	85
	3.9 External Aid	89
	3.10 Mutual Aid Members	89
	3.11 Government Authorities	90
	3.12 Reporting & Investigation	91
	3.13 Communication & Public Affairs	91
	3.14 Public Affairs	92
4.00	4.00 Emergency Planning	93
	4.1 Drills & Training	94
	4.2 Training	94



ADANI PORTS AND SEZ LTD
MUNDRA
ON SITE EMERGENCY PLAN (PORT AREA)

AUGUST - 2023

4.00	4.3 Emergency Plans	94
	4.3.1 Cyclonic Storms / Hurricanes	94
	4.3.2 Earthquakes	99
	4.3.3 Tsunami	100
	4.3.4 Flood	101
	4.3.5 Industrial Unrest	102
	4.3.6 Bomb Threat	103
	4.3.7 War	104
	4.3.8 Flood / Water Poisoning	105
	4.3.9 Fire	105
	4.3.10 Major Release of Toxic / Flammable Chemicals	106
	4.3.11 Major Release Of Toxic Gas	
	4.3.12 Transportation Incidents Involving Hazardous Materials	110
	4.3.13 Marine Emergency	112
5.00	5.0 Emergency Preparedness	113
	5.1 Fire Fighting Facilities with APSEZ, Mundra	114
	5.1.1 Fire Fighting Systems At Jetty	114
	5.1.2 Liquid Terminal	115
	5.1.3 Dry Cargo Area	116
	5.1.4 Terminal - 2	117
	5.1.5 Container Terminal - 2	117
	5.1.6 Container Terminal - 3	118
	5.1.7 Terminal - 1	
	5.1.8 West Basin	
	5.1.9 Adani House & Pub	119
	5.2 Safety Equipments & PPE's At APSEZ	120
	5.3 About On Site Emergency Plan	121
	5.4 About Post Emergency Activities	124
	5.6 Medical Emergency Preparedness	124
6.00	6.0 Off Site Emergency Plan	126
	6.1 About Off Site Emergency Plan	126
	6.2 Structure of Off Site Emergency	130
	6.3 Role Of Management	131
	6.4 Role Of Police & Evacuation Authority	131
	6.3 Role Of Mutual Aid Units	131

SECTION – II : ANNEXURES 1 TO 33

<u>ANNEXURES</u>	<u>PAGE NO.</u>
1. Identification of the Factory ...	132
2. Map of area ...	133
3. Plant Layout ...	134
4. Storage Hazards & Controls ...	135
5. Material Safety Data Sheets ...	136
6. Process and Vessel Hazards and controls ...	137
7. Other Hazards and Controls ...	138
8. Trade Waste Disposals ...	139
9. Records of Past Incidents ...	140
10. Gas Dispersion Concentration ...	141
11. Evacuation Table ...	142
12. Environmental Impact Assessment ...	143
13. Weather Conditions ...	144
14. Incident Controllers ...	145
15. Deputy Incident Controllers ...	147
16. Site Main Controllers ...	149
17. Key Personnel ...	149
18. Essential Workers ...	150
19. Safe Assembly Points ...	152
20. Emergency Control Center ...	154
21. Fire & Toxicity Control & Mutual Aid ...	155
22. Medical Arrangement ...	160
23. Transportation & evacuation Arrangements ...	162
24. Pollution Control Arrangements ...	165

<u>ANNEXURES</u>	<u>PAGE NO.</u>
25. Other Arrangements ...	167
26. Alarms & Sirens ...	168
27. Internal Phones ...	170
28. External Telephone Numbers ...	172
29. Nominated Persons to declare Major Emergency ...	173

PREFACE

Adani Port Mundra is the seamless integration of 3 verticals consisting of Ports, Logistics and Special Economic Zone. APSEZ Mundra with the flagship port in the Gulf of Kachchh, is India's largest commercial port. Adani Port handles a wide variety of cargo ranging from coal, crude, containers to fertilizers, agri products, steel & project cargo, edible oil, chemicals, automobiles etc. A corporate agenda for APSEZ is to deliver overarching principle of tipple bottom-line. Adani Ports is striving to become Green Port by managing port operations and services responsibly, creating safe, secure and eco-friendly working environment.

Adani Port - Mundra has infrastructure to handle containers Pan-India. We have container terminals operational. Deep draft berth facilitates berthing of largest container vessels arriving at the ports and best-in-class infrastructure ensures world class productivity, fast turnaround of vessels and efficient evacuation of containers from the port.

The Port operates two Single Point Mooring (SPM) facilities to evacuate imported crude oil. These SPMs can handle Very Large Crude Carriers (VLCC) and Ultra Large Crude Carriers (ULCC) up to 360,000 DWT. The crude is transported to refineries in North India through cross country pipeline network.

Adani Port - Mundra has capabilities and infrastructure to handle liquid cargo at Mundra. Multiple berths are equipped with different types & sizes of pipelines from jetty to tank farm to ensure safe and efficient handling of liquid products in big parcels. The tank farms can store multiple types of liquid cargo including vegetable oil, chemicals & petroleum, oil & lubricants (POL) products. The infrastructure at the Liquid terminal ensures best in class storage, safe and contamination free handling of liquid cargo.

Adani Port - Mundra is equipped with adequate infrastructure to handle coal. **Adani Port** handle all types and grades of coal including steam coal, imported coking coal & thermal coal, sourced from domestic sources. It has installed high speed ship unloaders / mobile harbour cranes for faster discharge of coal cargo and mechanized storage yards & integrated conveyor system to handle huge volumes of coal cargo.

Adani Port - Mundra is well equipped to handle minerals. Minerals & related cargo including Bauxite, Bentonite, Cement, Clay, Industrial salt, Iron ore fines, Rock phosphate and Gypsum, amongst others are handled here. Dedicated infrastructure, including specially demarcated concrete storage yards ensure zero ground loss. All necessary measures, with regards to equipment & storage are taken to ensure that there is no cargo loss or contamination.

Adani Port - Mundra has excellent capabilities to handle agri- cargo. Agri-commodities handled at the port include Yellow Peas, Chick Peas, Sugar, Wheat, de-oiled cakes, Barley, Sorghums, Maize & Rice, among others. Stringent standards concerning handling of Agri-products are followed at the port. Separate dedicated berths and specialized facilities ensure clean and contamination free handling of Agri-cargo along with abundant storage facilities and labour. Rail connectivity ensures that imported Agri-cargo is transported to distant areas within the country.

Adani Port - Mundra has capabilities and infrastructure to handle fertilizers. The fertilizers handled here include all types and grades including Granular Urea, Prilled Urea, DAP, DAP Lite, MOP Red, MOP White, NP, NPK etc. The Port team understands the delicate nature of fertilizer cargo and therefore employs the best method to handle fertilizer cargo, even during the peak season, ensuring full customer satisfaction. Dedicated berths, dedicated fleets of equipment's, abundant covered storage facilities and adequate labour are available for handling fertilizer cargo at Mundra has state-of-the-art dedicated mechanized infrastructure for handling fertilizer cargo which is capable of loading ten rakes daily.

Adani Port - Mundra can capably handle all types & grades of steel cargo including Plates, Beams, Coils, Pipes, Slabs, Bars, Billets & over dimension Steel Plates / Beams or Pipes, amongst others, requiring specialized operations. The Mundra port has state-of-the-art technology Goliath cranes attached with vacuum lifters for scratch free handling of quality sensitive cargo and a best-in-class steel yard spread across 1.5 lacs sq. mtrs to handle 6 MMT/ year.

Adani Port - Mundra has the requisite infrastructure to handle project cargo. We are specialized in handling over-sized and overweight project cargo. The port has loaded / discharged, heavy/oversized machinery / equipment like Boilers, Rail Wagons (of Delhi metro), Heavy Transformers, complete Windmills and Heavy Machineries.

Adani Port - Mundra has the perfect infrastructure to handle timber. The port handles timber logs of different kinds for different customers. It has earmarked a storage area capable of 350,000MT timber storage.

Mundra port established the RoRo terminal in 2009 and since then has been serving as a gateway port for automobile companies situated in Delhi NCR, Rajasthan and Gujarat region. Mundra port handles exports of Cars, Buses, and Trucks.

Adani Port - Mundra is committed to uphold high standards of health and safety practices far beyond satisfying legal or regulatory requirements & promoting a culture seeking continuous improvement in the Health & Safety performance of the organization.

In view of presence of various materials handled, hazardous nature of liquids, due to situation of the port, various types of hazards exist in handling, storage and logistic activities. Hence, it is desirable and also statutory to prepare an emergency action plan for any emergency which may affect plant personnel, property as well as neighbouring areas and population.

Therefore, we have prepared this book which incorporates all required matters along with on site emergency plan. Our safety policy dictates that we will take all precautions and preventive steps to see that our workers carry out their job in a safe and healthy working condition. We have taken reasonably practicable preventive measures to avoid any accident. Necessary testing, checking, inspections, maintenance are carried out regularly.

It is also obvious that systematic and methodical action in any emergency would reduce and mitigate risk to life, property not only of the port but also of the surrounding area and environment. This on site emergency plan is prepared to carry out a systematic and methodical action in the event of any emergency. It gives different pre-emergency, emergency time and post emergency actions to be taken in a planned way. Such actions would go a long way in preventing or mitigating risk to life, environmental and property in emergency.

We are responsible to carryout planning and do everything reasonably practicable to comply with requirements of this plan and revise and amend from our experience. This plan will also be circulated to all senior personnel for their knowledge, information and subsequent action.

For ADANI PORT & SEZ LTD. MUNDRA

(Auth.Sign)

(This emergency action plan has been prepared for **Adani Port, Mundra** as per the guidelines laid down by the office of Director, Industrial Safety & Health. The source of data regarding Gas Dispersion and other information is based upon the book of Major Hazard Control – published by International Labour Organization).

CHAPTER-1

PRELIMINARY

CONTENTS

- 1.0 INTRODUCTION OF EMERGENCY PLAN
- 1.1 IDENTIFICATION OF THE FACTORY
- 1.2 MAP OF THE AREA
- 1.3 SOME IMPORTANT DEFINITIONS
- 1.4 ABOUT OBJECTIVES OF THE EMERGENCY PLAN

1.0 INTRODUCTION OF THE PLAN

Today in this world many kind of chemicals, oils, minerals & materials are handled & transported in enormous quantities, probably beyond safe manageable levels and that too in many cases with record speed. People working in ports & industries, storing, handling, transporting and using various chemicals & other material are constantly exposed to hazards like fire, explosion, toxic gas releases, spillage of dangerous substances, exposure etc. Disaster means accidents causing catastrophic situation, in which day to-day pattern of life is in many instances, suddenly disrupted and people are plunged into helplessness and suffering, as a result need protection, clothing, shelter, medical and social care and other necessities of life. Disaster may occur by natural phenomena, by man or by mans impact upon the environment.

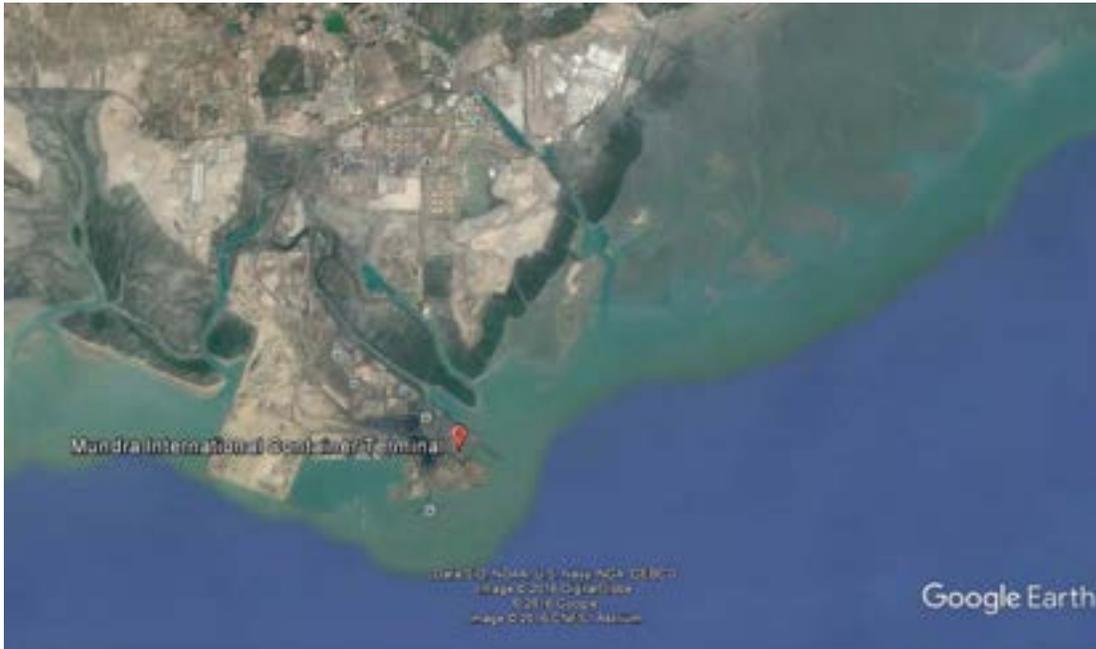
This emergency action plan has been prepared based upon the specific needs of the site for dealing with those emergencies which, it is foreseen, may still arise despite taking of all reasonably practicable precautions. An emergency element of the plan must be the provision to attempt to make safe the port. Emergency incidents considered are ranging from small event which can be dealt with by port personnel, without the help of outside services to the worst event which involves outside public, emergency services agencies etc. This plan is in two sections; the first section explains basic requirements as below:

- A – Definitions
- B – Objectives
- C – Hazard identification
- D – Risk analysis and environmental impact
- E – Organizational set-up
- F – Communication system
- G – Action on-site
- H – Off-site emergency plan
- I – Training, rehearsal and record aspect

The second section is annexure section. This 33 number annexure are designed to give specific information required during emergency. A considerable time can be saved due to handy information at the time of emergency. This information can also be helpful to the government in preparing district contingency plan.

1.1 IDENTIFICATION OF THE FACTORY

Adani Port at Mundra consisting of Ports, Logistics and Special Economic Zone. APSEZ handles a wide variety of cargo ranging from coal, crude, containers to fertilizers, agri products, steel & project cargo, edible oil, chemicals, automobiles etc.



Adani Port near Mundra is 7 Kms from the town of Mundra which is about 9 km from the Gulf of Kachchh, the ancient Mundra Town is the headquarter of the Mundra Taluka, about 70 km away from the Dist. Headquarter of Bhuj, Dist. Kachchh. Mundra is directly linked to the National Highway NH-8A (ext.), State Highway SH-6 and SH-48. Gandhidham railway station is the nearest passenger rail head 50 km away. Mandavi airstrip (about 30 km), Kandla airstrip (about 45 km) and Bhuj Airport (about 70 km) are the airstrips/airports in the vicinity. Mundra was a small town with agriculture and minor commerce dominating its socio-economic character about a decade back. Mundra was devastated like other towns and villages in the earthquake that struck Kuchchh on January 26, 2001. With the reconstructive spirit of the people and economic incentive packages given by the Govt. of Gujarat as well as Govt. of India for the Kachchh distt., Mundra is now witnessing a spate of industrial activity. The industrial and entrepreneurial potential of the town started unfolding with the Adani Group setting up its Port on the Mundra sea front in 1998.

	ADANI PORTS AND SEZ LTD MUNDRA	AUGUST - 2023
	ON SITE EMERGENCY PLAN (Port Area)	

IDENTIFICATION

Port Commissioned :	1998
Port & APSEZ area:	Mundra SEZ - 18000 ha, Notified SEZ area 8481.2784 ha.
Village :	Mundra
Nearest City:	Bhuj
Nearest Railway station	Bhuj, 6 0 Km
Nearest Airport	APSEZ Private Airstrip

SITE LOCATION		
State	Gujarat State	
Nearest Important Town & Distance	Mundra – 10 Kms	
Nearest Railway Station & Distance	Gandhidham – 50 Kms	
Nearest Port & Distance	Kandla Port Trust - 60 Kms	
Nearest Airport & Distance	Mandavi airstrip (about 30 km), Kandla airstrip (about 45 km) and Bhuj Airport (about 70 km) are the airstrips/airports in the vicinity	
Nearest Highway Milestone & Distance	National Highway 8A Extn. & State Highways 6 & 48.	
Approach Road	4-Lane Rail-over-Bridge to ensure that two modes of transportation i.e. road & rail, do not impede each other's movement.	
GEOGRAPHICAL DATA		
Height above mean sea level	14 meter	
Site characteristics (Terrain Type)	Coastal Area	
Location of APSEZ	Geographically, located between 22°.4451.73 North latitude and 69°.41.41.60 East Latitude	
Seismic Zone	Zone 5, as per IS : 1893 -2002	
METEOROLOGICAL DATA		
Climate of Area	Dry, Arid Coastal Climate	
Highest Daily maximum Temperature	46.1 °C	
Max. dry & wet bulb temperature	37.7 / 26.8 °C	
Wind Regime	Summer - SW & W, Monsoon - SW, Winters - N, NW	
Annual Rainfall	268.5 mm	
Visibility	Good through out of the year	
Relative Humidity %		
	Max	80
	Min	22
Wind Velocity Average	32.4 km/hr study period (Dec-05 to Feb 06).	

	ADANI PORTS AND SEZ LTD MUNDRA		AUGUST - 2023
	<hr/> ON SITE EMERGENCY PLAN (Port Area)		

Wind Velocity	Max	90 Km/ hr
Wind velocity during monsoon		50 KM/hr
WATER SUPPLY		
Source of Water		Well nearby area.

Adani Port - Mundra is committed to uphold high standards of health and safety practices far beyond satisfying legal or regulatory requirements & promoting a culture seeking continuous improvement in the Health & Safety performance of the organization.

Annexure – 1 attached in the report gives remaining detail of the port such as name of the occupier, manager, with their residence address and telephone numbers. Persons to be contacted in respective shifts etc. is mentioned. We have for our all the activities made the identification of hazards and relevant actions are taken as stated in Chapter – 2 of this plan.

1.2 MAP OF THE AREA

A map of the surrounding area of our Port & SEZ is enclosed marked as Annexure – 2, showing following locations of port such as:

- A. Exact location of the Port & SEZ
- B. Surrounding area
- C. Approach roads
- D. Off-site emergency services
- E. Company owned Fire Station, Police Station
- F. North direction

This map is useful to know the surrounding area, location of above facilities in advance and identify the area which could be affected due to an emergency, if turned into off-site emergency and if evacuation of workers and others is necessary. Another map is attached marked as **Annexure – 3, Factory layout** showing all vital detail of the unit such as (1) Hazardous storage & process area (2) Other Process Plants Departments & Machines (3) Location of Assembly points (4) location of Emergency Control Centre (5) location of firefighting equipment's, entry, exit gates etc.

1.3 IMPORTANT DEFINITIONS

All important definitions stated in the guidelines by DISH, are adhered to in preparation of this plan. These definitions are accepted by all the concerned government, semi-government bodies and institutions as mentioned relevant to the emergency planning.

1.4 ABOUT OBJECTIVES OF THE EMERGENCY PLAN

An emergency cannot always be prevented but controlled within limits and its effects minimized by using the best available resources at the time. Emergency planning is a management function and it should not be considered in isolation. Management should evaluate the activities, operations and process carried out within the works before starting to plan an emergency operation.

A check must be made to ensure that all required steps have already been taken are included in emergency planning. Considering the number of employees, material and process, availability of resources, location of site, size and complexity of the works, we have prepared this plan. In this plan, we have given clear instructions without overlap or confusion for all concerned staff members. The same details are prepared as per annexures.

In spite of various preventive and precautionary measures taken in the plant, the possibility of a mishap cannot be totally ruled out. Hence, the need to prepare a Contingency Plan for dealing with incidences which may still occur and are likely to affect LIFE and PROPERTY both within the plant and in the immediate neighbourhood.

Such an emergency could be the result of malfunction of the Plant & Equipment or non-observance of operating instructions. It could, at times, be the consequence of acts outside the control of plant management like severe storm, flooding, or deliberate acts of arson or sabotage.

OBJECTIVES OF THE PLAN

1. To control the emergency, localize it and if possible eliminate it.
2. To avoid confusion, panic and to handle the emergency with clear cut actions.
3. To minimize loss of life and property to the plant as well as to the neighbourhood.
4. To make head count and carry out rescue operations.
5. To treat the injured persons.
6. To preserve records and to take steps to prevent recurrence.

7. To restore normalcy.

The **On Site Emergency Plan (OSEP)** explains the code of conduct of all personnel in the plant along with the actions to be carried out in the event of an Emergency. This plan gives the guidelines for employees, contractors, transporters, etc. It not only defines responsibilities but also inform about prompt rescue operations, evacuations, rehabilitation, co-ordination and communication.

EMERGENCY

An emergency is a situation which may lead to or cause large scale damage or destruction of life, property or environment within or outside the factory. Such an unexpected situation may be too difficult to handle for the normal work-force within the plant.

NATURE OF EMERGENCY

The emergency specified in the OEP refers to the occurrence of one or more of the following events:

1. Fire/Explosion
2. Major accident such as structural or building collapse, overturning of road tanker containing chemicals.
3. Natural calamities like storm, flood, earth quake, etc.
4. Sabotage act of terrorism, civil commotion, air raid etc.

On Site Emergency Plan (ONLY PORT AREA)
Adani Ports and Special Economic Zone Limited
Code for Declaration of Emergency
Siren for one minute followed by 5 sec gap repeated four times.
Code for Declaration of All Clear
Continuous siren for two minute
Schedule of Siren Testing
4th and 19th Every Month – 1000 hours (Port) & 1100 hours (West Basin)

ON SITE EMERGENCY PLAN (Port Area)**CONTACT IN EMERGENCY (Intercom Numbers):****FIRE – 52400 [MPT], 52985 [WB] QHSE – 52778 [MPT], 52974 [WB]****SECURITY – 52300 [MPT], 52900 [WB] OHC – 52444 [MPT], 52984 [WB]****ISCR – 52100 [MPT] POC [MPT] – 52442, 52762 [MPT] CCR [WB] – 52934****CONTACT IN EMERGENCY (Landline Numbers): STD CODE – 02838****FIRE – 289101 [MPT], 255985 [WB] QHSE – 255778[MPT], 255974 [WB]****SECURITY – 289322 [MPT], 255900 [WB] OHC – (02838) 289267 [MPT], 255984 [WB]****POC [MPT] – 289371 / 72 CCR WB – 255934**

CHAPTER NO. II

INTRODUCTION OF RISK AND ENVIRONMENTAL IMPACT ASSESSMENT

CONTENTS

- 2.00 INTRODUCTION OF RISK AND ENVIRONMENTAL IMPACT ASSESSMENT PLAN
- 2.01 FACTORY LAY-OUT
- 2.02 STORAGE HAZARDS & CONTROLS
- 2.03 IDENTIFICATION OF HAZARD IN STORAGE & CONTROL MEASURES
- 2.04 IDENTIFICATION OF HAZARDS IN PROCESS & CONTROL MEASURES
- 2.05 PROCESS DESCRIPTION
- 2.06 OTHER HAZARDS & CONTROLS
- 2.07 TRADE WASTE DISPOSAL
- 2.08 RECORDS OF PAST INCIDENTS
- 2.09 GAS DISPERSION CONCENTRATION
- 2.10 RISK ASSESSMENT
- 2.11 ENVIRONMENTAL IMPACT ASSESSMENT PLAN

2.00 INTRODUCTION OF RISK & ENVIRONMENTAL IMPACT ASSESSMENT

In this chapter all vital information such as Port installations, machinery, quantum of substance stored – Its storage and handling, loading-unloading practices, Its potential to damage the work place, its potential to create an emergency, its potential to damage the environment and life, nature of process carried out, types of emergency likely to take place, provisions to control such emergencies, are given. Hazard identification is made based upon handling of various substances and relevant steps to avoid probable hazards.

2.01 FACTORY LAYOUT

Layout of the port is enclosed as annexure-3, which shows following important locations for emergency planning.

1. Main approach to the port & main gate
2. Liquid Terminal having 100 tanks for storage of different liquid commodities
3. Closed Godowns
4. Open storage yards
5. Fertilizer Cargo Complex
6. Steel Yard for handling steel cargo
7. The SPM facility
8. Berths & Jetty for Liquid cargo
9. Docks alongside its berths for handling dry bulk & break bulk cargo
10. Security Cabin / Exit & Entrance routes
11. The container terminals having a combined infrastructure consisting of 2.1 km of quay length
12. Admin buildings, canteens
13. Control buildings,
14. Other various building consists of offices
15. Fire stations,
16. Medical centres & occupational health centres
17. Internal Roads & railway line

The Port layout plan is kept in the Emergency Control Centre (ECC) so that proper and immediate actions can be taken by the concerned personnel.

2.02 IDENTIFICATION OF HAZARDS IN STORAGE & CONTROL MEASURES

In **ADANI PORT - Mundra**, huge quantities of dangerous chemicals are handled and kept for intermediate temporary storage in liquid terminal for further transport. By its nature, in which dangerous chemicals are handled (storage/transportation) carries the probability of an accident and gives rise to the laying out of different accident scenarios.

In addition to observe safe standards for the operation of Port, close attention shall be paid to overall site security arrangements. Highly flammable Substances such as: High Speed Diesel, Vinyl Acetate Monomer, Furnace Oil, Naphtha, De-natured Ethyl Alcohol, Methanol, Low Aromatic White Spirit are stored in giant capacity tanks. Besides above some intermediate compounds & chemicals such has Styrene Monomer, Linear Alkyl Benzene, Acetic Acid, Acetic Anhydride are stored. Other than above chemicals some mineral oils & other oil compounds such as Mineral Turpentine Oil, Alpha Plus, CBFS, Crude Soyabean Oil are stored. All above are very hazardous substances, even while handling in small quantity, safety should be the prime consideration.

As fire is likely in the case of Methanol, Naphtha, VAM, solvents & HSD due to leakage, ignition, spark, vapour dispersal, materials are kept isolated from any source of fire-ignition. Bonding, Earthing & grounding to all pipes, joints, tanks to mitigate static charges. Their handling is strictly monitored.

Hazardous Chemical	Storage Location	Major hazards	Physical Form	Maximum Quantity Stored Onsite kl
Motor spirit	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	15042
Naphtha	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	2944
Gasoil	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	461122

ON SITE EMERGENCY PLAN (Port Area)

Methanol	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	18000
Toluene	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	3000
Acetic acid	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	2960
P- Xylene	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	6460
Vinyl Acetate Monomer	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion, toxic gas	Liquid	1458
Styrene Monomer	Liquid terminal Tank farm	pool fire, dispersion of toxic styrene vapour	Liquid	4500

In addition of above raw materials, there are various open & closed godowns, scattered fuel storages for D.G. Sets, Coal Yards.

In spite of all controlling measures, accident can happen due to dangerous physical properties of above substances – Risk of fire, leak of chemical and subsequent toxic atmosphere. Although, the port operations are running since quite a long time without any incidence of fire or leak due to sound handling practices & laid down safety systems.

In Port Operations it is likely that some of the accidents occur due to all following mentioned reasons:

- **Falls from height:** can occur whilst carrying out trimming, sheeting and container lashing, securing loads, accessing ships, working on board a ship or working on heavy machinery.
- **Falling Objects:** Whilst carrying out loading and unloading operations and stacking and stowing goods there is a risk of falling objects. Items may be loose and incorrectly or poorly slung or stacked. Fittings and fixtures used during lashing operations may be dropped. Loads or objects may collapse or fall having become unstable during transport or having been poorly loaded.

ON SITE EMERGENCY PLAN (Port Area)

- **Fatigue:** Dock operations can be prone to unexpected events and delays over which there may be little control. Fatigue can develop slowly and will not always be obvious. It can increase the risk of accidents through poor perception or physical exhaustion.
- **Mooring Hazards:** Mooring can be a hazardous activity as there is a risk of a person getting caught in a line or a winch. The lines can be very heavy and awkward, particularly if they are wet, and may break and snap back.
- **Lifting Equipment's:** Container Lifting & material loading/unloading are very much dependent on lifting equipment's. If proper inspection, maintenance is not followed, these operations may cause severe accidents.
- **Fire/Electrocution:** All electrical equipment and installations if not designed, constructed, installed, maintained, protected and used properly, it can lead to fire, electrocution accidents.
- **Hazardous or Asphyxiate Substances:** Workers loading and unloading solid bulk cargoes may be exposed to dust or respiratory sensitizers that can cause asthma. Cargoes may be flammable, toxic, poisonous or corrosive. Some cargoes, for example grain, may have been fumigated. Some solid bulk cargoes in the hold may not be hazardous themselves, for example fishmeal or bark, but may produce gases due to decomposition or bacterial action. Vehicle exhaust emissions in the ship's hold may also give rise to hazardous fumes.
- **Moving Vehicles and Equipment:** An appropriate traffic management system must be in place and will aid both safety and operational control of the port.
- **Night Work:** Night work/shift work can contribute to or produce negative biological effects (heart and stomach disorders), psychosocial effects (fatigue, increased accidents, stress) and individual effects (disrupted family life, isolation, stress).
- **Noise:** Equipment and engines may produce noise which is augmented when they are operated in a ship's hold or a warehouse. As a rule of thumb you may be at risk if you have to shout to be clearly heard by someone 2 metres away, if your ears are still ringing after leaving the workplace or if there are noises due to impacts such as those caused by hammering.
- **Slips and Trips:** The majority of dock accidents reported to the HSA are due to slips, trips and falls on the same level.

ON SITE EMERGENCY PLAN (Port Area)

- **Tidal and Environmental Hazards:** The weather can have an adverse effect on port and dock operations and can reduce visibility. Cold and wet weather can reduce concentration and make manual work more difficult. Hot weather may result in heat exhaustion, sunburn or sunstroke. Wind, ice and fog can all increase the risk of slips, trips and falls. Tidal movements can affect access and egress to the ships, cause difficulties during loading operations and result in collisions between dockside equipment and a ship.

- **Severe weather and other natural hazards**
 - ✓ Ports may suffer from a variety of natural events. These include:
 - ✓ High winds and severe storms;
 - ✓ Flooding from tides, river water, land water or a combination of both;
 - ✓ Temperature extremes;
 - ✓ Earthquakes;

The ports regularly operate in temperatures over 40°C. Exposure to extremely high is likely to affect the ability of port workers to continue to work safely and without endangering their health. At this Mundra port, large cargo of dangerous chemicals (toxic or flammable) are unloaded from the ships and stored in liquid terminal. Unloaded dangerous chemicals are transferred to the storage tanks through the pipelines. Storage tanks are provided to store finished products which receive from the ship prior to transfer to consumer end for their processing. Huge quantities of dangerous chemicals are handled and kept for intermediate temporary storage in liquid terminal for further transport. Petroleum products, hazardous chemicals are transported to consumer by rail wagons, road tankers and cross country pipelines. The industrial and commercial activities in the area heavily pollute the environment.

2.03 IDENTIFICATION OF HAZARDS IN STORAGE / PROCESS & CONTROL MEASURES.

FIRE HAZARD

- ❖ Flammable substances are stored and handled in large quantity.
- ❖ Static electricity due to weak/loose earthing
- ❖ Slight /intermittent or steady leak causing flammable vapour cloud and any stray ignition.
- ❖ Accidental fire in Combustible materials godowns

TOXIC HAZARD

- ❖ Due to toxic physical properties of chemicals handled
- ❖ All above mentioned chemicals are stored and used in relatively sound quantity in storage tank. Transferred mechanically.
- ❖ There are chances of corrosion of pipes, tanks, receiver tanks due to materials as also external corrosive atmosphere.
- ❖ Leakage of toxic-corrosive substance in large amount – dispersion of toxic – corrosive chemical vapour - mist in the surrounding area of the unit.
- ❖ Splash of chemical and/or its exposure to any working person due to mishandling or by accident

EXPLOSION HAZARD

- ❖ Sudden outburst of fire, heat or steam, finding inadequate or no escape may cause bursting or explosion.
- ❖ Other Pressure equipment's (pneumatic operations, utilities, air receivers containing compressed air & gas in utility may cause such a situation

2.4 PROCESS DESCRIPTION

A port is a facility at the edge of an ocean, for receiving ships and transferring cargo to and from them. The term seaport is used for ports that handle ocean-going vessels. Ports have specially-designed equipment to help in the loading and unloading of vessels. In fact, it can be stated that a port is an intermodal node where goods are loaded/unloaded to/from vessels and sent to their destination, be it onshore or offshore.

A port system could be thought of as a complex, often huge, environment where several transport operations are carried out, including, not only maritime transport, but also unloading and, of course, storage of goods, along with typical process activities. Ports are normally located near a city, unless they are isolated terminals serving a process plant or a pipeline. Many cities have in fact been founded and have grown around spots that offered shelter for fishing boats, and later, with the growth of commerce and sea-exploration, have become port-cities. Transport includes ships and barges as well as Lorries, trains, and pipelines. Process operations embrace mainly storage, which can be of different types: solid bulks in silos, stacks, warehouses, packages; liquid bulks in tanks; containerized goods of any kind. Bulk carriers, used to transport bulk solids such as (iron) ore, coal, coke, bauxite/alumina, food staples (rice, grain, etc.), cement, sugar,

quartz, phosphate rock, fertilizers, sulphur, scrap, and similar cargo. They can be recognized by the large box-like hatches on their deck, designed to slide outboard for loading. Bulk carrier's discharge at terminals provided with proper cranes; ore and coal can be stored in heaps. Tankers are usually large ships which carries petroleum products or chemicals in bulk. Apart from pipeline transport, tankers are the only method of transporting large quantities of vegetable oils around the world. Among the chemicals transported by sea, the most important are methanol, ethanol, toluene, acetic acid, caustic soda lye, naphtha, gasoil, motor spirit etc. Land transport activities, which are carried out by lorry, train and pipelines. - Storage, warehouses, container terminals, car parks, bulk solid wharves, etc. Chemical releases from tank farms on site are the most probable. It includes highly flammable and toxic chemicals. The latter is at approximately atmospheric pressure so that even a catastrophic failure should not result in the formation of a large flammable vapor cloud. The causes for overpressure may be overheating due to a neighbouring fire, overfilling or rollover. Overfilling is a common phenomenon in storage installations and has one of the highest probabilities of occurrence values. Another possibility is the liquid catching fire due to a local incident or operation, which may lead to stress rupture of the tanks. Severe mechanical damage may occur from impacts from projectiles from disintegration of nearby vessels, aircraft impacts or nearby railway accident due to derailment. The tank farm storing of non-boiling liquids can be affected by pool fires and unconfined vapor cloud explosions. These spills may also result in the direct formation of a flammable vapor cloud. The latent heat required for evaporation has to be provided by the surroundings and the ground. The rate of evaporation will be initially high but decreases rapidly as the available heat from the surroundings is exhausted.

Liquid Terminal:

Liquid terminal comprises of tank farm area, pump house, and loading bays. Flammable Chemicals / petroleum products receive from the bulk ship carriers and transfer to intermediate storage tank for further distribution to the customer. Tank farm area comprises of finished petroleum products

2.5 OTHER HAZARDS AND CONTROLS

In the plant, in addition to the hazards from storage handling and usage of flammable substances and other substances, there are certain other hazards likely due to failure of machinery and equipment's. Such hazards are listed below:

- Machineries and equipment's failure
- Structural collapse
- Hazards during maintenance of plant

- Health hazards & Physical injuries
- Failure of electrical Installations
- Natural calamities (Earthquake, fall of lightning, floods, Tsunami, cyclones, storms) or manmade hazards. Causes of such other hazards, their effects on plant and the surrounding area, their preventive measures etc. are stated in ANNEXURE - 7

2.6 TRADE WASTE DISPOSAL

In Port Operations, no production activities are available. No hazardous trade waste is likely to generate in daily basis. Though effluent treatment plant has been provided for some of the identified waste.

In air pollution, the source of emission is from DG stack has been provided at sufficient height. Periodical monitoring of stack is done. Periodical Noise monitoring, ambient air monitoring are carried-out and records maintained.

We are having consolidated consent from the Gujarat Pollution Control Board : which is valid for 5 years. Other detail is furnished in Annexure – 8.

2.7 RECORD OF PAST INCIDENTS

So far, no incident has occurred in the past at our Port. However, due to port operations, handling of various hazardous chemicals at liquid terminals, container terminals & at various dry ports certain undesired situations have occurred at other ports in the world. Hence, from those incidents, we have already taken preventive steps, controlling measures. Regular checking, maintenance, tests are carried out to avoid any unwanted situations taking place.

2.8 GAS DISPERSION CONCENTRATION

Using Gaussian formula, as there are more chances of ground level release, assuming small leak rate to the worst event i.e. rupture of the tank and release, its down wind concentration is calculated at wind speed 2.0 M/second and Annexure – 10 is compiled. Subsequent to this, Evacuation Table, Annexure-11 is prepared to provide a quick guide to an On Site personnel to take proper actions. Moreover, such data are stated in Risk Assessment, but it is a crude approach and may not be fully appropriate for decision making as change of wind velocity and weather conditions may cause certain variations.

2.9 RISK ASSESSMENT

Identification of hazards constitutes the first step in the task of hazard analysis, which in turn produces a basis for risk assessment.

Points 2.2 to 2.7 give us the hazard identification in the unit. Probability of frequency of such hazards will give risks and analysis, how they could occur and estimation to the extent, magnitude and likelihood of any harmful effects or consequences will give risk analysis. Fire risk shall be calculated considering the worst event which can be used as guideline at the time of an emergency.

The main objective of the Risk Assessment (QRA) is to identify the potential hazardous scenarios and assess the impact of major accident hazards from the liquid terminal as well as from the tanker loading and ship unloading facilities on the Mundra port and property within and outside the battery limit of the facilities. The study was initiated by Mundra Port SEZ Pvt. Ltd to evaluate the potential hazardous situation in the liquid terminal, its consequences and impact over onsite and offsite areas, to investigate and determine the overall risks to health and safety arising from any possible major interactions between existing or proposed installation in the area, where the significant quantities of dangerous substances are stored, handled, and transported including the loading and unloading of such substance to and from vessels, to assess the risks. The Canvey reports were the first significant contribution to industrial port environment QRAs, and they are still relevant today however, it is an attempt at standardizing the process of risk assessment of navigation and unloading operations for a generic port terminal. The focus of entire study was on accidents where a serious loss of containment could result in production of large cloud of flammable or toxic substances. The general method adopted is described as follows: (Courtesy: **The QRA Report data taken from CHILWORTH Global**)

- To identify potentially hazardous materials and establish maximum total inventories and location. This information was gathered through conducting visits to each of the installation involved and holding discussions with site personnel
- To consider the behaviour of the dangerous substances on release, on the basis of information on material properties and process/ storage conditions
- To identify ways in which serious losses of containment could occur, presenting a hazard to the local population
- To assess the level of risk and the probable impact to the surroundings for certain port areas
- To assess the probability and consequences of selected failure events Liquid terminal and jetty areas are required to produce a contingency plan for accidental marine hydrocarbon pollution, including a study of the effects of possible spills and of their evolution.

The QRA results are immense use in developing onsite offsite emergency plan. The study covers liquid terminals, pump house and loading bays. Accidents occurring during the (external) approach of the tankers to the port were not taken into account. Possible sabotage-related scenarios and accidents likely to occur during tanker maintenance operations were excluded from the analysis. Hazardous flammable chemicals, liquid hydrocarbons were considered for the study. Moreover, only bulk transportation and handlings are included within the scope of the study in Mundra port huge quantities of dangerous chemicals are handled and kept for intermediate temporary storage in liquid terminals for further transport. By its nature, in which dangerous chemicals are handled (storage/transportation) carries the probability of an accident and gives rise to the laying out of different accident scenarios. The industrial and commercial activities in the Mundra port area heavily pollute the environment. Some chemicals are present for years in these sites, due to enterprising problems. In general, many incidents have occurred in various chemical storage facilities during the past few years with considerable consequences to neighbouring populations. The study team identified 49 numbers of Maximum Credible Loss Scenarios (MCLS), DNV- PHASTRISK software has been used for estimating the potential impact to surrounding environment. The types of accident that may take place in the Mundra port are: fire, explosion, release and dispersion of toxic gases/vapours or a combination of these. The thermal/toxic compound doses were first computed. The types of damage investigated were burns of various degrees, acute poisoning, or even death. The types of accident considered in the scenarios of this study are analysed below

Jet fire:

When pressurized flammable liquids are released from storage tanks or pipelines, the materials discharging through the hole will form a gas jet that entrains and mixes with the ambient air. If the material encounters an ignition sources while it is in the flammable range, a jet fire may occur

Pool fire

The continuous release of a flammable liquid usually results in a pool fire. When the liquid is spilled in a confined space, the pool size is also confined and the amount of air that sustains the fire is limited, because the ventilation is controlled by the vent ducts In this case the type of the fire is characterized as 'confined'. When the liquid is spilled in an open area, it covers a large surface area and the amount of air is unlimited.

UCVE

Then the fire is referred to as 'unconfined' Unconfined Vapor Cloud Explosion (UVCE) This type of explosion takes place when a sufficient amount of flammable material (gas or liquid having high vapor pressure) is released and mixed with air to form a flammable cloud, such that the average concentration of the compound in the cloud is higher than the lower limit of explosion. The explosion occurs in an open space and the resulting overpressure affects humans and buildings through a blast wave covering large distances.

BLEVE

BLEVE (Boiling Liquid Expanding Vapor Explosion) is a phenomenon resulting from the failure of a vessel containing a liquid at a temperature significantly above its boiling point at normal atmospheric pressure. The main hazard posed by BLEVE of a container filled with a flammable volatile liquid is a fireball and the resulting radiation, due to instantaneous ignition of the flammable vapor cloud. Release and dispersion of toxic gases and vapours During the combustion of a flammable material a lot of chemical compounds are produced and travel large distances downwind, forming a combustion gas cloud. Some of them (CO, NOx) are toxic and even fatal to humans at sufficiently high doses. In this way the particles are carried away by these gases traveling some distance into the heavy gas cloud and affect inhabitants before they meet the ground

Consequence Analysis Results Summary

In general, it was observed that effect of catastrophic rupture of storage tank in enclosures extends beyond the tolerable range. It is also observed that in these enclosures, only full bore rupture of the pipe lines and catastrophic rupture of the storage tanks are of main concern for high risk. For the catastrophic failure of the storage tank, one of the main causes is escalation of minor events.

Jet fire: Jet fires can arise from gas, two-phase, or liquid releases. The worst-case jet fires are likely to be from the pump house and mainly from the maximum credible accident scenarios in the critical pipeline failure in pump house and tanker loading bays. The following jet fire results obtained from the DNV PHAST software are presented below:

Naphtha transfer pump discharge line rupture scenario which results into jet fire flame radiation intensity of 37.5 kW/m² to the distance of 127 meter impinges directly to the adjacent pumps in the pump house and associated pipelines carrying hydrocarbons to the loading bays

ON SITE EMERGENCY PLAN (Port Area)

Vinyl Acetate Monomer discharge line rupture scenario, which results into jet fire flame radiation intensity of 37.5 kW/m² to the distance of 75 meters, impinges directly to pipelines carrying to the loading bays

Gasoil pump discharge line rupture scenario, which results into jet fire flame radiation intensity of 37.5 kW/m² to the distance of 41 meters, impinges directly to pipelines carrying to the loading bays

Pool fire: Pool fires can arise from any site that handles liquid hydrocarbons. The worst case is likely to be in the tank farm. Mostly tank farm pool fire is contained within the tank bund itself. Oil spills on ground from the pipelines handling hydrocarbons may result into pool fire and may affect adjacent equipment resulting into domino effects (BLEVE).

Scenario No	MCLS	Radiation intensity kW/m ²	Distance, m
1	Catastrophic rupture of Naphtha storage tank T-01 (2944 kl)	12.5	214
10	Catastrophic rupture of storage tank P-Xylene T-39 (1460 kl)	37.5	408
13	Catastrophic rupture of Vinyl Acetate Monomer VAM storage tank T-24 (1458 kl)	37.5	285
16	Catastrophic rupture of methanol storage tank T-119 (5000 kl)	37.5	303
19	Catastrophic rupture of storage tank P-Xylene T-115 (5000 kl)	37.5	226
31	Loss of containment from P-Xylene tanker 30 MT	37.5	126
40	Loss of containment from P- Xylene tanker 20 MT	37.5	117
47	P-Xylene pump P-39 discharge line full bore rupture	37.5	117

Failure Events	Leak Scenarios	Weather	Pool Diameter (m)	Pool Fire		
				Distance downwind (4 kW/m ²) [m]	Distance downwind (12.5 kW/m ²) [m]	Distance downwind (37.5 kW/m ²) [m]
Failure - Tank T-08 : Styrene Storage Tank	7 mm	3/F	9.15	32.35	21.52	10.00
		10/D	8.99	34.13	25.11	11.11
	25 mm	3/F	32.75	57.72	27.99	22.41
		10/D	32.22	64.44	27.50	23.01
	FBR	3/F	100.00	128.13	65.08	56.97
		10/D	98.53	145.90	64.91	57.27

ON SITE EMERGENCY PLAN (Port Area)

Failure Events	Leak Scenarios	Weather	Pool Diameter (m)	Pool Fire		
				Distance downwind (4 kW/m ²) [m]	Distance downwind (12.5 kW/m ²) [m]	Distance downwind (37.5 kW/m ²) [m]
Failure – P-16 : Styrene transfer pump	7 mm	3/F	10.86	35.61	23.27	10.92
		10/D	10.66	37.96	27.97	12.27
	25 mm	3/F	38.88	65.16	32.37	26.86
		10/D	38.24	73.32	31.71	27.47
	FBR	3/F	79.09	108.75	56.16	48.19
		10/D	77.91	123.65	55.07	48.66

Vapor cloud explosion:

In general, catastrophic gas explosions happen when considerable quantities of flammable material are released and dispersed with air to form an explosive vapor cloud before ignition takes place. A vapor cloud explosion (VCE) occurs if a cloud of flammable gas burns sufficiently quickly to generate high overpressures. The following vapor cloud explosion results obtained from the DNV PHAST software are presented below:

Catastrophic failure of Naphtha storage tank T-01 is a worst case scenario, which results into dispersion of naphtha (flammable mixture) in the atmosphere; it may generate overpressure (0.2608 bar) to the distance of 1235 meter and affecting the adjacent storage tanks as well as to the nearby enclosures

The following vapor cloud explosion results obtained from the DNV PHAST software in which overpressure blast waves affecting the adjacent storage tanks, as well as major impact to adjacent enclosures.

Scenario No	MCLS	Overpressure (bar)	Distance, m
7	Catastrophic rupture of methanol storage tank T-32 (1000 kl)	0.2068	124
10	Catastrophic rupture of storage tank P-Xylene T-39 (1460 kl)	0.2068	121
13	Catastrophic rupture of Vinyl Acetate Monomer VAM storage tank T-24 (1458 kl)	0.2068	433
16	Catastrophic rupture of methanol storage tank T-119 (5000 kl)	0.2068	257
19	Catastrophic rupture of storage tank P-Xylene T-115 (5000 kl)	0.2068	226
22	Catastrophic rupture of Toluene storage tank T-122 (3000 kl)	0.2068	465
31	Loss of containment from Naphtha tanker 30 MT	0.2068	147
37	Loss of containment from Naphtha tanker 20 MT	0.2068	126

46	Naphtha pump P- 01 discharge line full bore rupture	0.2068	257
48	Toluene pump P-122 discharge line full bore rupture	0.2068	93
49	VAM pump P-24 discharge line full bore rupture	0.2068	110

Toxic Gas Release:

In case of release of toxic gas, when a gas that is heavier than air is released, it initially behaves very differently from a neutrally buoyant gas. The heavy gas will first "slump," or sink, because it is heavier than the surrounding air. As the gas cloud moves downwind, gravity makes it spread; this can cause some of the vapor to travel upwind of its release point. Farther downwind, as the cloud becomes more diluted and its density approaches that of air, it begins behaving like a neutrally buoyant gas. This takes place when the concentration of heavy gas in the surrounding air drops below about 1 percent (10,000 parts per million). For many small releases, this will occur in the first few yards (meters). For large releases, this may happen much further downwind. A gas that has a molecular weight greater than that of air will form a heavy gas cloud if enough gas is released. Gases that are lighter than air at room temperature, but that are stored in a cryogenic (low temperature) state, can also form heavy gas clouds. Many substances that are gases under normal pressures and temperatures are stored under pressures high enough to liquefy them. When a tank ruptures or a broken valve causes a sudden pressure loss in a tank of liquefied gas, the liquid boils violently and the tank contents foam up, filling the tank with a mixture of gas and fine liquid droplets (called aerosol). Flash boiling is the term for that sudden vaporization of a liquid caused by a loss of pressure. When the liquid and gas phases of a chemical escape together from a ruptured tank, the release is called a two-phase flow. When a two-phase mixture escapes from storage, the release rate can be significantly greater than that for a release of pure gas. The two-phase mixture that escapes into the atmosphere may behave like a heavy gas cloud. The cloud is heavy in part because it is initially cold, and therefore denser than it would be at ambient temperatures, and also because it consists of a two-phase mixture. The tiny aerosol droplets mixed into the cloud act to weigh the cloud down and make it denser than a pure gas cloud, and their evaporation cools the cloud. Toxic materials that become airborne are carried by the wind and transported away from the spill site. While being transported downwind, the airborne chemical(s) mix with air and disperse. Gases and two-phase liquid-vapor mixtures are divided into three general classes:

- Positively buoyant
- Neutrally buoyant
- Negatively buoyant.

These classifications are based on the density difference between the released material and its surrounding medium (air). The classifications are influenced by release temperature, molecular weight, presence of aerosols, ambient temperature at release, and relative humidity.

Ignition Sources:

In order for a fire or explosion to start there must be an ignition source of sufficient heat intensity to cause an ignition. Ignition causes a release of flammable liquid or gas to become a fire (jet fire, flash fire, pool fire etc.) or explosion. There are many possible sources of ignition and those that are most likely will depend on the release scenario. Sources of ignition include electrical sparks, static electricity, naked flames, hot surfaces, impact, friction, etc. The following Ignition sources identified in a QRA under several categories including: **Hot Surfaces**- unlagged surfaces on hot equipment can act as sources of ignition; **Current Electricity**- electrical equipment and cables can act as sources of ignition if sparks are generated at contact points or where wires overheat; e.g. electrical equipment sparking **Static Electricity** - static electricity can build up on any unearthed equipment and generate sparks. Static is commonly found on vehicles, vessels handling particulate solids and manned areas with nonconductive floor or footwear unearthed floors; e.g. electrostatic discharges **Naked Flames** - all naked flames (including cigarettes) are potential sources Configuration; this category also includes welding, flame-cutting and other hot work, fired furnaces and flares; e.g. Open flame heaters (boilers and flame heaters) **Friction** - equipment with moving parts in contact can generate heat through friction if not properly lubricated. This includes all rotating equipment and cold cutting devices such as drills, lathes and saws; Mechanical sparking **Impact** - impact between hard surfaces, particularly metal-to-metal contact, can generate sparks. This includes lifted objects lowered to a metal floor too quickly and the use of hand tools such as hammers; and **Chemical ignition**- some chemicals can spontaneously ignite if exposed to air, while oxidizing agents such as oxygen gas and peroxides can cause flammable materials to ignite at ambient temperatures.

Meteorology:

Atmospheric stability plays an important role in the dispersion of chemicals. Stability means, its ability to suppress existing turbulence or to resist vertical motion". Variations in thermal and mechanical turbulence and in wind speed are greatest in the atmospheric layer in contact with the surface. These turbulences have been influenced greatly by the air temperature and air temperature decreases with the height. The rate at which the temperature of air decreases with height is called Environment Lapse Rate (ELR). It will vary from time to time and from place to place. The atmosphere is said to be stable, neutral or unstable according to ELR less than, equal to or greater than Dry Adiabatic Lapse Rate (DALR), which is a constant value of 0.98° C per 100 meters.

Pasquill Stability Classes :

Pasquill has defined 6 stability classes.

- A Extremely unstable.
- B Moderately unstable
- C Slightly unstable.
- D Neutral
- E Slightly stable.
- F Moderately stable.

Three prime factors that defines Stability

1. Solar radiation
2. Night-time sky over
3. Surface wind

When the atmosphere is unstable and wind speeds are moderate or high or gusty, rapid dispersion of vapors will occur. Under these conditions, air concentrations will be moderate or low and the material will be dispersed rapidly. When the atmosphere is stable and wind speed is low, dispersion of material will be limited and air concentration will be high. Six stability classes from A-F are defined while wind speed can take any one of numerous values.

Results for Different Weather Conditions:

For the flammable and toxic releases which reaches off-site of the plant, calculations iterated with different weather conditions, since wind speed and stability have a great effect on cloud dispersion. Stable weather gives the greatest effect distances considered for the most stable weather conditions that occur at the site, as well as the most common weather conditions. The key meteorological data required for consequence modeling are wind and temperature. The wind speed and stability define the dispersion of a material, whilst the temperature defines the evaporation rate. The data utilized here for the base case QRA model were a temperature of 35°C.

Ambient temperature:

Maximum	Normal/average	Minimum
43 deg C	28 deg C / 30 deg C	17 deg C

Relative humidity%: 65% to 90%

CLIMATOLOGICAL TABLE:

S.No	Month	Maximum wind speed (kmph)	Average wind speed
1.	January	18	3
2.	February	20	5
3.	March	24	6
4.	April	22	7
5.	May	20	1
6.	June	24	1
7.	July	18	8
8.	August	67	7
9.	September	17	5
10.	October	18	3
11.	November	13	2
12.	December	18	2

These wind speed and stability class are used in consequence modelling:

Stability class	F	D	C/D	C/D
Wind speed m/s	2	3	5	9

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Hazard Distances- Flash Fire						Explosion Results					
		Concentration		Distance in meters			Over pressure in bar	Distance in meters					
		UFL	LFL	2F	3 D	5 C/D		2F	3D	5 C/D			
1.	Catastrophic rupture of Naphtha storage tank T-01 (2944 kl)	UFL	LFL	264	223	189	0.02068	2380	2004	1803			
		LFL		757	617	549	0.1379	1312	1045	896			
		LFL-50%		1001	837	785	0.2068	1235	980	844			
2.	Major leak (25 mm) in Naphtha storage tank T-01 (2944 kl)	UFL	LFL	8.48	8.38	8.07	0.02068	182	156	134			
		LFL		57.79	50.84	40.7	0.1379	99	92	79			
		LFL-50%		75	71	60	0.2068	92	87	74			
3.	Minor leak (10 mm) in Naphtha storage tank T-01 (2944 kl)	UFL	LFL	4.57	4.34	3.62	0.02068	73	63	46			
		LFL		28	21	12	0.1379	41	38	26			
		LFL-50%		39	33	26	0.2068	38	36	25			
4.	Catastrophic rupture of Acetic acid storage tank T-40 (2960 kl)	UFL	LFL	6.88	6.88	6.88	0.02068	NH	NH	NH			
		LFL		6.9	6.9	7.57	0.1379	NH	NH	NH			
		LFL-50%		15.6	15.7	18.2	0.2068	NH	NH	NH			
5.	Major leak (25 mm) in Acetic acid storage tank T-40 (2960 kl)	UFL	LFL	5.46	5.45	5.39	0.02068	-	-	-			
		LFL		5.53	5.53	5.52	0.1379	-	-	-			
		LFL-50%		5.55	5.56	5.55	0.2068	-	-	-			

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Hazard Distances- Flash Fire					Explosion Results				
		Concentration	Distance in meters			Over pressure in bar	Distance in meters				
			2F	3 D	5 C/D		2F	3D	5 C/D		
6.	Minor leak (10 mm) in acetic acid storage tank T-40 (2960 kl)	UFL	3.43	3.27	3.03	0.02068	-	-	-	-	-
		LFL	4.10	4.06	3.96	0.1379	-	-	-	-	-
		LFL-50%	4.27	4.26	4.22	0.2068	-	-	-	-	-
7.	Catastrophic rupture of methanol storage tank T-32 (1000 kl)	UFL	28	28	30	0.02068	459	448	453	453	453
		LFL	44	36	47	0.1379	148	140	146	146	146
		LFL-50%	130	62	90	0.2068	124	117	122	122	122
8.	Major leak (25 mm) in methanol storage tank T-32 (1000 kl)	UFL	0.24	0.23	0.28	0.02068	-	-	36	-	-
		LFL	3.46	3.18	3.03	0.1379	-	-	16	-	-
		LFL-50%	9.85	10.16	7.88	0.2068	-	-	15	-	-
9.	Minor leak (10 mm) in methanol storage tank T-32 (1000 kl)	UFL	0.13	0.09	0.11	0.02068	-	-	-	-	-
		LFL	1.38	1.27	1.25	0.1379	-	-	-	-	-
		LFL-50%	3.27	3.38	2.83	0.2068	-	-	-	-	-
10.	Catastrophic rupture of storage tank P-Xylene T-39 (1460 kl)	UFL	29	29	31	0.02068	272	268	263	263	263
		LFL	52	49	48	0.1379	130	118	112	112	112
		LFL-50%	118	110	113	0.2068	121	111	106	106	106
11.	Major leak(25 mm) in P-Xylene storage tank T-39 (1460kl)	UFL	4.91	4.95	4.86	0.02068	-	-	-	-	-
		LFL	4.94	5.04	4.93	0.1379	-	-	-	-	-

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Hazard Distances- Flash Fire					Explosion Results				
		Concentration	Distance in meters			Over pressure in bar	Distance in meters				
			2F	3D	5 C/D		2F	3D	5 C/D		
		LFL-50%	5.21	5.05	4.94	0.2068	-	-	-	-	-
12.	Minor leak (10 mm) in P-xylene storage tank T-39 (1460 kJ)	UFL	3.35	3.39	3.08	0.02068	-	-	-	-	-
		LFL	3.51	3.97	4.04	0.1379	-	-	-	-	-
		LFL-50%	3.53	4.02	4.09	0.2068	-	-	-	-	-
13.	Catastrophic rupture of Vinyl Acetate Monomer VAM storage tank T-24 (1458 kJ)	UFL	33	33	36	0.02068	898	828	802	802	802
		LFL	240	212	195	0.1379	463	400	364	364	364
		LFL-50%	347	307	295	0.2068	433	372	337	337	337
14.	Major leak (25 mm) in storage tank Vinyl Acetate Monomer VAM T-24(1458 kJ)	UFL	4.77	4.68	4.71	0.02068	32	21	23	23	23
		LFL	9.23	7.45	5.53	0.1379	23	13	13	13	13
		LFL-50%	23.8	19.5	15.03	0.2068	22	12	12	12	12
15.	Minor leak (10 mm) in storage tank Vinyl Acetate Monomer (VAM) T-24 (1458 kJ)	UFL	3.11	2.92	2.69	0.02068	-	-	-	-	-
		LFL	4.29	3.94	4.21	0.1379	-	-	-	-	-
		LFL-50%	11.8	6.91	4.67	0.2068	-	-	-	-	-
16.	Catastrophic rupture of methanol storage tank T-119 (5000 kJ)	UFL	80	75	88	0.02068	857	857	937	937	937
		LFL	83	78	97	0.1379	290	284	309	309	309
		LFL-50%	153	145	261	0.2068	247	240	259	259	259

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Hazard Distances- Flash Fire					Explosion Results							
		Concentration		Distance in meters			Over pressure in bar	Distance in meters						
		UFL	LFL	2F	3D	5 C/D		2F	3D	5 C/D				
17.	Major leak (25 mm) in methanol storage tank T-119 (5000 kl)	UFL	LFL	2F	3D	5 C/D	0.02068	0.1379	0.2068	-	-	-	-	-
18.	Minor leak (10 mm) in Methanol storage tank T-119 (5000 kl)	UFL	LFL	2F	3D	5 C/D	0.02068	0.1379	0.2068	-	-	-	-	-
19.	Catastrophic rupture of storage tank P-Xylene T-115 (5000 kl)	UFL	LFL	2F	3D	5 C/D	0.02068	0.1379	0.2068	531	521	575	231	226
20.	Major leak (25 mm) in P-xylene storage tank T-115 (5000 kl)	UFL	LFL	2F	3D	5 C/D	0.02068	0.1379	0.2068	-	-	-	-	-
21.	Minor leak (10 mm) in P-Xylene storage tank T-115 (5000 kl)	UFL	LFL	2F	3D	5 C/D	0.02068	0.1379	0.2068	-	-	-	-	-
22.	Catastrophic rupture of Toluene storage tank T-122 (3000 kl)	UFL	LFL	2F	3D	5 C/D	0.02068	0.1379	0.2068	929	855	819	425	387

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
		LFL-50%	388	355	346	0.2068	465	388	362
23.	Major leak (25 mm) in toluene storage tank T-122 (3000 kl)	UFL	5.38	5.35	5.30	0.02068	17.5	17.4	17.7
		LFL	6.68	6.13	5.60	0.1379	11.9	11.9	12.0
		LFL-50%	15.9	13.3	10.1	0.2068	11.51	11.48	11.55
24.	Minor leak (10 mm) in toluene storage tank T-122 (3000 kl)	UFL	3.8	4.2	3.8	0.02068	-	-	-
		LFL	4.4	4.8	5.04	0.1379	-	-	-
		LFL-50%	7.54	5.73	5.09	0.2068	-	-	-
25.	Catastrophic rupture of gasoil storage tank T-101 (15040 kl)	UFL	55	48	47	0.02068	980	965	990
		LFL	110	106	116	0.1379	480	484	490
		LFL-50%	180	178	192	0.2068	185	192	196
26.	Major leak (25 mm) in gasoil storage tank T-101 (15040 kl)	UFL	5.8	5.8	5.8	0.02068	31	31	22
		LFL	8.7	7.5	6.1	0.1379	22	22	13
		LFL-50%	25.5	23.2	17.2	0.2068	22	22	12
27.	Minor leak (10 mm) in gasoil storage tank T-101 (15040 kl)	UFL	3.54	3.38	3.12	0.02068	-	-	-
		LFL	4.3	4.35	4.76	0.1379	-	-	-
		LFL-50%	4.4	4.42	4.81	0.2068	-	-	-

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Hazard Distances-Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
28.	Catastrophic rupture of motor spirit storage tank T-01 (2944 kl)	UFL	245	232	198	0.02068	1630	1960	1642
		LFL	780	712	708	0.1379	1421	1034	900
		LFL-50%	980	825	812	0.2068	1123	1025	985
29.	Major leak (25 mm) in motor spirit storage tank T-01 (2944 kl)	UFL	8.56	9.12	9.01	0.02068	210	195	165
		LFL	63	58	42	0.1379	184	162	114
		LFL-50%	95	92	90	0.2068	94	83	62
30.	Minor leak (10 mm) in motor spirit storage tank T-01 (2944 kl)	UFL	5.23	5.12	4.98	0.02068	150	148	132
		LFL	38	41	34	0.1379	60	51	38
		LFL-50%	28	24	20	0.2068	38	30	24
31.	Loss of containment from Naphtha tanker 30 MT	UFL	31	28	25	0.02068	363	344	335
		LFL	82	83	86	0.1379	161	152	147
		LFL-50%	101	111	121	0.2068	147	140	136
32.	Loss of containment from Acetic acid tanker 30MT	UFL	4.65	4.71	4.88	0.02068	-	-	-
		LFL	4.69	4.76	4.92	0.1379	-	-	-
		LFL-50%	4.71	4.77	4.94	0.2068	-	-	-
33.	Loss of containment from methanol tanker 30MT	UFL	4.52	4.57	4.74	0.02068	93	90	88
		LFL	55.5	53.3	55.9	0.1379	81	65	74

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
		LFL-50%	190	134	159	0.2068	81	64	73
34.	Loss of containment from P-Xylene tanker 30 MT	UFL	3.54	3.59	3.71	0.02068	122	40	NH
		LFL	76	22	3.75	0.1379	96	32	NH
		LFL-50%	131	54	58	0.2068	94	32	NH
35.	Loss of containment from toluene tanker 30 MT	UFL	3.30	3.34	3.46	0.02068	1029	46	76
		LFL	28	29	27	0.1379	56	47	43
		LFL-50%	42	46	52	0.2068	52	46	42
36.	Loss of containment from VAM tanker 30 MT	UFL	4.11	4.16	4.3	0.02068	150	127	121
		LFL	33	32	29	0.1379	68	59	54
		LFL-50%	50	51	51	0.2068	62	55	51
37.	Loss of containment from Naphtha tanker 20 MT	UFL	26	24	22	0.02068	315	301	292
		LFL	70	72	74	0.1379	139	132	127
		LFL-50%	87	97	108	0.2068	126	120	117
38.	Loss of containment from acetic acid tanker 20 MT	UFL	3.99	4.04	4.17	0.02068	-	-	-
		LFL	4.02	4.08	4.20	0.1379	-	-	-
		LFL-50%	4.04	4.09	4.22	0.2068	-	-	-

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
39.	Loss of containment from methanol tanker 20 MT	UFL	3.87	3.92	4.05	0.02068	79	83	84
		LFL	48.9	54	54	0.1379	64	65	73
		LFL-50%	161	166	128	0.2068	63	64	72
40.	Loss of containment from P- Xylene tanker 20 MT	UFL	3.03	3.07	3.16	0.02068	87	NH	NH
		LFL	58	3.10	14.02	0.1379	74	NH	NH
		LFL-50%	110	45	48	0.2068	73	NH	NH
41.	Loss of containment from Toluene tanker 20 MT	UFL	2.82	2.85	2.94	0.02068	91	72	65
		LFL	23	24	22	0.1379	45	40	34
		LFL-50%	37	37	46	0.2068	42	38	33
42.	Loss of containment from vinyl acetate monomer (VAM) tanker 20 MT	UFL	3.52	3.57	3.67	0.02068	133	116	104
		LFL	28	27	24	0.1379	59	52	46
		LFL-50%	43	47	44	0.2068	54	47	42
43.	Acetic acid pump P-40 discharge line full bore rupture	UFL	8.12	7.92	7.3	0.02068		15.3	15.4
		LFL	8.2	8.02	7.36	0.1379		11.3	11.4
		LFL-50%	9.83	10.0	10.2	0.2068		11.07	11.4
44.	Gasoil pump P-101 discharge line full bore rupture	UFL	9.2	8.8	9.3	0.02068	111	84	122
		LFL	36	28	40	0.1379	80	51	83

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
		LFL-50%	77	47	75	0.2068	78	49	80
45.	Methanol pump P-119 discharge line full bore rupture	UFL	9.12	10.38	10.9	0.02068	80	78	99
		LFL	24.4	24.3	29.4	0.1379	50	49	70
		LFL-50%	43.5	40.3	70.9	0.2068	48	47	67
46.	Naphtha pump P-01 discharge line full bore rupture	UFL	31	30	32	0.02068	484	480	429
		LFL	172	158	129	0.1379	238	271	237
		LFL-50%	221	214	179	0.2068	233	257	222
47.	P-Xylene pump P-39 discharge line full bore rupture	UFL	8.4	8.2	8.2	0.02068	39	62	48
		LFL	14	15	13	0.1379	25	45	34
		LFL-50%	27	45	38	0.2068	23	44	33
48.	Toluene pump P-122 discharge line full bore rupture	UFL	8.12	8.74	8.07	0.02068	118	146	134
		LFL	37	46	43	0.1379	67	97	86
		LFL-50%	58	80	73	0.2068	63	93	82
49.	VAM pump P-24 discharge line full bore rupture	UFL	8.88	8.74	9.29	0.02068	212	175	158
		LFL	70	57	50	0.1379	116	104	92
		LFL-50%	102	87	74	0.2068	110	99	87

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Pool Fire Results						Jet Fire Results					
		Radiation Levels (kW/m ²)		Distance in meters			Radiation Levels (kW/m ²)	Distance in meters					
		2F	3D	5C/D	2F	3D		5C/D					
1.	Catastrophic rupture of Naphtha storage tank T-01 (2944 kl)	4	289	290	296	4	-	-	-	-	-	-	-
		12.5	211	209	214	12.5	-	-	-	-	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-	-	-	-	-
2.	Major leak (25 mm) in Naphtha storage tank T-01 (2944 kl)	4	29	29	29	4	65	62	59	12.5	49	46	43
		37.5	NR	NR	NR	37.5	40	37	34	37.5	40	37	34
3.	Minor leak (10 mm) in Naphtha storage tank T-01 (2944 kl)	4	20.6	20.6	20.9	4	28	27	25	12.5	21	20	19
		37.5	11.4	12	13.8	37.5	17	16	15	37.5	17	16	15
4.	Catastrophic rupture of Acetic acid storage tank T-40 (2960 kl)	4	26	26	29	4	-	-	-	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-	37.5	-	-	-
5.	Major leak (25 mm) in Acetic acid storage tank T-40 (2960 kl)	4	26	27	27	4	17	17	16	12.5	14	13	13
		37.5	NR	NR	NR	37.5	NR	NR	NR	37.5	NR	NR	NR

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Pool Fire Results						Jet Fire Results					
		Radiation Levels (kW/m ²)		Distance in meters			Radiation Levels (kW/m ²)	Distance in meters					
		2F	3D	5C/D	2F	3D		5C/D					
6.	Minor leak (10 mm) in acetic acid storage tank T-40 (2960 k)	4	22	22	22	4	-	-	-	-	-	-	
		12.5	13	13	14	12.5	-	-	-	-	-	-	
		37.5	NR	NR	NR	37.5	-	-	-	-	-	-	
7.	Catastrophic rupture of methanol storage tank T-32 (1000 k)	4	30	30	32	4	-	-	-	-	-	-	
		12.5	20	21	25	12.5	-	-	-	-	-	-	
		37.5	NR	NR	NR	37.5	-	-	-	-	-	-	
8.	Major leak (25 mm) in methanol storage tank T-32 (1000 k)	4	55	59	68	4	29	34	36	12.5	6.89	19.5	
		12.5	40	46	57	12.5	NR	NR	NR	NR	NR	NR	
		37.5	29	34	45	37.5	-	-	-	-	-	-	
9.	Minor leak (10 mm) in methanol storage tank T-32 (1000 k)	4	20	23	25	4	4.69	8.90	9.66	12.5	NR	NR	
		12.5	14	18	20	12.5	NR	NR	NR	NR	NR	NR	
		37.5	NR	NR	NR	37.5	NR	NR	NR	NR	NR	NR	
10.	Catastrophic rupture of storage tank P-Xylene T-39 (1460 k)	4	943	948	951	4	-	-	-	12.5	-	-	
		12.5	593	599	609	12.5	-	-	-	37.5	-	-	
		37.5	377	390	408	37.5	-	-	-	-	-	-	

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Pool Fire Results			Jet Fire Results				
		Radiation Levels (kW/m ²)	Distance in meters		Radiation Levels (kW/m ²)	Distance in meters			
			2F	3D	5C/D	2F	3D	5C/D	
11.	Major leak(25 mm) in P-Xylene storage tank T-39 (1460kl)	4	55	56	56	4	17	16	16
		12.5	36	37	38	12.5	13	13	12
		37.5	22	24	26	37.5	11	10	10
12.	Minor leak (10 mm) in P-xylene storage tank T-39 (1460 kl)	4	54	55	55	4	8.78	8.52	8.17
		12.5	35	36	37	12.5	6.74	6.46	6.12
		37.5	20	23	25	37.5	6.23	5.82	4.54
13.	Catastrophic rupture of Vinyl Acetate Monomer VAM storage tank T-24 (1458 kl)	4	637	639	646	4	-	-	-
		12.5	406	414	424	12.5	-	-	-
		37.5	250	263	285	37.5	-	-	-
14.	Major leak (25 mm) in storage tank Vinyl Acetate Monomer VAM T-24(1458 kl)	4	33	33	34	4	33	32	30
		12.5	22	23	24	12.5	26	25	24
		37.5	10	11	11	37.5	21	20	19
15.	Minor leak (10 mm) in storage tank Vinyl Acetate Monomer (VAM) T-24 (1458 kl)	4	31	32	33	4	16	15	14
		12.5	20	22	24	12.5	13	12	11
		37.5	9.8	10.1	11	37.5	NR	NR	NR
16.	Catastrophic rupture of methanol storage tank T-	4	602	598	610	4	-	-	-

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results				
		Radiation Levels (kW/m ²)		Distance in meters		Radiation Levels (kW/m ²)		Distance in meters		
		2F	3D	5C/D	2F	3D	5C/D	2F	3D	5C/D
	119 (5000 kl)	12.5	426	429	447	12.5	-	-	-	-
		37.5	295	289	303	37.5	-	-	-	-
		4	29	30	30	4	36	34	32	
17.	Major leak (25 mm) in methanol storage tank T-119 (5000 kl)	12.5	21	22	23	12.5	28	27	26	
		37.5	NR	NR	NR	37.5	NR	NR	NR	NR
		4	25	25	26	4	17	16.5	15.4	
18.	Minor leak (10 mm) in Methanol storage tank T-119 (5000 kl)	12.5	17	18	19	12.5	NR	NR	NR	
		37.5	NR	NR	NR	37.5	NR	NR	NR	NR
		4	1621	1627	1634	4	-	-	-	
19.	Catastrophic rupture of storage tank P-Xylene T-115 (5000 kl)	12.5	1028	1036	1053	12.5	-	-	-	
		37.5	666	683	711	37.5	-	-	-	
		4	21	20	20	4	58	59	59	
20.	Major leak (25 mm) in P-xylene storage tank T-115 (5000 kl)	12.5	16	16	15	12.5	39	40	41	
		37.5	13	13	12	37.5	24	26	29	
21.	Minor leak (10 mm) in P-Xylene storage tank T-	4	56	58	58	4	10.8	10.5	10.08	

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
	115 (5000 kJ)	12.5	37	38	39	12.5	8.43	8.07	7.58
		37.5	22	25	27	37.5	7.21	6.7	6.08
22.	Catastrophic rupture of Toluene storage tank T-122 (3000 kJ)	4	410	430	463	4	-	-	-
		12.5	226	225	230	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
23.	Major leak (25 mm) in toluene storage tank T-122 (3000 kJ)	4	37	37	39	4	28	27	26
		12.5	23	25	27	12.5	22	21	20
		37.5	11	11	11	37.5	19	17	16
24.	Minor leak (10 mm) in toluene storage tank T-122 (3000 kJ)	4	36	37	38	4	15	15	14
		12.5	22	24	26	12.5	12	11	10
		37.5	10	11	11	37.5	9.9	9.4	8.78
25.	Catastrophic rupture of gasoil storage tank T-101 (15040 kJ)	4	320	318	291	4	-	-	-
		12.5	230	229	220	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
26.	Major leak (25 mm) in gasoil storage tank T-101	4	44	46.5	48.2	4	24	23	23

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Pool Fire Results					Jet Fire Results					
		Radiation Levels (KW/m ²)	Distance in meters			Radiation Levels (KW/m ²)	Distance in meters					
			2F	3D	5C/D		2F	3D	5C/D			
	(3000 kl)	12.5	23	24.8	26.8	12.5	18	18	17			
		37.5	NR	NR	NR	37.5	15	14	13			
		4	36	36	38	4	11.8	11.5	11.12			
27.	Minor leak (10 mm) in gasoil storage tank T-101 (3000 kl)	12.5	22	23	26	12.5	9.16	8.8	8.32			
		37.5	12	12	12	37.5	7.4	7	6.5			
		4	295	291	289	4	-	-	-			
28.	Catastrophic rupture of motor spirit storage tank T-01 (2944 kl)	12.5	204	201	215	12.5	-	-	-			
		37.5	NR	NR	NR	37.5	-	-	-			
		4	31	34	30	4	72	68	61			
29.	Major leak (25 mm) in motor spirit storage tank T-01 (2944 kl)	12.5	26	24	23	12.5	48	43	48			
		37.5	NR	NR	NR	37.5	38	37	31			
		4	24	22	19	4	41	43	38			
30.	Minor leak (10 mm) in motor spirit storage tank T-01 (2944 kl)	12.5	18	13	17	12.5	28	26	21			
		37.5	NR	NR	NR	37.5	17	19	21			
31.	Loss of containment from Naphtha tanker 30 MT	4	20	21	21	4	-	-	-			

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters		
2F	3D		5C/D	2F	3D		5C/D		
		12.5	14	14	15	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
		4	101	103	104	4	-	-	-
32.	Loss of containment from Acetic acid tanker 30MT	12.5	64	67	72	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
		4	123	123	124	4	-	-	-
33.	Loss of containment from methanol tanker 30MT	12.5	81	84	87	12.5	-	-	-
		37.5	49	49	49	37.5	-	-	-
		4	330	332	331	4	-	-	-
34.	Loss of containment from P-Xylene tanker 30 MT	12.5	204	207	212	12.5	-	-	-
		37.5	126	133	141	37.5	-	-	-
		4	112	120	130	4	-	-	-
35.	Loss of containment from toluene tanker 30 MT	12.5	47	48	50	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
36.	Loss of containment from VAM tanker 30 MT	4	213	215	217	4	-	-	-

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
		12.5	133	137	141	12.5	-	-	-
		37.5	74	80	89	37.5	-	-	-
		4	20	21	21	4	-	-	-
37.	Loss of containment from Naphttha tanker 20 MT	12.5	14	14.2	15.6	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
		4	84	85	87	4	-	-	-
38.	Loss of containment from acetic acid tanker 20 MT	12.5	52	56	59	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
		4	102	103	104	4	-	-	-
39.	Loss of containment from methanol tanker 20 MT	12.5	67	70	72	12.5	-	-	-
		37.5	40	40	40	37.5	-	-	-
		4	274	276	276	4	-	-	-
40.	Loss of containment from P- Xylene tanker 20 MT	12.5	170	173	177	12.5	-	-	-
		37.5	104	110	117	37.5	-	-	-
		4	95	102	111	4	-	-	-
41.	Loss of containment from Toluene tanker 20 MT								

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results				
		Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			
			2F	3D	5CID		2F	3D	5CID	
		12.5	39	40	41	12.5	-	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-	-
42.	Loss of containment from vinyl acetate monomer (NAM) tanker 20 MT	4	178	179	181	4	-	-	-	-
		12.5	111	115	118	12.5	-	-	-	-
		37.5	60	65	73	37.5	-	-	-	-
43.	Acetic acid pump P-40 discharge line full bore rupture	4	93	94	95	4	41	39	40	
		12.5	61	64	67	12.5	33	32	32	
		37.5	NR	NR	NR	37.5	NR	NR	NR	
44.	Gasoil pump P-101 discharge line full bore rupture	4	93	98	104	4	66	64	68	
		12.5	45	45	47	12.5	51	48	50	
		37.5	NR	NR	NR	37.5	41	38	40	
45.	Methanol pump P-119 discharge line full bore rupture	4	100	101	103	4	103	104	99	
		12.5	69	72	75	12.5	84	86	81	
		37.5	45	46	46	37.5	NR	NR	NR	
46.	Naphtha pump P-01 discharge line full bore	4	65	67	66	4	211	213	208	

ON SITE EMERGENCY PLAN (Port Area)

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
	rupture	12.5	43	45	46	12.5	158	158	151
		37.5	NR	NR	NR	37.5	127	125	118
47.	P-Xylene pump P-39 discharge line full bore rupture	4	263	265	264	4	49	51	47
		12.5	166	169	172	12.5	38	39	35
		37.5	105	110	117	37.5	31	32	28
48.	Toluene pump P-122 discharge line full bore rupture	4	97	105	112	4	72	77	75
		12.5	44	45	46	12.5	56	59	56
		37.5	NR	NR	NR	37.5	46	48	45
49.	VAM pump P-24 discharge line full bore rupture	4	177	179	180	4	116	112	112
		12.5	113	117	120	12.5	91	87	86
		37.5	66	70	77	37.5	75	72	71

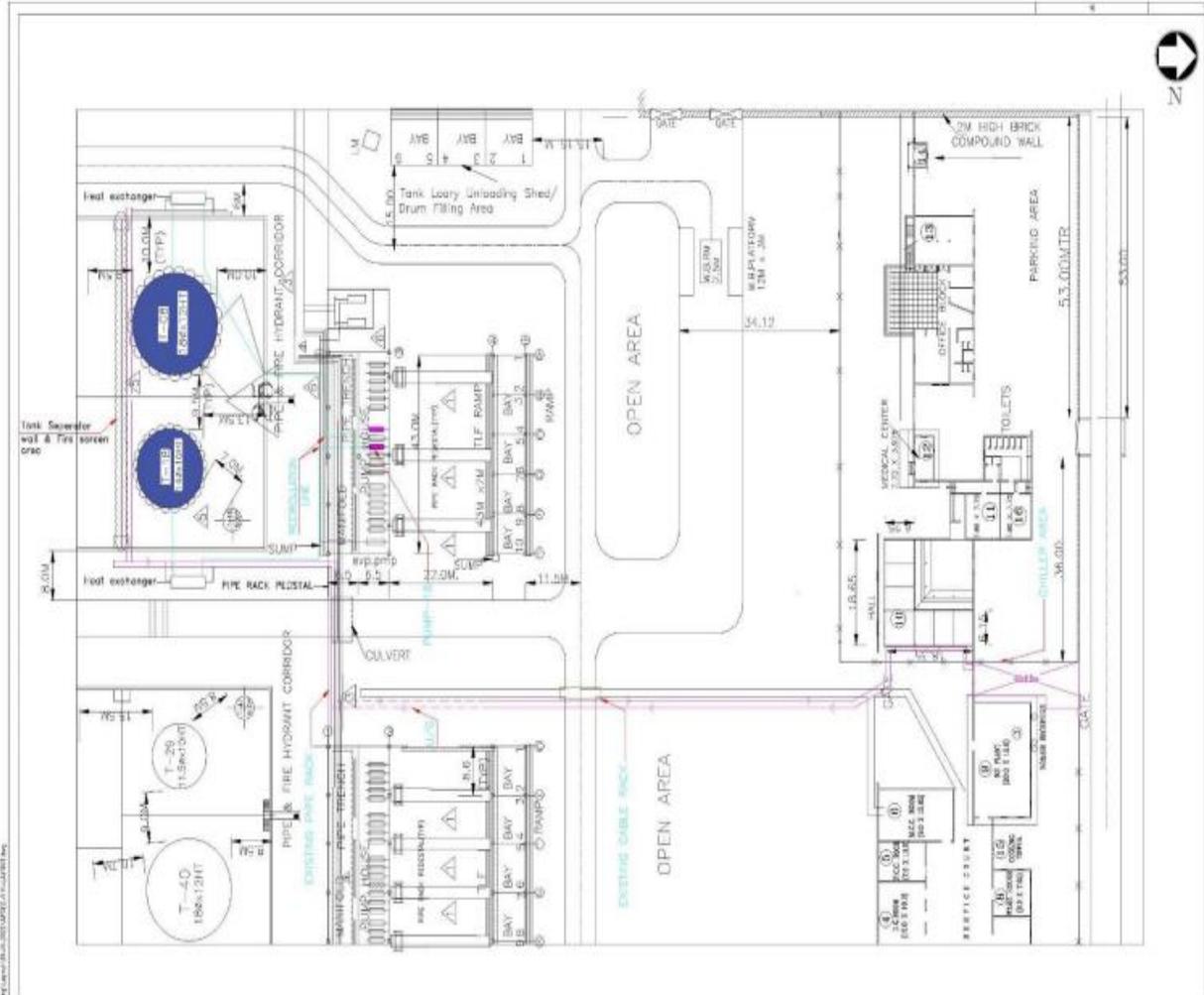
TABLE 4: CONSEQUENCE RESULTS FOR POOL FIRE AT STYRENE STORAGE AND TRANSFER PUMP AREA

Failure Events	Leak Scenarios	Weather	Pool Diameter (m)	Pool Fire		
				Distance downwind (4 kW/m ²) [m]	Distance downwind (12.5 kW/m ²) [m]	Distance downwind (37.5 kW/m ²) [m]
Failure - Tank T-08 : Styrene Storage Tank	7 mm	3/F	9.15	32.35	21.52	10.00
		10/D	8.99	34.13	25.11	11.11
	25 mm	3/F	32.75	57.72	27.99	22.41
		10/D	32.22	64.44	27.80	23.01
	FBR	3/F	100.00	128.13	66.08	56.97
		10/D	98.53	145.90	64.91	57.27
Failure - Tank T-18 : Styrene	7 mm	3/F	9.15	32.35	21.52	10.00
		10/D	8.99	34.13	25.11	11.11

Failure Events	Leak Scenarios	Weather	Pool Diameter (m)	Pool Fire		
				Distance downwind (4 kW/m ²) [m]	Distance downwind (12.5 kW/m ²) [m]	Distance downwind (37.5 kW/m ²) [m]
Storage Tank	25 mm	3/F	32.75	57.72	27.99	22.41
		10/D	32.22	64.44	27.80	23.01
	FBR	3/F	100.00	128.13	66.08	56.97
		10/D	98.53	145.90	64.91	57.27
Failure - P-08 : Styrene transfer pump	7 mm	3/F	10.86	35.61	23.27	10.92
		10/D	10.66	37.96	27.97	12.27
	25 mm	3/F	38.88	65.16	32.37	26.86
		10/D	38.24	73.32	31.71	27.47
FBR	3/F	79.09	108.75	56.16	48.19	
	10/D	77.91	123.65	55.07	48.66	

Failure Events	Leak Scenarios	Weather	Pool Diameter (m)	Pool Fire		
				Distance downwind (4 kW/m ²) [m]	Distance downwind (12.5 kW/m ²) [m]	Distance downwind (37.5 kW/m ²) [m]
Failure - P-18: Styrene transfer pump	7 mm	3/F	10.86	35.61	23.27	10.92
		10/D	10.66	37.96	27.97	12.27
	25 mm	3/F	38.88	65.16	32.37	26.86
		10/D	38.24	73.32	31.71	27.47
	FBR	3/F	79.09	108.75	56.16	48.19
		10/D	77.91	123.65	55.07	48.66

Styrene Storage Tank and Transfer Pump Facility, Mundra



Failure - Tank T-08 : Pool Fire Contour – 7 mm Leak

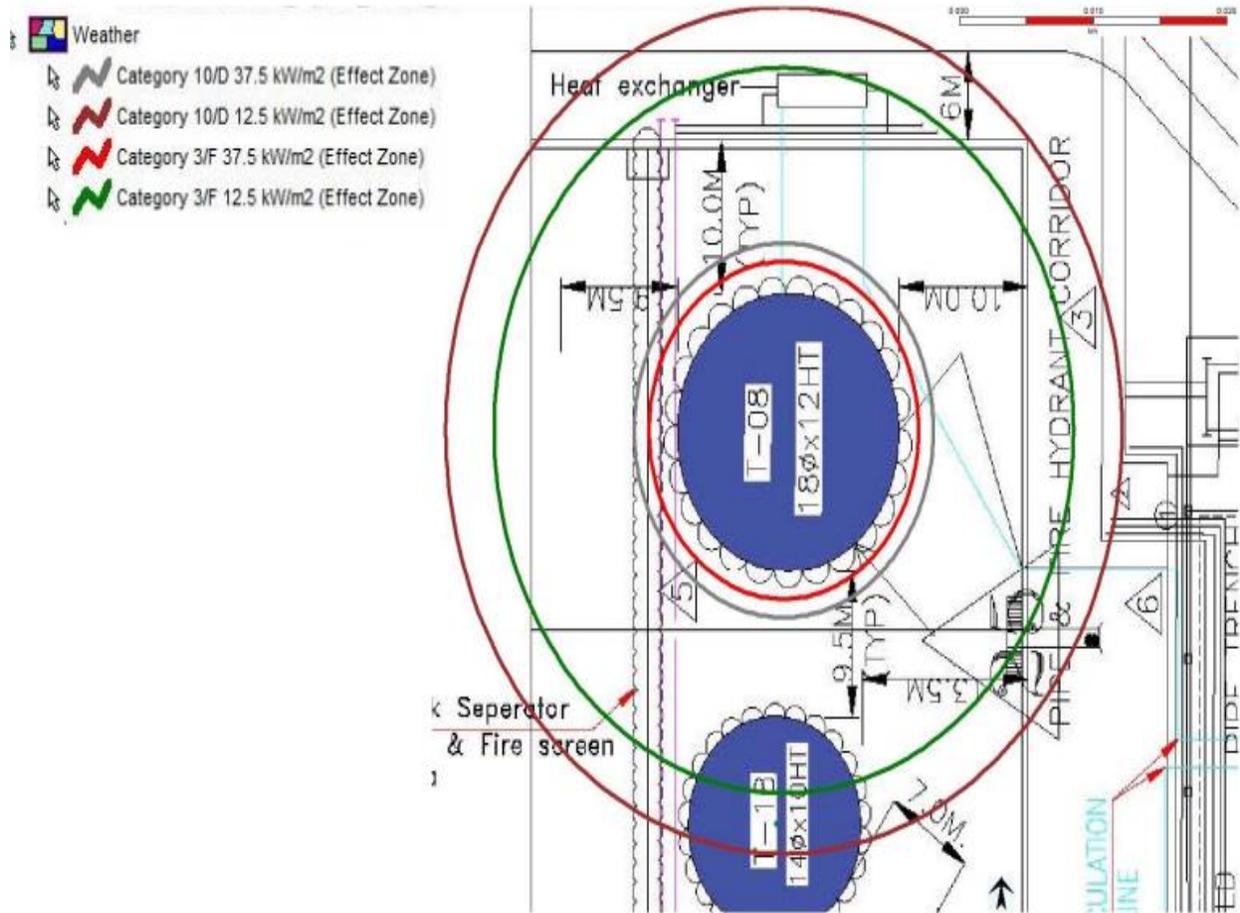


FIGURE 7: FAILURE - TANK T-08 : POOL FIRE CONTOUR – 7 MM LEAK

Failure - Tank T-18 : Pool Fire Contour – 7 mm Leak

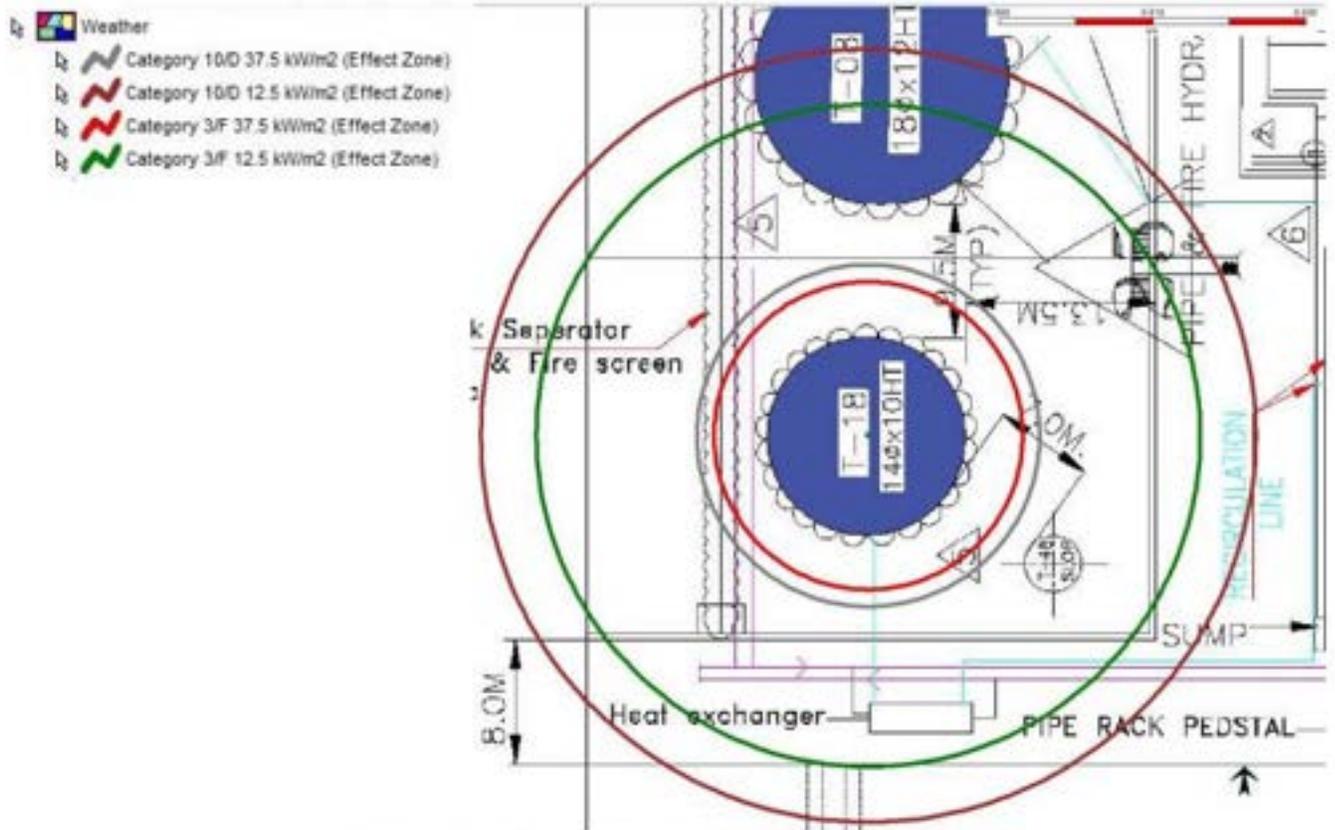


FIGURE 11: FAILURE - TANK T-18 : POOL FIRE CONTOUR – 7 MM LEAK

Failure - Tank T-18 : Pool Fire Contour – 25 mm Leak

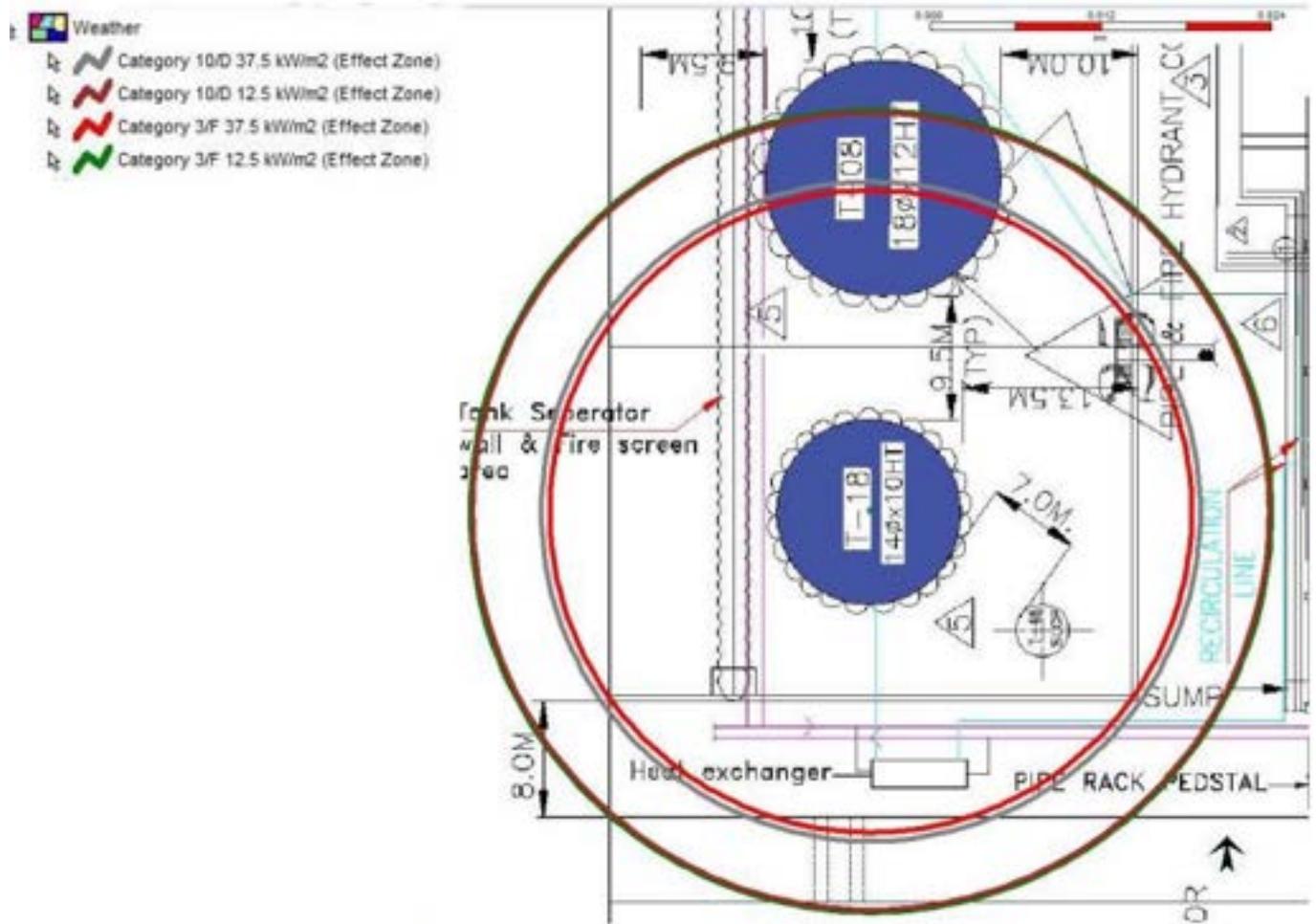


FIGURE 13: FAILURE - TANK T-18 : POOL FIRE CONTOUR – 25 MM LEAK

Failure – Pump P-08 : Pool Fire Contour – 7 mm Leak

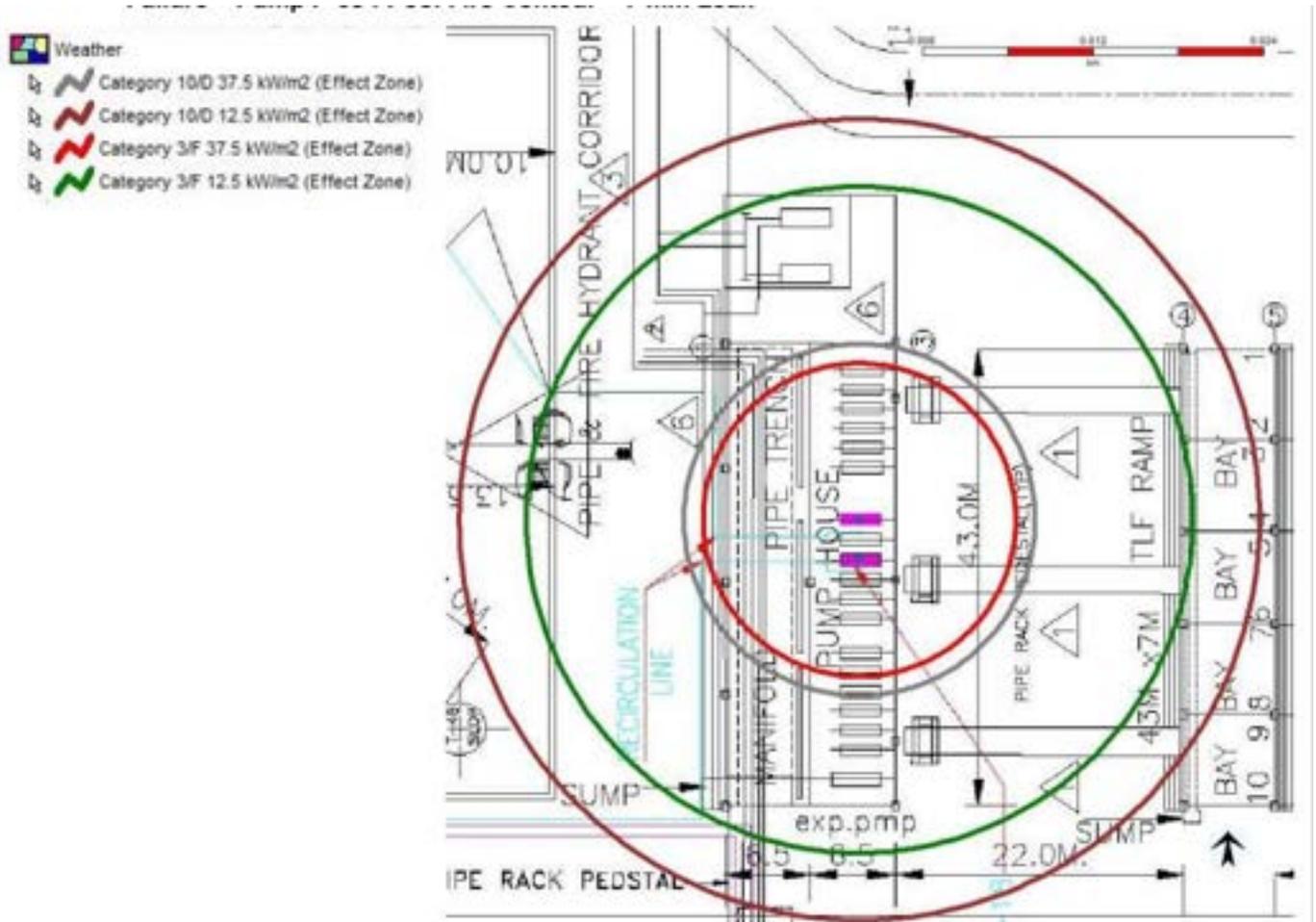


FIGURE 15: FAILURE – PUMP P-08 : POOL FIRE CONTOUR – 7 MM LEAK

	ADANI PORTS AND SEZ LTD MUNDRA	AUGUST - 2023
	ON SITE EMERGENCY PLAN (Port Area)	

Failure – Pump P-08 : Pool Fire Contour – 25 mm Leak

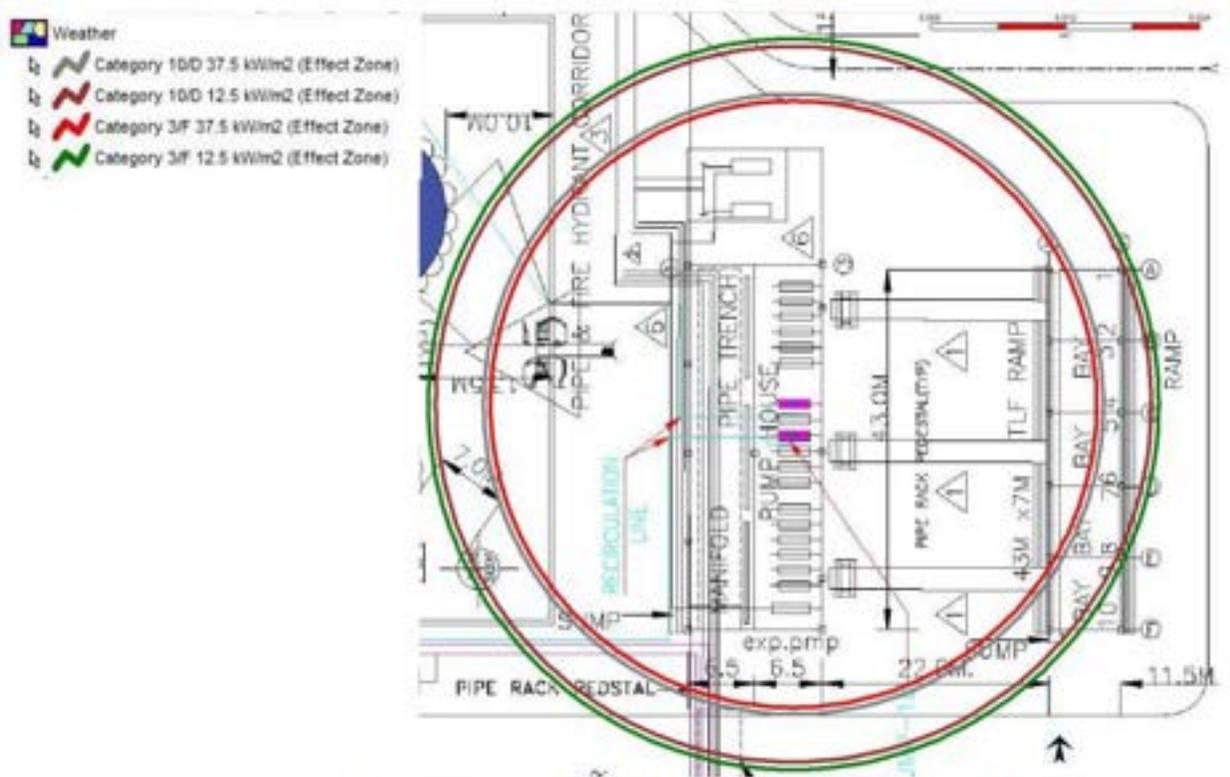


FIGURE 17: FAILURE – PUMP P-08 : POOL FIRE CONTOUR – 25 MM LEAK

Failure - Tank T-08 : As worst case scenario of rapid heating : Toxic styrene vapour dispersion downwind – IDLH 700 ppm

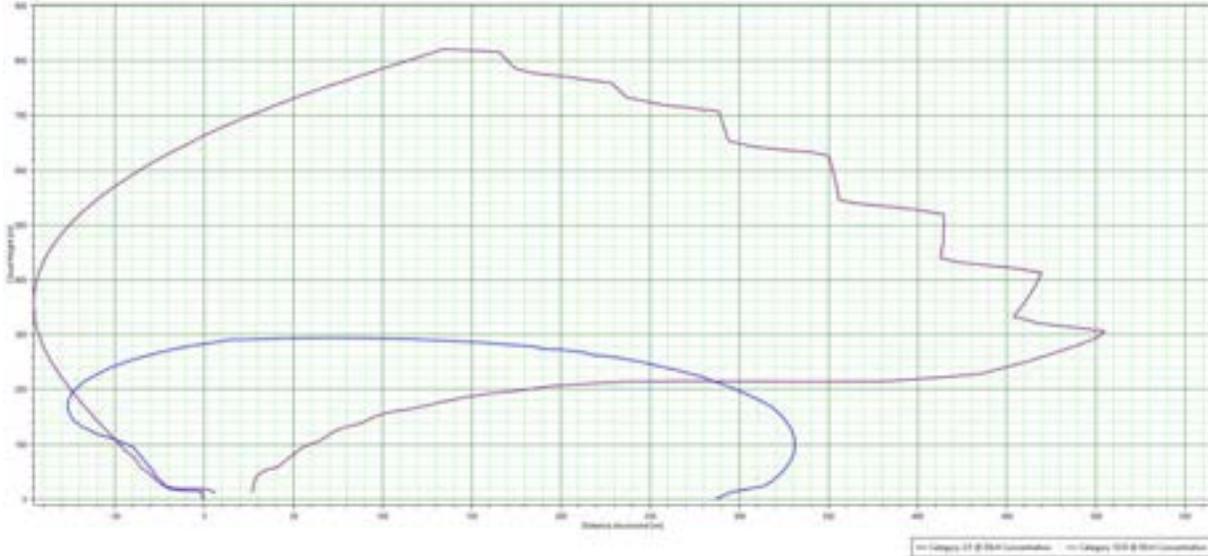


FIGURE 23: FAILURE - TANK T-08 : AS WORST CASE SCENARIO OF RAPID HEATING : TOXIC STYRENE VAPOUR DISPERSION DOWNWIND – IDLH 700 PPM

Toxic styrene vapour dispersion downwind Distance (IDLH 700 ppm) for 3/F : 331.18 m

Toxic styrene vapour dispersion downwind Distance (IDLH 700 ppm) for 10/D : 504.89 m

Failure - Tank T-18 : As worst case scenario of rapid heating : Toxic styrene vapour dispersion downwind – IDLH 700 ppm

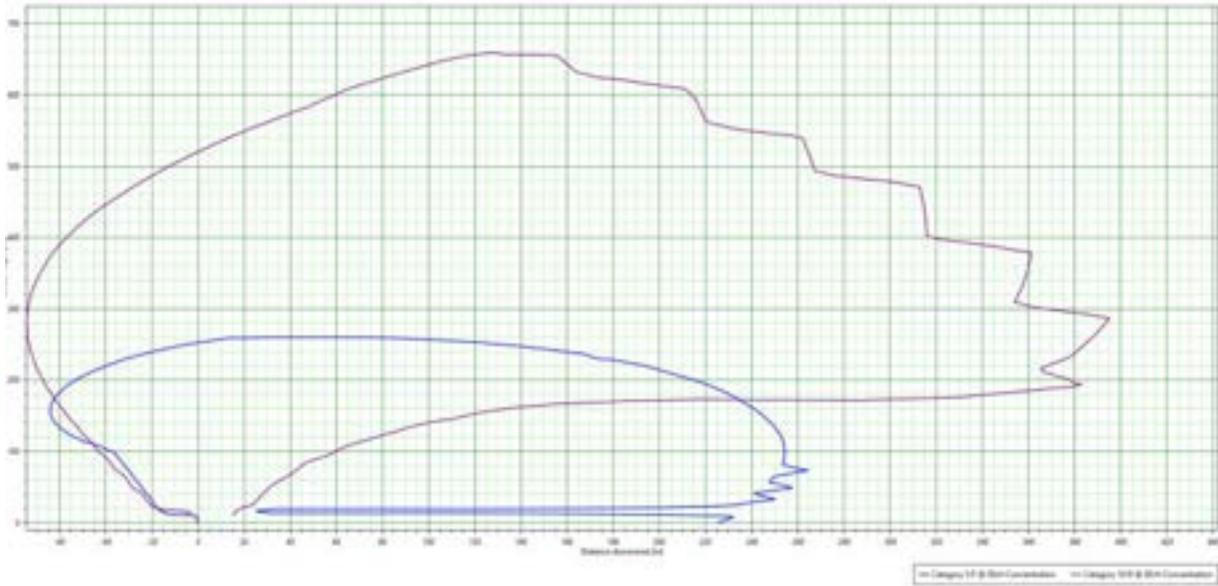


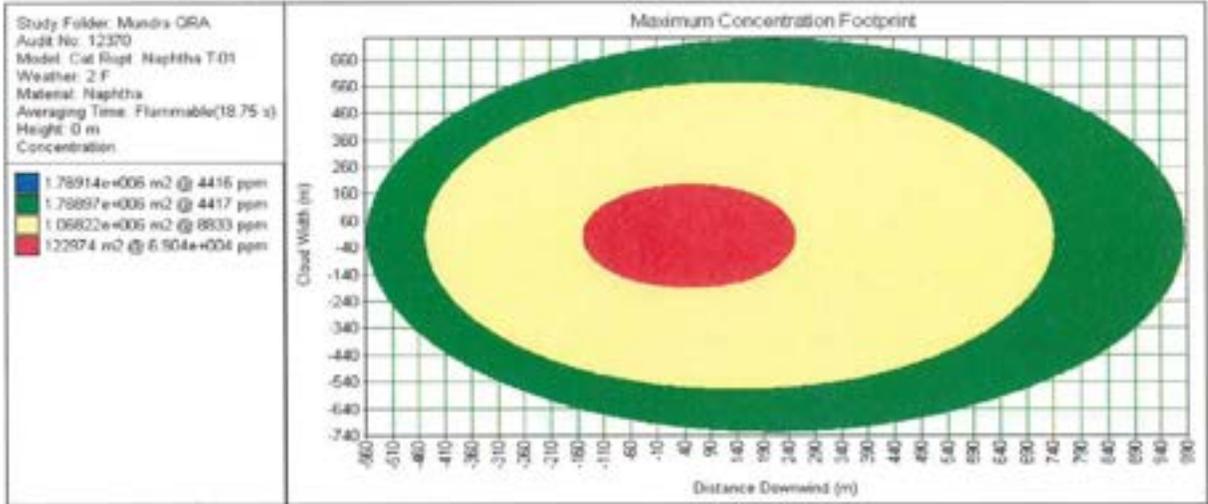
FIGURE 24: FAILURE - TANK T-18 : AS WORST CASE SCENARIO OF RAPID HEATING : TOXIC STYRENE VAPOUR DISPERSION DOWNWIND – IDLH 700 PPM

Toxic styrene vapour dispersion downwind Distance (IDLH 700 ppm) for 3/F : 264.63 m

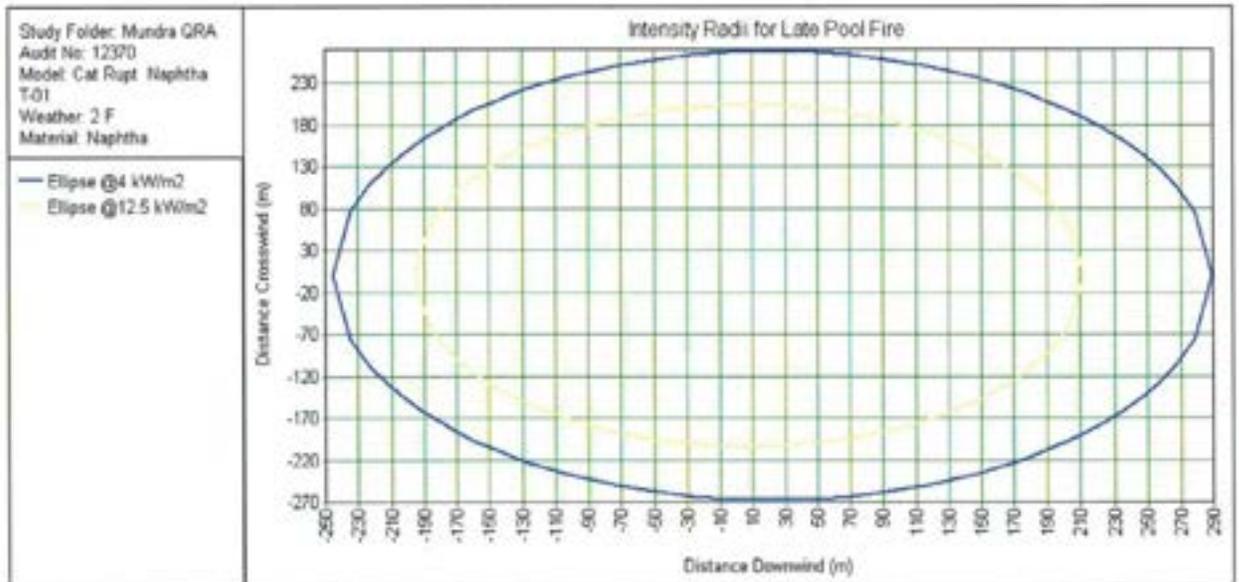
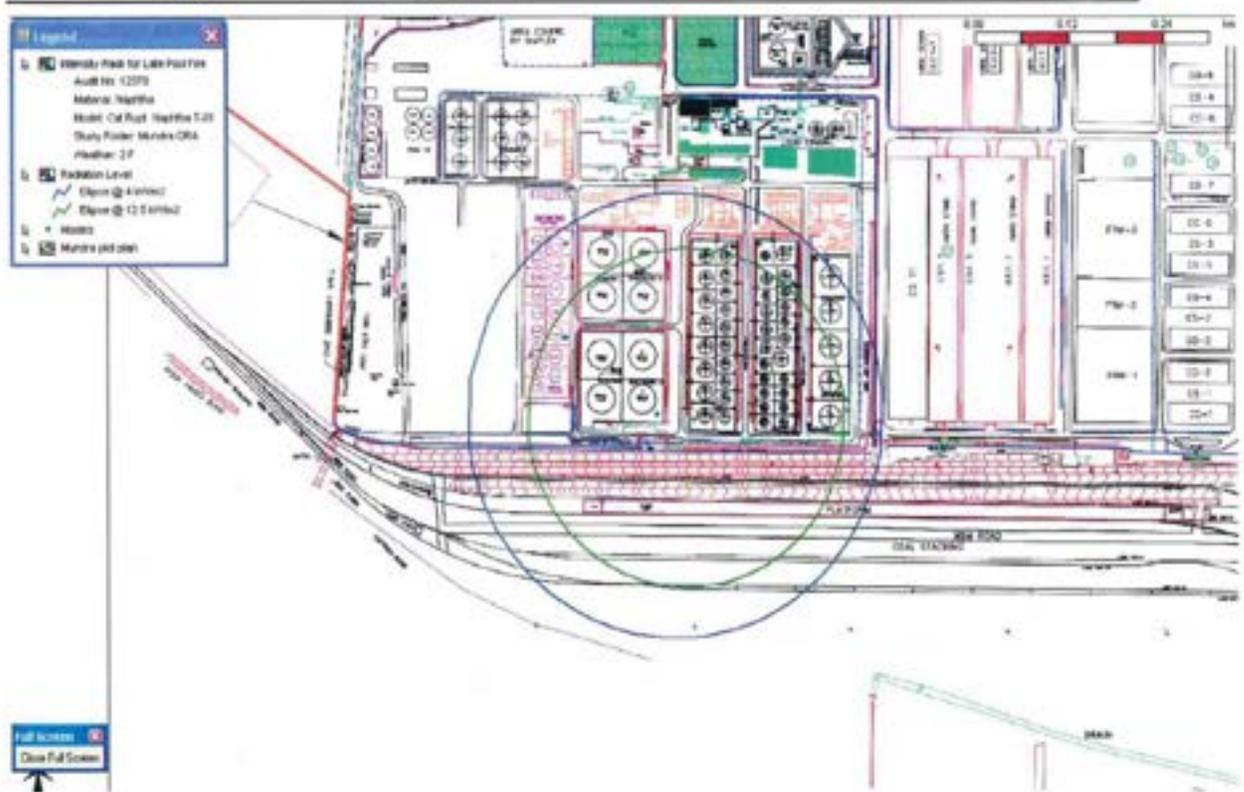
Toxic styrene vapour dispersion downwind Distance (IDLH 700 ppm) for 10/D : 395.06 m

ON SITE EMERGENCY PLAN (Port Area)

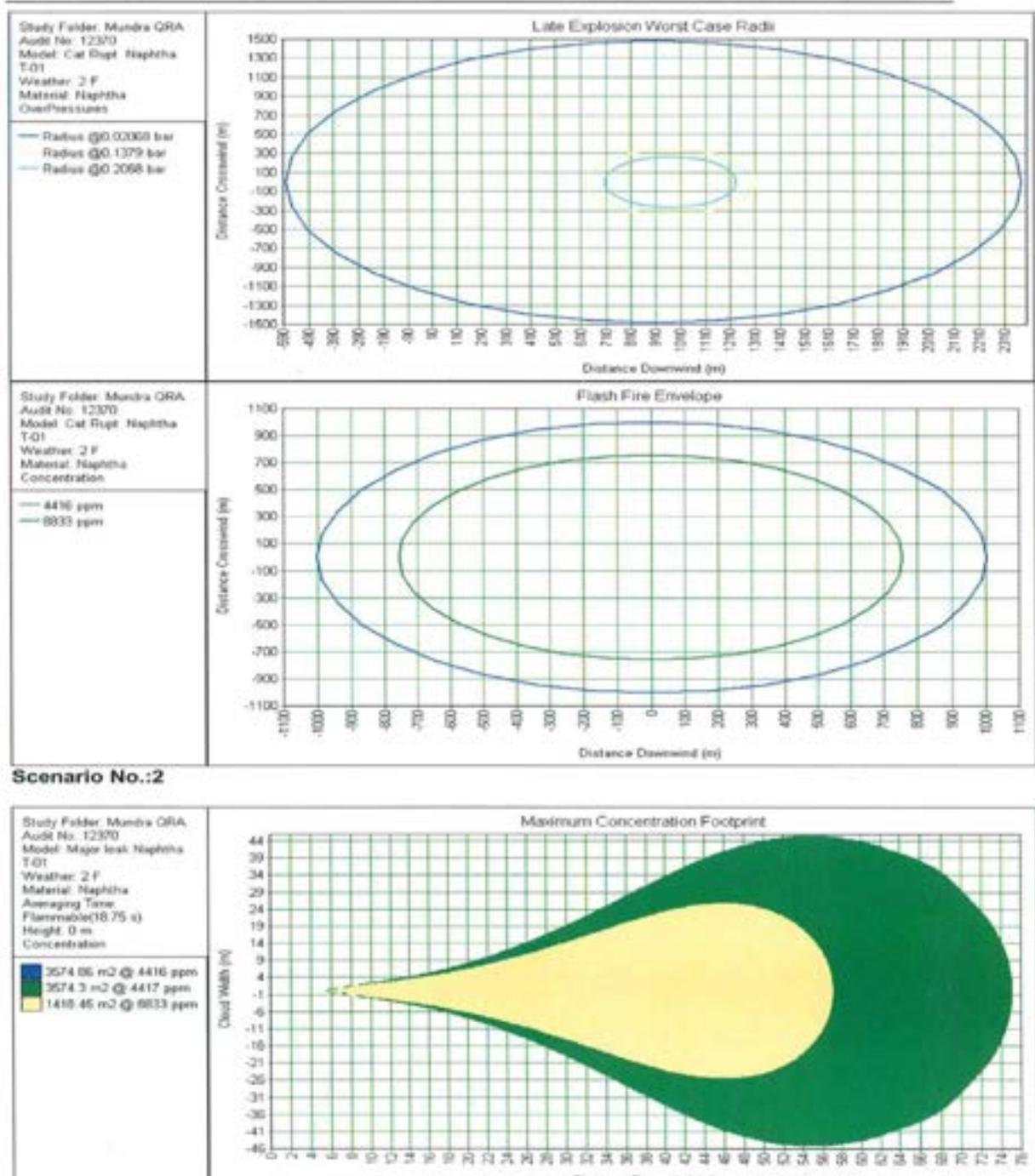
Scenario No.:1



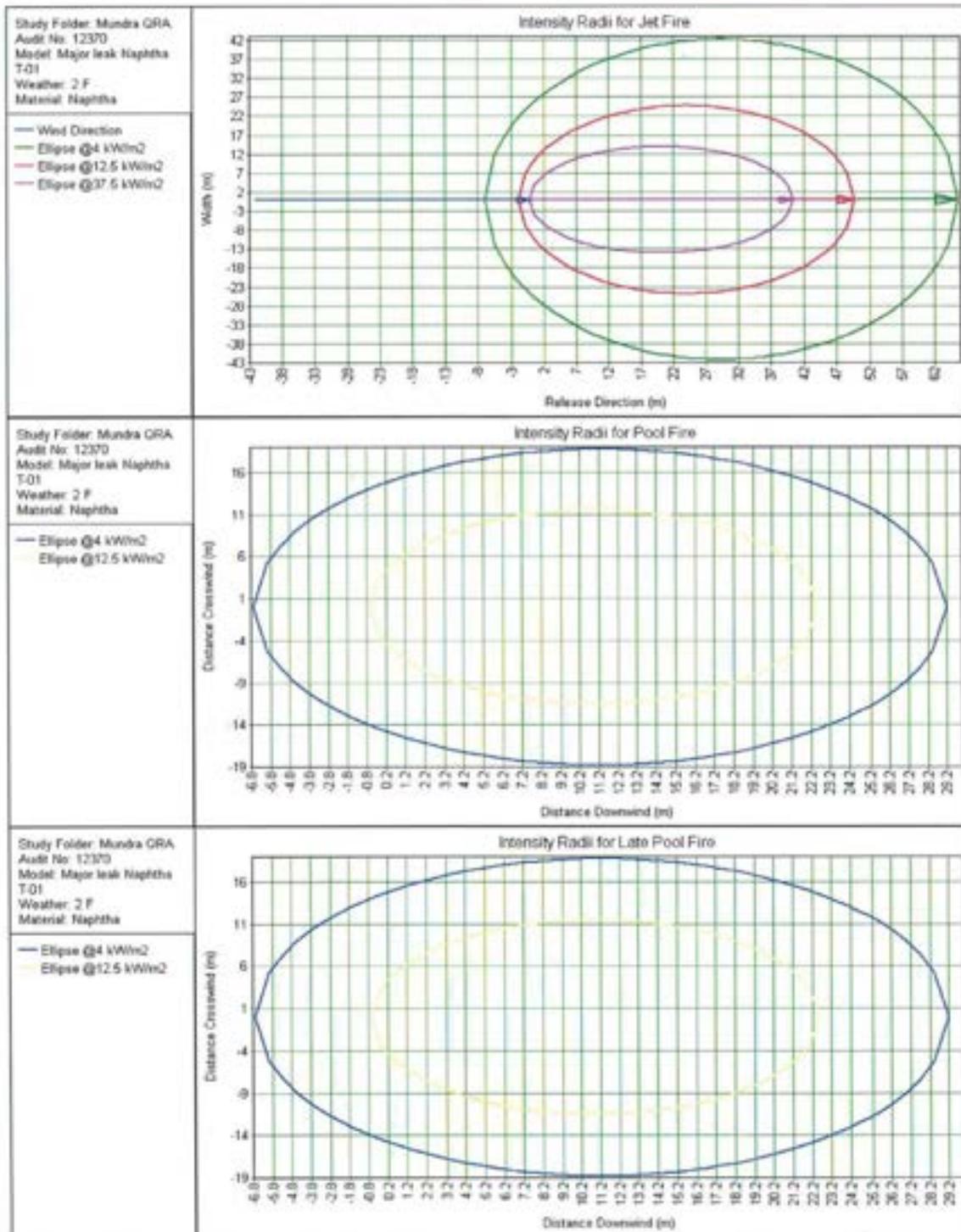
Mundra QRA Study



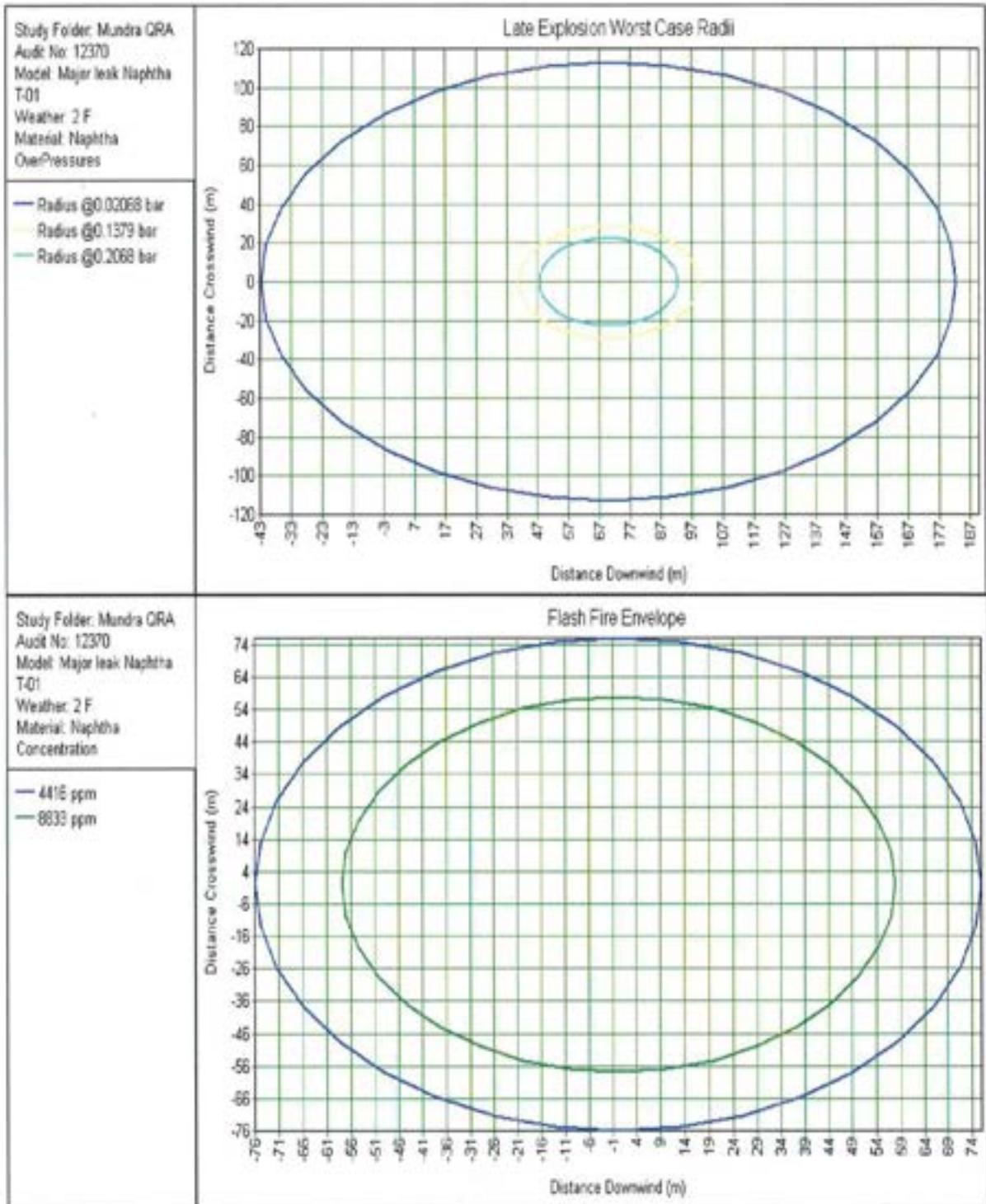
ON SITE EMERGENCY PLAN (Port Area)



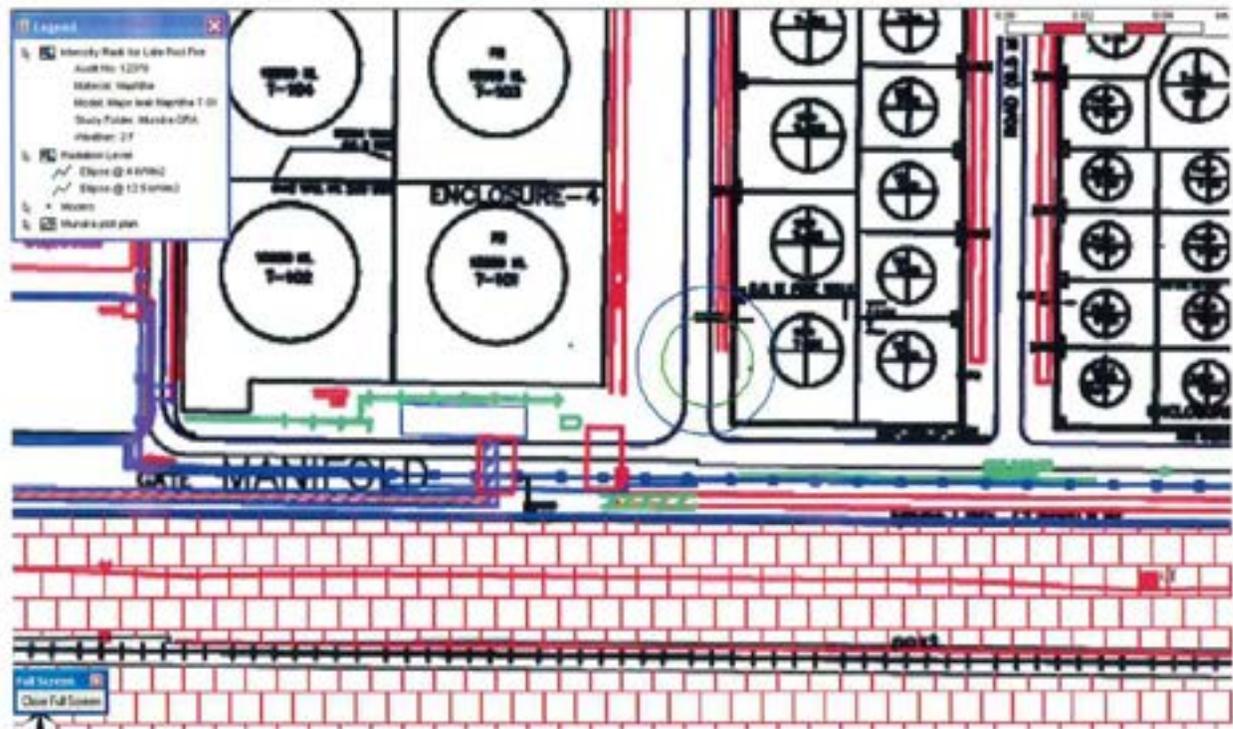
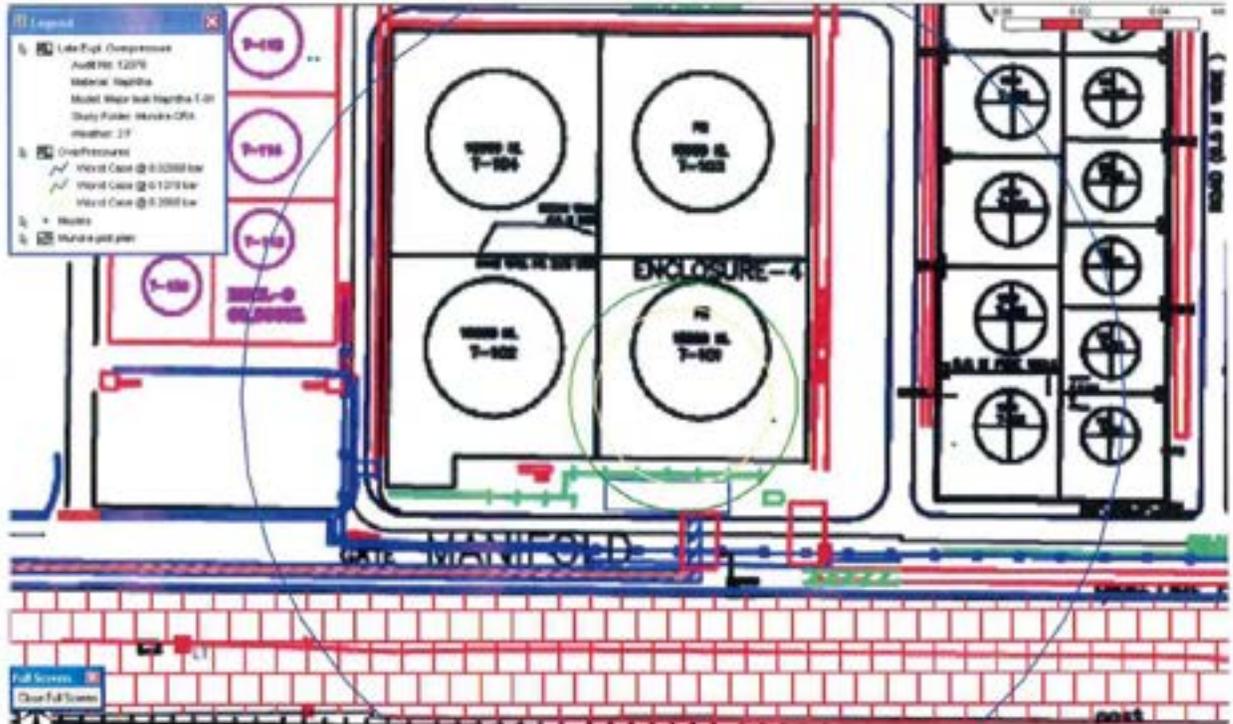
ON SITE EMERGENCY PLAN (Port Area)



ON SITE EMERGENCY PLAN (Port Area)

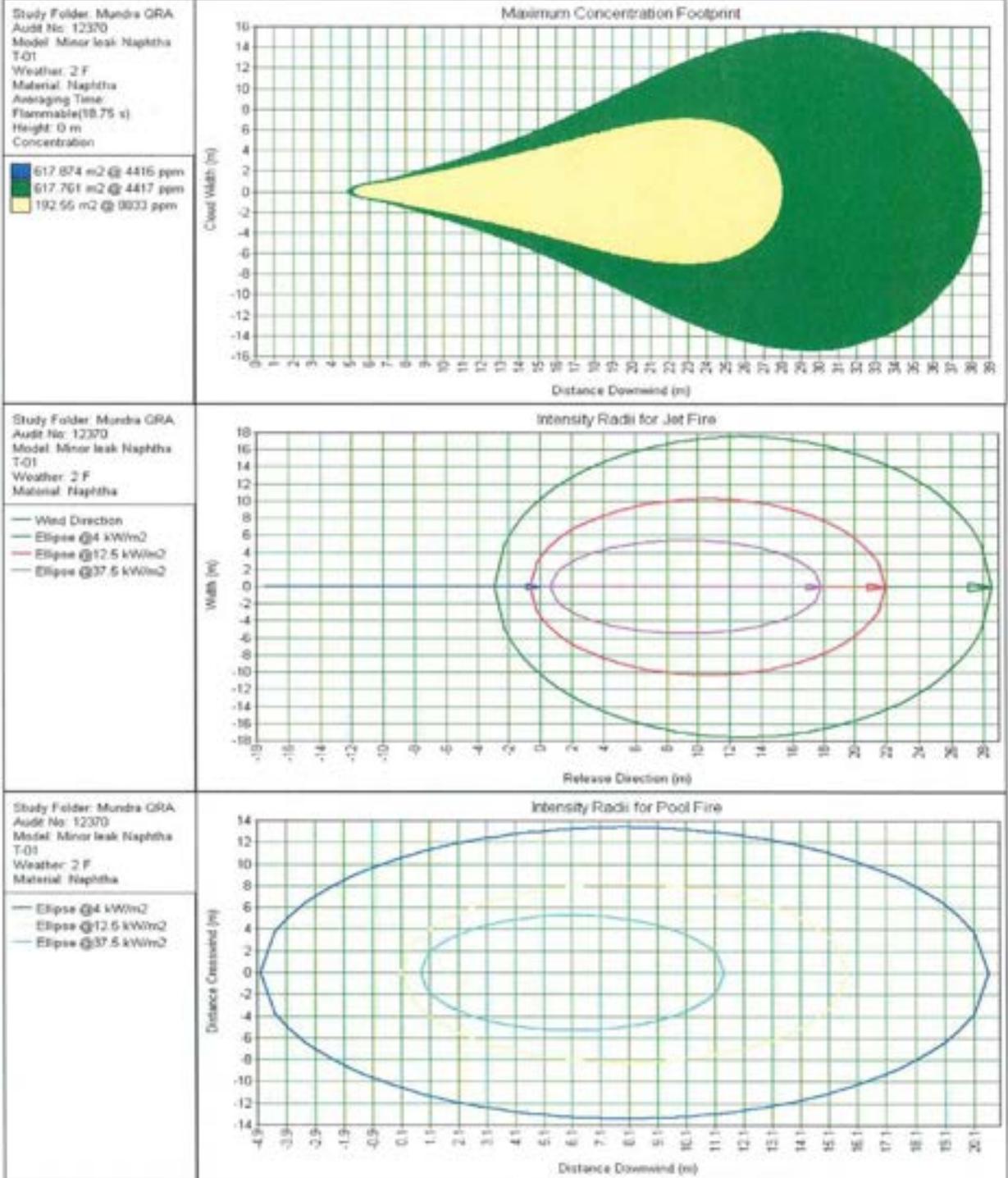


ON SITE EMERGENCY PLAN (Port Area)

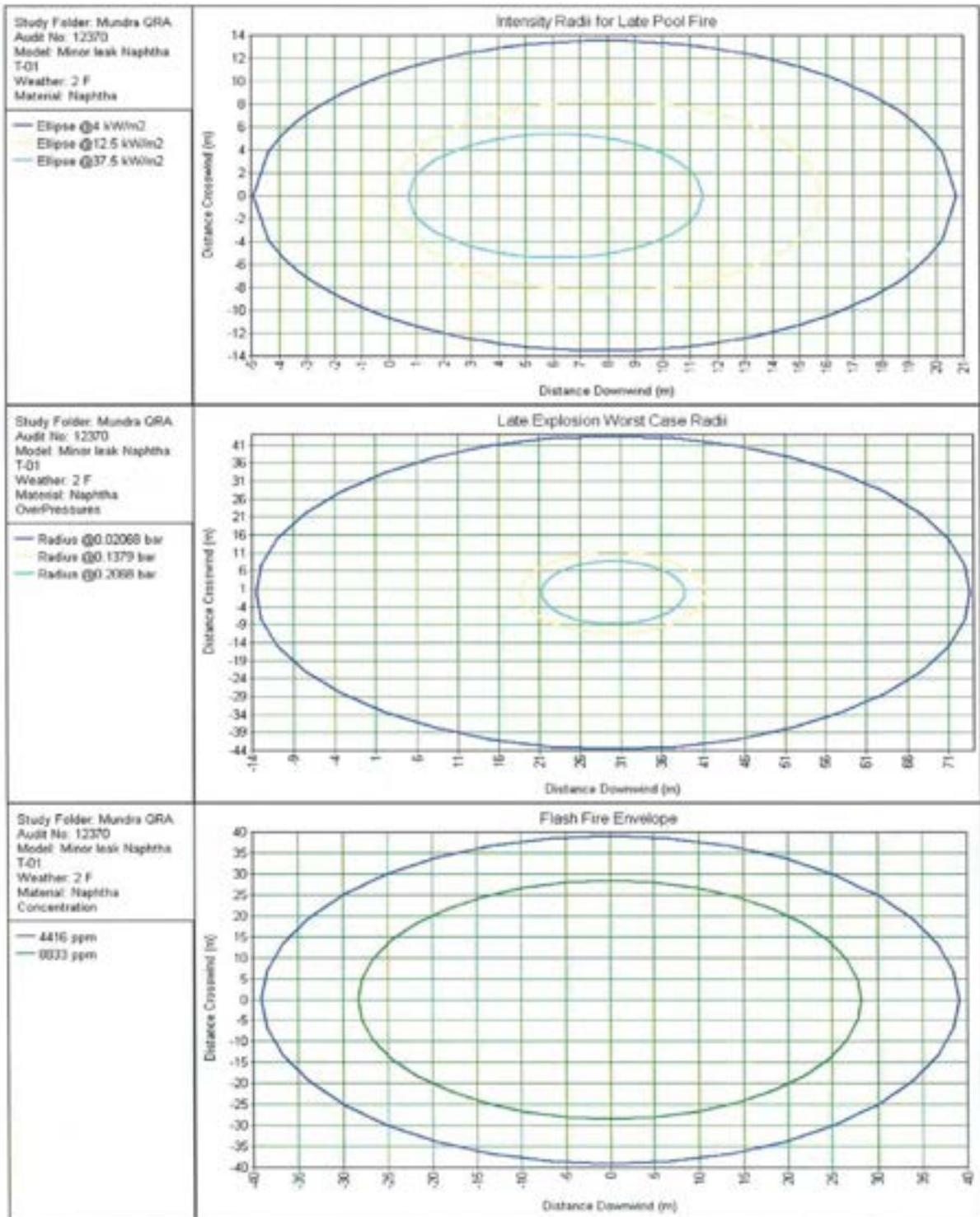


ON SITE EMERGENCY PLAN (Port Area)

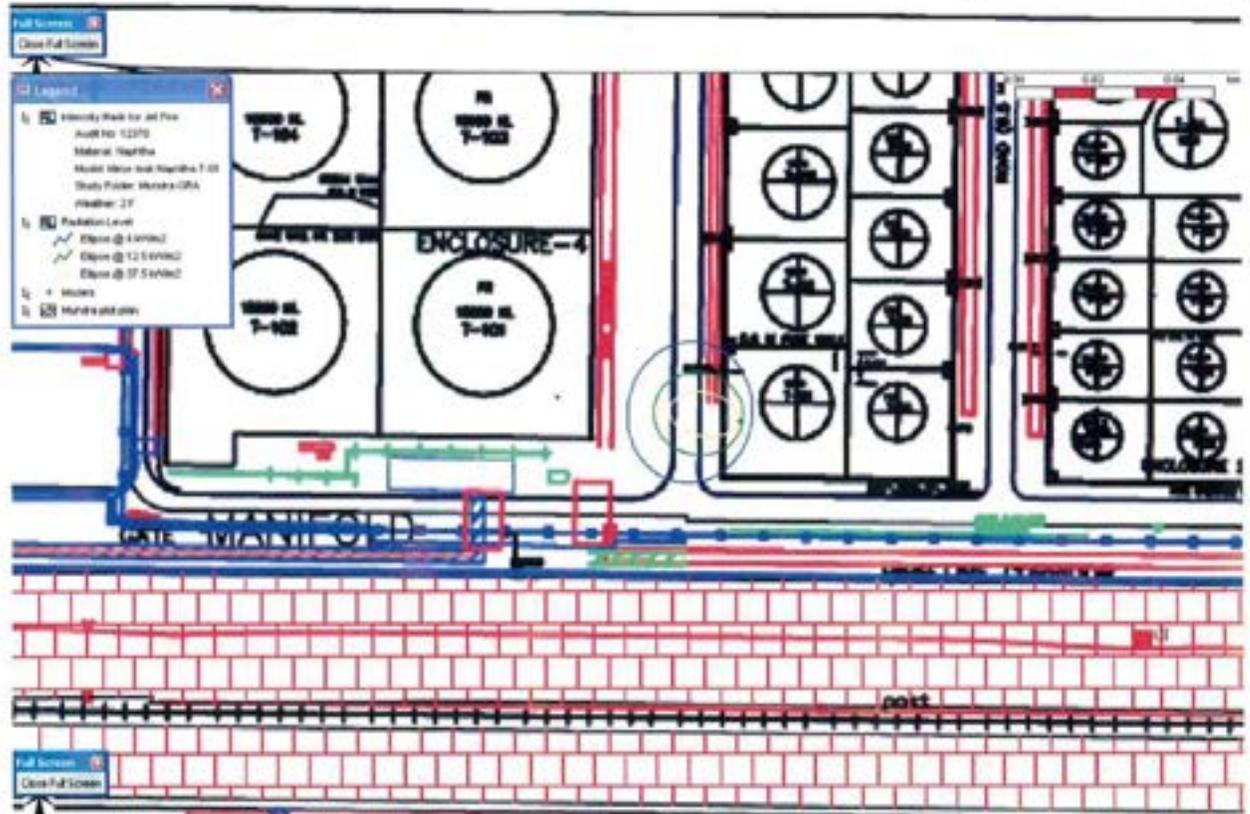
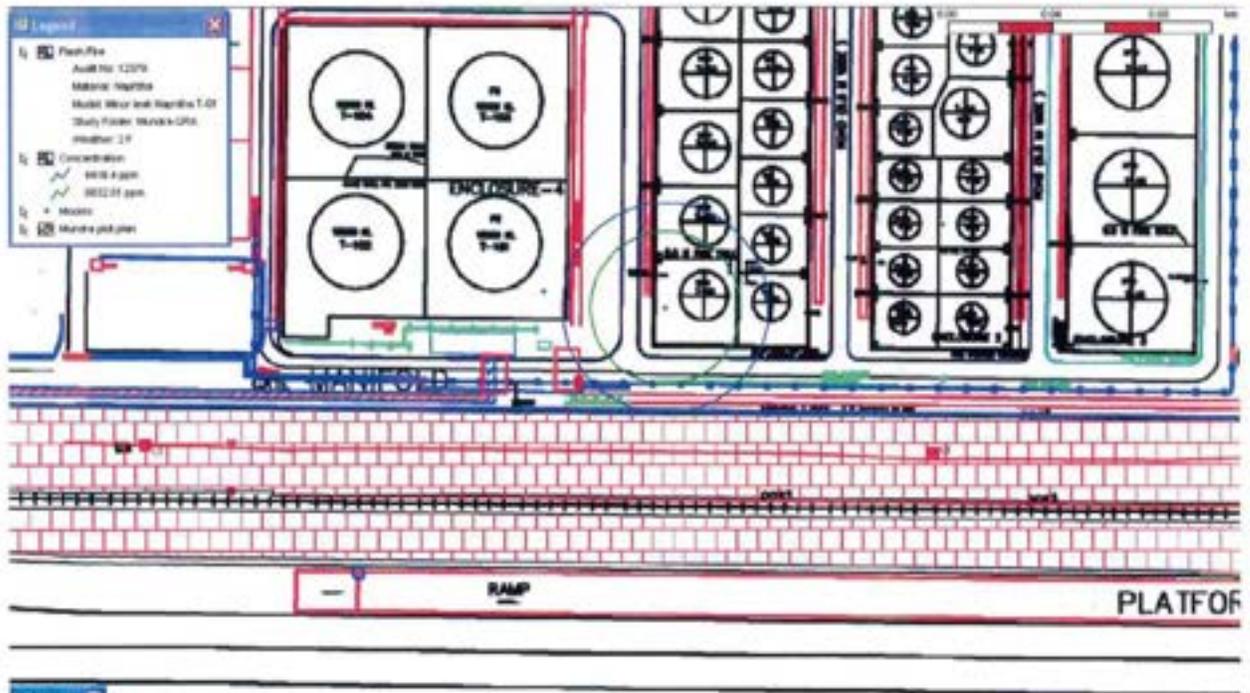
Scenario No.:3



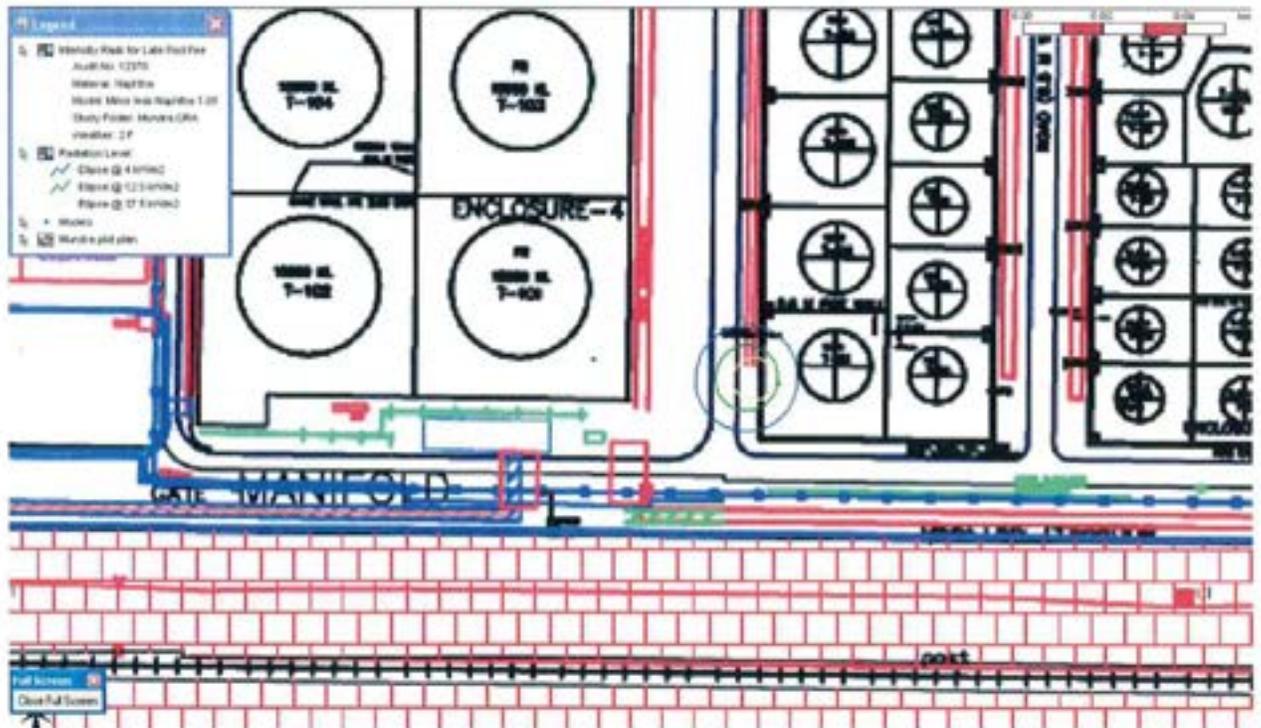
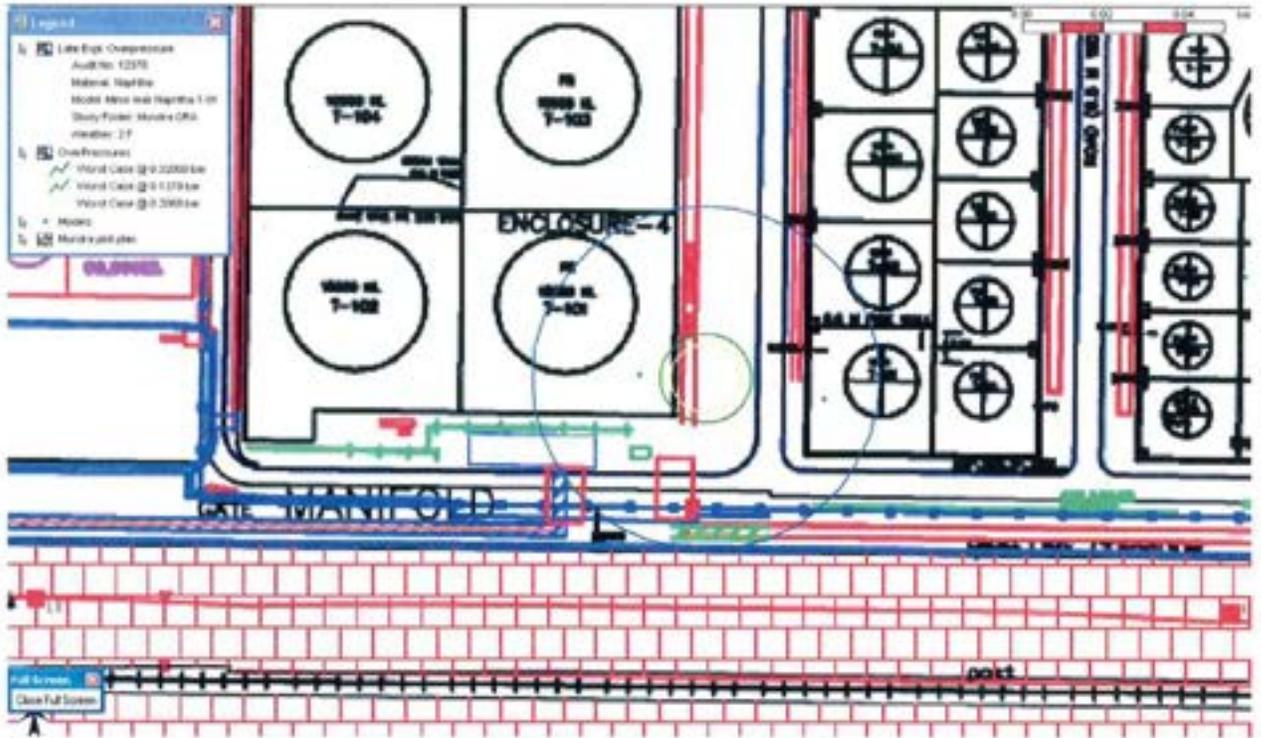
ON SITE EMERGENCY PLAN (Port Area)



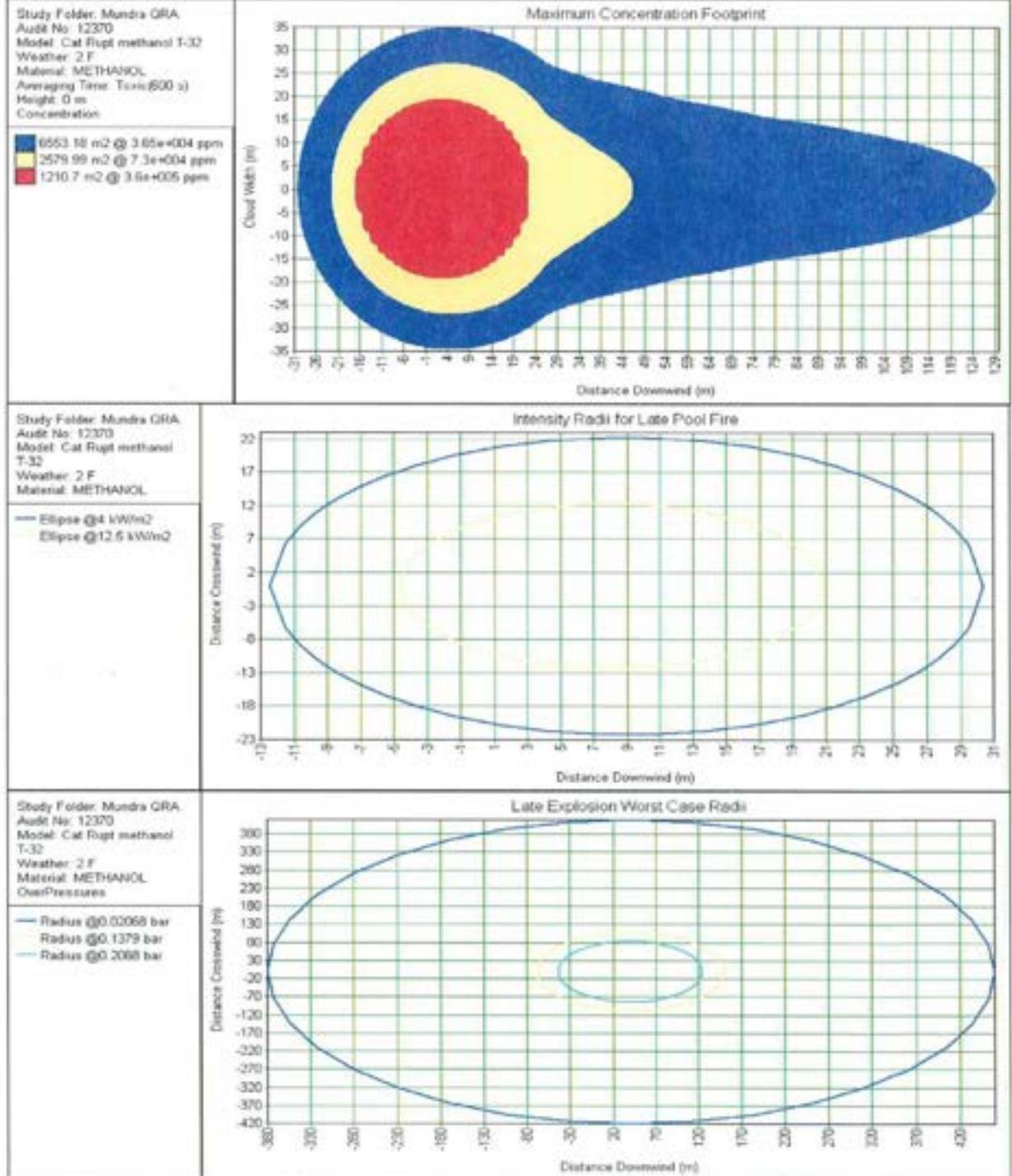
ON SITE EMERGENCY PLAN (Port Area)



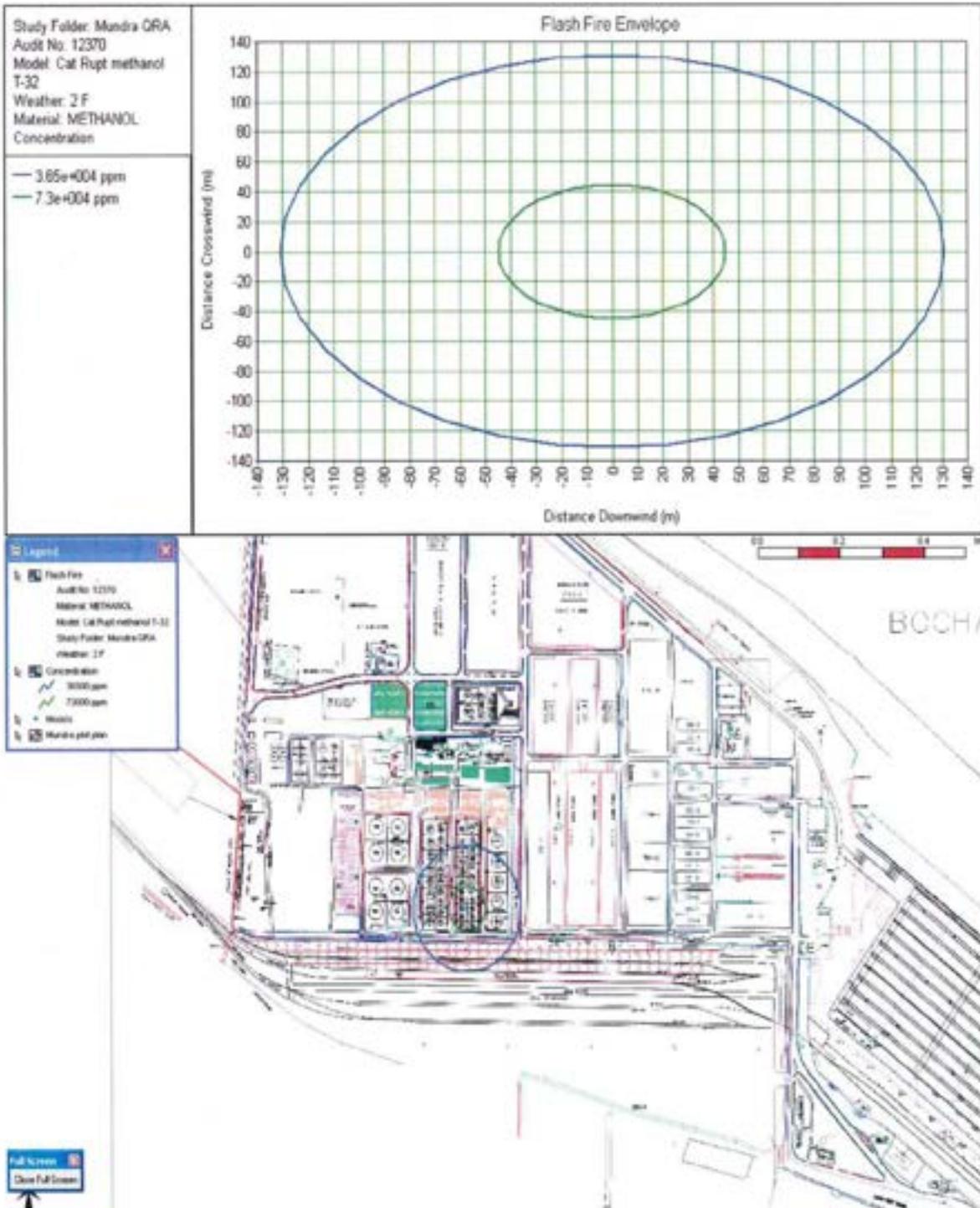
ON SITE EMERGENCY PLAN (Port Area)



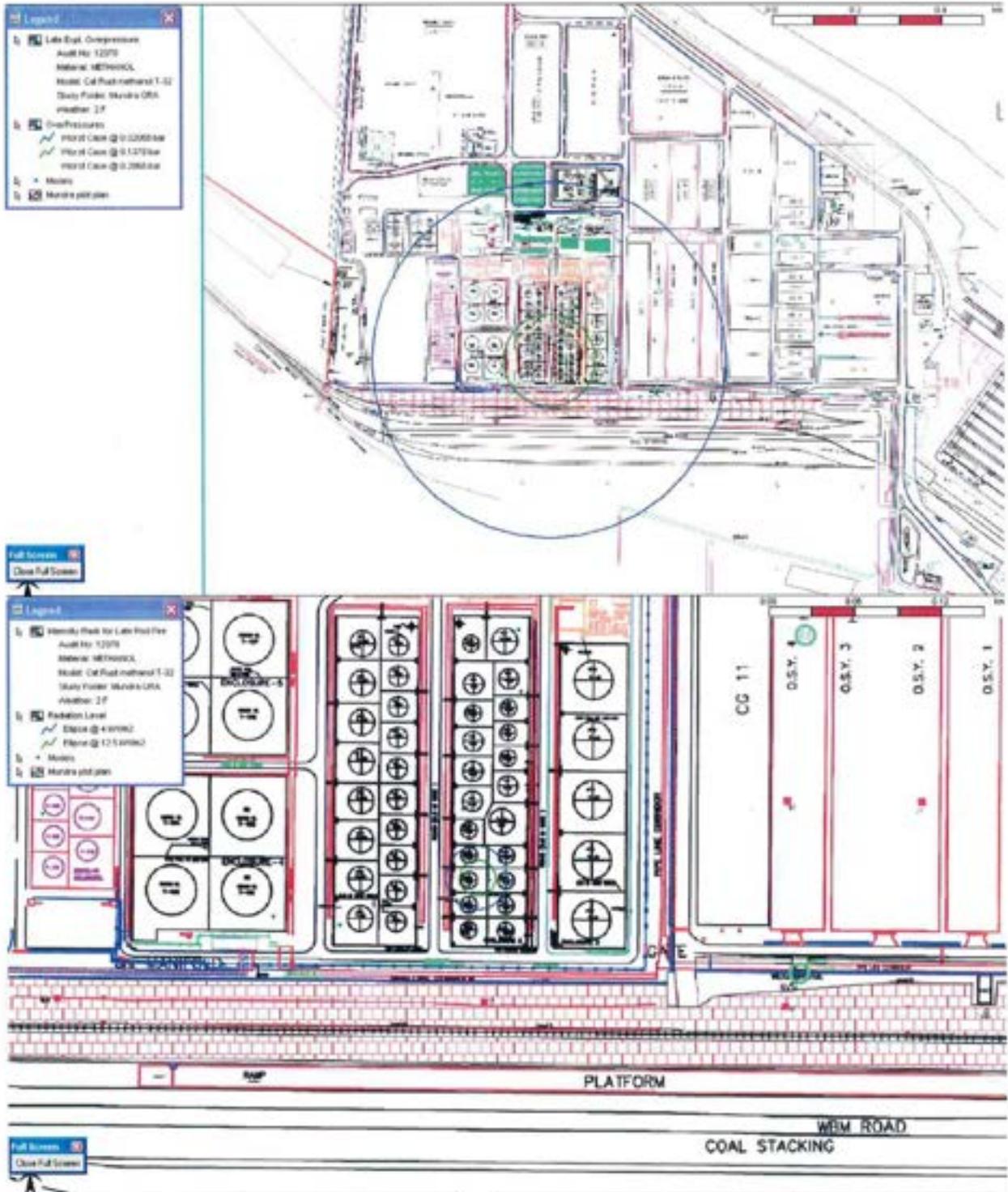
Scenario No.:7

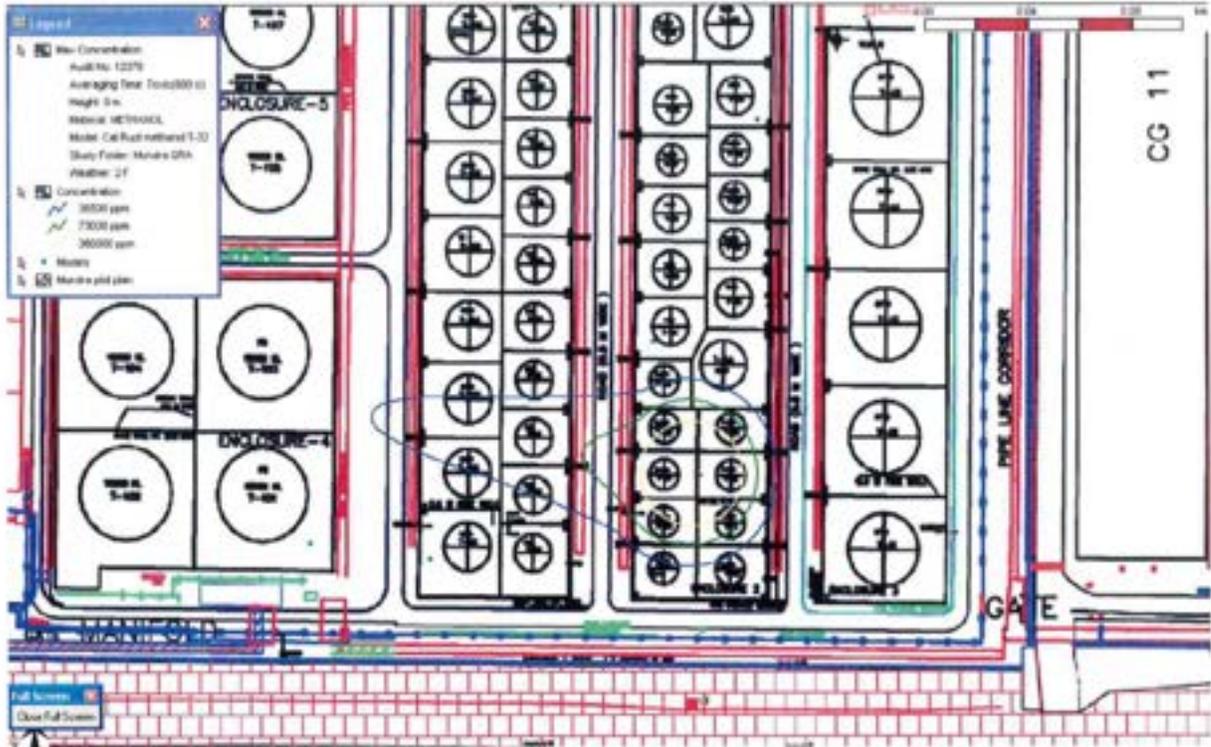


ON SITE EMERGENCY PLAN (Port Area)



ON SITE EMERGENCY PLAN (Port Area)

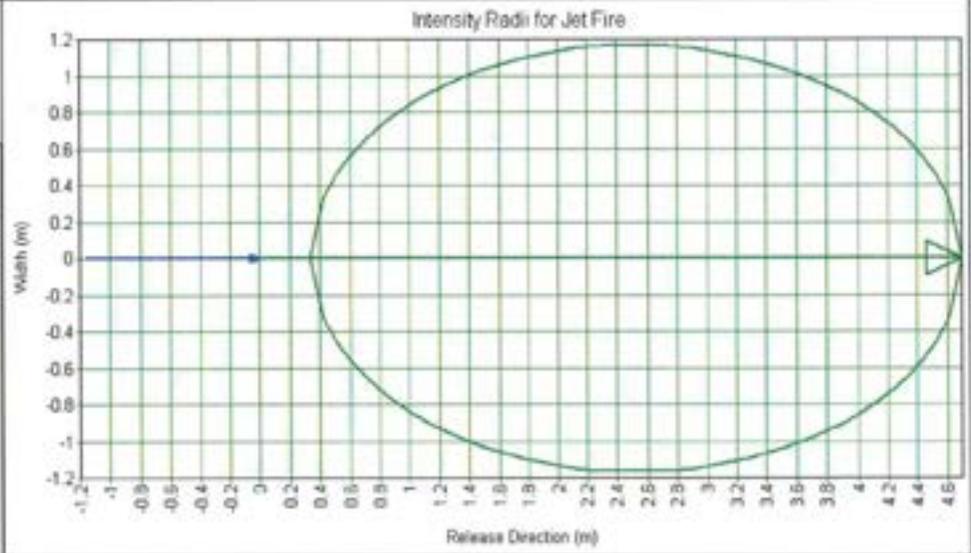




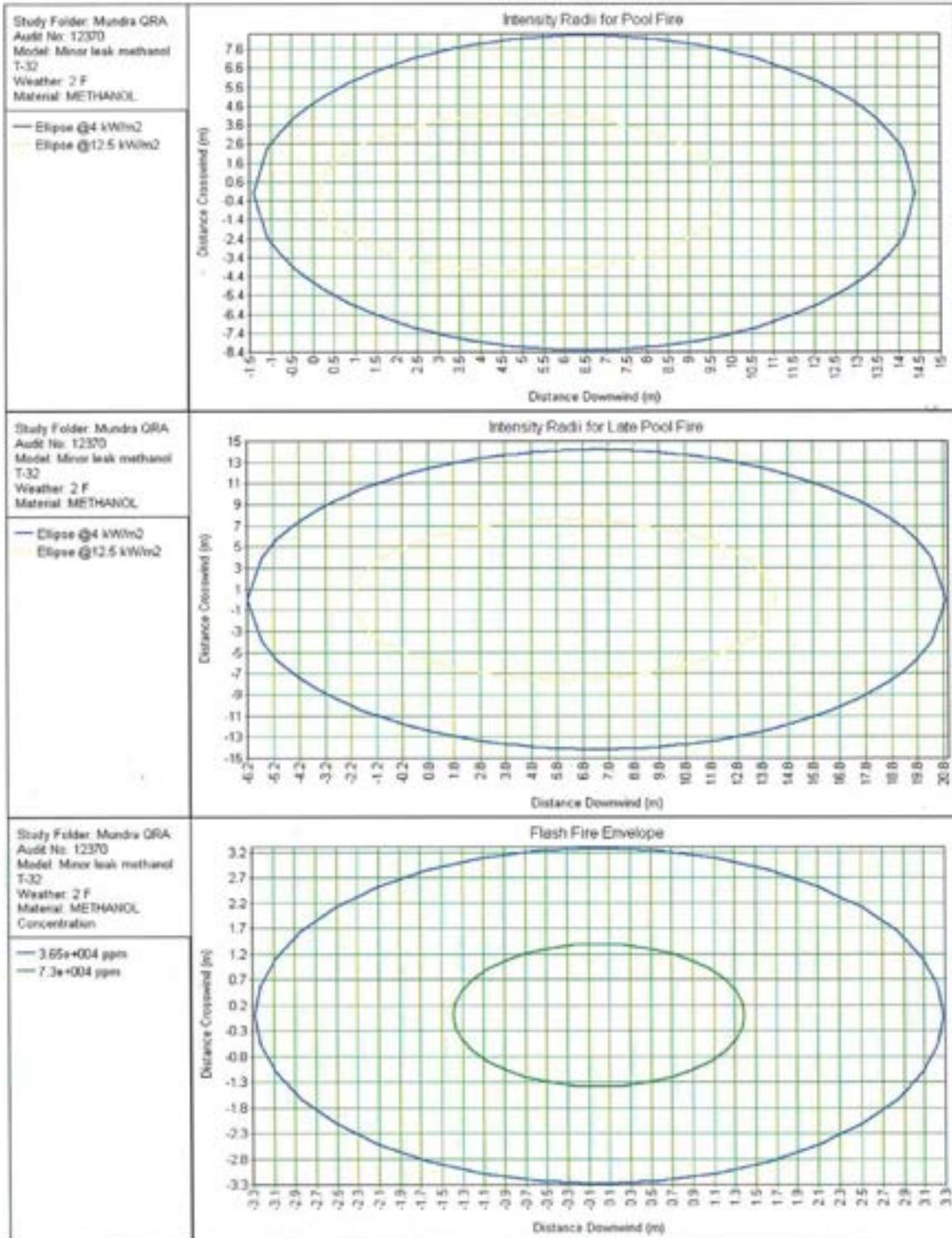
Scenario No.:9

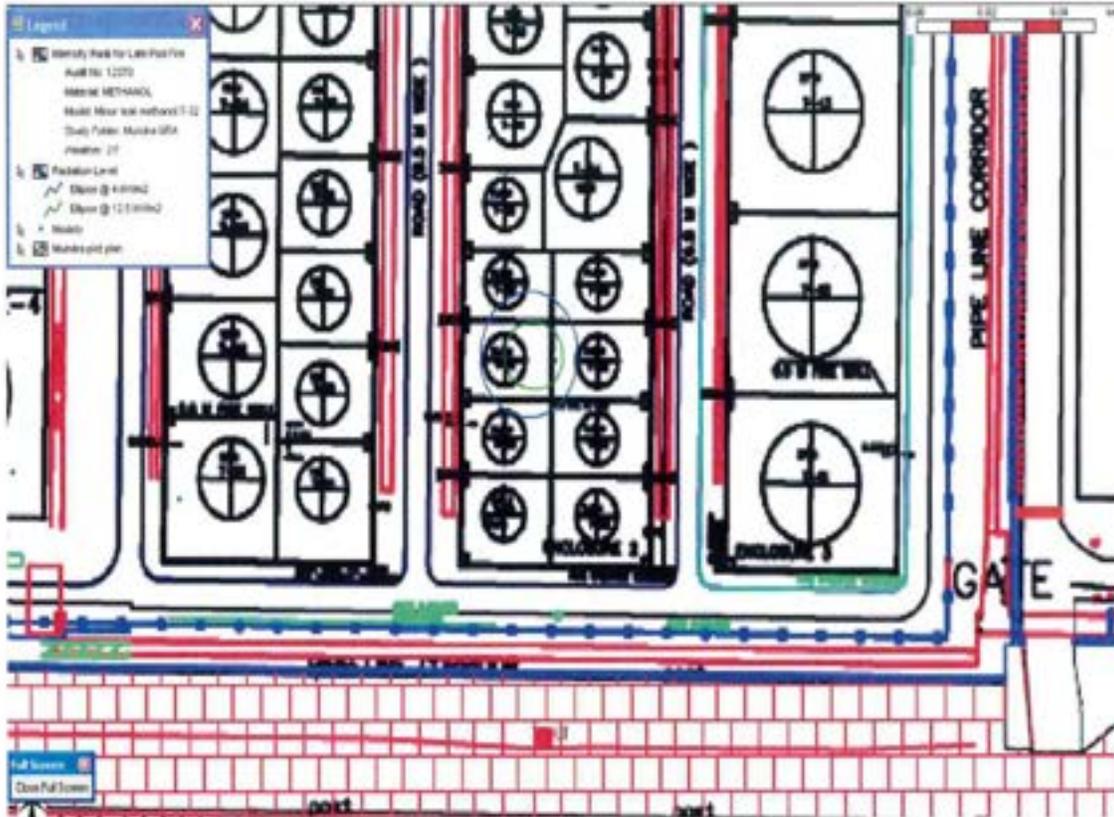
Study Folder: Mundra GRA
 Audit No: 12370
 Model: Minor leak: methanol
 T-32
 Weather: 2 F
 Material: METHANOL

— Wind Direction
 — Ellipse @4 kW/m²

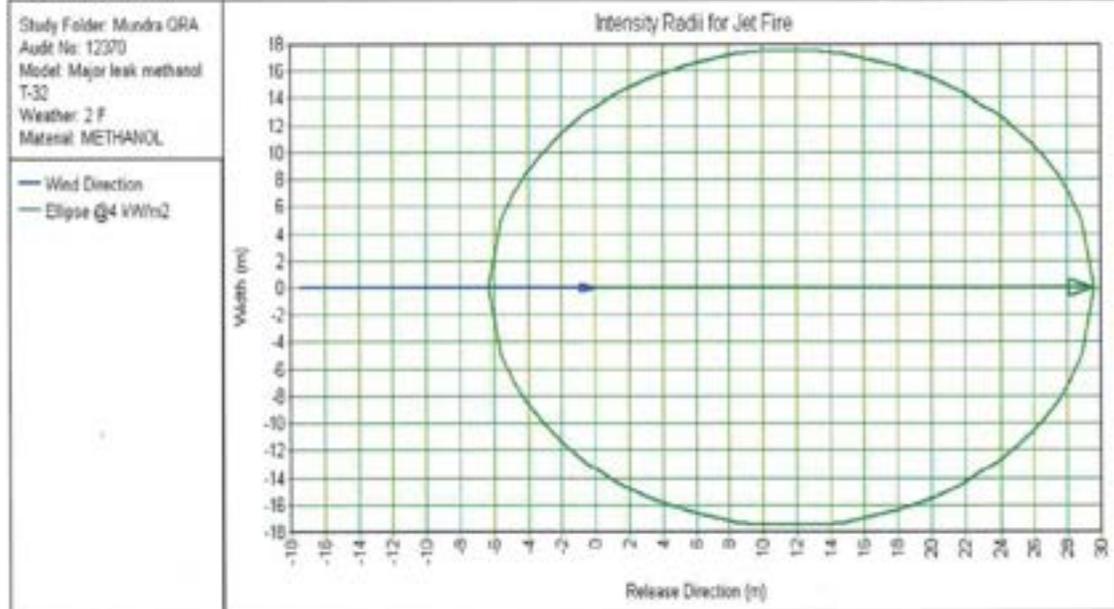


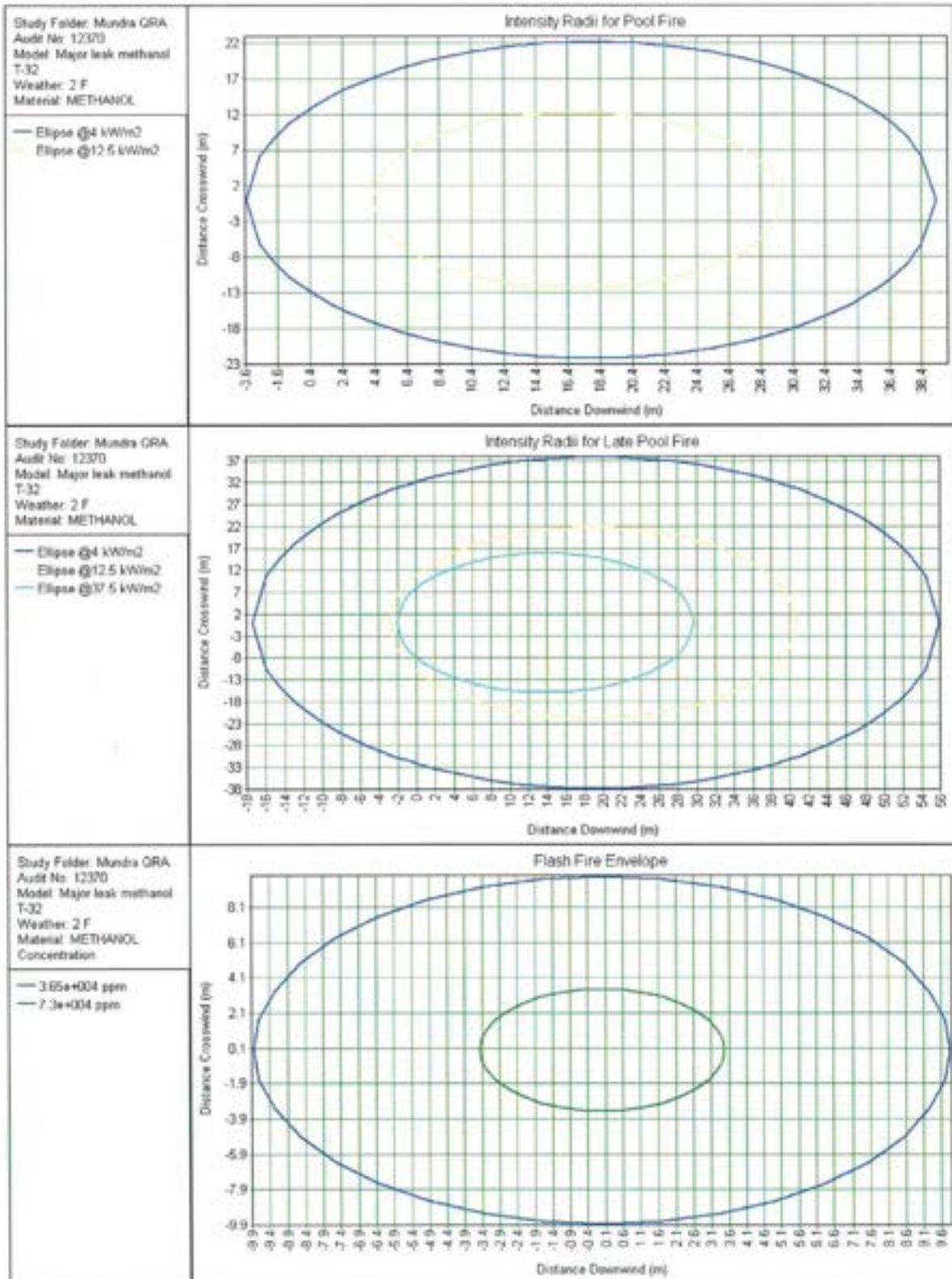
ON SITE EMERGENCY PLAN (Port Area)



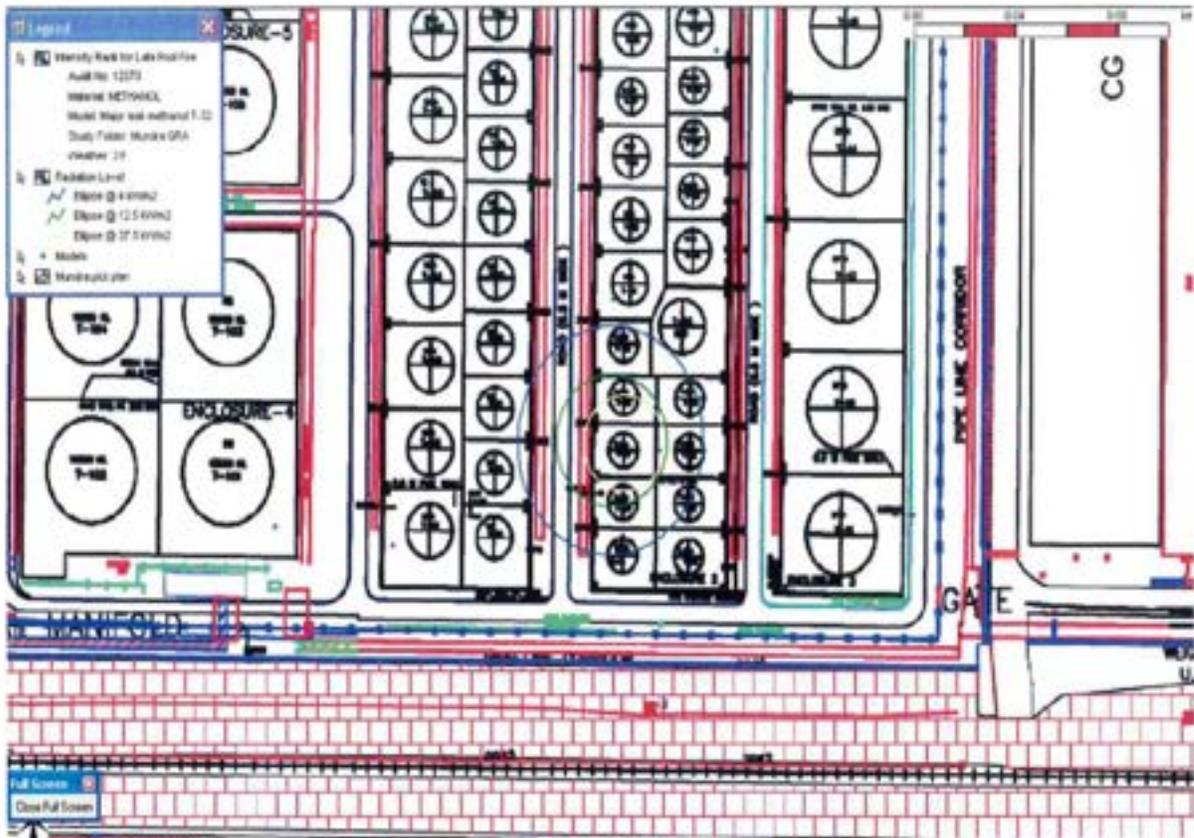


Scenario No.:8

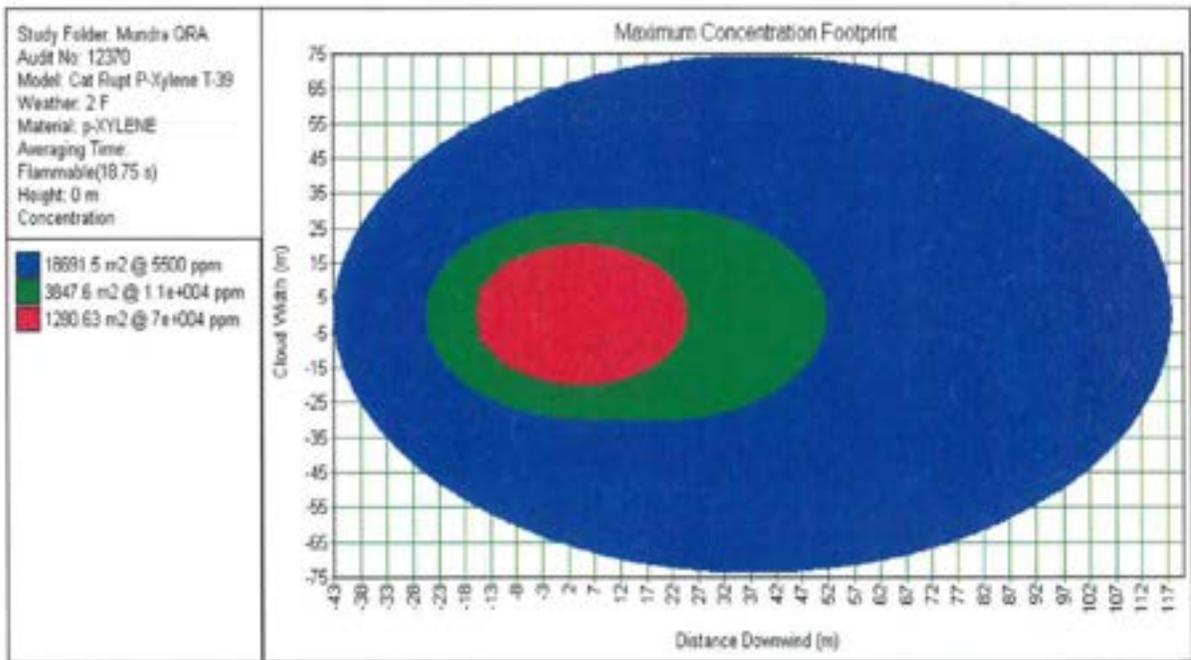




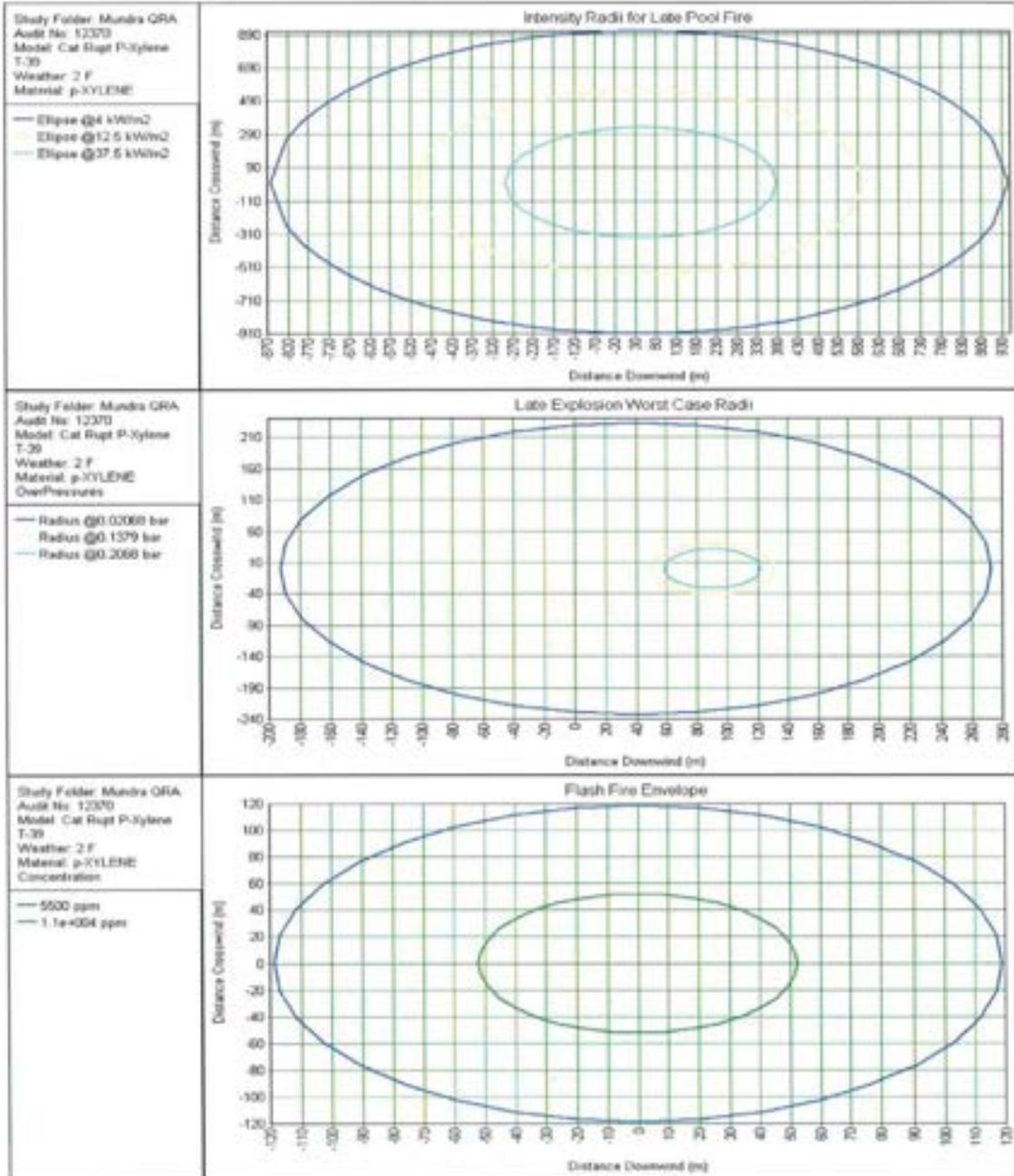
ON SITE EMERGENCY PLAN (Port Area)



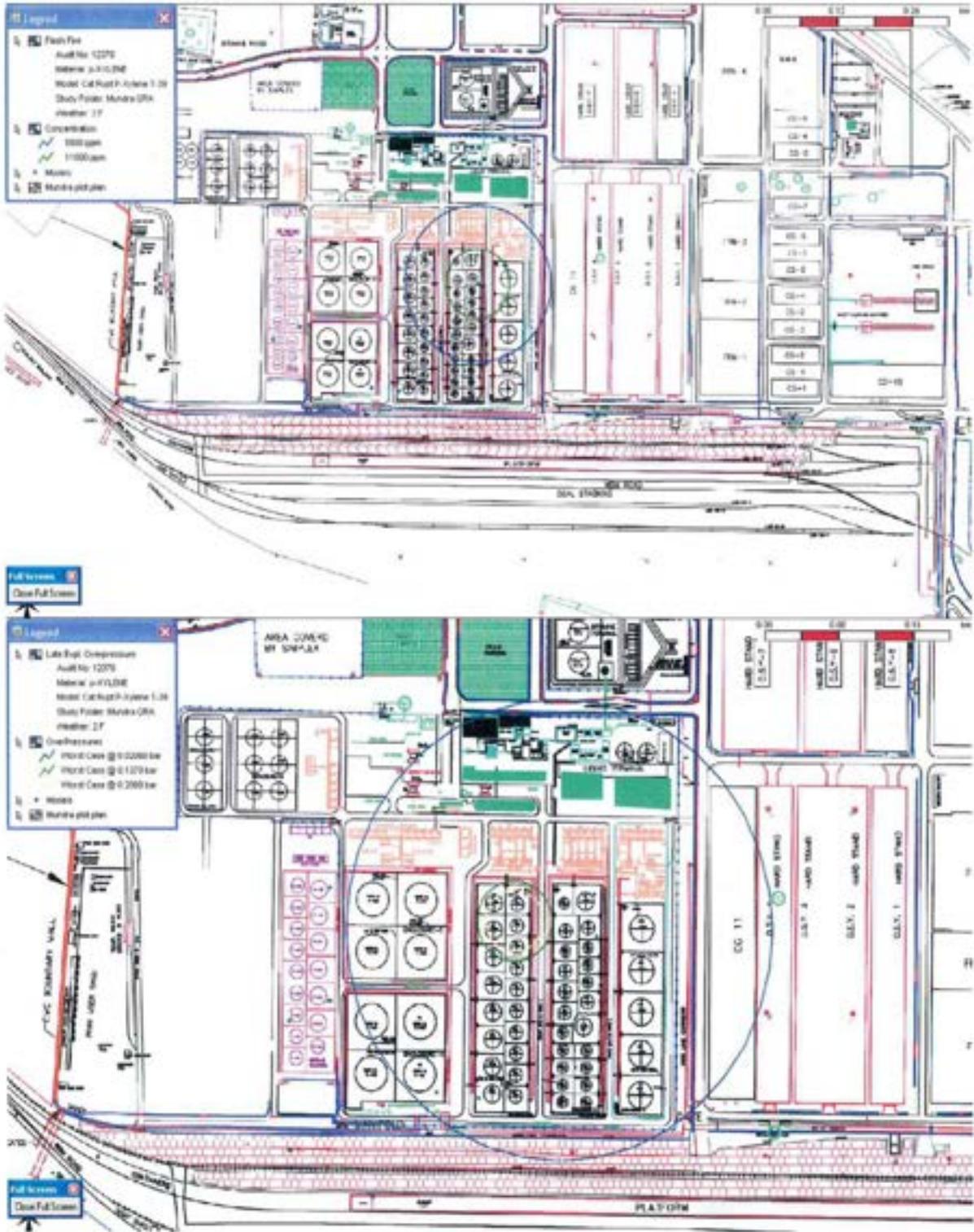
Scenario No.:10



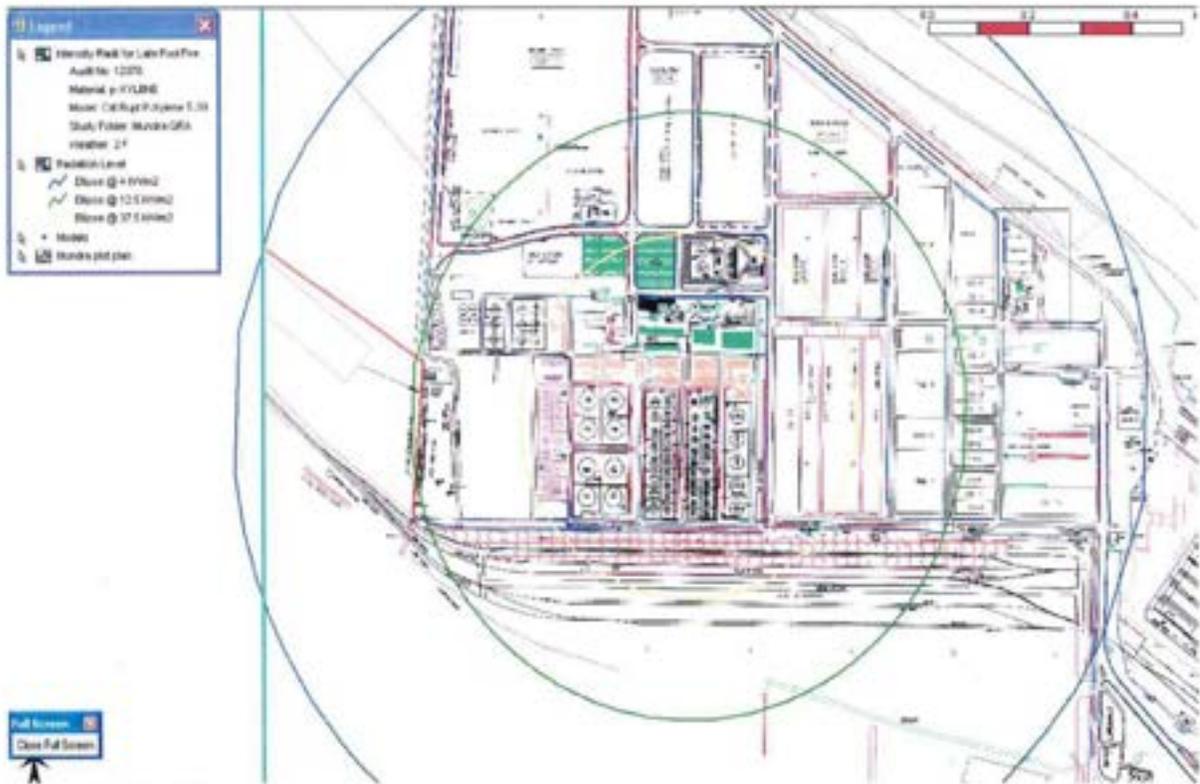
ON SITE EMERGENCY PLAN (Port Area)



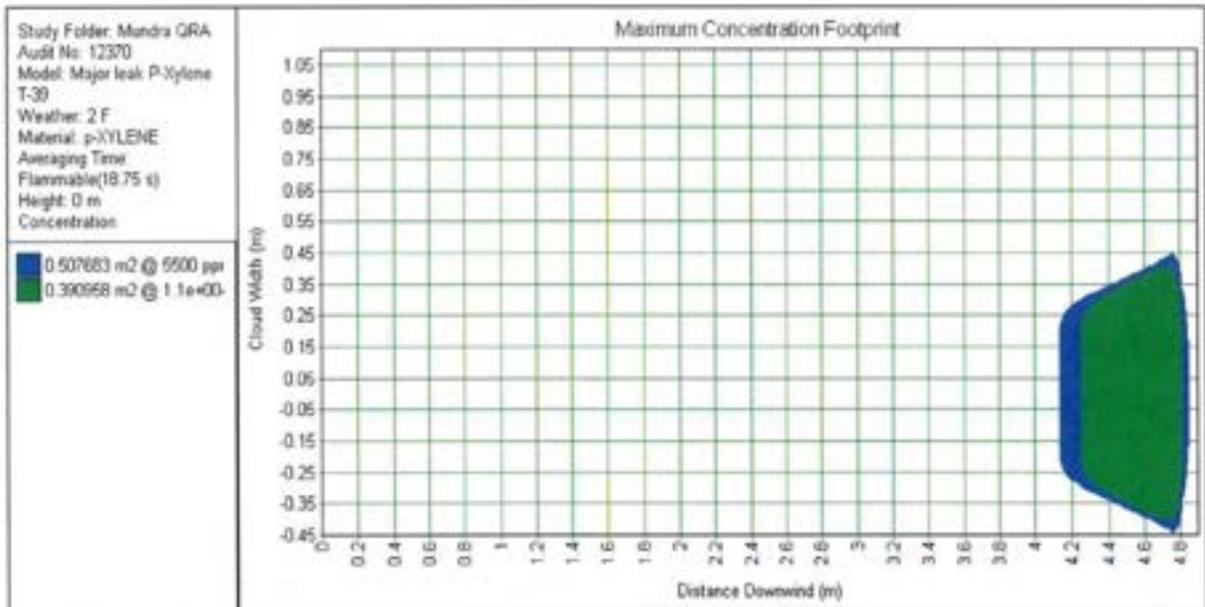
ON SITE EMERGENCY PLAN (Port Area)



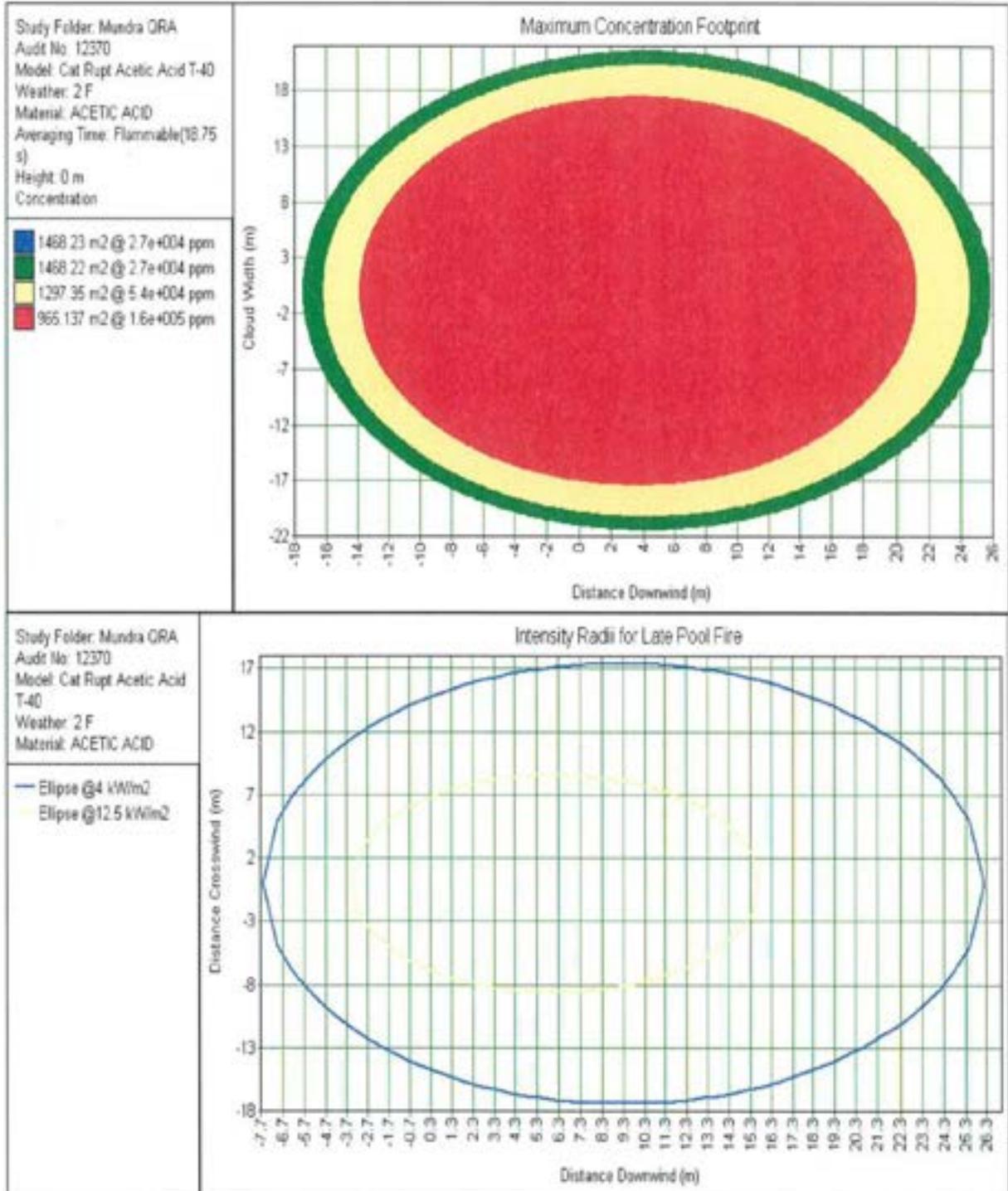
ON SITE EMERGENCY PLAN (Port Area)



Scenario No.:11



Scenario No.: 4



Overall Risk Contours Of Styrene Storage Tank And Transfer Pump Area

LSIR Contour : Failure - Tank T-08

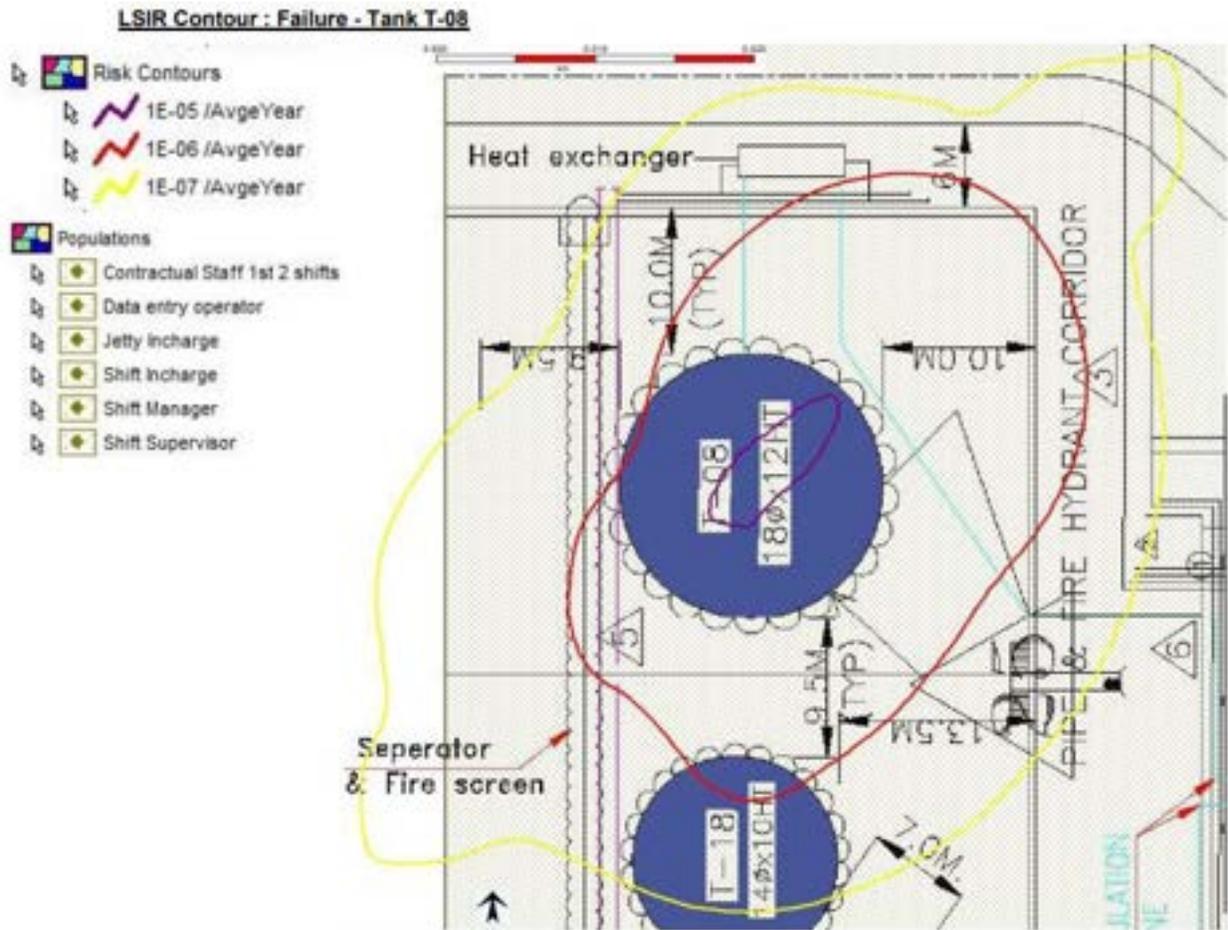


FIGURE 25: LSIR CONTOUR : FAILURE - TANK T-08

	ADANI PORTS AND SEZ LTD MUNDRA	AUGUST - 2023
	ON SITE EMERGENCY PLAN (Port Area)	

LSIR Contour : Failure - Tank T-18

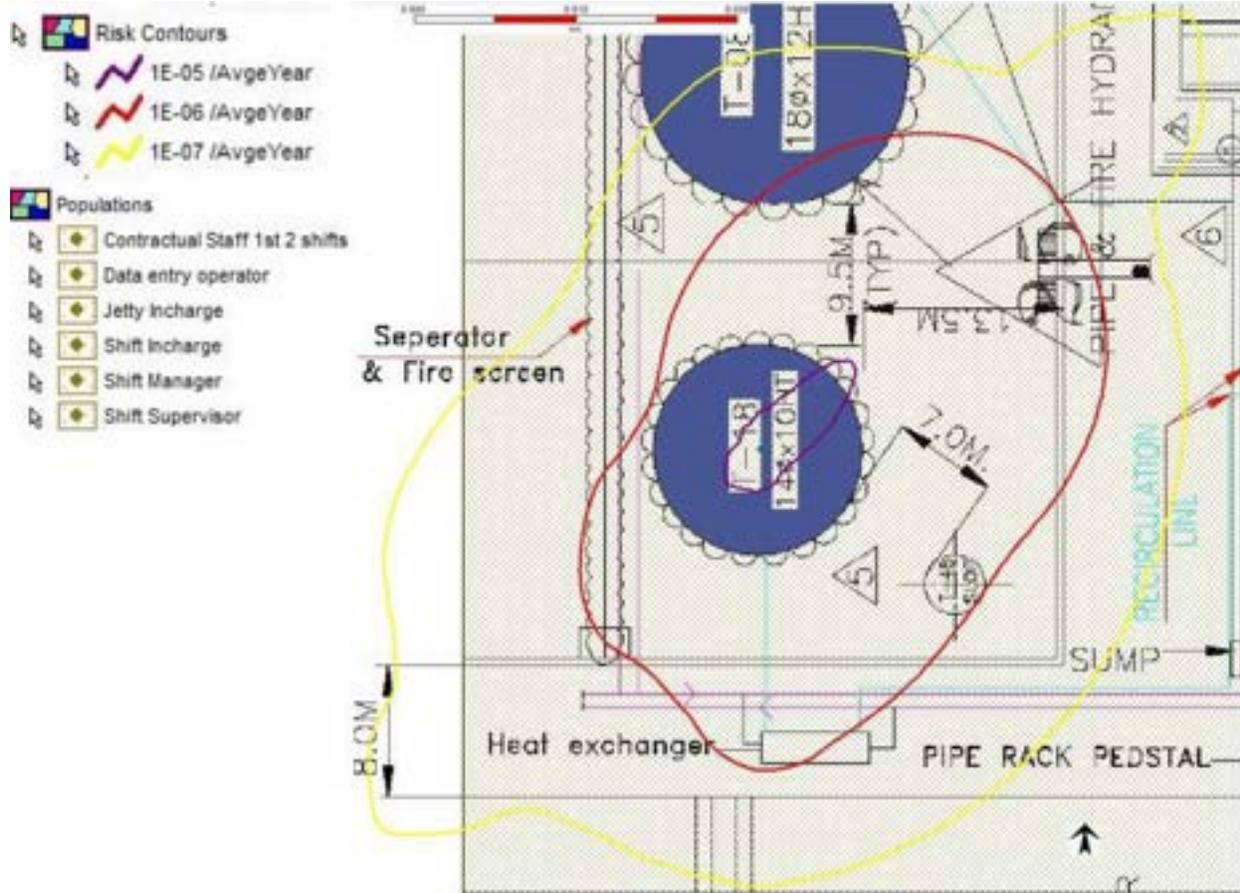


FIGURE 26: LSIR CONTOUR : FAILURE - TANK T-18

LSIR Contour : Failure - Pump P-08



FIGURE 27: LSIR CONTOUR : FAILURE - PUMP P-08

LSIR Contour : Failure - Pump P-18



FIGURE 28: LSIR CONTOUR : FAILURE - PUMP P-18

CHAPTER NO. III

ABOUT EMERGENCY ORGANISATION

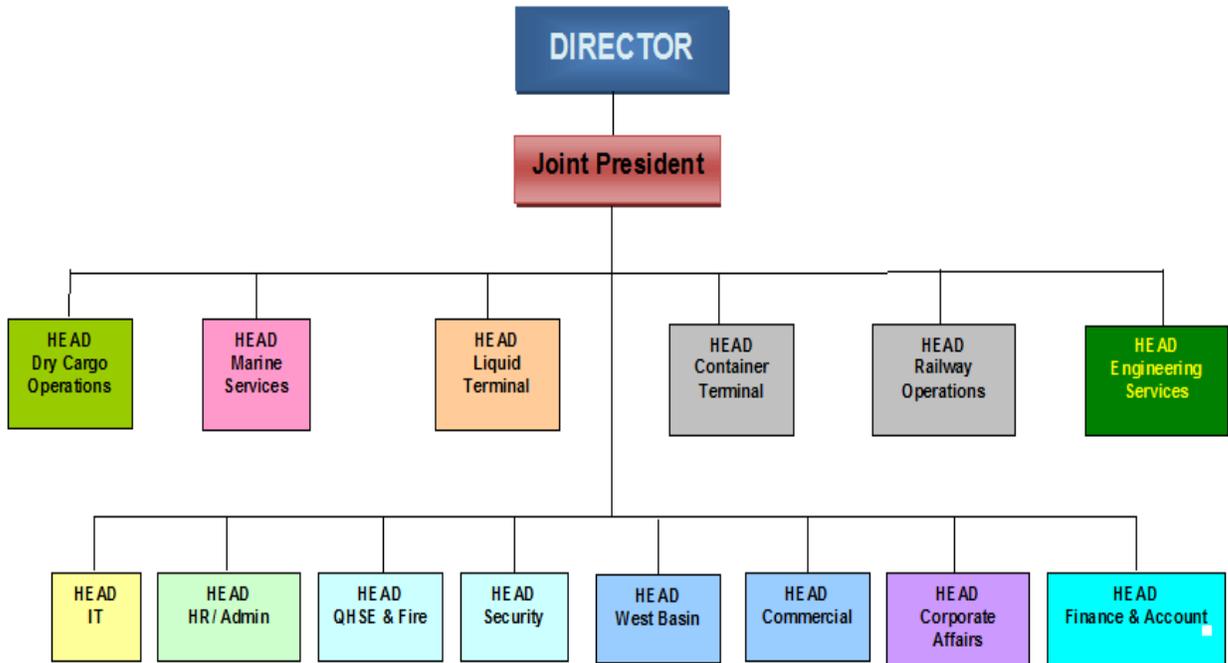
CONTENTS

- 3.00 ABOUT EMERGENCY ORGANIZATION
- 3.01 SCOPE & PURPOSE
- 3.02 THE NEED OF DISASTER PLANNING AT APSEZ
- 3.03 EMERGENCIES - CLASSIFICATION OF EMERGENCES
- 3.04 EMERGENCY RESPONSE ORGANIZATION
- 3.05 EMERGENCY REPORTING LINE
- 3.05 ASSEMBLY POINTS
- 3.06 CATEGORIES OF EMERGENCIES
- 3.07 DUTIES & RESPONSIBILITIES
- 3.08 EXTERNAL AID
- 3.09 MUTUAL AID MEMBERS
- 3.10 GOVERNMENT AUTHORITIES
- 3.11 REPORTING & INVESTIGATION
- 3.12 COMMUNICATION & PUBLIC AFFAIRS
- 3.13 PUBLIC AFFAIRS

3.0 EMERGENCY ORGANIZATION

Emergency organization is the main aim behind preparing this plan. Due weight is added to select and assign suitable responsibilities to the most appropriate persons of the **Adani Port, Mundra** from respective departments. Care is taken to earmark emergency duties from their day-today responsibilities. The organization shall prove effective if activities are carried-out in a defined way. To get maximum advantage of emergency organization, we have defined the activities of various workers in the following way.

ORGANIZATIONAL STRUCTURE



TERMS	DEFINITION
Emergency Control Center	In the event of an emergency, Port ISCR (Integrated Security Control Room) has been declared as Emergency Control Center. ISCR is situated at 2nd Floor Security Operations Adani House, Adani Ports & SEZ Ltd.

	ADANI PORTS AND SEZ LTD MUNDRA	AUGUST - 2023
	ON SITE EMERGENCY PLAN (Port Area)	

Coordinator	HOD or senior most functionaries in the respective services and other critical personnel available at site at the time of an emergency. They will report at the Emergency Control Center, unless and otherwise instructed by the site main controller.
Plant Key Person	Head of Department of individual process plant(s). {Should assume charge of Site Incident Controller in case of an emergency in their respective plant(s)}.
Non-Essential Personnel	Consists of employees, contractor's employees, visitors etc. (other than emergency response personnel) present at the incident site. In the event of an emergency, these persons shall assemble at the emergency assembly point of the plant/ area and shall respond as instructed by the site incident controller.

3.01 SCOPE & PURPOSE

SCOPE :: The very purpose of this plan is to activate the emergency response organization smoothly and effectively, once the emergency is declared. The plan details the arrangements for responding to emergency scenarios, covering in details the following aspects:

- To assess and define emergency including level of risk.
- To contain the incident and bring it under control.
- To coordinate with mutual aid members and Government authorities.
- To minimize damage to lives, property and the environment.
- To rescue and evacuate workers to safe areas.
- To provide necessary assistance to casualties.

PURPOSE :

The purpose of this plan is to:

- Establish & define roles of coordinators, key personnel and other emergency response personnel.

	ADANI PORTS AND SEZ LTD MUNDRA <hr/> ON SITE EMERGENCY PLAN (Port Area)	AUGUST - 2023
---	---	----------------------

- Establish guidelines for effective response to any emergency.
- Ensure a smooth interface between various emergency procedures and the APSEZ Emergency Action Plan.

For this plan to be effective, it is necessary that:

- Coordinators, key personnel and other emergency response personnel are familiarized with this action plan.
- On-site resources are mobilized in minimum time.
- Assistance from outside agencies is readily available.
- The drills for identified emergencies are regularly exercised.
- The emergency responses are reviewed and updated based on latest developments, other information and requirements in order to improve effectiveness of the APSEZ EAP.

3.02 THE NEED OF DISASTER PLANNING AT APSEZ (Port Area)

Disaster at The Port: A major emergency in Port is one, which has the potential to cause serious injury or loss of life. It may cause extensive damage to property and serious disruption both inside and outside the port. Sometimes, it would require the assistance of outside emergency services to handle it effectively. Although an emergency may be caused by a number of different factors, viz plant failure, human error, earthquake, Cyclone, flood, vessel collide, vehicle crash, major spillage or sabotage, it will normally manifest itself in three basic forms viz - Fire, Explosion or toxic release.

Need of Disaster Planning: In spite of universal acceptance of excellent codes of practices for design and operation of plants and storage, there have been occurrences of a number of losses due to major incidents of varying degree of severity. In fact, no industrial plant or office and no commercial or mercantile organization can be totally immune from disaster. These disasters could be attributed to various causes including failure of adherence to codes of practice. The first few minutes after an emergency situation occurs are generally the most critical. The wrong action or a few seconds delayed action in crises can make all the difference. A quick and effective response at that time can have tremendous significance on whether the situation is controlled with little loss or whether it turns into a disaster. Contingency planning increases thinking accuracy and reduces thinking time in an emergency, which reduces loss. The effectiveness of what we should do if disaster strikes will depend upon how well we have prepared the contingency plans and trained the people who will have to implement them. Even if the plans generated and equipment provided are never used, the very fact that the

plans have been developed and equipment have been provided creates confidence among employees and from an economic point, may reduce the insurance rates. The Social and legal consequences of —Bhopall Gas Tragedy have sufficiently demonstrated that these considerations alone are important enough to persuade management of hazardous plants to develop suitable plans. Thus disaster is a situation generally arising with little or no warning and causing or threatening death, injury or serious disruption to people and services which cannot be controlled, by fire, police and services operating alone. The incident will require special mobilization and co-operation of other bodies and voluntary organization.

3.03 EMERGENCIES - CLASSIFICATION OF EMERGENCES

Different types of emergencies that may arise at the Port can be broadly classified as:

a) Nature – I (On – Site Emergency) – It can be further subdivided into two levels:

Level – I The emergency is perceived to be a kind of situation arising due to an incident which is confined to a small area and does not pose an immediate threat to life and property and this can be handled with resources available within premises.

Level – II The emergency is perceived to be a kind of situation arising due to an incident which poses threat to human lives and/ or property, having potential to affect large area within the factory premises. This kind of situation is beyond the control of internal resources and requires mobilization of additional resources from other sections/ departments and help from outside agencies. The situation requires declaration of On – Site emergency.

b) Nature – II (Off – Site Emergency)

The emergency is perceived to be a kind of situation arising out of an incident having potential threat to human lives and property not only within Port but also in surrounding areas and environment. It may not be possible to control such situations with the resources available within APSEZ. The situation may demand prompt response of multiple emergency response groups as have been recognized under the District Emergency plan for Kutch. A similar situation in neighbouring industry that may affect The Port Area and also falls under this category.

POTENTIAL EMERGENCIES

Sr. No.	Emergencies
1.	Cyclonic Storm/ Hurricane
2.	Earthquake
3.	Tsunami
4.	Flood
5.	Industrial unrest
6.	Bomb Threat
7.	War
8.	Food/ Water Poisoning
9.	Fire , Transportation Incidents involving Hazardous Materials
10.	Major Release of Flammable/ Toxic Chemicals
11.	Major Release of Flammable/ Toxic Gases
12.	Transportation Incidents involving Hazardous Material
13.	Marine Emergency

3.04 EMERGENCY RESPONSE ORGANIZATION

For control of an emergency, **Adani Port - Mundra** has established an emergency response organization headed by **COO (alternate – next Sr. Officer In-charge)**, who shall be the Site Main Controller. This emergency response organization will provide the command and control structure to coordinate and direct the response to an emergency, and depending on the circumstances of the emergency will consists of:

Management Team Director / CEO / COO (Site Main Controller) QHSE – HOD or senior most functionary of the department Site Incident Controller – Head of Department or Senior most functionaries available at site in respective both Day and Night hours. Deputy Site Incident Controller – Section Head or Next Senior most functionaries available at site in respective both Day and Night hours.
--

Primary Support Team

Coordinators (HOD or senior most functionaries)

- Fire Services
- QHSE
- Security Services
- Occupational Health Center
- Engineering Services
- Human Resource
- Administration

Secondary Support Team

Coordinators (HOD or senior most functionaries)

- Finance & Accounts
- Commercial
- Administration (Transport Cell)
- Administration (Welfare & Canteen)
- Corporate Communication

Only Site Main controller can activate the emergency response organization. An Emergency Control Center has been established in the office of Site Main Controller (**Alternate – ISCR 2nd Floor | Security Operation | Adani House (APSEZ Mundra)**).

The primary role of the emergency response organization in an emergency shall be:

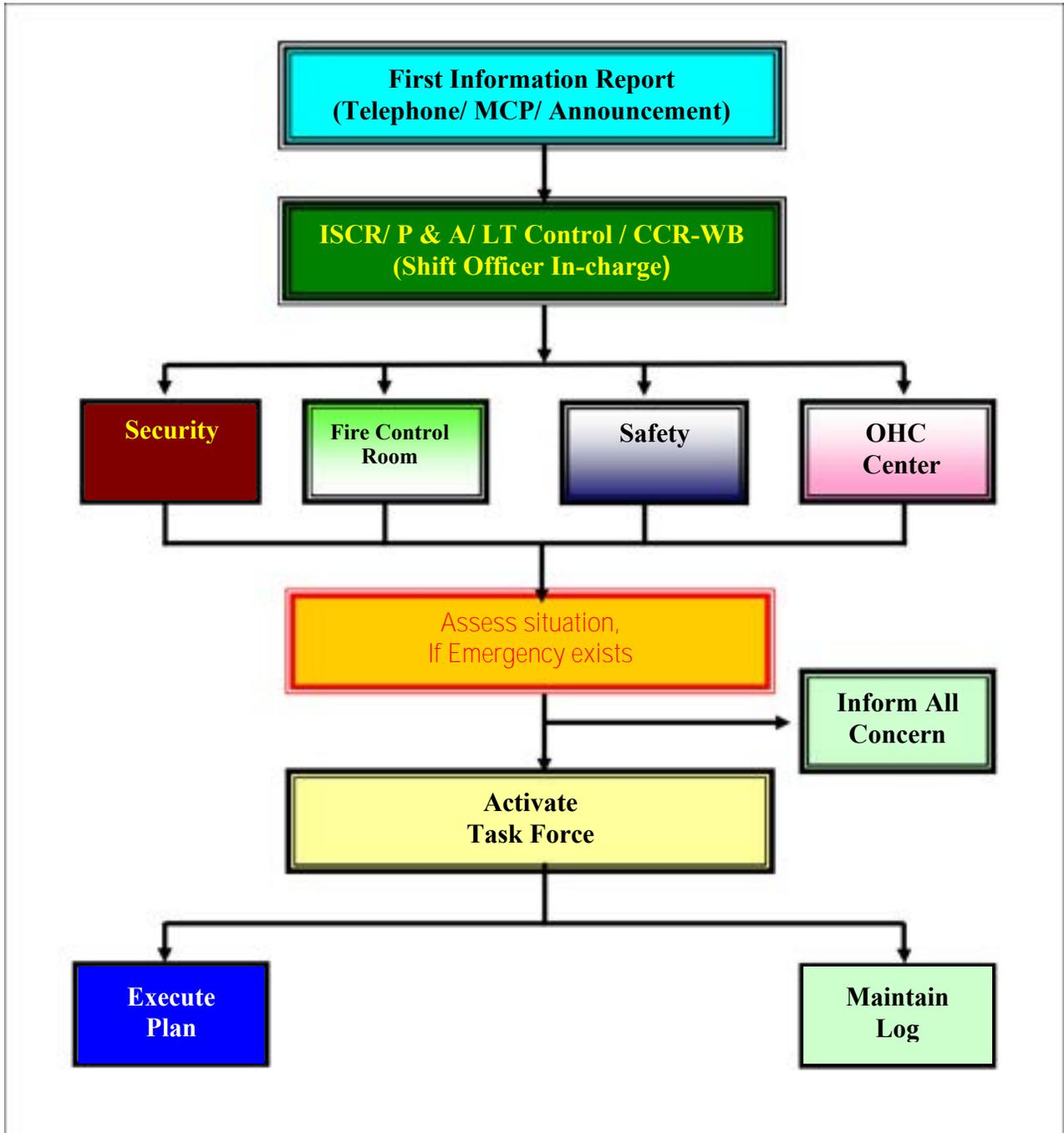
- ❖ Determine the degree to which the emergency response organization shall be activated.
- ❖ Determine extent of actual action required, organize and render assistance to Site Incident Controller.
- ❖ Coordinate with all other concerned.

Emergency Reporting Line is as outlined in **Chart B**.

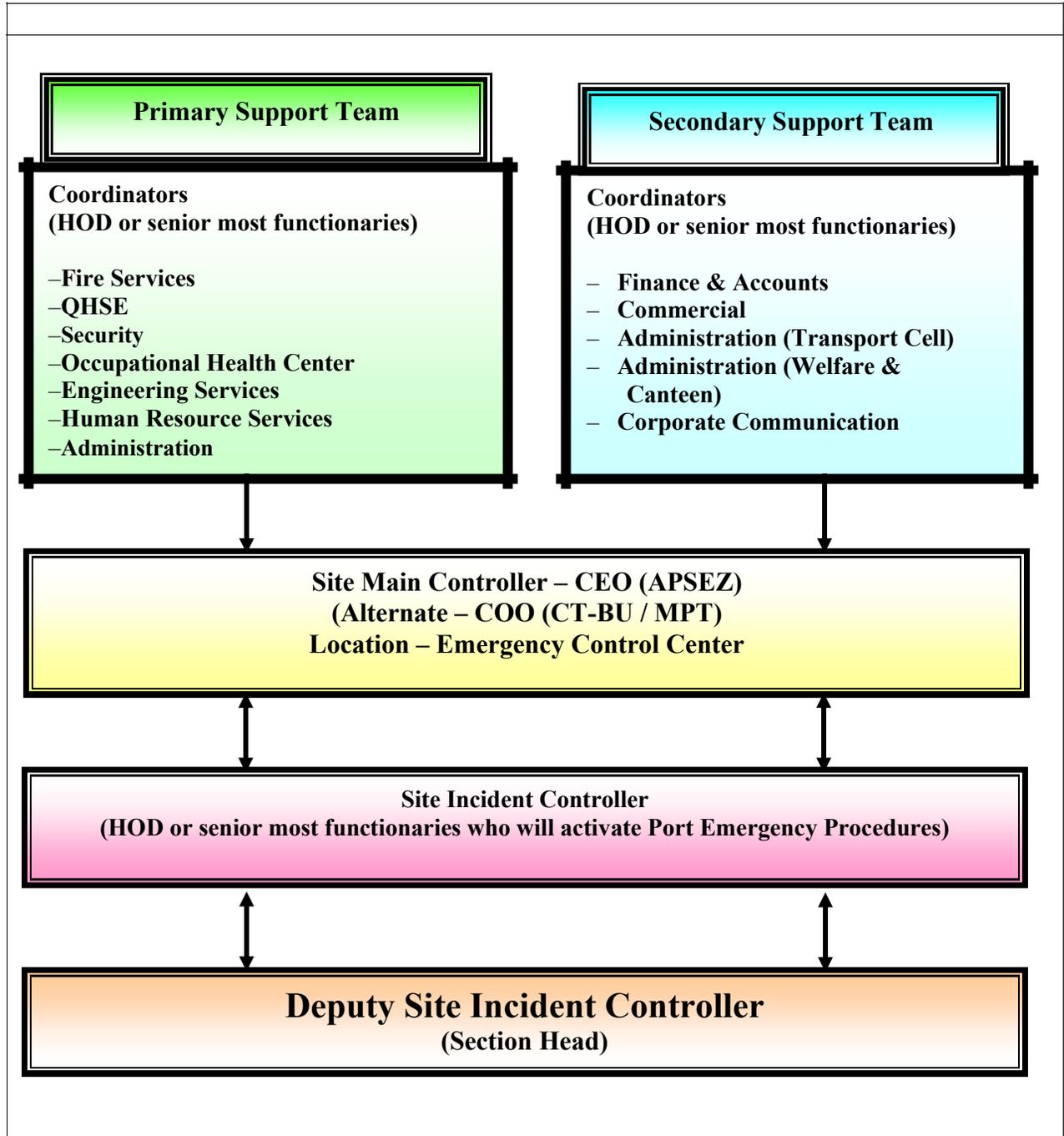
Emergency Task Force is as outlined in **Chart C**.

Emergency Assembly Points are as outlined in **Chart D**.

3.05 EMERGENCY REPORTING LINE

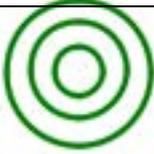


EMERGENCY TASK FORCE (Applicable for 24 X 7 including night hours)



3.06 ASSEMBLY POINTS

ASSEMBLY POINT

		
	EMERGENCY ASSEMBLY POINT	
	Port Emergency Assembly Points	
PORT AREA		
ZONE	AREA	
ZONE – 1	Marine House	
ZONE – 2	CG–7	
ZONE – 3	Driver Canteen	
ZONE – 4	Old Administration Canteen	
ZONE – 5	Railway Building (R & D Yard)	
ZONE – 6	Terminal – 2 (Security Gate)	
ZONE – 7	Container Terminal - 2 (Security Gate)	
ZONE – 8	Main Gate	
ZONE – 9	Port User Building	
ZONE – 10	Adani House	
ZONE – 11	Terminal – 03 (Security Gate)	
ZONE – 12	South Basin (Security Gate)	
WEST BASIN AREA		
ZONE – 1	SS-1	
ZONE – 2	PMC Office	
ZONE – 3	GIS (Near DG House)	
ZONE – 4	Main Gate	
ZONE – 5	Approach - 03	
ZONE – 6	Amenities Building	
<p style="color: red;">Non-essential personnel shall assemble at Emergency Assembly Point as announced by Site Incident Controller.</p>		
<hr style="width: 50px; margin: 0 auto;"/> 95 <hr style="width: 50px; margin: 0 auto;"/>		

3.07 CATEGORIES OF EMERGENCIES

The general action plan to deal with:

- Emergencies (Category wise) are as outlined in **Chart –E.**
- Emergencies (Occurrence - with due warning) are as outlined in **Chart –F.**
- Emergencies (Occurrence – sudden) are as outlined in **Chart –G.**

EMERGENCIES CATEGORY WISE

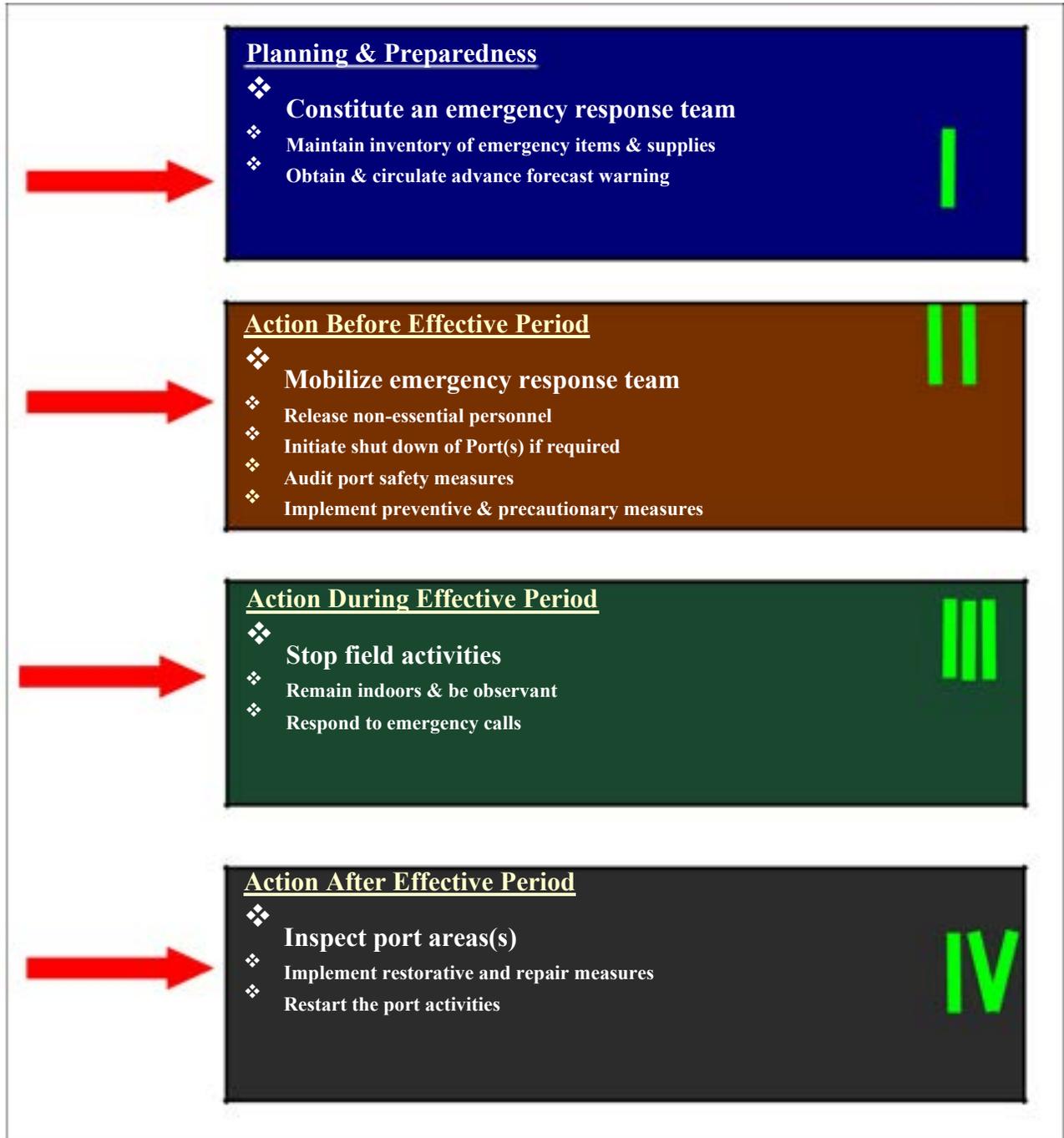
**Emergencies
(Occurrence – with due warning)**

- ❖ **Cyclonic Storm/ Hurricane**
- ❖ Earthquake
- ❖ Flood
- ❖ Tsunami
- ❖ Industrial Unrest
- ❖ Bomb Threat
- ❖ War

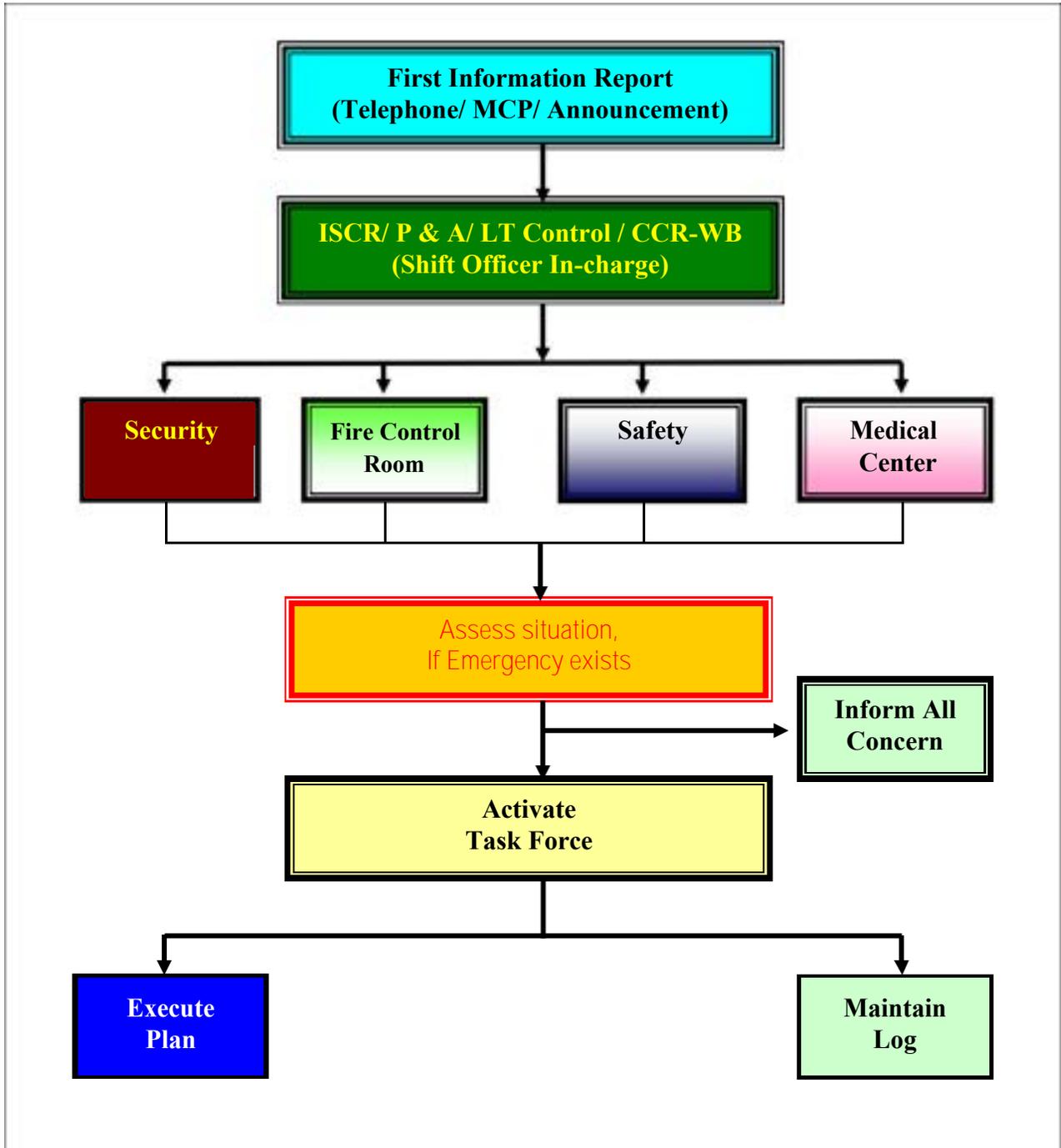
**Emergencies
(Occurrence – without warning)**

- ❖ **Food/ Water Poisoning**
- ❖ Fire
- ❖ **Major Release of Flammable/
Toxic Chemicals**
- ❖ **Major Release of Flammable/
Toxic Gases**
- ❖ **Transportation incidents involving
Hazardous Materials**
- ❖ Marine Emergency

GENERAL ACTION PLAN – EMERGENCIES (OCCURRENCE – WITH DUE WARNING)



GENERAL ACTION PLAN – EMERGENCIES (OCCURRENCE – WITHOUT WARNING / SUDDEN)



ON SITE EMERGENCY PLAN (Port Area)**3.08 DUTIES & RESPONSIBILITIES****3.8.1 Site Main Controller:**

- Has overall responsibility for the conduct of all emergency operations within the port complex.
- Shall immediately assess the situation plus its consequences, formally declare the level of emergency and order appropriate action.
- Shall direct all emergency operations within the port premises with the following priority:
 - Safety of personnel, property and equipment
 - Pollution and environmental impact control
 - Damage and loss control
 - Minimum curtailment of port activities
- Shall ensure all possible assistance to personnel affected for medical attention and hospitalization as appropriate.
- Shall ensure that all local and statutory authorities are kept advised of the facts and status.
- Shall ensure that normalcy is declared only when considered absolutely safe to do so.
- Shall be responsible for making available all possible company resources for emergency operations within Mundra Taluka and Bhuj District, if required/ requested by the appropriate Government Authority or —Mutual Aidl organization.

3.8.2 Site Incident Controller

- Shall immediately assess the scale of emergency and report to Site Main Controller for instructions/ directions.
- Shall be responsible for operations in affected area with priorities as under:
 - Safety of personnel, property and equipment
 - Pollution and environmental impact control
 - Damage and loss control
 - Minimum curtailment of port activities
- Shall liaise with other heads of department for their support and assistance.
- Shall ensure continual reporting of situation to Site Main Controller and shall recommend calling for external resources as appropriate.

3.8.3 Emergency Support Officers

- Shall report to Site Incident Controller immediately and assist him as required (all possible portable emergency equipment, resources and personnel to incident location).
- Shall liaise closely with Head- Administration to facilitate the transfer of equipment, resources and personnel to incident location as appropriate.

3.8.4 Emergency Support Officers (Cont.)

- Shall carefully evaluate the risks, effects and possible consequences of:
 - the incident to his area of responsibility and propose further course of action to the Site Incident Controller with particular concern about safety of personnel, protection of environment and control of operation
- If the emergency situation involves Railways (locomotives, tracks and/or sidings), shall inform the Area Manager of Western Railways for assistance and mobilization of the Railways Emergency Team.

3.8.5 HOS – Administration (Transport Cell, Welfare & Canteen)

- Shall report to Site Incident Controller immediately and assist him as directed.
- Shall coordinate the activities of administration units.
- Shall inform and liaise with local bodies and authorities and police department in respect of the incident/ emergency.
- Shall arrange for transportation of whatever nature for use in the situation.
- Shall ensure that internal and external communication systems are available.
- Arrange for hot drinks/ snacks/ foods as requires at incident location.
- Shall arrange for assistance, if required from the —**Mutual Aid** system if available and as directed by Incident Controller.

3.8.6 HOD – Human Resources

- Shall report immediately to Site Incident Controller and assist him as directed.
- Shall ensure Assembly Points are manned and all persons reporting there properly identified.
- Shall arrange to record full details of all persons affected by the incident and to inform next of kin as appropriate.
- Shall arrange for the transfer of all affected persons to suitable places for first aid or further medical attention as appropriate.
- Shall arrange for the evacuation, from the location of incident of all personnel not essential.
- Shall arrange to depute company personnel to each location where affected persons are being treated or are gathered for whatever reasons, to render assistance.
- Shall arrange to keep regularly informed of status and facts pertaining to incident to the families of company personal in its residential area.
- Shall inform to Government Authorities (DISH, GPCB etc.)
- Liaison with Government Authorities (DISH, GPCB etc.)

3.8.7 HOD – Corporate Affairs

- Shall report immediately to Site Incident Controller and assist him as directed.
- Shall assume the role of Public Relation Officer (PRO) for communication, dissemination of information, status and facts (preparation of communiqués, statements etc.) Shall coordinate with business related statutory and Government organization.

3.8.8 HOD – Engineering Services

- Shall report immediately to Site Incident Controller and assist him as directed.
- Shall ensure activation of departmental damage limitation activities.
- Shall ensure immediate electrical isolation of the incident location thereafter; arrange availability of power after ascertaining safety of doing so.
- Shall make available all support that may be possible for the extrication/ evacuation of persons from the affected area.
- Shall liaise with the Engineering Services of organizations in close neighborhood for sourcing of supplemental equipment resources and assistance.
- Shall depute all available personnel to assist administration department.

3.8.9 HOD – Commercial

- Ensure availability of materials required by the Site Incident Controller.
- Issue materials from central stores round-the-clock (if required).
- Arrange emergency procurements from local dealers/ vendors or from neighboring industries.
- Arrange transportation of materials from central stores to the site of incident in coordination with the Coordinator (Transport Cell).

3.8.10 HOD – Finance & Accounts

- Shall report immediately to Site Incident Controller and assist him as directed.
- Shall ensure availability of funds and cash for all emergent requirements.
- Shall depute all available department personnel to assist HR in their activities.
- Shall ensure that under writers, shareholders, lenders, bankers and other Financial Institutions and statutory bodies are kept advised of the situation as appropriate.

3.8.11 HOD – Security

- Close the visitors ‘gate.
- Instruct the security to occupy pre-determined post for controlling security of installation.
- Call up additional help from Barracks.
 Ensure that unauthorized persons / vehicles do not enter the gate.

	ADANI PORTS AND SEZ LTD MUNDRA <hr/> ON SITE EMERGENCY PLAN (Port Area)	AUGUST - 2023
---	---	----------------------

3.8.12 HOD – Security (Cont.)

- Ensure that unauthorized persons / vehicles do not enter the gate.
- Provide security men for firefighting & rescue.
- Arrange for transport of higher authorities to the terminal.
- Transport vehicles would be provided near emergency control center.
- Depute two security guards for controlling traffic at scene of disaster.
- Produce a list of port staff on duty in co-ordination with time office.
- Ensure availability of security men at gates so that they can lead authorities to disaster site.
- Ensure that non-essential persons do not crowd affected area.

3.8.13 HOS – Fire Services

- He will report to Site Incident Controller and has the single motive – concern for safety of personnel during emergency response operations. He will normally function as an advisor to the Site Incident Controller.
- He will not be directing any activity, issuing or relaying orders/ information.

3.8.14 HOD/ HOS – Safety

- Report at Emergency Control Center and assist Site Main Controller with necessary information, support and resources.
- Mobilize off-duty personnel for assistance.
- Coordinate with the Coordinator – Commercial to mobilize additional resources, viz. spill containment equipment/ firefighting equipment/ personal protective equipment, spare breathing air cylinders etc., as may be required at the site of incident.

3.8.15 HOS – Occupational Health Center

- Contact Site Main Controller. Report at Emergency Control Center or at Occupational Health Center as instructed by the Site Main Controller.
- Organize first aid arrangements for the affected persons at the site of incident (cold zone) as may be necessary.
- Ensure that adequate paramedical staff, equipment and medicines are available at the Occupational Health Center. Mobilize additional resources (if necessary).
- Liaise with the local medical authorities and city hospitals, if the casualties are high and situation demands external medical help.
- Coordinate with the Coordinator - Transport for transporting victims to various hospitals.

3.09 EXTERNAL AID

In case of an emergency, which poses threat to human lives or/ and property, within **Adani Port - Mundra** as well as in the surrounding neighborhood areas, it may not be possible to control such situations with the resources available at APSEZ. In such situations, additional resources are mobilized from other agencies, which include:

- Neighbouring Industries (Mutual Aid Members)
- Government Authorities

External Aid Providers are as outlined in **Chart H**.

Note: Agreement is under process.

3.10 MUTUAL AID MEMBERS

Adani Port has entered into an agreement for mutual aid with following units for help/ assistance in the event of an emergency.

- Indian Oil Corporation Limited,
- Hindustan Petroleum Corporation Limited,
- Jindal SAW Ltd. (IBU),
- Adani Power Limited,
- Costal Gujarat Power Limited,
- Hindustan Mittal Energy Limited

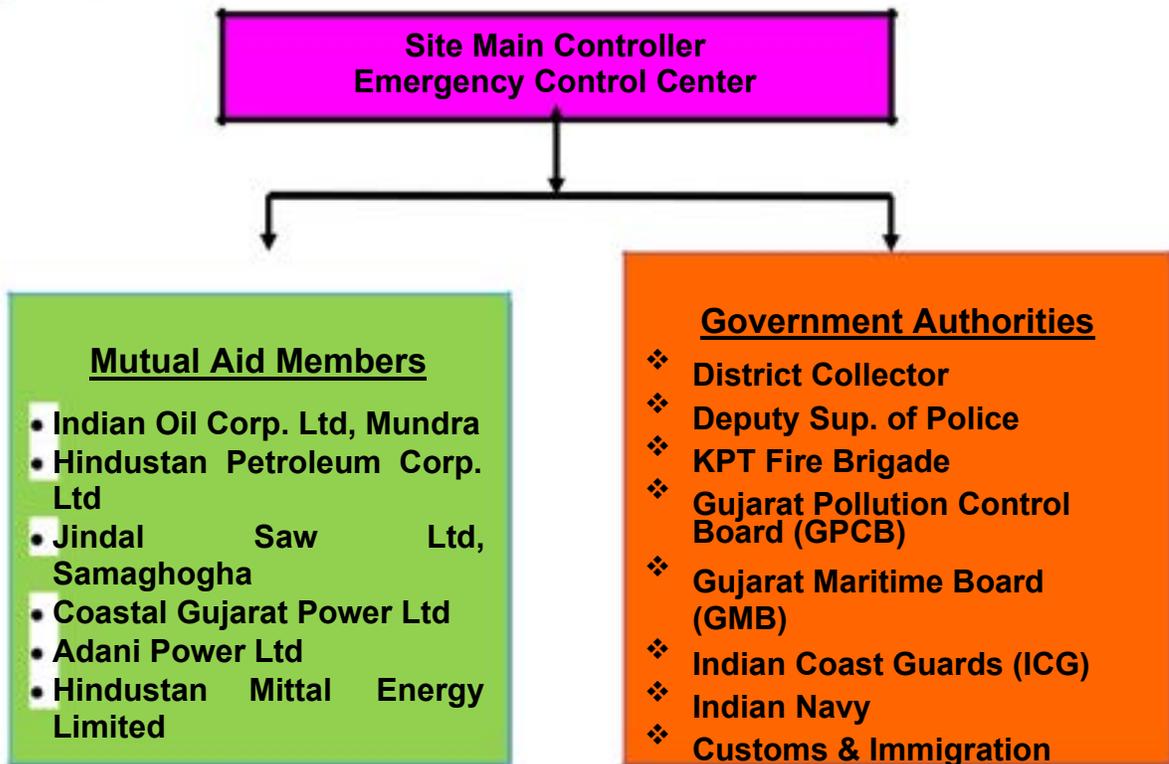
The mutual aid members shall:

- Respond promptly to the emergency call as and when communicated.
- Send their fire tenders/ crewmembers along with necessary supplies/ materials at the site of incident (as requested) and report at the **Adani Port** Security Gate and get instructions from security personnel on duty. These resources and personnel shall be deployed as directed by Site Incident Controller.
- The crew in-charges of the mutual aid members shall be responsible for safety of their crew engaged in emergency operations.

3.11 GOVERNMENT AUTHORITIES

If the situation demands response from multiple groups/ teams, APSEZ may seek assistance from various Government Authorities as have been recognized under the District Disaster Management Plan. These may include:

- District Collector
- Fire Brigade
- Police Commissioner
- Gujarat Pollution Control Board (GPCB)
- Gujarat Maritime Board (GMB)
- Indian Coast Guards (ICG)
- Indian Navy
- Immigration & Customs



	ADANI PORTS AND SEZ LTD MUNDRA <hr/> ON SITE EMERGENCY PLAN (Port Area)	AUGUST - 2023
---	---	----------------------

3.12 REPORTING & INVESTIGATION

REPORTING: Any incident (whether minor or major) shall be reported. The main objective of incident reporting is to:

- Provide first-hand information to all the concerned
- Initiate investigation
- Prepare failure analysis report
- Report to the Government authorities (if required)

References

- Procedure for Incident Reporting
- Incident Report Format
- Work Injury Report

INVESTIGATION: All incidents (whether minor or major) shall be investigated. The main objectives of incident investigation are to:

- Identify the root cause(s) of the incident.
- Take appropriate preventive measures to prevent recurrence.
- To comply with the statutory requirements.

References

Incident Investigation Procedure

3.13 COMMUNICATION & PUBLIC AFFAIRS

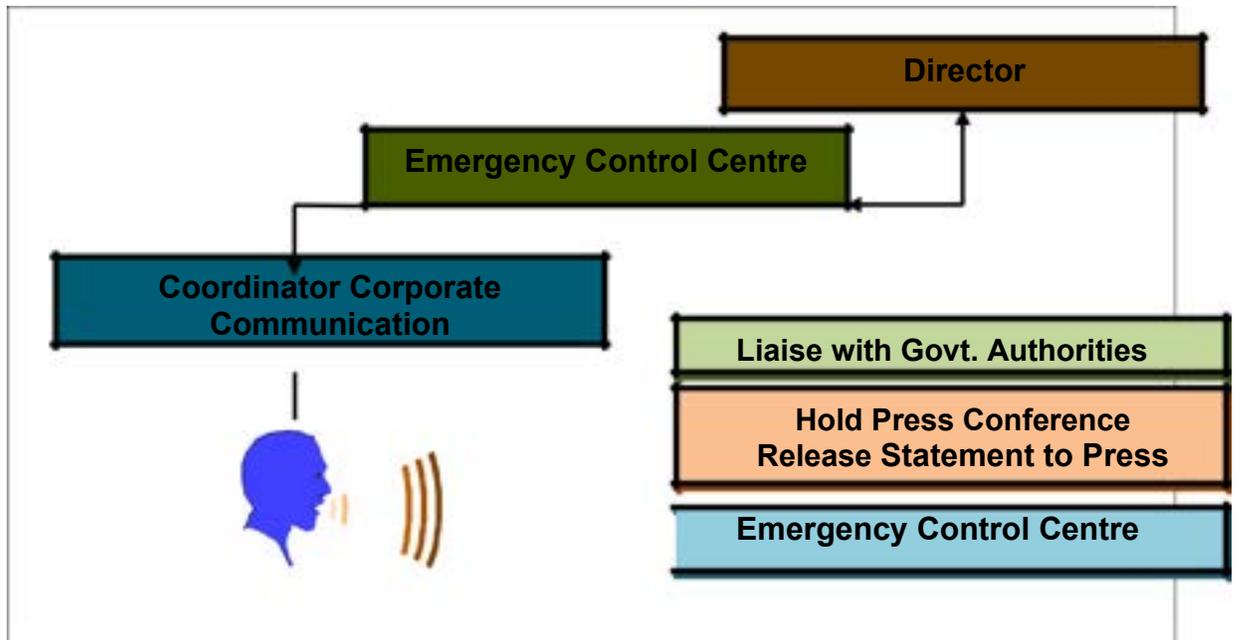
COMMUNICATION: Communication, an integral part for handling any emergency, helps in taking quick decisions, efficient & effective control of the emergency. Communication between the Emergency Control Center & the Field Command Post is established by means of:

- ❖ Telephone
- ❖ Mobile
- ❖ Port Announcement System
- ❖ Wireless VHF / UHF Radio
- ❖ E – Mail
- ❖ Emergency Vehicle

Communication between the Emergency Control Center and external authorities will be by:

- ❖ Telephone
- ❖ E – Mail
- ❖ Fax
- ❖ Emergency Vehicle

3.14 PUBLIC AFFAIRS



CHAPTER - 4

EMERGENCY PLANNING

- 4.01 DRILLS & TRAINING
- 4.02 TRAINING
- 4.03 EMERGENCY PLANS
 - 4.3.1 CYCLONIC STORMS / HURRICANE
 - 4.3.2 EARTHQUAKE
 - 4.3.3 TSUNAMI
 - 4.3.4 FLOOD
 - 4.3.5 INDUSTRIAL UNREST
 - 4.3.6 BOMB THREAT
 - 4.3.7 WAR
 - 4.3.8 FLOOD/WATER POISONING
 - 4.3.9 FIRE
 - 4.3.10 MAJOR RELEASE OF FLAMMABLE/TOXIC CHEMICALS
 - 4.3.11 MAJOR RELEASE OF FLAMMABLE/TOXIC GASES
 - 4.3.12 INCIDENTS INVOLVING TRANSPORTATION OF HAZARDOUS MATERIAL
 - 4.3.13 MARINE EMERGENCY

4.01 DRILLS & TRAINING

Emergency response drills are conducted once a month to ensure effective response by not only the staff within **Adani Port** complex but also by external aid members (as required). The participation & actions will depend on the level of emergency drill planned, as per following table:

Drill	Duration	Port Level	Complex Level	District Level	Frequency	Notes
Siren Testing Drill	1 Minute	X	--	--	Twice in a Month	Test communication, check availability of personnel and evaluate response time.
Emergency Response Drill	1 – 2 hours	--	X	--	Monthly	Consists of interactive discussions of a simulated scenario among members of emergency response team but does not involve mobilization of personnel & equipment

4.02 TRAINING

The importance of training to personnel involved in responding to any emergency scenario is recognized and acknowledged. The training to employees at APSEZ is as per following table:

Course	Duration	New Recruit	Existing Staff	Frequency	Notes
Induction Training	4 Days	X	--	On joining the organization	All employees on joining the organization shall undergo the training at Learning Center

4.03 EMERGENCY PLANS

INDIVIDUAL PLANS ARE REQUIRED TO DEVELOP EMERGENCY PLANS AS PER GUIDELINES PROVIDED IN SAMPLE PLANS

4.3.1 CYCLONIC STORMS / HURRICANE

Cyclonic storms/ hurricanes are intense depressions, which develop in tropical latitudes and are often the cause of very high winds and seas. The wind blows around the center of a tropical storm in a spiral flow inward, anti-clockwise in Northern Hemisphere and clockwise in Southern Hemispheres. Plan for tackling cyclonic storm/ hurricane can be broadly divided in following stages:

Action By	Activity
-----------	----------

PLANNING & PREPAREDNESS

<p>Port Key Person</p>	<ul style="list-style-type: none"> ❑ Constitute Emergency Response Team(s) comprising of at least: <li style="padding-left: 20px;">- Port Engineer (01), Fire Team Member (01), Port Operators (02), ❑ Electrician (01) <li style="padding-left: 0;">Note <li style="padding-left: 20px;">➤ Based on total strength of the individual plant, more than one team may be constituted. <li style="padding-left: 20px;">➤ Each member of the team shall have a designated alternate member. ❑ Maintain inventory of emergency items & supplies as necessary, including but not limited to: <li style="padding-left: 20px;">❑ Torches, Ropes, lines, wires, tarpaulins, plastic sheets, Tool kit, duct tapes, assorted gears, First aid box, Sand bags etc. <li style="padding-left: 20px;">➤ The list is subject to updating depending on the requirements of the individual plant. ❑ Liaise with HOD – ES for Civil & Mechanical Support (including supply of spares). ❑ Liaise with HOD – HR for food stock, water, blankets & bedding and medicine. ❑ Liaise with Port Operation Control.
-------------------------------	---

CYCLONIC STORMS/HURRICANE (Cont.)

Action By	Activity
-----------	----------

ACTION BEFORE EFFECTIVE PERIOD

<p>Port Key Person</p>	<ul style="list-style-type: none"> ❑ Liase with Site Main Controller ❑ Mobilize Emergency Response Team(s). Note <ul style="list-style-type: none"> ➤ Members to be briefed about the emergency. ➤ Members to be informed that they may be required to stay at site during & after the emergency. ❑ Release non-essential personnel. <ul style="list-style-type: none"> ➤ Port key person reserves prerogative on the release of employees. ➤ Personnel to be briefed on the possible time of return to work. ❑ Initiate Port shut down based in: <ul style="list-style-type: none"> ❖ Consultation with Site Main Controller. ❑ Audit Port area(s) for safety measures to ensure that: <ul style="list-style-type: none"> ❖ <i>Loose items are secured.</i> ❖ <i>Electric machinery is covered and protected against water ingress.</i> ❖ Storm water drains are cleared of any obstructions. ❑ Implement preventive & precautionary measures (including but not limited) to ensure: <ul style="list-style-type: none"> ❖ <i>Inventory of emergency supplies is maintained.</i> ❖ <i>Material and equipment that can possibly be damaged by water ingress is elevated.</i> ❖ <i>Windows & doors are weather tight.</i> ❖ <i>Roof mounted equipment are braced.</i> ❖ <i>Material & equipment that cannot be moved are covered.</i> ❖ Sandbags are placed in doorways where flooding from storm water can occur. In flood as consequence of Cyclonic Storm/ Hurricane is anticipated, ensure: <ul style="list-style-type: none"> ❖ <i>Dyke valves of Hydrocarbon storage tanks are open.</i> ❖ Oil Spill Management Plan is actuated.
<p>CYCLONIC STORMS/HURRICANE (Cont.)</p>	

Dry Cargo Department	<ul style="list-style-type: none"> ❑ Remove all fine grained cargo stored at open storage yard and store at indoor warehouse. ❑ Secure the fine grained cargo stored at open storage yards with Tarpaulin. ❑ Stop all stevedoring activities, bring all Mobile Harbour cranes to shore, safely park the cranes and down its booms. ❑ Inform all contractors to remove all their equipment from jetty area and safely park at shore, in case of crane down its boom. ❑ Arrest all barge / ship loaders, and Mobile truck loading hoppers at its wheel to prevent horizontal movement due to wind and secure from its top by arranging guy ropes. ❑ Stop loading / unloading of ship and measure the ship cargo quantities along with clients surveyor and communicate Marine Dept. / shipping agencies to take the ship to anchorage area.
Marine Department	<ul style="list-style-type: none"> ❑ In coordination with dry cargo instruct all ship captains to take the ships anchorage. ❑ Stop all activities at jetty area. ❑ Ensure the jetty areas are free from loose and unsecured materials / equipment. ❑ Update all departments about the latest whether conditions. ❑ Ensure TUG's are shored and secured. ❑ Stop SPM operation remove pipes connections from the ship and conform to maintain safe distance from SPM.
Liquid Terminal Department	<ul style="list-style-type: none"> ❑ Stop loading / unloading of ship, take ullage with clients surveyor, detach hose connections with the shipping vessels and communicate Marine Dept. / Shipping agencies to take the ship to anchorage area. ❑ Remove all loose materials and equipment from jetty area. ❑ Stop all activities, remove all tanker Lorries from liquid terminal and do not allow any tanker Lorries to enter the liquid terminal area.

Department Wise Emergency Action Plan for Cyclone

Container Terminal / RORO Department	<ul style="list-style-type: none"> ❑ Stop loading / unloading of ship take stock of containers along with surveyor, and communicate Marine Dept. / Shipping agencies to take the ship to anchorage area. ❑ Stop all activities and park the RTGC and RMQC at specified location and secure in all respect to prevent horizontal movement and topping. Ensure crane operators come out of crane after safely parking the cranes. ❑ Remove all loose materials and equipment's from Quay area. ❑ Ensure the height of container stock piling safe withstand the wind force, if it unsafe restrict the stock pile height. ❑ Stop trailer loading and remove all trailer from CT and do not allow any trailer to enter CT. ❑ Secure the all cars stationed at buffer yard by putting blocks on all the wheels.
---	--

Security Department	<ul style="list-style-type: none"> ❑ Close the gate and stop allowing visitors and transport trucks either inward or outward. ❑ Ensure vehicles are parked at designated parking areas, with wheels are blocked. ❑ Instruct all drivers to take shelter at canteens (concrete buildings).
Fire Department	<ul style="list-style-type: none"> ❑ Equip the fire tenders with rescue equipment, safely park the fire tenders and secure its wheel by providing blocks.
Project Management Cell (PMC)	<ul style="list-style-type: none"> ❑ Stop all activities, park the cranes and equipment's at safe location, lower the booms of cranes and secure them. ❑ Ensure all erected structures are secured with guy ropes and ties are provided. ❑ Remove all loose materials from top of buildings and structures or secure them. ❑ Ensure all workmen are sheltered at safe locations like canteens (concrete buildings). ❑ Secure the Jetty area piling rigs and cranes by tying with guy ropes. ❑ Stop all project vehicle movements and ensure the vehicles are parked at safe location with wheels are blocked. ❑ Ensure the barge type floating cranes are off loaded and brought to shore and its boom is downed. ❑ Ensure all vehicles and cranes are removed from break water embankments.

4.3.2 EARTHQUAKE	
<p>Earthquake is most likely to occur without pre-warning and so its severity and destructive potential are highly unpredictable. Earthquake can result in collapse of buildings, structures & elevated equipment, heavy casualties apart from fracture of underground pipelines and uprooting of energized wires etc. The plan to deal with earthquake can be divided in following stages:</p>	
Action By	Activity
PLANNING & PREPAREDNESS	
Port Key Person	<ul style="list-style-type: none"> ❑ Constitute Emergency Response Team(s) comprising of at least: <ul style="list-style-type: none"> ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) ➤ Based on total strength of the individual plant, more than one team may be constituted. ➤ Each member of the team shall have a designated alternate member. ❑ Liaise with HOD – HR to identify control centers equipped with: <ul style="list-style-type: none"> ❖ Communication facilities. ❖ Emergency vehicles/ equipment. ❖ List of emergency contacts & suppliers. ❖ Medical facilities.

ACTION DURING EFFECTIVE PERIOD

Individuals	<ul style="list-style-type: none"> ❑ Do not panic. ❑ Avoid standing near windows, external walls. ❑ Stand near columns or duck under sturdy furniture. ❑ Assemble at emergency assembly point.
--------------------	--

ACTION AFTER EFFECTIVE PERIOD

Site Incident Controller	<ul style="list-style-type: none"> ❑ Take head count. Activate Port emergency plan. ❑ Liaise with Site Main Controller for shut down of Port(s) if required. ❑ Liaise with HOS – Fire Services to initiate search & rescue. ❑ Liaise with – Occupational Health Center Services to provide first aid to the victims and remove casualties (if any). ❑ Report at site.
Port Key Person	<ul style="list-style-type: none"> ❑ Assess damage. ❑ Undertake restorative measures & repairs. ❑ Liaise with HOS –Occupational Health Centre to follow up on casualties.

4.3.3 TSUNAMI

Tsunami is Japanese for "harbor wave which is a huge ocean wave that can travel at speeds up to 600 mi/hr (965 km/hr) can have heights of up to 30 m (98 ft), wavelengths of up to 200 km (124 mi) and long periods, usually between 10 and 60 minutes. Sometimes incorrectly called a tidal wave, a tsunami is usually caused by an underwater earthquake or volcanic eruption and often causes extreme destruction when it strikes land. It is a series of waves which travel outward on the ocean surface in all directions in a kind of ripple effect. Since the waves can start out hundreds of miles long and only a few feet high, they would not necessarily be noticeable to a passing ship or a plane flying overhead. The plan to deal with Tsunami can be divided in following stages:

Action By		Activity
-----------	--	----------

PLANNING & PREPAREDNESS

Port Key Person	<ul style="list-style-type: none"> ❑ Constitute Emergency Response Team(s) comprising of at least: <ul style="list-style-type: none"> ❑ Port Engineer (01), Fire Team Member (01), Port Operators (02), ❑ Electrician (01), Marine Control Officer (01), POC Officer (01), ISCR (01) ➤ Based on total strength of the individual plant, more than one team may be constituted. ➤ Each member of the team shall have a designated alternate member. ❑ Liaise with HOD – Security to identify control centers equipped with: <ul style="list-style-type: none"> ❖ Communication facilities. ❖ Emergency vehicles/ equipment (tugs, speed/mooring boat). ❖ List of emergency contacts (ISCR, POC, Marine Control, Deputy PFSO, Port Security) ❖ Occupational Health Facilities.
------------------------	--

ACTION DURING EFFECTIVE PERIOD

Individuals	<ul style="list-style-type: none"> ❑ Do not panic. ❑ Avoid standing near to sea side. ❑ Stand near columns or duck under sturdy furniture. ❑ Assemble at emergency assembly point.
--------------------	--

ACTION AFTER EFFECTIVE PERIOD

Site Incident Controller	<ul style="list-style-type: none"> ❑ Liaise with Site Main Controller for shut down of Port(s) if required. ❑ Liaise with HOS – Security and HOS – Fire Services to search & rescue. ❑ Liaise with HOS – Occupational Health Center to provide first aid to the victims and remove casualties (if any). ❑ Report at site. ❑ Assess damage.
Port Key Person	<ul style="list-style-type: none"> ❑ Undertake restorative measures & repairs. ❑ Liaise with HOD – Human Resources & Administration.

4.3.4 FLOOD

An overflowing of water onto land that is normally dry. A flood tide is an abundant flow or outpouring. It is a temporary rise of the water level, as in a river or lake or along a seacoast, resulting in its spilling over and out of its natural or artificial confines onto land that is normally dry. Floods are usually caused by excessive runoff from precipitation or snowmelt, or by coastal storm surges or other tidal phenomena. Floods are sometimes described according to their statistical occurrence. A fifty-year flood is a flood having a magnitude that is reached in a particular location on average once every fifty years. In any given year there is a two percent statistical chance of the occurrence of a fifty-year flood and a one percent chance of a hundred-year flood.

Action By	Activity
-----------	----------

PLANNING & PREPAREDNESS

Port Key Person	<ul style="list-style-type: none"> ❑ Constitute Emergency Response Team(s) comprising of at least: <ul style="list-style-type: none"> ❑ Port Engineer (01), Fire Team Member (01), Port Operators (02), ❑ Electrician (01) ➤ Based on total strength of the individual plant, more than one team may be constituted. ➤ Each member of the team shall have a designated alternate member. ❑ Liaise with HOD – HR to identify control centers equipped with: <ul style="list-style-type: none"> ❖ Communication facilities. ❖ Emergency vehicles/ equipment. ❖ List of emergency contacts & supplier ❖ Medical facilities.
------------------------	--

ACTION DURING EFFECTIVE PERIOD

Individuals	<ul style="list-style-type: none"> ❑ Do not panic. ❑ Avoid standing near to sea side. ❑ Stand near columns or duck under sturdy furniture. ❑ Assemble at emergency assembly point.
--------------------	--

ACTION AFTER EFFECTIVE PERIOD

Site Incident Controller	<ul style="list-style-type: none"> ❑ Liaise with Site Main Controller for shut down of Port(s) if required. ❑ Liaise with HOS – Security and HOS – Fire Services to search & rescue. ❑ Liaise with HOS – Occupational Health Center Services to provide first aid to the victims and remove casualties (if any). ❑ Report at site. ❑ Assess damage.
Port Key Person	<ul style="list-style-type: none"> ❑ Undertake restorative measures & repairs. ❑ Liaise with HOD – Human Resources & Administration.

4.3.5 INDUSTRIAL UNREST

Industrial relation between personnel and management may deteriorate because of any reason. Problems, which may arise due to industrial unrest, include:

- ❖ Dharna/ Strike/ Hunger strike
- ❖ Unofficial gatherings/ Gate meetings/ Forceful entry
- ❖ Work to rule/ Go slow/ Disobedience
- ❖ Gherao/ Rasta roko
- ❖ Intimidation & Use of force
- ❖ Support from local & criminal elements
- ❖ Sabotage

In such a scenario, to ensure smooth operation of Port, protection of lives and property, well-coordinated effort is needed from all concerned. Plan to deal with industrial unrest can be broadly divided in following stages:

Action By	Activity
-----------	----------

PLANNING & PREPAREDNESS

	<ul style="list-style-type: none"> ❑ Constitute Emergency Response Team(s) comprising of at least: Port Key Person Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note ➤ Based on total strength of the individual plant, more than one team may be constituted. ➤ Each member of the team shall have a designated alternate member. ❑ Plan 8 hours shift. ❑ Liaise with HOD – HR for food stock, water, blankets & bedding and medicine.
--	---

INDUSTRIAL UNREST (Cont.)

Action By	Activity
-----------	----------

ACTION BEFORE EFFECTIVE PERIOD

Port Key Person	<ul style="list-style-type: none"> ❑ Liaise with Site Main Controller ❑ Liaise with HOD – Security for security & vigilance requirements. ❑ Liaise with HOD – HR for planning of accommodation of additional personnel and transport for additional requirements of vehicle (if any).
------------------------	--

ACTION DURING EFFECTIVE PERIOD

Port Key Person	<ul style="list-style-type: none"> ❑ Liaise with HOD – Security for <ul style="list-style-type: none"> ❖ Strengthening security at sensitive points. ❖ Ensuring protection of lives & property. ❖ Vigilance & patrolling. ❖ Maintaining law & order. ❑ Liaise with Site Main Controller for <ul style="list-style-type: none"> ❖ Updates on the situation.
------------------------	---

ACTION AFTER EFFECTIVE PERIOD

Port Key Person	<ul style="list-style-type: none"> ❑ Assess damage (if any). ❑ Liaise with Site Main Controller for restoring normalcy.
------------------------	---

4.3.6 BOMB THREAT

Bombs can have devastating effect not only on the Adani Port but also on neighboring areas. Hence, any threat received regarding plantation of the bomb shall be viewed seriously. Plan to deal with bomb threat can be divided in following stages:

Action By	Activity
-----------	----------

PLANNING & PREPAREDNESS

Port Key Person	<ul style="list-style-type: none"> ❑ Constitute Search Team(s) comprising of at least: <ul style="list-style-type: none"> ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note <ul style="list-style-type: none"> ➤ Based on total strength of the individual plant, more than one team may be constituted. ➤ Each member of the team shall have a designated alternate member. ❑ Increase awareness in the Port personnel regarding threat perception (not to handle suspicious objects, report suspicious movements by unknown persons).
------------------------	---

ACTION BEFORE EFFECTIVE PERIOD

Port Key Person	<ul style="list-style-type: none"> ❑ Inform all personnel to provide information regarding unidentified or suspicious objects/ persons. ❑ Liaise with Port Operation Centre. ❑ Liaise with HOD – Security for ❑ Intensifying vigilance & patrolling. Initiating bomb search. Making arrangements to minimize effects. Making arrangements for evacuation.
-----------------	--

ACTION DURING EFFECTIVE PERIOD

Port Key Person	<ul style="list-style-type: none"> ❑ Liaise with Site Main Controller for any action to be taken on case to case
-----------------	---

ACTION AFTER EFFECTIVE PERIOD

Port Key Person	<ul style="list-style-type: none"> ❑ Liaise with Site Main Controller for restoring normalcy (if bomb recovered/ no untoward incident occurs). <p>If blast occurs</p> <ul style="list-style-type: none"> ❑ Assess damage (if any). ❑ Take restorative measures. ❑ Liaise with Site Main Controller.
-----------------	--

4.3.7 WAR

During an outbreak of war, bombarding by enemy planes at Mundra site can have devastating effects. Plan to deal with bomb threat can be divided in following stages:

Action By	Activity
-----------	----------

PLANNING & PREPAREDNESS

Port Key Person	<ul style="list-style-type: none"> ❑ Constitute Emergency Response Team(s) comprising of at least: Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) <p>Based on total strength of the individual plant, more than one team may be constituted.</p> <p>Each member of the team shall have a designated alternate member.</p> <ul style="list-style-type: none"> ❑ Make arrangements for camouflage the flares. ❑ Liaise with HOD – Security to increase awareness in the Port personnel regarding war.
-----------------	--

ACTION BEFORE EFFECTIVE PERIOD

Port Key Person	<ul style="list-style-type: none"> ❑ Liaise with Port Operation Centre. ❑ Liaise with HOD – Security for ❖ Intensifying vigilance & patrolling.
-----------------	--

ACTION DURING EFFECTIVE PERIOD

Port Person	Key	<ul style="list-style-type: none"> ❑ Liaise with Site Main Controller for minimizing light (during night) & obtaining updated information. ❑ Liaise with HOD – Security for evacuation of non-essential personnel.
--------------------	------------	--

ACTION AFTER EFFECTIVE PERIOD

Port Person	Key	<ul style="list-style-type: none"> ❑ Assess damage (if any). ❑ Liaise with Site Main Controller to restore normalcy.
--------------------	------------	--

4.3.8 FOOD/WATER POISONING

Plan to deal with food/ water poisoning can be divided in following stages:

Action By		Activity
-----------	--	----------

PLANNING & PREPAREDNESS

Port Key Person	<ul style="list-style-type: none"> ❑ Liaise with HOS – Occupational Health Services: ❖ To impart training regarding food/ water poisoning. ❖ For supply of medicines, saline water etc.
------------------------	--

ACTION DURING EFFECTIVE PERIOD

Port Key Person	<ul style="list-style-type: none"> ❑ Liaise with Site Main Controller & HOS – Occupational Health Services ❖ Identify the contaminant source. ❖ Seize contaminated material. ❖ Take preventive measures to avoid recurrence. ❖ Inform all concerned. ❖ Arrange sample analysis & alternate supplies. ❖ Arrange medical assistance to the victims.
------------------------	--

ACTION AFTER EFFECTIVE PERIOD

Port Person	Key	<ul style="list-style-type: none"> ❑ Liaise with Site Main Controller & HOS – Occupational Health Services to: <p style="margin-left: 20px;">Conduct epidemiological investigation to identify the cause.</p> <p style="margin-left: 20px;">Take preventive measures to avoid recurrence.</p> <p style="margin-left: 20px;">Follow up on casualties.</p>
--------------------	------------	---

4.3.9 FIRE / Chemical Tank Farm Fire

Plan to deal with fire can be divided in following stages:

Action By		Activity
-----------	--	----------

PLANNING & PREPAREDNESS

Port Key Person	<ul style="list-style-type: none"> <input type="checkbox"/> Constitute Emergency Response Team(s) comprising of at least: <input type="checkbox"/> Port Engineer (01), Fire Team Member (01), Port Operators (02), <input type="checkbox"/> Electrician (01) ➤ Based on total strength of the individual plant, more than one team may be constituted. ➤ Each member of the team shall have a designated alternate member. <input type="checkbox"/> Liaise with HOS – Fire Services to: <ul style="list-style-type: none"> ❖ Maintain adequate fleet of fire tenders & firefighting equipment. ❖ Maintain patrolling to eliminate potential sources of fire hazard. ❖ Impart regular refresher training to auxiliary fire squad members.
------------------------	---

ACTION DURING EFFECTIVE PERIOD

Emergency Response Team	<ul style="list-style-type: none"> <input type="checkbox"/> Activate alarm. Try & contain fire. <input type="checkbox"/> Liaise with Site Main Controller, HOS – Fire and HOS – Occupational Health Services to: <ul style="list-style-type: none"> ❖ Evacuate non-essential personnel. ❖ Ensure search & rescue ❖ Ensure casualties receive attention. <input type="checkbox"/> Liaise with HOD – Security to restrict movement in affected area.
--------------------------------	---

ACTION AFTER EFFECTIVE PERIOD

Emergency Response Team	<ul style="list-style-type: none"> <input type="checkbox"/> Assess damage. <input type="checkbox"/> Implement fire preventive measures. <input type="checkbox"/> Undertake restorative measures & repairs. <input type="checkbox"/> Liaise with HOS – Occupational Health Services to follow up on casualties.
--------------------------------	--

4.3.10 MAJOR RELEASE OF FLAMMABLE/TOXIC CHEMICALS AT CHEMICAL TANK FARM (Including night operations)

Plan to deal with major release of flammable/ toxic chemicals can be divided in stages:

Action By	Activity
-----------	----------

PLANNING & PREPAREDNESS

Port Key Person	<ul style="list-style-type: none"> ❖ Constitute Emergency Response Team(s) comprising of at least: Port Engineer (01), Fire Team Member (01), Port Operators (02), <input type="checkbox"/> Electrician (01) ➤ Based on total strength of the individual plant, more than one team may be constituted. ➤ Each member of the team shall have a designated alternate member. <input type="checkbox"/> Maintain under flow baffle, over flow baffle, blocking gates & dykes. <input type="checkbox"/> Liaise with HOD – QHSE for: <ul style="list-style-type: none"> ❖ Conducting regular audits. ❖ Training of persons regarding various aspects of spillage. ❖ Identifying locations to set up blockages. <input type="checkbox"/> Liaise with HOS – Fire Services for acquiring equipment for recovery.
------------------------	---

ACTION BEFORE EFFECTIVE PERIOD

Emergency Response Team	<ul style="list-style-type: none"> ❑ Control, block or contain flow of spillage. ❑ Suspend all hot work in the vicinity & isolate electric powers to affected area(s). ❑ Recover or direct spill material to effluent pit. ❑ Liaise with HOS – Fire/ Occupational Health Services to: <ul style="list-style-type: none"> ❖ Evacuate non-essential personnel. ❖ Administer first aid to victims. ❑ Liaise with HOD – Security to restrict movement in the area. ❑ Liaise with Site Main Controller for external assistance required (if any).
--------------------------------	---

ACTION AFTER EFFECTIVE PERIOD

Emergency Response Team	<ul style="list-style-type: none"> ❑ Assess damage. ❑ Implement fire preventive measures. ❑ Undertake restorative measures & repairs. ❑ Liaise with HOS – Occupational Health Services to follow up on casualties.
--------------------------------	--

Onshore Oil Spill Collection Plan
Onshore Oil spills are classified into three categories

- ❑ Leakage within the enclosure and oil spill is retained by the dyke wall.
- ❑ Leakage from the pipe lines.
- ❑ Leakage from the tanker truck carrying the oil.

Facilities available

- ❑ As the enclosure tanks are stored with various oil products the bund walls are provided to retain the product individually for every tank.
- ❑ For the storage of spilled product, slop tanks are available in each enclosure.
- ❑ 2 nos. Portable pumps of intrinsically safe are available.
- ❑ The tank farm drain point valves are kept closed.
- ❑ Pipe lines are available to transfer the spilled product to slop tank.
- ❑ Spill collection kit is available. (6 nos. Drip trays, 4nos. Empty barrels, 4nos. Carboys, 4nos. Funnels, 2nos. Barrel shifting trolleys and 10nos. Soaking pads, 4 nos. Bonding wire with clamps 20mts long).
- ❑ Emergency response team to collect the spilled oil is available in each shift.
- ❑ PPE's are available.

Leakage within the enclosure and oil spill is retained by the dyke wall

Sr. No.	Corrective Action	Action By
1.	Inform Security and stop all vehicles entering the Liquid Terminal and stop all vehicles inside and remove unwanted workmen from the liquid terminal.	LT Shift Incharge/ Security
2.	Inform and assemble the Emergency Response Team at spillage site.	LT Shift Incharge
3.	Ensure necessary PPE's are worn by the emergency response team.	LT Shift Incharge
4.	Shift the intrinsically safe portable pump to nearby location to facilitate pumping of the product to slop tank.	LT Shift Incharge

5.	Shift the spill collection kit to the location.	LT Shift Incharge
6.	Inform fire department to perform standby with firefighting facility.	LT Shift Incharge
7.	Lay the pump suction line foot valve in the pool of spilled liquid.	LT Shift Incharge
8.	Connect the pump discharge line to pipe line network leading to slop tank.	LT Shift Incharge
9.	Ensure jumpers/ bonding is provided if other than wire breaded hose is used or PVC/ Rubber hoses are used (from foot valve to pump & pump to pipe line).	LT Shift Incharge
10.	Give power supply to the pump and run the pump.	LT Shift Incharge
11.	Switch off the pump once the spilled oil level goes below the foot valve and air sucks in.	LT Shift Incharge
12.	Collect the remaining oil with the help of soaking pad, carboys and put it in barrels.	LT Shift Incharge
13.	Pump the oil collected in barrels to slop tank.	LT Shift Incharge

Leakage from the pipe lines during pipeline transfer operation

Sr. No.	Corrective Action	Action By
1.	Stop the leakage by switching off the pump. Arrest the leakage by closing the valve or plugging the leakage point.	LT Shift Incharge
2.	Inform security and establish security posts at the junction of roads where the pipe line is leaking.	LT Shift Incharge/ Security
3.	Road blockage shall be established at least 200mts away from the leakage point.	Security
4.	Ensure vehicles are stopped or rerouted 200mts away from leakage point.	Security
5.	Do not allow to switch on or switch off any electrical equipment within 200mts radius of leakage point.	Security
6.	Do not allow mobile phones within the radius of 200mts.	Security
7.	Inform fire department to perform standby duty with fire fighting facility.	LT Shift Incharge
8.	Inform and assemble the Emergency Response Team at spillage site.	LT Shift Incharge
9.	Ensure necessary PPE's are worn by the emergency response team.	LT Shift Incharge
10.	Shift the spill collection kit to the location.	LT Shift Incharge
11.	With the help of soaking pad collect the spilled oil in carboys and barrels.	LT Shift Incharge
12.	Shift the barrels to waste oil storage area and dispose it through vendors.	LT Shift Incharge
13.	Put sand or saw dust and clean the area.	LT Shift Incharge

14.	Take action to permanently arrest the pipe line leakage.	LT Shift Incharge
Leakage from the tanker truck carrying the oil / chemicals		
1.	Arrest the leakage by closing the particular tanker compartment valve or plugging the leakage point.	LT Shift Incharge
2.	Inform security and establish security posts at the junction of roads where the tanker truck is parked.	LT Shift Incharge/ Security
3.	Road blockage shall be established at least 200mts away from the leakage point.	Security
4.	Ensure vehicles are stopped or rerouted 200mts away from the leakage point.	Security
5.	Do not allow to switch on or switch off any electrical equipment within 200mts radius of leakage point.	Security
6.	Do not allow mobile phones within the radius of 200mts.	Security
7.	Inform fire department to perform standby duty with fire fighting facility.	LT Shift Incharge
8.	Inform and assemble the Emergency Response Team at spillage site.	LT Shift Incharge
9.	Ensure necessary PPE's are worn by the emergency response team.	LT Shift Incharge
10.	Shift the spill collection kit to the location.	LT Shift Incharge
11.	With the help of soaking pad collect the spilled oil in carboys and barrels.	LT Shift Incharge
12.	Shift the barrels to waste oil storage area and dispose it through vendors.	LT Shift Incharge
13.	Put sand or saw dust and clean the area.	LT Shift Incharge
<ul style="list-style-type: none"> • In all emergencies LT Shift incharge shall inform QHSE department and QHSE department shall monitor everything is happening as per the action plan and guide where ever required. • For the purpose of Emergency Response Team HOD Liquid Terminal shall ensure at least two staffs are identified and they are available in each shift. The work force for collecting the spill is arranged by stopping some of the LT activities and also can be obtained from Fire Department. • Fire department shall spare at least four persons (firemen) for spill collection purpose and they shall work under the guidance of LT shift incharge. • Fire department shall also perform standby duty with firefighting arrangements during the entire course of spill collection operation. 		
4.3.11 MAJOR RELEASE OF FLAMMABLE/TOXIC GASES AT CHEMICAL TANK FARM (Including night operations)		
Plan to deal with major release of flammable/ toxic gases can be divided in following stages:		
Action By		Activity
PLANNING & PREPAREDNESS		

<p>Port Key Person</p>	<ul style="list-style-type: none"> ❑ Constitute Emergency Response Team(s) comprising of at least: Port Engineer (01), Fire Team Member (01), Port Operators (02), ❑ Electrician (01) <p>Note</p> <ul style="list-style-type: none"> ➤ Based on total strength of the individual plant, more than one team may be constituted. ➤ Each member of the team shall have a designated alternate member. ❑ Maintain pressure relief valves & vents. ❑ Identify location to isolate, redirect the lines to flares or re-circulation. ❑ Liaise with HOD – QHSE for: <ul style="list-style-type: none"> ❖ Conducting regular audits. ❖ Training of persons regarding various aspects gas leakage. ❑ Liaise with HOS – Fire Services for personnel protective equipment.
-------------------------------	--

ACTION DURING EFFECTIVE PERIOD

<p>Emergency Response Team</p>	<ul style="list-style-type: none"> ❑ Control, block or contain leakage. ❑ Suspend all hot work in the vicinity & isolate electric powers to affected area(s). ❑ Isolate and redirect the lines to flares or re-circulation. ❑ Liaise with HOS – Fire/ Occupational Health Services to: <ul style="list-style-type: none"> ❖ Evacuate non-essential personnel. ❖ Administer first aid to victims. ❑ Liaise with HOD – Security to restrict movement in the area. ❑ Liaise with Site Main Controller for external assistance required (if any).
---------------------------------------	--

ACTION AFTER EFFECTIVE PERIOD

<p>Emergency Response Team</p>	<ul style="list-style-type: none"> ❑ Assess damage. ❑ Implement fire preventive measures. ❑ Undertake restorative measures & repairs. ❑ Liaise with Coordinator – Occupational Health Services to follow up on casualties.
---------------------------------------	--

4.3.12 INCIDENTS INVOLVING TRANSPORTATION OF HAZARDOUS MATERIAL

Various hazardous materials are normally transported to and from **Adani Port** by tank lorries. These tank lorries have the potential to mechanical failures & road incidents (within and/ or outside the complex) resulting in the possible scenarios viz. spillage, leakage, fire & explosion that might pose an imminent danger to vehicular traffic and surrounding populations [mostly in built-up areas] apart from threat to an environment. The plan to deal with transportation incidents involving hazardous material may be divided in following stages:

Action By	Activity
-----------	----------

PLANNING & PREPAREDNESS

Port Key Person	<ul style="list-style-type: none"> ❖ Constitute Emergency Response Team(s) comprising of at least: Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) ➤ Based on total strength of the individual plant, more than one team may be constituted. ➤ Each member of the team shall have a designated alternate member. ❑ Collect information about the product and specification/ design of the tanker for the product. ❑ Liaise with HOD – Security for: <ul style="list-style-type: none"> ❖ Ensuring safety equipment & fitness certificates are valid. ❖ Auditing the tankers. ❖ Awareness program for transporters, drivers‘etc.
ACTION DURING EFFECTIVE PERIOD	
Emergency Response Team	<ul style="list-style-type: none"> ❑ Liaise with HOD – Security/ Driver/ Transporter to: ❖ Ascertain extent of damage and impact. ❖ Control, block or contain leakage. ❖ Inform various agencies. ❖ Request for assistance. ❖ Restrict movement in the affected area.
ACTION AFTER EFFECTIVE PERIOD	
Emergency Response Team	<ul style="list-style-type: none"> ❑ Assess damage. ❑ Undertake restorative measures & repairs. ❑ Liaise with HOS – Occupational Health Services to follow up on causalities

4.3.13 MARINE EMERGENCY

Shipping fleet operates outside the premises of **Adani Port** and is subject to international, national and local rules. Marine emergencies are classified into:

On-shore Emergency (Nature I & Nature II)

- ❖ May occur in Jetty/ Shipping Division area.
- ❖ Shall be handled as per the Adani Port Emergency Action Plan.
- ❖ Senior most functionaries to take charge as Emergency Coordinator (Site Incident Controller).
- ❖ Radio Room shall function as Marine Control Center.

On-site Emergency (Nature I - Level-I or Nature I – Level II)

- ❖ May occur on board APSEZ vessels (not requiring external help)
- ❖ Master shall assume charge on board vessel
- ❖ Senior most functionaries to take charge as Emergency Coordinator (Site Incident Controller).

Off-Site Emergency (Nature-II)

- ❖ Shall be handled as per Contingency Manual & Single Point Mooring Operations Manual.
- ❖ Master shall assume charge on board vessel.
- ❖ Senior most functionaries on shore to take charge as Emergency Coordinator (Site Incident Controller).

In case of an Oil Spill, the action plan shall be as per “Oil & Chemical Spillage Response Plan” During any of the above-classified marine emergencies:

MARINE EMERGENCY (Cont.)

- ❖ During working hours
 - ❑ Key Person or senior most functionary to assume charge of Site Incident Controller
 - ❑ Next senior most functionary to assume charge of Deputy Site Incident Controller
 - ❑ Coordinators to report at Site Shift Managers Office
- ❖ During silent hours
 - ❑ Radio Officer in duty to assume charge of Site Incident Controller
 - ❑ Shift Officer to assume charge of Deputy Site Incident Controller
 - ❑ Coordinators to report at Site Shift Managers Office
- ❖ Oil & Chemical Spillage Response Plan

CHAPTER – 5

EMERGENCY PREPAREDNESS

5.01 FIRE FIGHTING FACILITIES AVAILABLE WITH ADANI PORT, MUNDRA

5.1.1 FIRE FIGHTING SYSTEM AT THE JETTY

5.1.2 LIQUID TERMINAL

5.1.3 DRY CARGO AREA

5.1.4 TERMINAL – 2:

5.1.6 CONTAINER TERMINAL – 3 [SOUTH BASIN]:

5.1.7 TERMINAL – 1:

5.1.8 WEST BASIN:

5.1.9 ADANI HOUSE & PUB:

5.2.0 SAFETY EQUIPMENTS & PERSONAL PROTECTIVE EQUIPMENTS AVAILABLE WITH ADANI PORT

5.01 FIRE FIGHTING FACILITIES AVAILABLE WITH ADANI PORT, MUNDRA

Adequate firefighting systems are provided for protection of berths, buildings and facilities of the port. The firefighting facilities are based upon TAC and NFPA guidelines.

The pumps and fire water pipe network system are provided to serve hydrants suitably located around the entire premises with Extinguishers, Hydrants, Hose boxes and Monitors. The Fire & Safety staff of the **Adani Port** covers the entire premise and provides suitable fire protection coverage with mobile equipment, personnel, etc. The capacity of the fire water system is sized to fight a fire hazard at the proposed berth. A general guideline for the fire hydrant system is as given below:

5.1.1 FIRE FIGHTING SYSTEM AT THE JETTY

The firefighting systems at all the berths are designed to be combined with foam concentrate systems. 08 Water/Foam Monitors are installed on the four berths, so that the manifold area of the maximum tanker size (including the tanker drift movements) is included in their throw pattern. An additional Jumbo Jet Water Curtain Nozzle installed at berth no. 01 & 02 to isolate the Valve manifold area or the tanker, in case of fire at one or the other.

- Adequate foam storage is provided to ensure firefighting in all areas for a minimum period as in accordance with Indian Standards or NFPA but on no account less than 30 minutes.
- All the firefighting systems is designed in accordance with the Indian and NFPA standards.
- The system follows the minimum design criteria as stipulated in the Guidelines, which are summarized hereunder:
 - In case of fire, the ship will be towed to the open sea and the firewater protection for the ship will be treated as first aid until towing is done.
 - One single largest risk is considered for providing fire protection facilities.
 - Sea water, which is available at the location, will be conveniently used.
 - As port terminals handling ships of size less than 50,000 DWT, one set of firewater pumps are provided this will cater to both monitors as well as hydrant service and water curtains.
 - The firewater pressure system is designed for a minimum residual pressure of 7 kg/m² at the hydraulically remotest point of application in the terminal.
 - Fire water flow rate will be the aggregate of the following:
 - Water flow for Water/Foam Monitors for protection of loading arms/piping manifold and ship;
 - Water flow for areas segregation through water curtains between ship and loading arms and hydrant service.
 - The water network laid to ensure multi-directional flow wherever possible. Isolation valves are provided in the network to enable isolation of any section of the network.

The major components of the firefighting system for the berths are as follows:

1. Monitors:

Two monitors with an adequate capacity with suitable horizontal throw. The positions of the monitors are so designed to cover the entire area of largest tanker berthed at Jetty.

2. Curtain nozzles:

These nozzles are provided between unloading arms and the tanker at berth no. 01 & 02 for segregation of the two with a water curtain.

3. Water hydrants:

Water hydrants are stand post type and are double headed. One hydrant post is provided for every 30 meters length on the jetty. These are located alongside berths for easy accessibility. 6" hydrant heads with standard twin 63 mm hydrant valves are used.

4. Mobile Monitor:

One unit of Mobile Monitor with 800 ltrs foam in tank kept at jetty to reinforce firefighting system during handling of Chemicals /Hydrocarbons.

5. Foam-concentrate drums are provided for the foam monitors (with 3% concentrate). A total of 3310 ltrs of AR-AFFF concentrate are stored in easily cartable Jerry cans of 20-ltrs and 200 ltrs capacity drum kept at Marine Terminal.

6. Firewater network ring main is of 300 mm diameter.

5.1.2 LIQUID TERMINAL

Presently there are 97 tanks at Liquid Terminal and the area of the tank farm is divided in three zones. They are CTF (61 fixed roof tanks), POL (8 tanks including two floating roof tank), EOL (25 fixed roof tanks) and Bitumen Terminal (3 fixed roof tanks) The Firefighting systems at the Liquid Terminal area is fully approved by the TAC. It is designed to meet the demand of two major fires at distinct locations. The essence of the systems is quick knock down of fire at the earliest instance. The firefighting systems consists of six electric pumps, four diesel pumps and two Jockey pump and ring main of 300/250 mm dia. each tank of CTF, POL and Bitumen Terminal is protected with devoted foam and water protection system. All the loading bays and enclosure are suitably covered with Water Monitors and Hydrants.

The major components of the firefighting system for the Liquid Terminal is as follows:

a. Foam Pourers:

All the fixed roof & floating roof tanks of CTF, POL & Bitumen Terminal are covered by Foam Pourer System. The Foam could be operated by quick opening type butterfly valve positioned near each tank. In case of bitumen tanks foam have to feed in the line from external source.

b. Water Spray Rings:

All the tanks of CTF and EOL are protected by medium velocity water spray system all around the tanks. The discharge rate of water spray is 3 lpm/m² for the effective cooling against radiation heat. The water sprays are also operated by quick opening type butterfly valves.

c. Water Monitors:

All the Loading Bays, Tank enclosures are adequately covered by the Water Monitors. The water monitors are strategically positioned to cover maximum area. the monitors are manually operated by the valves placed with each monitor.

d. Hydrants:

Double headed Hydrants are evenly positioned all over the Terminal area in accordance with TAC and NFPA guidelines

5.1.3 DRY CARGO AREA

The Dry Cargo area is the zone of moderate risk hence only fully pressurized Hydrant system is provided. The well designed Single and Double outlet type hydrant posts are located all around the open storage yards and the covered godowns.

a. Hydrants:

All the open and covered type of storage areas are covered by Single or double type Hydrant posts. The hydrant system is kept fully pressurized at 7 Kg/cm² with a minimum operating pressure of 6 Kg/cm² at any point in the system.

■ FIRE STATION

The Fire station is the nerve center of the Fire concerned matters. The Fire Station Control Room is continuously 24 hours a day, 365 days a year. The control room is equipped with modern communication gadgets like, Wireless set, internal telephone & Mobile phones. Apart from the communication systems, the Fire fighting vehicle Foam Tender and Fire Engine are also stationed there. All sorts of firefighting equipment and appliances are stowed in the Fire Station.

The below given is the list of some of the equipment's stowed at Fire Station.

- Spare fire extinguishers and foam compound drums
- Delivery Hose pipe
- Different types of Branch Pipes & Foam making equipment.
- First aid Firefighting extinguishers
- Mobile Foam Monitors
- Foam Mobile Units
- Fire suits
- First aid kit
- Safety belts
- Ropes
- Cutting tools
- SCBA
- Safety helmets

PPEs - goggles, Apron, shoes, gloves, nose mask, gumboots

5.1.4 TERMINAL – 2:

- Fire Control Room : Fire Station
- Emergency Siren : 1.6 km range manually operated siren
- Fire Control Plan : As Mentioned Below

Fire Pump: 273 m³/hr discharge X 02 nos. of Vertical Turbine Diesel Driven Pump and 30 m³/hr discharge X 01 no. of Vertical Turbine Electric Driven Jockey Pump for fire prevention at Terminal- 2 and back-up yard.

Fixed Fire Fighting System: 14 no. of Double Headed Fire Hydrant at jetties, 18 nos. of Single Headed Fire Hydrants at Terminal – 2 back-up yard and 10 nos. of Delivery Hose kept at pump house for fire prevention.

Fire Extinguishers:

Dry Chemical Powder Fire Extinguishers: 03 no. of 50 kg., 20 no. of 10 kg., 10 no. of 2 kg
CO2 Fire Extinguishers: 15 no. of 4.5 kg.

5.1.5 CONTAINER TERMINAL – 2 [ADANI MUNDRA CONTAINER TERMINAL]:

- Fire Control Room : Fire Station
- Emergency Siren : 1.6 km range manually operated siren

- Fire Control Plan : As Mentioned Below

Fire Pump: 273 m³/hr discharge X 1 no. of Vertical Turbine Electric Driven Main Pump and 273 m³/hr discharge X 01 no. of Vertical Turbine Diesel Driven Pump and 25 m³/hr discharge X 1 no. of Vertical Turbine Electric Driven Jockey Pump for fire prevention at AMCT.

Fixed Fire Fighting System: 33 no. of Single Headed Fire Hydrant, 10 no. of Water Monitors and 20 nos. of Delivery Hose with Hose Station for fire prevention.

Fire Extinguishers:

DCP Fire Extinguishers: 40 Nos. (2 kg), 10 Nos. (9 kg), 5 Nos. (10 kg), 3 Nos. (50 kg) CO2 Fire Extinguishers 70 no. (4.5 kg), 24 (3.5 kg) for QC, RTG, Other Area.

5.1.6 CONTAINER TERMINAL – 3 [SOUTH BASIN]:

- Fire Control Room : Fire Station
- Fire Control Plan : As Mentioned Below

Fire Extinguishers: for for QC, RTG and other area CT 3.

CO2 Fire Extinguishers: 65 Nos (2 kg), 45 Nos (4.5 Kg) for for QC, RTG and other area CT 3.

DCP Fire Extinguishers: 40 Nos (2 kg), 13 Nos (5 Kg), 10 Nos (10 Kg)

Fire Tender: Multipurpose Fire Tender

5.1.7 TERMINAL – 1:

- Fire Control Room : Fire Station
- Emergency Siren : 5 km range manually operated siren
- Fire Control Plan : As Mentioned Below

Fire Pump: 273 m³/hr discharge X 02 nos. of Vertical Turbine Diesel Driven Pump and 30 m³/hr discharge X 01 no. of Vertical Turbine Electric Driven Jockey Pump for fire prevention at Terminal- 1.

Fixed Fire Fighting System:

33 no. of Double Headed Fire Hydrant at jetties, at Terminal – 1 and 70 nos. of Delivery Hose kept at pump house for fire prevention. 8 no. of Water / Foam Monitor.

Fire Extinguishers:

DCP Fire Extinguishers: 16 no (50 kg). 15 no (10 kg), 8 no (2 kg)
CO2 fire extinguishers: 12 no (4.5 kg)

5.1.8 WEST BASIN:

- Fire Control Room : Porta Cabin, Fire Station
- Emergency Siren : 1 at SS – 1 Building [Range 1.6 km],
Manual Siren [Range 1.6 km] at Fire Station
- Fire Control Plan : **As Mentioned Below**

Fire Pump: 273 m³/hr discharge X 2 no. of Horizontal end suction type Electric Driven Main Pump and 273 m³/hr discharge X 01 no. of Horizontal end suction type Diesel Driven Pump and 10.8 m³/hr discharge X 1 no. of Back pull out type Electric Driven Jockey Pump for fire prevention at West Basin.

Fixed Fire Fighting System: 122 no. of Single Headed Fire Hydrant, 99 no. of Water Monitors and 250 no. of Delivery Hose for fire prevention.

Fire Extinguishers:

DCP Fire Extinguishers: 16 no (50 kg). 15 no (10 kg), 8 no (2 kg)
CO2 fire extinguishers: 12 no (4.5 kg)

Fire Tender:

- Water Tank capacity (in built) - 6000 liters
 - Pump discharge - 2250 LPM
 - Aluminized Suit - 01 no.
 - Water Jel Blanket - 01 no.
 - Delivery Hose - 20 nos.
 - 35l Aluminium Extension Ladder - 01 no.
 - Self-contained Breathing Apparatus Set - 03 no.
- Other firefighting related equipment.

5.1.9 ADANI HOUSE & PUB :

- Fire Control Room : Fire Station
- Emergency Siren : Adani house & PUB

■ Fire Control Plan :

Fire Pump:

96.10 m³/hr discharge X 01 no. of Electric Driven Main Pump,
10.8 m³/hr discharge X 01 no. of Electric Driven Jockey Pump for fire prevention.

Fixed Fire Fighting System:

- **Adani House:** 9 nos of Single Headed Fire Hydrant, 5 nos of Hose Reel Hose, 18 nos of Delivery Hose kept at Adani House.
- **PUB:** 19 nos of Single Headed Fire Hydrant, 15 nos of Hose Reel Hose, 38 nos of Delivery Hose.

Fire Extinguishers:

- DCP Fire Extinguishers: 22 nos of 10 kg
- CO2 Fire Extinguishers: 40 nos of 4.5 kg, 8 nos of 9 kg, 2 nos of 22.5kg

Auto Flooding System: NAF S125 Flooding System at IT Server Room and UPS Room connected with Fire Detection System to protect from fire.

Fire Detection System:

- Smoke Detector System in Entire Adani House.
- Separate Fire Alarm System for PUB buildings

5.2.0 SAFETY EQUIPMENTS & PERSONAL PROTECTIVE EQUIPMENTS AVAILABLE WITH APSEZ

HAZARD KIT
The following items of hazard kits are under procurement/have been procured.
Protective Clothing

- Chemical protective suits
- Proximity suit
- Neoprene 14" gloves
- Natural rubber gloves
- Surgical gloves
- High voltage lineman's gloves
- Overalls
- Goggles (polycarbonate lens)
- Hardhats with headband suspensions
- Face shield (full) 10-x19-x.060
- Boots (neoprene, steel toe and modsole)
- Safety harness
- Ear Muffs

Breathing Apparatus

- Emergency Oxygen Bottles.
- Positive pressure self contained breathing apparatus
- Spare cylinders
- Full-face cartridge type respirators

Leak Control Equipment

- Drums
- Epoxy kit
- Patch Kit
- Wooden plug kit
- Rubber plug kit
- Mastic

First Aid Equipment

- Extinguishers capable for handling Class A, B, C and D fires.
- First aid kit (36 units)
- Resuscitator (B.W.S. CPR Portable with aspirator P/N 900 0 002 - 111 - 01 woolen fire blankets.

Miscellaneous

- Teflon thread tape
- Electrical tape
- Pipe pieces, assorted.
- Pipe union, assorted.
- Pipe caps, assorted
- Hose clamps, assorted.
- Saddle clamps, assorted.
- Couplings (galvanized), assorted.
- Hand cleaner (waterless)
- Flashlight (NS)
- Reflective triangles
- Quick setting cement
- Frontier barriers & safety cones.

Absorbents and Containers

- Absorbent pads
- Plastic can liners / bags
- Recovery drum sets
- Diatomaceous earth bag
- Sponges

Monitoring Equipment

- Combustible gas detector (Explosive meter, Range:0-100 LEL & 0-5ppm)
- Oxygen detector (0-25% oxygen, PAC III, Drage make)
- Organic vapour detector (PAC III, Drager make)
- pH paper (0-14) (Ydrin, 1/2 x 50 with dispenser)
- Indication wind system AC-DC recording cup & vane anemometer with meter telescoping mast.

Miscellaneous

- Portable flood lights (4 Nos.)
- Emergency suits (2 Nos.)
- SCBA - 4 Nos.
- Loud Hailer (battery operated)
- Portable DCP extinguisher
- Emergency Rescue Cage

Tools and hardware

- Drill (electrical)
- Drill set, assorted sizes (short length)
- Drill set, assorted sizes (length)
- Punch set, assorted sizes
- Wire brush
- Paint brushes
- Tape measure steel tape
- Foot ruler (metal)
- Welding kit
- Pipe cutters
- Drum trolleys
- Chemical buckets
- Dust pans
- Hacksaw
- Hacksaw blades

Oxygen Trauma, First-Aid & Emergency Box Kit (Medical)

- Oxygen Cylinder
- Water Jel Blankets
- Rescue Blankets
- Oxygen breathing kit
- Instant Glucose
- Paramedic Scissors
- Forceps
- Gloves
- Ring cutter
- Cervical collar
- Eye pads
- Tourniquets
- Multi-trauma dressings
- Adaptec dressing
- Flexible Bandages
- Pocket Masks - Eyewash bottle
- Bag mask resuscitator
- Portable respirator
- Portable lamps / torches
- Mouth-to-mask
- Blood pressure Equipment

Adequate number of fire tender

- There are three nos of fire tenders one is Foam Tender with water, foam, DCP and CO₂ facility having a centrifugal fire pump. Pump is of gunmetal and stainless steel also with 60 mtrs. long hose and nozzle provided above the pump panel.
- CO₂ gas cylinders of sufficient capacity are mounted for expelling the 75 kg DCP extinguishers. The foam tender also carries 6 x 22.5 kg. nos. of CO₂ Cylinder.
- Water Tender of 12000 ltrs water capacity with adequate numbers of firefighting equipment and rear mounted portable pump of 450 ltr / pmt capacity

Neutralising Agents

- Acid neutralizing agent (neutrasorb 100 = box)
- Neutrasol two
- 2-1/2 gallon container / carton)
- Neutralizer Neutrality
- Clorox

5.03 ABOUT ON-SITE EMERGENCY PLAN

Following three stage activities are planned to perform, as these activities are co-related, provide better ideas for emergency preparedness, and emergency actions with subsequent follow-ups.

- a) Pre-emergency activities
- b) Emergency time activities
- c) Post emergency activities

In Pre Emergency Activities: Following activities are carried-out: Internal Safety Surveys, Mock Drills & Training : Joint Mock Drills are performed engaging Mutual Aid Units. Arrangement is made to acquire emergency aid in the form of First Aid, chemical leak control, Evacuation, Vehicle for Transportation of affected. Moreover, from Fire Brigade is liaised with. (if the emergency is uncontrollable by the internal resources at the unit).

5.04 ABOUT POST EMERGENCY ACTIVITIES

- A) collection of records
- B) Making insurance claim
- C) Conducting inquiries and taking preventive measures
- D) Rehabilitation of affected persons within and outside plant
- E) Restart of plant

CHAPTER NO.VI

OFF-SITE EMERGENCY PLAN

CONTENTS

- 6.01 THE NEED OF OFF-SITE EMERGENCY
- 6.02 THE STRUCTURE OF OFF-SITE EMERGENCY
- 6.03 THE ROLE OF MANAGEMENT
- 6.04 THE ROLE OF POLICE AND EVACUATION AUTHORITY
- 6.05 THE ROLE OF MUTUAL AID AGENCIES

6.01 ABOUT OFF-SITE EMERGENCY PLAN

Ours is a **PORT**, Importing and exporting various goods including liquid chemicals, petroleum products.. Various substances, chemicals are stored at the terminals. Leak of chemicals, fire may lead to a serious off site emergency. In view of this, it is necessary to prepare an off-site emergency plan to deal with any emergency methodically and systematically to control and reduce its effects. In this connection, we have formed a EMERGENCY ORGANIZATION as per Chapter - 3

Incident controllers, Deputy Incident Controllers, Site Main Controllers are appointed and their emergency duties are determined. Arrangements are made for communication with external authorities. Safe assembly points and Emergency Control Centers are determined. Pre-emergency, emergency time and post emergency activities are formulated. A list of all important telephone numbers is prepared. Arrangement is made to get / provide emergency help with mutual aid units. Special knowledge, advise, experts will be available. Liaison will be made with off-site emergency authorities.

6.02 STRUCTURE OF OFF-SITE EMERGENCY

BASIC ACTIONS IN EMERGENCIES

Immediate Actions

Immediate action is the most important factor in emergency control because the first few seconds count, as a fire develops and spreads very quickly unless prompt and efficient actions are taken. In the event of fire in the Port/terminal, the following actions shall be taken as quickly as possible.

- Take immediate steps to stop leakage/fire and raise alarm simultaneously.
- Initiate action as per FIRE ORGANIZATION PLAN or Disaster Management Plan, based on gravity of the emergency.
- Stop all operations and ensure closure of all valves and isolation valves
- All out efforts should be made to contain the spread of leakage/fire.
- Saving of human life shall get priority in comparison to stocks/assets.
- Plant personnel without specific duties should assemble at the nominated place
- All vehicles except those required for emergency use should be moved away from the operating area, in an orderly manner at pre-nominated route.
- Electrical system except for control supplies, utilities, lighting and firefighting system should be isolated.
- If the feed to the fire cannot be cut off, the fire must be controlled and not extinguished.
- Start water spray system at areas involved in or exposed to fire risks.
- In case of leakage of chemicals without fire and inability to stop the flow, take all precautions to avoid source of ignition.
- Block all roads in the adjacent area and enlist Police support for the purpose if warranted.

Fire Fighting Operations

- Enlist support of local fire brigade and neighbouring industries.
- If escaping vapor cannot be stopped, jets of water should be directed at the point of leakage to asset controlled release of vapor and in between water fog should be used for dilution and rapid dispersion of vapor cloud.
- Fire fighting personnel working in or close to un-ignited vapor clouds or close to fire must wear protective clothing and equipment including safety harness and manned life line. They must be protected continuously by water sprays. Water protection for fire fighters should never be shut off even though the flames appear to have been extinguished until all personnel are safely out of the danger area.
- Exercise care to ensure that static charge is not generated in vapor cloud. For this purpose, solid jets of water must be avoided, instead for nozzles should be used.
- Fire fighters should advance towards a fire down – wind if possible.
- Cylinder fire should be approached using proper barricades / protection to avoid direct hit from flying cylinders.
- If the only valve that can be used to stop the leakage is surrounded by fire, it may not be possible to close it manually. The attempt should be directed by trained persons only. The person attempting the closure should be continuously protected by means of water spraying (through fog nozzles), fire entry suit, water jet blanket or any other approved equipment. The person must be equipped with a safety harness and manned life line.
- Any rapid increase in pressure or noise level of product discharged through safety relief vale of the vessel/pipeline should be treated as a warning of over pressurization. In such cases all personnel should be evacuated immediately
- As in case of any emergency situation, it is of paramount importance to avoid endangering human life in the event of fire involving or seriously exposing equipment containing chemicals or serious leakage of chemicals without the fire.

Action in the event of chemical leakage without fire

- Take basic action as detailed in (1) above
- If escaping is not on fire, close any valve which will stop the flow.

Action in the event of fire

- ❖ Take basic action as detailed in (1) above.
- ❖ Extinguish Fires – A small fire at the point of leakage should be extinguished by enveloping with a water spray. However, it is against, stressed that fire should not, except in special circumstances explained earlier, be extinguished until the escape of product has been stopped.
- ❖ Fire fighting procedure – Fire fighting procedures would vary depending upon various factors such as nature, sources sizes, location etc of fire. Basic fire fighting techniques have been explained earlier in section (2). However, for the purpose of guidelines, fire fighting techniques for few common cases are as follows:
- ❖ Cylinder Fire If a cylinder is involved in fire, internal pressure may start rising and if not relieved the built up pressure could rise and ultimately rupture the container. Ignition of the escaping gas would aggravate the fire but the release of pressure would reduce the possibility of rupture of the container. No attempt should be made to extinguish the burning gas. But the container and other containers in the vicinity should be kept cool by water sprays until the

contents of the container have burnt away. If the gas leakage does not ignite, the container should be approached from upwind (if in the open air) and be removed to a place of safety remote from sources of ignition.

- ❖ Cylinders not directly involved in the fire should be moved away from heat exposure, while applying cooling water sprays on cylinder directly involved.
- ❖ Fire on storage vessel: If a pressure vessel is exposed to radiant heat from external fire, it should be kept cool by water sprays to prevent excessive pressure rise in the vessel. Cooling water sprays must be applied without delay in the heat affected areas using fixed water sprinkler system or equivalent spray water coverage, through fixed monitors or other equipment. Cooling the vessel with water sprays reduces the heat input to the vessel and thereby reduces the pressure, thus reducing the rate of discharge from the relief valves.

Fire Fighting Organization Plan

A plan of action for use in the event of a major leakage of with a fire or risk of fire is essential. Such a plan must be carefully prepared for each area. It should be fully understood by all the Port supervisory personnel and other personnel's 'responsibilities for action as per plan. It shall be based on the following:

- Port personnel shall be fully trained for specialized techniques necessary for combating leakages and fires.
- If leakage and / or fire occurs, all personnel should use the equipment provided and to carry out their allotted tasks as detailed in the firefighting organization plan.
- Personnel should be conversant with fire control equipment and also its location.
- Port personnel should be familiar with the standard recognition markings of the control, first-aid and all safety equipment, must know the location of emergency exits, and they should know the location of water points/monitors and must be familiar with the sound of the emergency (fire) alarm.
- The firefighting organization plan together with layout of fire fighting and safety devices shall be displayed at prominent places and explained to all personnel. It shall include the following functions, expanded to suit the location facilities / equipment:
 - Sounding the emergency (fire) alarm.
 - Shutting off the supply to any leakage point / fire.
 - Summoning the fire brigade / police
 - Fire control, with first-aid, firefighting equipment
 - Closing down all operations in the area pertaining to emergency
 - Preventing all sources of ignition in case flammable substance leak occurs
 - Evacuation of vehicles
 - Evacuation and mustering of personnel
 - Establishing an emergency fire-control center
 - Traffic control
 - Stations and duties of all personnel
 - Policing of affected areas
 - Any other specialized duties
 - Display of fire brigade, ambulance, Police telephone numbers etc.
 - All clear signal by competent person.

Liaison with local Fire Brigade

Close co-operation with the local fire authorities is essential and shall take the following form:

- Fire brigade other than of Port should be made familiar with layout of plant and the location of important equipment / facilities provided, and their method of use. Mock fire drills / exercise jointly by plant personnel and outside fire brigades shall be planned.
- Firefighting equipment at the plant shall be compatible with the outside fire brigade equipment, otherwise adopters shall be kept ready for hoses,
- The outside fire brigade shall be aware of the ports firefighting organization plan and the views held at the plan regarding the most effective fire control method. (Water insoluble)
- In the event of an emergency / fire, the Port manager and / or his representative shall advise the Fire Officer about particular or potential hazards that may be present at that particular point of time.

Fire Drills & Training

- ❖ Drills for all plant personnel, making use of the Fire Fighting Organization plan and practicing the specialized techniques required for fighting fires or dispensing / diluting vapor shall be held minimum once in a month.
- ❖ The drills should cover various types of incidents, e.g. Major spillage, leak / fire, cylinder fire etc.
- ❖ Extinguishers due for recharging due for hydro testing shall be discharged during drills and replenished subsequently 50% (Min.) stock of refills as replenishment for Fire Extinguishers should be maintained.
- ❖ The fire pump should be run, sprinkler system activated, emergency systems tested, water hoses run out and spray / set techniques practiced during drills.
- ❖ Fire alarm shall be sounded / tested / neighbouring areas and the fire brigade shall be warned in advance of this test).
- ❖ Protective clothing, mask and any other specialized safety equipment available shall be tried out during drills to train all concerned in their application.
- ❖ The local fire brigade should be encouraged to participate in fire drills periodically.
- ❖ Any shortcoming, noticed during the drill shall be rectified.

ON-SITE EMERGENCY PLAN (DISASTER MANAGEMENT PLAN)

It is basically a pre-plan to handle any emergency situation of a higher magnitude arising out of factors listed below:

- ✓ Major fire / explosions
- ✓ Lighting
- ✓ Heavy floods
- ✓ Earthquakes
- ✓ Sabotage/ terrorist outrage
- ✓ War situation

	ADANI PORTS AND SEZ LTD MUNDRA <hr/> ON SITE EMERGENCY PLAN (PORT AREA)	AUGUST - 2023
--	---	----------------------

Due to varying risk potentials and also varying hazards at / around each location _ON SITE EMERGENCY PLAN for each location shall be drawn up individually based on the outline given below:

- Identify disaster scenario i.e. the situations under which the plan would become operational. Plan for the worst possible scenario.
- Identify resources required from each of the outside agencies.
- Establish outside agencies, role of each agency and obtain their commitment for rendering assistance in crises situation as per the agreed plan.
- Establish organogram for ON SITE EMERGENCY PLAN based on available manpower in various groups and identify the leader and alternative leader for each of the groups and the role to be played by each team in various likely crises situations.
- Identify Disaster Control room / group.
- Furnish detailed data and drawings relevant for the crises management.
- Mock drills to be conducted minimum once a year.
- Modify the plan based on the experience gained through mock drills and try out the modified plan through subsequent mock drills.
- The plan shall be updated as and when the changes recorded in the plan occur and communication sent to all concerned.

Communication organogram

As a part of ON SITE EMERGENCY PLAN, communication organogram shall be drawn up giving flow of communication from the originating location to various local agencies and also to Statutory Authorities and upwards within the organization to mobilize support and to consider alternatives for maintaining essential supplies. **(As mentioned in Chapter 3.13 & 3.14 Communication & Public Affairs)**

MANAGER (SITE MAIN CONTROLLER)

1. Rush to the port on receiving the message of the incident
2. Call other persons if required.
3. Inform hospitals, doctor, police, dist. Authorities, Director, Industrial Safety & Health
4. Arrange for roll call of workers and find if anyone missing
5. Arrange for first aid of injured and hospitalization
6. Arrange food / water for persons controlling the emergency
7. Arrange for money
8. Assess situation & determine area likely to be affected

OCCUPIER

1. Prepare a statement for press & public release and take responsibilities of press and public relationship
2. Plan out rehabilitation / post emergency activities

	<p style="text-align: center;">ADANI PORTS AND SEZ LTD MUNDRA</p> <hr/> <p style="text-align: center;">ON SITE EMERGENCY PLAN (PORT AREA)</p>	<p style="text-align: right;">AUGUST - 2023</p>
--	---	--

6.03 ROLE OF MANAGEMENT

A copy of this on-site emergency to be submitted in duplicate to Deputy Director, Industrial Safety & Health, District Authority.

6.04 ROLE OF POLICE AND EVACUATION AUTHORITY

Police may be required for maintaining law and order outside the factory and on the approach road.

6.05 ROLE OF MUTUAL AID UNITS

Agreement with nearby units is to be made for providing help, aid, assistance, vehicle, expert to overcome the situation.

SECTION – II **ANNEXURES**

CONTENTS

Annex	Title
1	Identification Of The Factory
2	Factory Lay Out
3	Location Plan Of Factory
4	Storage Hazards And Control
5	Material Safety Data Sheet
6	Process & Vessel Hazards And Control
7	Other Hazards And Control
8	Trade Waste Disposal
9	Record Of Past Incident
10	Gas Dispersion Concentration
11	Evacuation Table
12	Environmental Impact Assessment
13	Weather Condition
14	Incident Controller
15	Deputy Incident Controller
16	Site Main Controlle0052
17	Key Personnel
18	Essential Workers
19	Assembly Points
20	Emergency Control Center
21	Fire And Toxicity Control Arrangements
22	Medical Arrangements
23	Transport & Evacuation Arrangements
24	Population Control Arrangements
25	Other Arrangements
26	Alarms & Sirens
27	Internal Phones
28	External Phones
29	Nominated Person To Declare Major Emergency
30	Form To Record Emergency Phone-Calls
31	Statutory Communication
32	Separation Distance
33	Emergency Instruction Booklet

**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

Authorized by: AGM (QHSE)
Issue No. : 05
August 2023

Rev : 12
Date: 10th

Annexure – 1					
IDENTIFICATION OF FACTORY					
Full Name & Address of factory			ADANI PORTS and SEZ LIMITED P.O. Box 1, Mundra – 370 421 (KUTCH) Gujarat, India.		
Phone	02838-255000		Office		
Fax No.	02838-226301		E-mail	info@mundraport.com	
Full Name & Address of the Occupier			DR. MALAY MAHADEVIA C/O. ADANI PORTS & S.E.Z. LIMITED NAVINAL ISLAND, MUNDRA.		
Phone No.			Office	Residence	
			--	--	
Full Name & Address of the Manager			CEO. SUJALKUMAR SHAH C/O. ADANI PORTS & S.E.Z. LTD., NAVINAL ISLAND, MUNDRA		
Phone No.			Office	Residence	
			02838-255000	--	
Manufacturing Process			Handling of Dry and Liquid Cargo in Bulk		
Name of the Shift					
			Maximum Worker at a time		
			Male	Female	Total
General Shift – G			1187	42	1229
Shift – A			402		402
Shift – B			402		402
Shift – C			380		380
Total Shifts:			2371	42	2413
First Person to be contacted in case of emergency :					
Name of the shift	Name & Designation	Place of Availability	Phone No.		
			Mobile	In Factory	Residence
(A),(B),(C) shifts	PORT ISCR (Integrated Security Control Room)	PORT ISCR	8980011811	02838-255100 Ext. 52100	-
Any Other information, if any : Any of the persons will be available round the clock :					



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED
EMERGENCY ACTION PLAN**

AUGUST - 2023

**Authorized by: AGM (QHSE)
Issue No. : 05
August 2023**

**Rev : 12
Date: 10th**

**Annexure – 2
FACTORY LAY OUT**





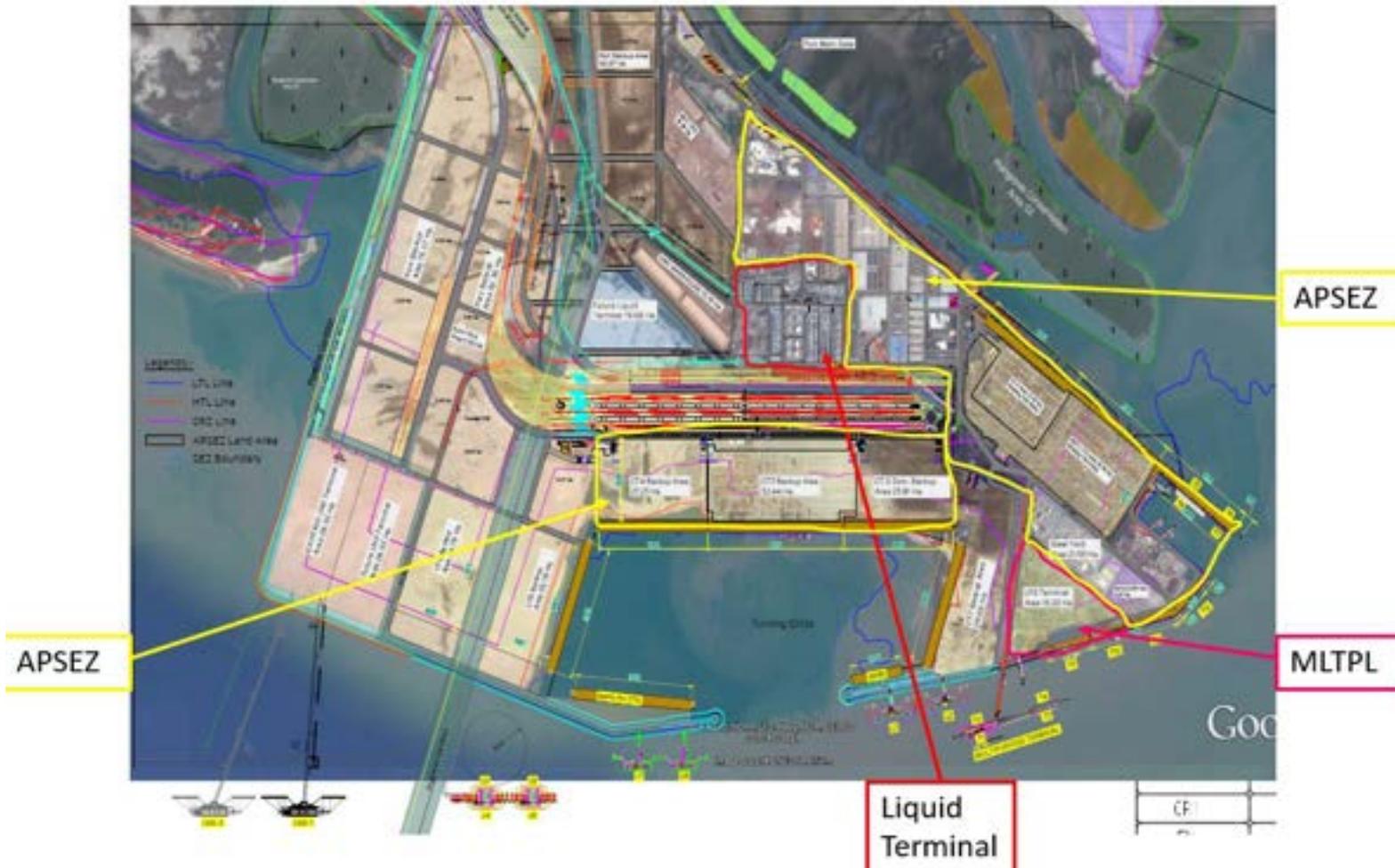
**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED
EMERGENCY ACTION PLAN**

AUGUST - 2023

**Authorized by: AGM (QHSE)
Issue No. : 05
August 2023**

**Rev : 12
Date: 10th**

**Annexure – 3
LOCATION PLAN OF FACTORY**



	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10 th August 2023	

Annexure – 4

STORAGE HAZARDS & CONTROL

Name of the hazardous substance (Mention concentration if any)	Sr. No. of the MSDS enclosed	Quantity		Place of its storage	Operating pressure & Temp.	Type of Hazards possible (Fire, explosion, Toxic release, Spill etc.)	Control Measures Provided	In charge Person	
		Maximum That can be stored	Actually stored (Including in process & handling)					Name & Designation	Phone No.
1	2	3	4	5	6	7	8	9	10
A. <u>Raw Materials:</u>	Available	Storage of Liquid 3.25 Lac KL	185135 MT as on 04.01.22	Liquid Storage Tanks	Ambient Temperature and Pressure	Fire, explosion, Toxic Release, Spill	Water Sprinkler, Foam Purer, Hydrant System	Mr. Gaurang Chudasama (Head – LT)	8980802997
B. Finished Product:	--	--	--	--	--	--	--	--	--
C. Intermediates	--	--	--	--	--	--	--	--	--
D. Bye-Products	--	--	--	--	--	--	--	--	--
E. Other: (E.g. Catalysts, inhibitors etc.)	--	--	--	--	--	--	--	--	--

Note: There is no process or manufacturing activity only storage handling of dry and liquid cargo in bulk.

Annexure – 5

THE MSDS OF HAZARDOUS CHEMICALS

Sr. No	Name Of HAZARDOUS CHEMICALS	Page No
1	Motor spirit	MSDS Attached at the end of Annexures
2	Naphtha	Do
3	Gasoil	Do
4	Methanol	Do
5	Toluene	Do
6	Acetic acid	Do
7	P- Xylene	Do
8	Vinyl Acetate Monomer	Do
9	Styrene Monomer	Do

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Annexure – 6									
PROCESS & VESSEL HAZARDS AND CONTROLS									
Sr. No.	Name of the Plant, Department or place	Name of the hazardous process and operation	Materials in the process/ operation with their quantity	Name of the vessel and its location	Operating parameters: (Pressure, Temp. etc.)	Type of hazards possible (exothermic, run away, pressure release, toxic release, fire, explosion etc.)	Control Measures provided	In charge Person	
								Name	Tele. No.
1	2	3	4	5	6	7	8	9	10
1	Air compressor (LT workshop)	Air compression	Compressed Air	Air driers & Air Receivers	Pressure	High Pressure release	Safety Valve,	Mr. Gaurang Chudasama (Head – LT)	8980802997
2	Nitrogen compressor (LT workshop & Near ISPS Gate)	Nitrogen compression	Nitrogen	Nitrogen Receiver	Pressure	Nitrogen release with high pressure	Safety valve		



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

AUGUST - 2023

**Authorized by: AGM (QHSE)
Issue No. : 05**

**Rev : 12
Date: 10th August 2023**

Annexure – 7

OTHER HAZARDS & CONTROLS

Sr. No	Name of the possible hazard or emergency	Its source and reasons	Its effects on persons, property & environment	Place of effect	Control measures provided	In charge personal	
						Name and Designation	Telephone No (internal)
1	2	3	4	5	6	7	8
1	Utility Systems Emergency	Diesel fuel, Steam Boiler, Chemical storage for cooling water Treatment.	Burn Injury, Property Damage	Process Area	F&G system, FFS is available, MSDS is Available, PPE is available Safe handling of chemical operation available	Mr. Rama Rao Kondappa	9925203436
2	Electricity, Short Circuit	Substation	Shock, Fire	Electrical Sub station	As per electricity rules (Restricted Entry, Transformer Maintenance, etc.)	Ketan Joshi	8980015057
3	Fire	Fuel storages	Fire	Storeroom, DG set area	All provisions as per laid down rules Classified storag0065	Ratnadip Trivedi	8979203595
4	Natural calamities					Mr. Rama Rao Kondappa	9925203436

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10 th August 2023	

Annexure – 8								
TRADE WASTE DISPOSAL								
Sr. No.	Type and Name of the trade waste	Generation per Annum	Place of its generation	Place of its safe disposal	Treatment method adopted for safe disposal	Alarm indicating accidental release or release in excessive proportion	Monitoring & Control measures provided	In charge person's name, Address & Phone No.
1	2	3	4	5	6	7	8	9
1.	Used/Spent Oil	300.0 MT	All the departments	Reception, Collection, Storage, Transportation & Disposal by selling out to registered recycler/ re-processor	Send to authorized recycler	-----	Disposal by selling out to registered recycler/ re-processor	Mr. Kamal Saliya, Central Store 9099211149 (M)
2.	ETP Sludge	1.095 MT	Liquid Terminal	Collection, Storage, Transportation & Disposal by co-processing at cement industries	Disposal by co-processing at cement industries through SEPPL / RSPL		Disposal by co-processing at cement industries	Mr. Gaurang Chudasama Liquid Terminal 980802997 (M)

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10 th August 2023	

Annexure – 8								
TRADE WASTE DISPOSAL								
Sr. No.	Type and Name of the trade waste	Generation per Annum	Place of its generation	Place of its safe disposal	Treatment method adopted for safe disposal	Alarm indicating accidental release or release in excessive proportion	Monitoring & Control measures provided	In charge person's name, Address & Phone No.
1	2	3	4	5	6	7	8	9
3.	Sludge & Filters contaminated with oil	5.0 MT	All the Departments	Collection, Collection, Storage, Transportation & Disposal by co-processing at cement industries	Disposal by co-processing at cement industries through SEPPL / RSPL		Disposal by co-processing at cement industries	Mr. Kamal Saliya, Central Store 9099211149 (M)

Annexure – 8								
TRADE WASTE DISPOSAL								
Sr. No.	Type and Name of the trade waste	Generation per Annum	Place of its generation	Place of its safe disposal	Treatment method adopted for safe disposal	Alarm indicating accidental	Monitoring & Control measures	In charge person's name, Address & Phone No.



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

AUGUST - 2023

EMERGENCY ACTION PLAN

Authorized by: AGM (QHSE)
Issue No. : 05

Rev : 12
Date: 10th August 2023

1	2	3	4	5	6	7	8	9
4.	Waste Residue Containing Oil	100.0 MT	All the Departments	Collection, Collection, Storage, Transportatio n & Disposal by co- processing at cement industries	Disposal by co- processing at cement industries through SEPPL / RSPL / Sanghi Cement / Ambuja Cement		Disposal by co- processing at cement industries	Mr. Bhagwat Swaroop Sharma Environment 7622947676 (M)
5.	Bottom sludge	Whatever quantity generated	Liquid Terminal	Collection, Collection, Storage, Transportatio n & Disposal by co- processing at cement industries	Disposal by co- processing at cement industries through SEPPL / RSPL / Ambuja Cement		Disposal by co- processing at cement industries	Mr. Gaurang Chudasama Liquid Terminal 8980802997 (M)

Annexure – 8

TRADE WASTE DISPOSAL



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

AUGUST - 2023

EMERGENCY ACTION PLAN

**Authorized by: AGM (QHSE)
Issue No. : 05**

**Rev : 12
Date: 10th August 2023**

Sr. No.	Type And Name Of The Trade Waste	Generation Per Annum	Place Of Its Generation	Place Of Its Safe Disposal	Treatment Method Adopted For Safe Disposal	Alarm Indicating Accidental Release Or Release In Excessive Proportion	Monitoring & Control Measures Provided	In Charge Person's Name, Address & Phone No.
1	2	3	4	5	6	7	8	9
6.	Pig Waste	24.0 MT	Liquid Terminal	Collection, Collection, Storage, Transportation & Disposal by co-processing at cement industries	Disposal by co-processing at cement industries through SEPPL / RSPL / Ambuja Cement		Disposal by co-processing at cement industries	Mr. Gaurang Chudasama Liquid Terminal 8980802997 (M)

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Annexure – 9

RECORDS OF PAST INCIDENTS

Sr. No	Type Of Incident (Major Accident) Emergency Or Disaster	Date & Time Of Occur	Its Place	Duration	Time Required In Controlling It	No. Of Workers Working At That Time	Person Affect0053		Person Died		Effects On the Survivors		Subsequent Step For Safety Provide D	Other Details If Any (E.G. Antidotes Used Etc.)
							Inside The Factory	Outside The Factory	Inside The Factory	Outside The Factory	Immediate	Delayed		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No Major Undesirable Incident Occurred So Far														

ANNEXURE – 10											
GAS DISPERSION CONCENTRATION											
As Per Attached Pages.											
ASSURING LEAK RATE (Q) = 3 Kg. /Sec, I.E., 3*10 ⁶ G/Sec AND VELOCITY (U)=2 & N/Sec., DOWNNING CONCENTRATIONS OF SOME GASES AT VARIOUS DISTANCE ARE CALCULATED AND TABULATED AS FOLLOWS:											
Product: Maximum Concentration (Ppm) In Downing Direction At Distance X, Wind Velocity= 2m/Sec, For Most Unstable After-noon Weather Condition (A).											
	100 M	200 M	300 M	400 M	500 M	600 M	1 KM	2 KM	3 KM	4 KM	5 KM
1.											
Note: For Other Weather Condition Respective Curve Should Be Chosen											
Product: Maximum Concentration (Ppm) In Downing Direction At Distance X, Wind Velocity=5m/Sec, For Most Unstable Weather Condition (A).											
	100 M	200 M	300 M	400 M	500 M	600 M	1 KM	2 KM	3 KM	4 KM	5 KM
1.											
Note: For Other Weather Condition Respective Curve Should Be Chosen.											
Above Data Is Given For Information Only As None Is Applicable To Us.											

ANNEXURE – 11

EVACUATION TABLE

Evacuation Table Based On Prevailing Wind of 6 To 12 MPM
(2.7 To 5.4 M/S)

Material	Radius of Immediate Danger Area (Km)	Dimension Of Evacuation Area	
		Downwind (Km)	Crosswind (Km)
1. Motor spirit			
2. Naphtha.			
3. Acetic acid			
4. P- Xylene			
5. Styrene Monomer			
6. Methanol			
7. Toluene			
8. Gasoil			
9. Vinyl Acetate Monomer			

Source: Emergency Action Guide for Selected Hazardous Materials. U.S. Department Of Transportation.1978.

ANNEXURE – 12																
ENVIRONMENTAL IMPACT ASSESSMENTS																
Sr. No	Distance (Radius) From The Factory	Environment (Employees Hutment. Neighboring Factory. Village. Water Courses. River. School Hospital. Public Place Vegetable/Food Market Crops. Tall Structure. Flora. Fauna Etc.)	Population With Composition						Possible Consequences & Assessment						Type Of Control Measures Necessary	
			Day Time			Nigh Time			Type Of Risk & Effect Possible	Duration Of Risk.	Risk Assessment			Available In The Factory	Required From Outside	
			Healthy	Vulnerable	Total	Healthy	Vulnerable	Total			No. Of People Name & Amount (Rs) Of Property & Other Environment That May Be Affected	Frequency Of The Hazard (I.E., One Such Incident In What Time)	Acceptable Criteria			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
	More than 10 Km	More than 10 Km away from factory. No water course, river, school hospital public place vegetable market crops, flora, fauna nearby area.	--	--	--	--	--	--								



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

Authorized by: AGM (QHSE)
Issue No. : 05

Rev : 12
Date: 10th August 2023

AUGUST - 2023

**Annexure – 13
WEATHER CONDITIONS**

Sr. No.	Period of the year	Wind Velocity, M/Sec.	Wind Direction	Weather conditions	Pasquill classification A to F
	Month				
1	2	3	4	5	6
1	JANUARY	5-7	NNE / NE	CALM	D
2	FEBRUARY	5-7	NNE / NE	CALM	D
3	MARCH	7-9	SSW / SW	CALM	D
4	APRIL	9-10	SSW / SW	CALM	D
5	MAY	10-12	WSW / SW	SLIGHT	D
6	JUNE	10-12	WSW / SW	MODERATE / ROUGH	D
7	JULY	12-15	WSW / SW	ROUGH	D
8	AUGUST	12-15	WSW / SW	ROUGH / MODERATE	D
9	SEPTEMBER	8-10	WSW / SW	SLIGHT	D
10	OCTOBER	8-9	WSW / SW	CALM	D
11	NOVEMBER	5-7	WSW / SW	CALM	D
12	DECEMBER	5-7	NNE / NE	CALM	D

Legend: A: Extremely Unstable
B: Moderately Unstable
C: Slightly Unstable
D: Natural
E: Slightly Stable
F: Moderately Stable

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED	AUGUST - 2023
	EMERGENCY ACTION PLAN	
	Authorized by: AGM (QHSE) Issue No. : 05	Rev : 12 Date: 10 th August 2023

**Annexure – 14
INCIDENT CONTROLLERS**

Sr. No.	Incident Controller's						Runner's		
	Name	Designation	Place of Availability		Phone No.		Name & Designation	Place of Availability	Phone No.
			In Factory	Residence Address	In the Factory	Residence			
1	2	3	4	5	6	7	8	9	10
1	Mr. Bhagwat Upadhaye	Head – Dry Cargo	Tug Berth Building	Samudra Township	98792 03599 02838-255870	--	Mr. Mahavirsinh Jhala	Tug Berth Building	9687639228 02838-255838
2	Mr. Gaurang Chudasama	Head - LT	Liquid Terminal	Shantivan Colony	8980802997 02838 - 255742	4459	Mr. K R Rao	Liquid Terminal	99252 03436 02838-255872
3	Capt. Pradeep Ramachandran	Head – AMCT	(AMCT) CT2 Building	Samudra Township	6358940439 02838 – 255732	--	Mr. Prakash Pillai	(AMCT) CT2 Building	7574894335 02838 - 255917
4	Mr. Cherian Abraham	Head - AICTPL	(AICTPL) CT3 – Building	Samudra Township	8980048850 02838 – 255732	--	Mr. Jignesh Bhatt	(AICTPL) CT3 – Building	7069083202 02838 - 255551
5	Mr. Gajanan Govekar	Head - ACMTPL	(ACMTPL) CT4 – Building	Samudra Township	7069013836 02838 - 255809	4458	Mr. Vijay Patel	(ACMTPL) CT4 – Building	8980016436 02838 - 255409
6	Mr. Mavji Vaghamshi	Head - ES	Tug Berth Building	Shantivan Colony	97277 84691 02838-255949	--	Mr. Kuldipsinh Zala	Tug Berth Building	9727784692 02838 - 255949
7	Capt. Sachin Srivastava	Head – Marine	Tug Berth Building	Shantivan Colony	6359883102 02838 – 255727	4629 / 4630	Capt. Rajat Garg	Tug Berth Building	9717527583 02838- 255947

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED							AUGUST - 2023
	EMERGENCY ACTION PLAN							
Authorized by: AGM (QHSE) Issue No. : 05					Rev : 12 Date: 10th August 2023			

8	Mr. Jawed Iqbal	Head- Railway Services	Railway Building	Shantivan Colony	98982 91000 02838 – 255763	4477	Mr. O P Sharma	Railway Building	98253 00413 02838 - 255765
9	Mr. Vikas Arora	Head – Howe	PUB Building	Shantivan Colony	98792 03557 02838 – 255581	4721	Mr. Harit Mehta	PUB Building	98792 03557 02838 - 259142
10	Mr. Snehasish Bhattacharyya	Head-HR	Adani House	Shantivan Colony	8826363738 02838 - 255723	4635 / 4636	Mr. Namit Kapoor	Adani House	6358945030 02838 - 255164

Annexure – 14B (West Basin)

INCIDENT CONTROLLERS

Sr. No.	Incident Controller's						Runner's		
	Name	Designation	Place of Availability		Phone No.		Name & Designation	Place of Availability	Phone No.
			In Factory	Residence Address	In the Factory	Residence			
1	2	3	4	5	6	7	8	9	10
1	Mr. Vivek Singh	Head – West Basin Port	SS-1	Shantivan Colony	8980015440 02838 - 255708	4623 4624	Mr. Kashyap Pandya	SS-1	9925223632
2	Mr. Kashyap Pandya	DGM – ES	SS-1	Shantivan Colony	9925223632	--	Mr. Vishal Bhavsar	SS-1	9879203580
3	Mr. Nitin Joshi	Associate Manager – DC	SS-1	Shantivan Colony	8980015365	B-block	Mr. Shivabhai Vanjar	SS-1	7574894352

Annexure – 15

DEPUTY INCIDENT CONTROLLERS

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED						AUGUST - 2023
	EMERGENCY ACTION PLAN						
Authorized by: AGM (QHSE) Issue No. : 05				Rev : 12 Date: 10 th August 2023			

Sr. No.	Deputy Incident Controller's						Persons to be called if IC & Dy-IC both are not available.		
	Name	Designation	Place of Availability		Phone No.		Name	Place of Availability	Phone No.
			In Factory	Residence Address	In the Factory	Residence			
1	3	4	6	7	8	9	10	11	12
1	Mr. Mahavirsinh Jhala	Manager – Dry Cargo	Tug Berth Building	Shantivan Colony	89800 15471 02838-255939	--	Mr. Umesh Padaliya	FCC	8980015040 02838-255987
2	Mr. K R Rao	DGM – LT	Liquid Terminal	Shantivan Colony	99252 03436 02838 - 255745	4501	Mr. Manish Jain	Liquid Terminal	98796 14715 02838 - 284419
3	Mr. Umang Makwana	Manager – AMCT	(AMCT) CT2- New Building	Samundra Township	7069013835 02838 - 62511	--	Duty Superintendent	(AMCT) CT2- New Building	96876 39248
4	Mr. Jignesh Bhatt	Senior Manager – AICTPL	(AICTPL) CT3 – Building	Samundra Township	7069083202 02838 – 255551	--	Duty Superintendent	(AICTPL) CT3 – Building	89800 48857
5	Mr. Vijay Patel	Associate Manager - AICTPL	(ACMTPL) CT4 – Building	Samundra Township	7069013836 02838 - 255408	4466	Duty Superintendent	(ACMTPL) CT4 – Building	70690 83090
6	Mr. Kuldipsinh Zala	DGM - AGM	Tug Berth Building	Shantivan Colony	9727784692 02838 - 255949	4506	Mr. Devendra Dubey	Tug Berth Building	98792 03578 2838-255832
7	Capt. Rajat Garg	DGM- Marine	Tug Berth Building	Shantivan Colony	9717527583 02838- 255947	4444	Capt. Girish Chandra	Tug Berth Building	6357231712 02838-255787

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED							AUGUST - 2023
	EMERGENCY ACTION PLAN							
Authorized by: AGM (QHSE) Issue No. : 05					Rev : 12 Date: 10th August 2023			

8	Mr. O P Sharma	AGM – Railway	Railway Building	Shantivan Colony	98253 00413 02838 - 255765	4428	Mr. Paresh Palan	Railway Building	99252 03424 02838-255787
9	Mr. Vikas Arora	DGM – Howe	PUB Building	Shantivan Colony	98792 03557 02838 - 259142	4482	Mr. Harit Mehta	PUB Building	98792 03557 02838 – 255719
10	Mr. Namit Kapoor	GM-Admin	Adani House	Shantivan Colony	6358945030 02838 - 255164	--	Mr. Supratim Sengupta	Adani House	9979855956 02838 - 255158

Annexure – 15B (West Basin)								
DEPUTY INCIDENT CONTROLLERS								
Deputy Incident Controller's						Persons to be called if IC & Dy-IC both are not available.		
Name	Designation	Place of Availability		Phone No.		Name	Place of Availability	Phone No.
		In Factory	Residence Address	In the Factory	Residence			
2	3	4	5	6	7	8	9	10
Mr. Kashyap Pandya	DGM – WB	SS-1	Shantivan Colony	9925223632	4517	Mr. Nital Bhut	SS-1	8980015358
Mr. Nitin Joshi	Asso Manager - DC	SS-1	Samudra Township	89800 15282	B – Block	Mr. Shivabhai Vanjar	SS-1	75748 94352
Mr. Kashyap Pandya	DGM – WB ES – MHS	SS-1	Shantivan Colony	97277 84692	4472	Mr. Mayur Sadhu	SS-1	8980 015121
Mr. Nital Bhut	Dy. Manager ES – MHS	SS-1	Samudra Township	89800 15358	B – Clock	Mr. Vishal Bhavsar	SS-1	98792 03580
Supporting Staff of Chennai Radha [Engineering Services]								

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Name	Designation	Place of Availability in Factory	Residence	Phone No.
Mr. Ravi V	RM – Chennai Radha	Workshop	Mundra	8607700609
Mr. Tapankumar Sarkar	Operation Head - Chennai Radha	Workshop	Mundra	9726412631
Mr. Mahesh Kumar	Maintenance Head – Chennai Radha	Workshop	Mundra	9726418881
Mr. Arha Chakrabarty	HOS E & I - Chennai Radha	Workshop	Mundra	9726429031
Mr. Lakshmanan T	Mechanical Head - Chennai Radha	Workshop	Mundra	8683800531

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED						AUGUST - 2023
	EMERGENCY ACTION PLAN						
Authorized by: AGM (QHSE) Issue No. : 05				Rev : 12 Date: 10 th August 2023			

Annexure – 16									
SITE MAIN CONTROLLERS									
Sr. No	Site Main Controllers						Alternate Site Main Controllers		
	Name	Designation	Place of Availability		Phone No.		Name & Designation	Place of availability	Phone No.
			In Factory	Residence Address	In the Factory	Residence			
1	2	3	4	5	6	7	8	9	10
1	Mr. Sujalkumar Shah	CEO	Adani House	Shantivan Colony	6358015565 02838 - 255002	4568 / 4569	Mr. Manoj Katar COO	Tug Berth	9879614724 02838 – 255404
							Mr. Pradeep Jayaraman COO	ACMTPL	9152036949 02838 – 255410

Annexure – 17							
KEY PERSONNEL							
EMERGENCY CONTACT NUMBERS							
Sr. NO.	NAME	Designation	Place of Availability		Phone No		
			Factory	Residence	Land line	Residence	Mobile
1	2	3	4	5	6	7	8
1	Mr. Sujalkumar Shah	CEO	Adani House	Shantivan Colony	02838 – 255002		6358015565
2	Mr. Manoj Katar	COO	Tug Berth	Shantivan Colony	02838 – 255404		9879614724

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED					AUGUST - 2023
	EMERGENCY ACTION PLAN					
Authorized by: AGM (QHSE) Issue No. : 05				Rev : 12 Date: 10th August 2023		

3	Mr. Pradeep Jayaraman	COO	ACMTPL	Samudra Township	02838 – 255410		9152036949
4	Mr. Vivek Singh	Head - WB	SS – 01 WB	Shantivan Colony	--	4623 / 4624	8980015440
5	Mr. Rakshit Shah	ED	Adani House	Shantivan Colony	02838 - 255001	52497	99791 21111
6	Mr. Mavji Vaghamshi	Head-ES	Tug Berth Bld.	Shantivan Colony	02838 - 255713	--	97277 84691
7	Mr. Gaurang Chudasama	Head- LT	Liquid Terminal	Shantivan Colony	02838 - 255742	4459	8980802997
8	Mr. Snehasish Bhattacharyya	Head - HR	Adani House	Shantivan Colony	02838 - 255723	--	8826363738
9	Capt. Pradeep Ramachandran	Head – AMCT	CT2- New Bld.	Samudra Township	02838 – 255732	4617 / 4618	6358940439
10	Mr. Cherian Abraham	Head – AICTPL	CT3 Bld.	Shantivan Colony	02838 - 255733	--	8980048850
11	Mr. Gajanan Govekar	Head - ACMTPL	CT4 Bld.	Samudra Township	02838 – 255727	4629 / 4630	6358940439
12	Capt. Sachin Srivastava	Head – Marine	Tug Berth Bldg.	Shantivan Colony	02838 – 255727	4629 / 4630	7069013836
13	Mr. Bhagwat Upadhaye	Head – Dry Cargo	Tug Berth Bldg.	Samudra Township	02838-255870	--	98792 03599
14	Mr. Jawed Iqbal	Head - Railway	Rly. Building	Shantivan Colony	02838 – 255763	--	90999 91319
15	Mr. Manan Bhatt	Head – OHS	CT2- New Bld.	Samudra Township	02838-255777	--	9979855922
16	Dr. Rakesh Chaturvedi	Head – Fire	Fire Station	Samudra Township	2838 255857		7069083035
17	Col. Nirmal Dhaliwal	Head - Security	Adani House	Shantivan Colony	02838-255800	--	9109988165
18	Mr. Mukul Varshney	SEZ Utilities	Adani House	Samudra Township	02838-255828	--	9981994709
19	Mr. Paresh Gohel	SEZ Operations	Adani House	Shantivan Colony	02838-255112		9879206539
20	Mr. Gireesh Sharma	Commercial Services	Adani House	Shantivan Colony	02838-255150		9099991164

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Annexure – 18									
ESSENTIAL WORKERS									
Auxiliary Fire Squad, Central Safety Department Cell, Other Helpful members from other departments (MLTPL & LTM)									
Shifts	Group No. (Any One. Shall Be Available In Each Shift& On Holiday On Call)	Sr. No	Name & Designation	Trained For	Place Of Availability		Phone No		Personal Protective equipment's Required
					In The Factory	Residence Address	Factory	Residential	
I- Shift II- Shift III-Shift	OHC Staff Safety Department. Fire Department Security staff		1.ERT MEMBERS 2. FIRST AID TRAINED PERSONNEL 3. FIRE FIGHTING PERSONNEL 4.Security, ISCR team	FIRST AID Medical Help To help Fire Brigade FIRE FIGHTING Evacuation of affected persons Informing surrounding factories etc. Shutting down plant Law & order within premises	In Plant & APSEZ	As per Company Record, MOA	As per Company Record, MOA		
Note: 1. The shift may change, but the group will be available against each shift 2. Prepare 2 to 3 groups even if there is only one or two shifts.									

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED	AUGUST - 2023
	EMERGENCY ACTION PLAN	
Authorized by: AGM (QHSE) Issue No. : 05	Rev : 12 Date: 10th August 2023	

Annexure – 19								
SAFE ASSEMBLY POINTS								
Identificati on Sr. No. of the Assembly Point	Location	Accomm odation Capacity	At the time of Emergency					
			Person In charge				Land line Nos.	Mobile Nos.
			Name	Designation	Place of availability			
					In the factory	Residential address		
1	2	3	4	5	6	7	8	9
Zone 1.	Terminal -1 (Sec. Gate)	100	Capt. Sachin Srivastav	Head-Marine	Tug Berth Bld.	Shantivan Colony	02838 – 255727	63598 83102
Zone 2.	CG 7	200	Mr. Manan Bhatt	Head – OHS & F	CT2 New bld.	Samudra Township	02838 – 255777	9979855922
Zone 3.	Driver Canteen	200	Mr. Gaurang Chudasama	Head – LT	LT	Shantivan Colony	02838 - 255742	8980802997
Zone 4.	LT - Behind Encl-09	200	Mr. Gaurang Chudasama	Head – LT	LT	Shantivan Colony	02838 - 255742	8980802997
Zone 5.	Old Admin Canteen	200	Mr. Bhagwat Upadhaye	Head – Dry Cargo	Tug Berth Bld.	Samudra Township	02838 - 255870	9879203599
Zone 6.	Railway. Building	200	Mr. Jawed Iqbal	Head – Rly	Rly. Building	Shantivan Colony	02838 – 255763	98982 91000
Zone 7.	Terminal 2 (Sec. Gate)	200	Capt. Sachin Srivastav	Head-Marine	Tug Berth Bld.	Shantivan Colony	02838 – 255727	63598 83102
Zone 8.	AMCT CT-2 (Sec. Gate)	200	Capt. Pradeep Ramachandran	Head – AMCT	CT2 New bld.	Shantivan Colony	02838 – 255732	6358940439
Zone 9.	Main Gate	500	Mr. Nirmal Dhaliwal	AGM - Security	Main Gate	Shantivan Colony	02838 - 255800	9981994709
Zone 10.	PUB	500	Mr. Vikas Arora	Head Howe	PUB	Shantivan Colony	02838 - 255932	9879203557
Zone 11.	Adani House	200	Mr. Snehasish Bhattacharyya	Head – HR	Adani House	Shantivan Colony	02838 - 255723	8826363738
Zone 12.	Terminal – 3 (Sec. Gate)	200	Capt. Sachin Srivastav	Head-Marine	Tug Berth Bld.	Shantivan Colony	02838 – 255727	63598 83102

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED						AUGUST - 2023
	EMERGENCY ACTION PLAN						
Authorized by: AGM (QHSE) Issue No. : 05				Rev : 12 Date: 10th August 2023			

Zone 13.	AICTPL (Sec. Gate)	500	Mr. Cherian Abraham	Head - AICTPL	CT – 03 (AICTPL)	Shantivan Colony	02838 - 255733	89800 48850
Zone 14.	ACMTPL (Sec. Gate)	500	Mr. Gajanan Govekar	Head – ACMTPL	CT – 04 (ACMTPL)	Samudra Township	02838 - 255809	7069013836

Annexure – 19B (West Basin)

SAFE ASSEMBLY POINTS

Identification Sr. No. of the Assembly Point	Location	Accommo- dation Capacity	At the time of Emergency					
			Person In charge				Land line Nos.	Mobile Nos.
			Name	Designation	Place of availability			
					In the factory	Residential Address		
1	2	3	4	5	6	7	8	9
Zone 1	Opp. SS-1	100	Mr. Vimal Baldaniya	AM-ES	SS-1	---	----	89800 15123
			Mr. Jignesh Kansara	Junior Officer – DC	SS-1	Mundra	02838 – 252936	99132 43060
Zone 2	Nr. Howe Office	100	Mr. Bharat Pokar	Officer –Safety	Howe office	Mundra	----	89800 15467
Zone 3	GIS	100	Mr. Vishal Bhavsar	Manager – E & I	SS-1	Shantivan Colony	----	89800 15057
			Shift In charge – E & I	----	SS-1	----	----	89800 15212
Zone 4	Nr. Main Gate	100	Mr. Khadim Hussain	Officer, Security	Main Gate	----	----	84609 28563
			Security Shift Incharge	----	Main Gate	----	02838 – 252900	97277 84645
Zone 5	Approach-3	100	Mr. Kashyap Pandya	DGM – MHS	SS-1	Shantivan Colony	02838 – 255973	99252 23632
			Mr. Nitin Joshi	Ass Manager. – DC	SS-1	Samudra Township	02838 – 255924	89800 15365
Zone 6	Amenities Building	100	Mr. Narendrasinh Jadeja	AM -ES	SS-1	Shantivan Colony	02838 – 2562381	89800 16461
			Mr. Paresh Gadhavi	Assistant-Admin	SS-1	Mundra	02838 – 255969	89800 16462

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Annexure – 20						
EMERGENCY CONTROL CENTRE: ECR						
Location of the Centre: Port ISCR (Integrated Security Control Room)						
Telephone numbers of the Centre: external: 8980011811 / 02838-255100 Ext. 52100				internal:		
Sr. No.	Items kept in the Centre	Numbers or quantity	Person who will handle/operate this item	Its period of operation		Notes
				Last	Present	
1	2	3	4	5	6	7
1.	Self-Breathing Apparatus	2	Fire combat team members	Nil	Nil	None
2.	Fire Extinguishers	6	Do			
3.	First Aid Box	1	Do			
4.	General Personal Protective Equipment	5	Do			
5.	Torch, Raincoat, Umbrella, Mask, Helmet	5 set	Do			
6.	A copy of factory plan, On Site Emer. Plan	Yes, One	Do			
7.	Notebooks, Pen, Emergency Message form.	Yes	Do			
8.	Potable Gas Detectors	2	Do			

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10 th August 2023	

Annexure – 21										
FIRE & TOXICITY CONTROL ARRANGEMENTS										
Fire Water & Other sources	Nos. of Reservoir	02 (U/G water reservoir)	Nos. of Tanks	04 (O/H water storage tank)	Total Quantity				19358 KL	Nos. of CO2 Extinguishers
	No. of hydrant Points	No. of fire pumps, type & Capacity	No. of hose reels & Total Length	No. of fire tenders and capacity	No. of Sprinklers/Monitors					
					Fixed		Portable		Alternative power arrangement	
					Lifting height	Pressure	Lifting height	Pressure		
1	2	3	4	5	6	7	8	9	10	11
Sea Water & Narmada Water	385	<u>Diesel pump:</u> 06 no. – 273 M ³ /hr 02 no. – 410 M ³ /hr	60 mtr lengths – 30 nos.	04 no. fire tender	60 mtr horizontal & 40 mtr vertical throw	7 kg/cm ²	60 mtr horizontal & 40 mtr vertical throw	7 kg/cm ²	Diesel Generator backup	500 Nos.



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

AUGUST - 2023

EMERGENCY ACTION PLAN

Authorized by: AGM (QHSE)
Issue No. : 05

Rev : 12
Date: 10th August 2023

		02 no. – 616 M ³ /hr <u>Electric pump:</u> 03 no. – 273 M ³ /hr 02 no. – 410 M ³ /hr 04 no. – 616 M ³ /hr 01 no. – 100 M ³ /hr <u>Jockey pump:</u> 06 no. – 20 to 40 M ³ /hr 01 no. – 96 M ³ /hr		Capacity: 1) Water tender – 6 KL Water 2) Foam tender 01 - 6 KL Water & 3 KL Foam 3) Foam tender 02 - 5 KL water & 1 KL foam 4) Multipurpose fire tender - 8 KI Water - 3 KL Foam - 45 Kg CO2 - 150 Kg DCP							
Dry Powder Type		Foam Type		Water Jet Product		Other Extinguisher		Personal protective equipments			
Type of powder & total quantity	No. of portable Extinguisher	Type of foam & total quantity	No. of portable Extinguisher	No. & size of blankets	Other Jet products	Type	Number or Quantity	Respiratory		Non-respiratory	
								Type	No.	Type	No.
12	13	14	15	16	17	18	19	20	21	22	23

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED								AUGUST - 2023	
	EMERGENCY ACTION PLAN									
Authorized by: AGM (QHSE) Issue No. : 05						Rev : 12 Date: 10 th August 2023				

Sodium bicarbonate; 2000 kg	700 Nos.	AFFF & AR-AFFF 28 KL with system & 2 KI storage	08 Nos.	163 cm X 152 cm 04 nos.	Nil	Nil	Nil	1) Self- Contained Breathing Apparatus Set 2) Airline Self- Contained Breathing Apparatus Set	1) 12 nos. 2) 01 Nos.	Safety Helmet Gumboot	50 nos. 25 Nos.
--------------------------------	----------	--	---------	-------------------------------	-----	-----	-----	---	------------------------------------	-----------------------------	------------------------

Annexure – 21B (West Basin)										
FIRE & TOXICITY CONTROL ARRANGEMENTS										
Fire Water & Other sources	Nos. of Reservoir	00 (U/G water reservoir)	Nos. of Tanks	02 (O/H water storage tank)	Total Quantity				1100 KL	Nos. of CO ₂ Extinguishers
	No. of hydrant Points	No. of fire pumps, type & Capacity	No. of hose reels & Total Length	No. of fire tenders and capacity	No. of Monitors 101 nos.				Alternative power arrangement	
					Fixed [99]		Portable [02]			
					Lifting height	Pressure	Lifting height	Pressure		
1	2	3	4	5	6	7	8	9	10	11

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED								AUGUST - 2023
	EMERGENCY ACTION PLAN								
Authorized by: AGM (QHSE) Issue No. : 05						Rev : 12 Date: 10th August 2023			

Sea Water & Narmada Water	Reservoir capacity is 1100 KL Nos. of Hydrant 122	<u>Diesel pump:</u> 01 no. – 273 M ³ /hr	15mts lengths – 250 nos.	01 no.	30 mtr head	7 kg/cm ²	20 mtr head	7 kg/cm ²	Diesel Generator backup	2Kg – 36 4.5Kg – 128	
		<u>Electric pump:</u> 02 no. – 273 M ³ /hr		<u>Capacity:</u> 1) 5 KL water							
		<u>Jockey pump:</u> 02 no. – 10.8 M ³ /hr									
Dry Powder Type		Foam Type		Water Jet Product		Other Extinguisher		Personal protective equipment			
Type of powder & total quantity	No. of portable Extinguisher	Type of foam & total quantity	No. of portable Extinguisher	No. & size of blankets	Other Jet products	Type	Number or Quantity	Respiratory		Non-respiratory	
								Type	No.	Type	No.
12	13	14	15	16	17	18	19	20	21	22	23

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED									AUGUST - 2023
	EMERGENCY ACTION PLAN									
Authorized by: AGM (QHSE) Issue No. : 05						Rev : 12 Date: 10th August 2023				

Sodium bicarbonate; 700 kg	2Kg – 62	AFFF 200 liter	9 Ltr – 7	01 no.	Nil	Water CO2 type	9 Ltr – 5	Self- Contained Breathing Apparatus Set	03 no	<ul style="list-style-type: none"> • Safety Helmet • Gumboot • Fire Proximity Suit 	25 no.
	5Kg – 15		45 Ltr – 5				20 no.				
	9Kg – 44										
	10 Kg – 16										
	50Kg – 4										

MUTUAL AID ARRANGEMENT											
Name & Address of the factories & Fire stations	Approx. distance	Contact		FFE available		PPE available		No. of experts & trained persons available	Decontamination substances available	Gas detectors available	Other equipments available
		Person	Phone No.	Type	Quantity	Type	Quantity				
24	25	26	27	28	29	30	31	32	33	34	35
Indian Oil Corporation Limited, Mundra-Panipat Pipeline, Post Box No. – 1, P.O. Mundra, Old Port Road, Mundra, District – Kutch, Gujarat, PIN-370421.	12 km	Mr. Satosh kumar / Mr. Fate kumar	967210 211 / 904106 9414	--	--	--	--	--	--	--	--
Hindustan Petroleum Corporation Limited, Mundra-Delhi Pipeline, P.O. Mundra, IOCL Link Road, Mundra, District – Kutch, Gujarat, PIN-370421.	06 km	M R Chauhan / Mr. Surabh bhatt	992017 3377 / 968760 6093	--	--	--	--	--	--	--	--



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

AUGUST - 2023

Authorized by: AGM (QHSE)
Issue No. : 05

Rev : 12
Date: 10th August 2023

Jindal SAW Ltd. (IBU), Village – Samaghoga, Taluka – Mundra, District – Kutch, Gujarat, PIN-370421.	28 km	Mr Girish Kumar / Mr Dipak Kumar	900595 8965 / 968767 8052	--	--	--	--	--	--	--	--
Adani Power Limited, Adani Power Site, Tunda-Wandh, Mundra-Mandvi Highway, Siracha, Mundra, District – Kutch, Gujarat, PIN-370435.	25 km	Mr. Anil C Datar / Mr. Dinesh Mishra	968766 0356 / 789440 6485	--	--	--	--	--	--	--	--
Costal Gujarat Power Limited, Ultra Mega Power Project, Tunda Vandh Road, Tunda Village, Mundra, District – Kutch, Gujarat, PIN-370435.	28 km	Mr. Pramod Singh /Mr. Jignesh Kumar	922729 5495 / 909999 5701	--	--	--	--	--	--	--	--
Hindustan Mittal Energy Limited Plot no.06 (2), Old port road, Mundra, District -Kutch Gujarat, PIN-370435.	06 Km	Mr Partha Chakrva borty / Mr. Vipin Yadav	989960 0434 / 706900 2406	-	-	-	-	-	-	-	-

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Annexure – 22												
MEDICAL ARRANGEMENTS												
First-aid Centers / Ambulance room / OHC / Hospital							Ambulance van or alternate arrangement					
Sr No.	Name & Location	Phone No.	In charge person			Facilities & equipments	Antidotes available	First aiders available	Place of availability	Capacity	Facilities in the van	Driver's name & Address
			Name & Designation	Residence								
1	2	3	4	5	6	7	8	9	10	11	12	13
1	OHC – NR. LT APSEZ LTD	02838 255710 89800 15070	On Duty Dr.	8511078 199	Samdra Township	All equipment's as per Factory Act 1948	All Antidotes are available	24 Hours 1.Sanajy Rathod 2.Subash Moond 3. Gulam Khatri 4. Radheshyam 5. Deepu Sharma 6. Dindayal Sharma	OHC – Nr. LT APSEZ LTD	4 Bed capacity	All equipment's as per Factory Act 1948	1.Bharat Dhafada (Gundala-Mundra-9925203405) 2.Bhavesh L Maheshwari 3.Nizar Ali 4.Jaspal Zala 5.Jitendra Gadhvi 6.Ashish Anshora 7.Jitubha Zala 8.Bhavesh A Maheshwari 9.Yogendrasinh
2	Adani Hospital, Samundra Township, Old Bander Road, Mundra Kutch	02838-255899	Dr. Vatsal Pandya	8980802 842	Samundra Township	ICU on Wheel, X ray, Sonography, Physiotherapy, Laboratory, Pharmacy and telemedicine etc.	All Antidotes are available	Adani Hospital Staff	In APSEZ near Saundra Township	100 Bed capacity	All equipment's as per Factory Act 1948	Mr. Vinay Pratap Singh 9099858095

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Annexure – 22B (West Basin)												
MEDICAL ARRANGEMENTS												
First-aid Centers / Ambulance room / OHC / Hospital							Ambulance van or alternate arrangement					
Sr No.	Name & Location	Phone No.	In charge person		Facilities & equipment	Antidotes available	First aiders available	Place of availability	Capacity	Facilities in the van	Driver's name & Address	
			Name & Designation	Residence								
1	2	3	4	5	6	7	8	9	10	11	12	13
1	OHC – Nr. SS-1 Building	02838-255984 8980015155	Medical Officer	9687639281	Samudra Township	All equipment as per Factory Act 1948	All Antidotes are available	24 Hours 1.Sanajy Rathod 2. Subash Moond 3. Gulam Khatri 4. Radheshyam 5. Deepu Sharma 6. Dindayal Sharma	OHC – Nr. SS-1 Building	consulting	All equipment as per Factory Act 1948	1.Bharat Dhafada (Gundala-Mundra-9925203405) 2.Bhaves L Maheshwari 3.Nizar Ali 4.Jaspal Zala 5.Jitendra Gadhvi 6.Ashish Anshora 7.Jitubha Zala 8.Bhaves A Maheshwari 9.Yogendrasinh
2	Adani Hospital, Samundra Township, Old Bander Road, Mundra Kutch	02838-255899	Dr. Vatsal Pandya	8980802842	Samundra Township	ICU on Wheel, X ray, Sonography, Physiotherapy, Laboratory, Pharmacy and telemedicine etc.	All Antidotes are available	Adani Hospital Staff	In APSEZ near samundra Township	100 Bed capacity	All equipments as per Factory Act 1948	Mr. Vinay Pratap Singh 9099858095

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Annexure – 23									
TRANSPORT & EVACUATION ARRANGEMENT									
Type of siren, if any, for evacuation				Steam & Electrical hooter type siren					
Own Transport Center				Own Vehicles					
Name of Location	Phone No.	In charge person			Sr. No.	Type & No.	Capacity	No & Type of public warning instruments	Driver's name & Address
		Name & Designation	Residence						
			Phone	Address					
Mundra	9909927251	Mr. Archan Bhat	9909927251	Mundra	During Day Time (0700 hrs. to 1800 hrs.)				
					1	HMV	56 seater x 8 54 Seater x 13 7 seater x 25	Nil	All drivers available
					2	LMV	(Available at different location)		
During Night Time (1800 hrs. to 0700 hrs.)									



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

AUGUST - 2023

**Authorized by: AGM (QHSE)
Issue No. : 05**

**Rev : 12
Date: 10th August 2023**

					1	HMV	56 Seater x 3 (at SVC)	Nil	Naran, Rupsinh, Tulsi Vijay raj, Mulji, Mintoo, Satendra, Pravin, Kapil, (All available at Port, SVC and Drivers Rest room)
					2	HMV	13 Seater x 2 (at CT 2 & CT3)		
					3	LMV	7 seater x 30 (Dry Cargo – 01, LT – 02, CT 2 – 04, Engg. Service – 01, Marine- 03, Safety-01, Fire-01, Railway-01, Security- 16)		
					4	Ambul ance	05 (02 at Port, 01 WP, 01 SEZ, 01 at SVC)		

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10 th August 2023	

Outside shelters for evacuated persons							
Sr. No.	Name, address & distance	Phone. No.	In charge Person			Accommodation capacity	Facilities available
			Name & Designating	Residence			
				Phone	Address		
11	12	13	14	15	16	17	18
1	Shantivan Colony	6358945030	Mr. Namit Kapoor	52814	Shantivan Colony	1500	Open ground available at SV Colony (Cricket ground and Rang Manch), Shopping Complex available
2	Samundra Township	6358945030	Mr. Namit Kapoor	52814	Samundra Township	2500	Open ground available at Samundra Township (Children Park and utility park), Shopping Complex available

Annexure – 24

POLLUTION CONTROL ARRANGEMENTS

Water Pollution Control				Air Monitoring			
Type & Capacity of effluent treatment plant	No. of sample monitoring & its frequency	In charge person's name, address & Phone No.	No. of sample monitoring & its frequency	Type & parameters of tests	Wind direction	Instrument available.	In charge person's name, address & Phone No.
1	2	3	4	5	6	7	9

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED						AUGUST - 2023
	EMERGENCY ACTION PLAN						
Authorized by: AGM (QHSE) Issue No. : 05				Rev : 12 Date: 10th August 2023			

265 KLD		2 sample per month		Mr. Gaurang Chudasama CTF Building, Liquid Terminal, APSEZ 90990 05225 (M)		Twice a Week		<u>Type</u> Ambient Air Monitoring <u>Parameters</u> PM 10, PM 2.5, SO ₂ , NO _x , CO, Hydrocarbon, Benzene		Wind vane		Respirable Dust Sampler & Fine Particulate Dust Sampler		Mr. Gaurang Chudasama CTF Building, Liquid Terminal, APSEZ 90990 05225 (M)	
Stack Monitoring				Scrubbers, Incinerators etc.				Land Pollution Controls				Pollution control Board			
No. of sample monitoring & its frequency	Type & parameters of tests	Instrument available.	In charge person's name, address & Phone No	Location	Type & Capacity	For What	In charge person's name, address & Phone No.	No. of sample monitoring & its frequency	In charge person's name, address & Phone No.	Permission obtained?	Conditions fulfilled?				
11 sample per month	SO ₂ , NO _x , SPM	Stack Monitoring kit.	As above	----- N A -----				2 sample per month	As above	Yes (As per CC&A)	Yes (As per CC&A)				

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Annexure –25													
OTHER ARRANGEMENTS													
For Key Personnel and Essential Workers See Annexure -17 & 18													
Sr. No.	Type and name of arrangements available	Qty.	Place of availability	Phone no.	Incharge person's			Mutual aid arrangements					
					Name & designation	Residence		Place from where the same thing is available	Quantity available	Incharge person's Name & designation	Phones		Address
						Phone	Address				Office	Resi.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Alternatives power arrangements		Liquid Terminal	8980802997	Mr. Gaurang Chudasama		Shantivan Colony	GSPC/LNG		Mr. Dineshchandra Shah / Plant Head	9909914844		
2	Additional firefighting support		Fire Station	7069083035	Dr. Rakesh Chaturvedi		Samudra Township	APL		Mr. Anil Datar / DGM Head Safety & Fire	9687660359		
3	Special engineering support		Tug Berth Bld.	9727784691	Mr. Mavji Vaghamshi		Shantivan Colony	IOCL		Mr. Kumar Mukesh Rajan	981s1537164		
4	Additional administrative support		Adani House	8826363738	Mr. Snehasish Bhattacharyya		Shantivan Colony	HMPL		Mr. N Karthikeyan	9982288833		
5	Additional Environmental support		Adani House	6357231713	Mr. Bhagwat Swaroop Sharma		Shantivan Colony	HPCL		Mr. Vijay M Darot	8936919000		

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		EMERGENCY ACTION PLAN	AUGUST - 2023
	Authorized by: AGM (QHSE) Issue No. : 05			

Annexure -26											
ALARMS & SIRENS											
Sr. No.	Plant wise alarm points						The alarm (signal) is heard (seen) at	Sound difference if any			
	Plant/Dept./Location		Sr. No. of the alarm point	Its place of location (With floor No. if any)	Type of the alarm of siren	Its Period of checking		Type of emergency	Type of alarm or siren	Duration of sounding	Type of sound of alarm /siren
	Name & Location	No. of floor									
1	2	3	4	5	6	7	8	9	10	11	12
1	Liquid Terminal	1) LT Control room, 2) Ground floor of LT office	1 & 2	Roof of the first floor	Wailing	Twice in a month	5 km range	All Type of Emergency	Hooter	As per siren code	Wailing
2	Dry Cargo area	Ground floor	3	Roof of fire pump house	Wailing	Twice in a month	5 km range	All Type of Emergency	Hooter	As per siren code	Wailing
3	Marine Terminal	Ground floor fire p/h	4	Roof of Marine Terminal building	Wailing	Twice in a month	5 km range	All Type of Emergency	Hooter	As per siren code	Wailing
4	Adani House	Ground floor	5	Each floor	Wailing	Twice in a month	500 mtr range	All Type of Emergency	Hooter	As per siren code	Wailing

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED									AUGUST - 2023
	EMERGENCY ACTION PLAN									
Authorized by: AGM (QHSE) Issue No. : 05						Rev : 12 Date: 10th August 2023				

5	PUB Building	Ground floor	6, 7 & 8	Each floor	Wailing	Twice in a month	500 mtr range	All Type of Emergency	Hooter	As per siren code	Wailing
6	ES - Building	Ground floor	9	Roof of ES building	Wailing	Twice in a month	8 km range	All Type of Emergency	Hooter	As per siren code	Wailing
7	AMCT / CT2	Ground floor fire P/H	10	Ground floor	Wailing (Manual)	Twice in a month	1.6 km range	All Type of Emergency	Hooter	As per siren code	Wailing
8	Terminal-2	Ground floor fire P/H	11	Ground floor	Wailing (Manual)	Twice in a month	1.6 km range	All Type of Emergency	Hooter	As per siren code	Wailing
9	AICTPL / CT2	Ground floor fire P/H	10	Ground floor	Wailing (Manual)	Twice in a month	1.6 km range	All Type of Emergency	Hooter	As per siren code	Wailing
10	ACMTPL / CT2	Ground floor fire P/H	10	Ground floor	Wailing (Manual)	Twice in a month	1.6 km range	All Type of Emergency	Hooter	As per siren code	Wailing

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10 th August 2023	

Annexure –26B (West Basin)											
ALARMS & SIRENS											
Sr. No.	Plant wise alarm points						The alarm (signal) is heard at	Sound difference if any			
	Plant/Dept./Location		Sr. No. of the alarm point	Its place of location (With floor No. if any)	Type of the alarm of siren	Its Period of checking		Type of emergency	Type of alarm or siren	Duration of sounding	Type of sound of alarm /siren
	Name & Location	No. of floor									
1	2	3	4	5	6	7	8	9	10	11	12
1	SS-1	Top floor	1	Roof of SS-1 building	Wailing (Electric)	Twice in a month	8 km range	All Type of Emergency	Hooter	02 minute (all clear)	Wailing
2	Fire Dept.	Ground floor	1	Fire porta cabin	Wailing (Manual)	Twice in a month	1.6 km range	All Type of Emergency	Hooter	02 minute (all clear)	Wailing

Code of Siren:

- **Emergency** : Wailing Siren continuous for one minute with gap Siren for one minute followed by five second gap. Repeated four times.
- **Testing** : Continuous Siren for one minute (4th and 19th of Every Month at 1100 hrs.).
- **All Clear** : Continuous Siren for two minutes.

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Annexure – 27

INTERNAL PHONES

Sr. No.	Name & Location of the plant, department of area (including internal emergency service)	Phone No. (Internal)	Person available on this phone				
			Name	Designation	Designation or duty under on-site / offsite emergency plan, if any.	Residence	
						Phone No. (Internal)	Address
1	2	3	4		6	7	8
1	TELEPHONE EXCHANGE	99	SHIFT INCHARGE	SR.OFFICER	MR. PRADEEP TRIVEDI	4258	SHANTIVAN COLONY
2	FIRE CONTROL ROOM	52801	SHIFT INCHARGE	FIRE OPERATOR	DR. RAKESH CHATURVEDI	4731	SAMUDRA TOWNSHIP
3	MEDICAL	52710	INCHARGE	MEDICAL OFFICER	MEDICAL OFFICER	--	--
4	SECURITY	52300	DUTY OFFICER	OFFICER	COL. NIRMAL DHALIWAL	4504	SHANTIVAN COLONY
5	MARINE CONTROL	52761	SHIFT INCHARGE	HEADMARINE	CAPT. SACHIN SRIVASTAVA	4629 / 4630	SHANTIVAN COLONY
6	SAFETY OFFICER	52777	SAFETY OFFICER	SAFETY OFFICER	MR. MANAN BHATT	--	SHANTIVAN COLONY
7	LT CONTROL ROOM	52744	SHIFT INCHARGE	AGM	MR. GAURANG CHUDASAMA	4459	SHANTIVAN COLONY
8	DRY CARGO	52932	SHIFT INCHARGE	HEAD-DC	MR. BHAGWAT UPADHAYE	--	SAMUDRA TOWNSHIP
9	ELECTRICAL & ISTR.	52826	SHIFT INCHARGE	AGM	MR. MAVJI VAGHAMSHI	4506	SHANTIVAN COLONY

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED						AUGUST - 2023
	EMERGENCY ACTION PLAN						
Authorized by: AGM (QHSE) Issue No. : 05				Rev : 12 Date: 10th August 2023			

10	PORT OFFICE CONTROL	52762	SHIFT INCHARGE	HEAD MARINE	CAPT. SACHIN SRIVASTAVA	4629 / 4630	SHANTIVAN COLONY
----	------------------------	-------	----------------	----------------	-------------------------	----------------	------------------

Annexure – 27B (West Basin)
INTERNAL PHONES

Sr. No.	Name & Location of the plant, department of area (including internal emergency service)	Phone No. (Internal)	Person available on this phone				
			Designation or duty under on-site / offsite emergency plan, if any.	Designation	Name	Residence	
						Phone No. (Internal)	Address
1	2	3	4	5	6	7	8
1	TELEPHONE EXCHANGE	99	SHIFT INCHARGE	SR.OFFICER	MR. PRADEEP TRIVEDI	4181	Shantivan Colony
2	FIRE CONTROL ROOM	52900	SHIFT INCHARGE	AGM	DR. RAKESH CHATURVEDI	4731	Samudra Township
3	MEDICAL	52984	INCHARGE	MEDICAL OFFICER	---	4460	Shantivan Colony
4	SECURITY	52939, 52900	DUTY OFFICER	SR.MANAGER	COL. NIRMAL DHALIWAL	--	Shantivan Colony
5	MARINE CONTROL	52933	SHIFT INCHARGE	GM	CAPT. SACHIN SRIVASTAVA	4726	Shantivan Colony
6	LT CONTROL ROOM		SHIFT INCHARGE	AGM	MR. GAURANG CHUDASAMA	4459	Shantivan Colony
7	DRY CARGO	52936	SHIFT INCHARGE	MANAGER	MR. NITIN JOSHI	4439	Shantivan Colony
8	ELECTRICAL & INS.	52932	SHIFT INCHARGE	DGM	MR. KASHYAP PANDYA	4506	Shantivan Colony
9	CENTRAL CONTROL ROOM	52932	SHIFT INCHARGE	DGM	MR. KASHYAP PANDYA	4044	Shantivan Colony

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED	AUGUST - 2023
	EMERGENCY ACTION PLAN	
	Authorized by: AGM (QHSE) Issue No. : 05	Rev : 12 Date: 10 th August 2023

Annexure – 28				
EXTERNAL PHONES				
Sr. No.	Name & Address of the dept. / Service / Person (including external emergency services)	Phone No. (External)	Person available	
			Designated person	Services Expected Under On- site / off –site Emergency plan
1.	Bhuj Fire Station	02832 – 222590, 101	Fire Officer	Fire fighting Service
2.	Gandhidham Fire Station	02836-231610, 101	Fire officer	Fire fighting Service
3.	Fire & Ambulance serv.	108	Medical Off.	Fire fighting Service
4.	Kandla Fire Station	02836 - 270176, 270178	Chief Fire Off.	Fire fighting Service
5.	Factory Inspector	02836 – 260020, 260262	Asst. Director	Legal Advisory Service
6.	Collector Office	02832 – 250020, 251805	Collector	Administration Service
7.	Civil Defense	02832-220703	Dy. Collector	Evacuation Service
8.	Hospital, Bhuj	02832 – 221610, 250150	Civil Surgeon	Medical Service
9.	KPT- Hospital, Kandla	02836- 270205, 270633	Medical officer	Medical Service
10.	Police	02832 -250511, 250444	DSP	Law & Order
11.	Police control City	100	Control room	Law & Order
12.	Gujarat Maritime Board	02838-22136	Port Off.	Marine Service
13.	Indian Navy, Porbandar	0286-2240954	Navy Officer	Security service (WAR)
14.	Indian Coast Guards	02831-286430,31(Jhakhau) 0286-2240958 (Porbandar)	Cost Guard officer	Security service

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Annexure – 29						
NOMINATED PERSONS TO DECLARE MAJOR EMERGENCY						
Sr. No.	Name of the plant, department or location	Name & Designation of the nominated persons to declare major emergency	Duty of designation given, if any, under the onsite / off-site emergency plan	Phone No.	Residence	
					Phone No.	Address
1	Mr. Sujalkumar Shah	CEO	Site Main Controller	02838 – 255002	63580 15565	Shantivan colony
2	Mr. Manoj Katar	COO	Site Main Controller	02838 – 255404	98796 14724	Shantivan colony
3	Pradeep Jayaraman	COO	Site Main Controller	02838 – 255410	91520 36949	Samudra Township

	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED		AUGUST - 2023
	EMERGENCY ACTION PLAN		
Authorized by: AGM (QHSE) Issue No. : 05		Rev : 12 Date: 10th August 2023	

Annexure – 30	
FORM TO RECORD EMERGENCY TELEPHONE CALL	
PART A: ESSENTIAL INFORMATION	
DETAILS OF CALL AS REPORTED	
CALLER'S NAME & DESIGNATION _____ DATE _____ TIME _____ PHONE NO. _____	
PURPOSE OF CALL IS ANY PARTICULAR ADVICE REQUIRED IMMEDIATELY?	
NAME OF CHEMICALS. TO BE SPELT OUT CLEARLY	
BRIF DESCRIPTION OF INCIDENT. FIRE/ EXPLOSION /LIQUID SPILL/GAS RELEASE. QUANTITY INVOLVED. PACKAGING/STORING/HOLDING/USING DETAILS. LOCATION OF INCIDENT. CAUSE. IF KNOW, IN BRIEF.	

PART B: INFORMATION TO BE ORTAINED IF READELY AVAILABLE.		
HAS ANYONE BEEN INJURED? AFFECTED BY CHEMICALS?	YES/NO YES/NO	IF YES, HOW MANY? IF YES, HOW MANY?
WHAT FIRST-AID HAS BEEN GIVEN?		
HAS ANY ONE BEEN TAKEN TO HOSPITAL? IF YES, ADDRESS OF THE HOSPITAL.	YES/NO	
IS THE ROAD BLOCKED? YES/NO. CLOSED TO TRAFFIC? YES/NO		
WHO OWNS THE CHIMEALS? YES/NO HAS THE ONNER BEEN INFORMED?		
IF CAUSED BY VEHICLE, VEHICLE NUMBER _____ AND NAME & ADDRESS OF THE ONNER _____		
HAS THE ONNER BEEN INFORMED?	YES/NO	
TO WHON WAS THE LOAD COSIGMED?		



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

**Authorized by: AGM (QHSE)
Issue No. : 05**

**Rev : 12
Date: 10th August 2023**

Annexure – 31

STATUTORY COMMUNICAION

Prior to start of terminal printed booklet and communication given to workforce

STATUTORY INFORMAION TO BE GIVEN TO:	PERIODICITY OF SUCH INFORMAION TO BE GIVEN (STATUTORY OR SELF DECIDED)	DATE OF LAST INFORMATION GIVEN	TO HOW MANY PERSONS	SUGGESTIONS RECEIVED IF ANY	LAST DATE OF IMPLEMENTATION OF USEFUL SUGGESTIONS
1	2	3	4	5	6
The workers	Information to workers once a month Safety Information Booklet as per	N/A	N/A	N/A	N/A
The general public & neighboring firms	Information to be furnished to General Public In vicinity as per GFR-41B.	N/A	N/A	N/A	N/A
District Emergency Authority	Yes, as and when asked for	N/A	N/A	N/A	N/A
Factory Inspector	Yes, as and when asked for 1 copy of onsite emergency plan / GFR 68-L to be given.	N/A	N/A	N/A	N/A



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

Authorized by: AGM (QHSE)
Issue No. : 05

Rev : 12
Date: 10th August 2023

Annexure – 32

SEPARATION DISTANCE

SR. NO.	SUBSTANCE	TANKS		SEPARATION DISTANCE REQUIRED (M)	DISTANCE AT PRESENT (M)
		CAPACITY (T)	NUMBERS		
1	2	3	4	5	6
1.	Storage of Liquid Petroleum Product in atmospheric Tank	As per Annexure - 4	Two	15 Meters	18 Meters
2	Storage of Liquid Acetic acid in atmospheric Tank	As per Annexure - 4	Two	N/A	N/A

Note: Layout of the installations conform to safe distances and is duly approved & licensed by the Office of Director, Industrial Safety & Health.



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

**Authorized by: AGM (QHSE)
Issue No. : 05**

**Rev : 12
Date: 10th August 2023**

Annexure – 33

EMERGENCY INSTRUCTION BOOKLET

Sr No	Role to be played as (Name emergency designation Viz, incident controller, particular key person or essential worker doing the job of)	His emergency duties/functions (Narrate in short and clear sentence and in 1:2:3)	Also refer document of (other relevant the factory Viz. Safety manual etc.)	He should report at (the incident Place or contract route etc.)
1	2	3	4	5
1	Incident Controllers (IC)	<ol style="list-style-type: none"> 1. Assess scale of emergency and accordingly activate emergency plant. 2. Assume duties of SMC in his absence and depute DIC in his place. 3. Direct plant-shut-down evacuation, call in outside. 4. Call key-personnel. 5. Direct rescues & fire fighting. 6. Direct all operations in affected area giving priority to safety of personnel plant / property and environment. 7. Search for casualties. 8. Evacuate non-essential workers to safe assembly point. 9. Establish communication with ECC. 10. Provide necessary information fire bridge / outside service. 11. Brief SMC about developments. 12. Preserve evidence necessary for investigation. 13. Act as alarm raiser 		ECC / Place of Incident
2	Deputy Incident Controller (DIC)	<ol style="list-style-type: none"> 1. Assume the role of IC in his absence, send runner to call IC. 2. Help IC in shutting down the plant, controlling the incident fire - fighting etc. 3. Implement all the instructions from IC. 4. Report developments to IC. 5. Act as alarm raiser. 		Place of Incident
3	Site Main Controller (SMC)	<ol style="list-style-type: none"> 1. Relieve IC of overall main control. 2. Consult IC and decide if a major emergency exists, if so, call in outside emergency services, mutual aid teams fire-brigade and if necessary, activate off-site plan, inform nearby factories/general public and DEA police, Factory Inspectorate. 		



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

**Authorized by: AGM (QHSE)
Issue No. : 05**

**Rev : 12
Date: 10th August 2023**

		<ol style="list-style-type: none"> 3. Ensure that key personnel are called in. 4. Exercise direct operational control of parts of works outside affected area. 5. Consult IC and key persons & if necessary direct safe close down, evacuation of plant people as well as neighboring population. 6. Ensure medical help for casualties/victims. Ensure that their families. Relatives are informed. 7. Inform and liaison with fire, officers, DEA, Police, Hospital Inspectorate. 8. Contract meteorological officer for weather predictions, if emergency is prolonged. 9. Ensure head count is done and arrange rescue for missing. 10. Arrange for chronological record of events to be maintained. 11. Arrange for catering facilities. 12. Issue authorized statements to news/media. 13. Ensure evidence is preserved. 14. Control rehabilitation of affected areas and ensure safety of plant before re-entry. 15. Control traffic movement within the factory. 16. Act as alarm raiser. 		
4	Key Personnel	<ol style="list-style-type: none"> 1. To provide advice / information to SMS. 2. To implement decision taken by SMC. 3. Help SMC in evacuation, emergency engineering work supply of equipment's utilities, carrying out atmospheric tests, arranging medical-aid, transportation, listing with DEA police, Factory Inspectorate and other area as the need be. 4. Act as alarm raiser. 		ECC
5	Essential Workers	<p>Carryout instructions of IC/DIC in</p> <ol style="list-style-type: none"> 1. Firefighting, gas leak and spill control. 2. Helping fire brigade and mutual aid teams. 3. Shutting down plant and making it safe. 4. Emergency engineering work. 5. Providing emergency power water equipment's etc. 6. Moving equipment and vehicles from the affected area. 7. Search evacuation, rest welfare 8. Giving first aid / medical help. 9. Carrying out atmospheric test and pollution control. 10. Manning assembly points, outside shelters and look after welfare of evacuated persons. 	IC / DI of fire Toxicity Control Station	Incident area



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

Authorized by: AGM (QHSE)

Issue No. : 05

Rev : 12

Date: 10th August 2023

		<ul style="list-style-type: none"> 11. Recording details of causalities. 12. Handling telephone calls acting as messenger. 13. Controlling traffic within the factory. 14. Informing surrounding factories and general public. 15. Act as alarm raiser 		
6	Assembly Point in - charge	<ul style="list-style-type: none"> 1. Mark the position of assembly points by clear notice. 2. Ensure that the assembly point is safe. 3. Record the names and departments of those reporting there as well as those leaving. 4. Establish communication with SMC. 5. Arrange for suitable P.P.E. if these are required for reaching assembly points of ECC. 6. Act as alarm raiser 		
7	E.C.C. In Charge	<ul style="list-style-type: none"> 1. To equip E.C.C. with proper means of communication and stationery and dates logging equipment's. 2. Procure latest telephone directory and a separate list of important telephone numbers. 3. walking-talkie or P.A.S. system. 4. Sets of various maps and drawings showing the area the factory layout, hazardous storage, flammable areas, effluent, treatment plant, first-aid center, assembly point, E.C.C. Canteen fire- fighting station etc. 5. Mark affected areas within and outside the factory. 6. Keep available the copies of this on-site and off-site emergency plan. 7. Keep real role of employees with their address, blood group information etc. 8. Arrange tape recorder and if possible, video to record the incident. 9. Arrange pads, pens pencils and stationery. 10. Keep ready gas detractors (if required) self-breathing apparatus sets of PPE'S, torches umbrellas, raincoats etc. 11. Act as alarm raiser 		
8	Fire and toxicity control In-Charge	<p><u>Before Emergency</u></p> <ul style="list-style-type: none"> 1. Keeping a separate place (small room) ready with fire - fighting equipment's, gas leak control equipment's and P.P. E'S. 2. Checking periodically that this equipment's are functional. 3. Checking that warning system for fire / toxic release is in working order. <p><u>During Emergency</u></p> <ul style="list-style-type: none"> A. Proceed to the scene of emergency. 	Fire / Toxicity	Control Station



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

Authorized by: AGM (QHSE)

Issue No. : 05

Rev : 12

Date: 10th August 2023

		<p>B. Use corrective of fire extinguisher & control fire with the help of essential workers. C. In case of gas release use safety kit to control the same. D. Ask IC / SMC for mutual-aid external aid if necessary. E. Act as alarm raiser</p>		
9	Medical arrangements In-charge	<p><u>Before Emergency</u> 1. Putting permanent notice for location of first-aid center, dispensary, ambulance room. 2. Checking adequacy of area of first aid center for the organization and advice management accordingly. 3. Ensuring availability of first aid medicines, antidotes and staff. 4. Maintaining health record including blood-group information of all the workers. 5. Leasing with Hospital / Doctors in the vicinity.</p> <p><u>During Emergency</u> A. With the help of first aids give first aid to victims. B. Arrange hospitalization of call doctors at site as per need. C. Act as alarm raiser. D. Arranging outside shelters before emergency.</p>		
10	In charge of transport and evacuation arrangement	<p>1. Keeping ready company's Vehicle. 2. Keeping readies, a list with address & phone nos. of public transport companies offering vehicles for men and goods. 3. Informing transporters to send vehicles and using own vehicles. 4. Informing "Mutual-aid-companies "about transport requirements 5. Arranging medicines, food clothing etc., at outside shelters, during emergency. 6. Act as alarm raiser</p>		
11	In-Charge of pollution control arrangement	<p><u>Before Emergency</u> 1. Checking adequacy of pollution control arrangements by checking quality of liquid and gaseous effluents. Providing extra capacity if necessary. 2. Checking workability of arrangements and making them functional. 3. Ensuring regular preventive maintenance of such arrangements. 4. Keeping reagents ready. 5. Ensuring through logbooks regular monitoring.</p> <p><u>During Emergency</u> 1. Analysing the effluent and so needful to treat it. 2. Ensuring quality of liquid & gaseous effluent before discharge.</p>	Site and Effluent	Treatment Plant



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

Authorized by: AGM (QHSE)

Issue No. : 05

Rev : 12

Date: 10th August 2023

		3. Monitoring air in and around unit in case of toxic release before rehabilitation. 4. Act as alarm raiser		
--	--	--	--	--



**ADANI PORTS AND
SPECIAL ECONOMIC ZONE LIMITED**

EMERGENCY ACTION PLAN

Authorized by: AGM (QHSE)

Issue No. : 05

Rev : 12

Date: 10th August 2023

Schedule: 5: MATERIAL SAFETY DATA SHEET:

See Rule 68-J 2(2) & 2(3)

Annexure – 16

ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED
MOCK DRILL REPORT

Date	:	28.05.2024
Time	:	22:40 hr
Location	:	00 line (In front of FCC)
Type/Text of the Scenario	:	Isolation of Wagon due to fire catch on wagon during PY Gas Unloading at "00" Line.

INTRODUCTION:

On the day of unloading Pyrolysis Gasoline on track number "0" in front of FCC, the field officer, Mr. Bhavik Maheswari, was conducting his field round when he noticed leakage of Pygas from wagon number 40089660233. Unfortunately, an unknown ignition source caused the leaked oil to catch fire. The fire spread quickly and caught the attention of Mr. Bhavik Maheswari, who immediately informed Mr. Mahendra Gadhvi, also present on-site. After verifying the incident, Mr. Mahendra Gadhvi informed the Control Room Shift in charge and declared an emergency. As a result, the ISCR, OHC, Fire, and Railway services were immediately informed, and the relevant departments were subsequently notified via message/call.

LOCATION (WITH PHOTOGRAPH):



SEQUENCE OF EVENTS WITH PHOTOGRAPHS:

ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED MOCK DRILL REPORT

<p>INCIDENT CONTROLLER IN ACTION</p>	<p>FIRE TEAM REACH AT LOCATION AND ACTIVATING FIRE WATER NETWORK</p>
 <p>A photograph showing an incident controller wearing a white hard hat, a high-visibility yellow vest, and dark trousers. He is holding a mobile phone to his ear, appearing to be in communication. The background is dark and industrial, with some lights visible.</p>	 <p>A photograph of a red fire truck with its emergency lights flashing. The truck is parked on a paved area at night. A person in a red uniform is standing near the truck. The scene is illuminated by the truck's lights and some ambient light.</p>
<p>FIREMAN ACTIVATING FIRE HYDRENT SYSTEM</p>	<p>FIRE FydRENT SYSTEM ACTIVATED AND COOLING OF ADJUCENT WAGONS</p>
 <p>A photograph of a fireman in a blue uniform with reflective stripes and a yellow helmet. He is standing next to a red fire hydrant system, appearing to be operating it. The background shows industrial structures.</p>	 <p>A photograph showing a fire team in blue uniforms using high-pressure water hoses to spray water onto a large industrial wagon. The scene is at night, with the water spray creating a misty atmosphere. Other workers in high-visibility vests are visible in the background.</p>
<p>IC- Closely Monitoring Responders Action & communicating with LT-controll room</p>	<p>Fire team engaged in cooling nearby wogon at "0' line</p>

ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED MOCK DRILL REPORT

	
<p>Security DSO and IC interacting about the Emergency</p>	<p>IC updating the status of incident to LT-Shift incharge</p>
	
<p>Observers are an action and closely monitoring responders action</p>	<p>OBSERVER AN ACTION, OBSERVATIONS NOTICING</p>

ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED MOCK DRILL REPORT



Discussion in between IC & Fire services manager



Temperature monitoring of effected wagons checked by fire team



Wagon De-attachment work started by Railway services



Wagon De-attachment & rail rack isolation work started by Railway services



INCIDENT BRIEFING AT ASSEMBLY POINT



INCIDENT BRIEFING AT ASSEMBLY POINT

ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED
MOCK DRILL REPORT



RESPONSE TIME:

#	Description	Exact Time
1.	First responder informed to LT control room regarding emergency scenario	: 22:39
2.	Incident controller comes on site	: 22:40
3.	Declaration of Emergency	: 22:40
4.	Stand by fire tender reached on the incident location	: 22:42
5.	Fire Team from Fire station reaching time at incident Point	: 22:44
6.	Security team reaching time at incident point	: 22: 46
7.	Safety Shift in-charge reaching time at incident point	: 22: 46
8.	Maintenance team reached at site	: 22:46
9.	Hose disconnection from wagon started	: 22:47
10.	Locomotive reach at the location	: 22:48
11.	Ambulance reaching time at incident Point	: 22:49
12.	Wagon De-attachment work started by Railway services	: 22:51
13.	Wagon separation done by Loco	: 22:58



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED
MOCK DRILL REPORT

14.	Trolley with Spill kit reached at incident location	:	22:59
15.	Train departed and reached approximately 120 meters away from location	:	23:00
16.	Termination of Emergency and All clear siren		23:00

COMMUNICATION & ACTIONS:

Action By	Information To / Action By	Remarks
First Responder	Information given to incident controller about situation / scenario Operated VHF	Good Response, Immediately informed to LT- Jetty In charge at site.
Site Incident Controller	Assess the site and declare on-site emergency.	
Concern Department/ Area In-charge	Inform to ISCR, Security, Fire, Medical, Safety etc.	
Railway Services	Railway team reached the site immediately after declaration of emergency	
Corporate Affairs	NA	
HR/ Admin	Respond on call and ready for any type of HR/Admin related help	
Safety Team	Reached at site on time.	
OHC	OHC team response was quick. Ambulance reached on site	
Security Control Room	Barricade the incident area and ensure vehicle movement restriction inside terminal.	
Fire Control Room Inform	Fire tender reached at site in quick time and started cooling the nearby 4wagons.	

COMMUNICATION TO MUTUAL AID GROUP

(IF REQUIRED, AS AND WHEN MUTUAL AID IS CALLED) – Not Required.

To	By Whom/ Media	Standard	Performance
IOCL		2 min. after receiving information to Emergency Control Room	
HPCL			
JINDAL SAW			
ADANI POWER			
CGPL			
HMEL			

RESPONSE TIME PERFORMANCE OF ACTION



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED
MOCK DRILL REPORT

Agency	Standard Time	Performance	Rating (Max. 9/ Block)	
			+VE Marks	-VE Marks
Ambulance	4-5 Min	4 Min	9	
Safety	4-5 Min	4 Min	9	
Fire Services	1-2 Min	3 Min	9	

A. PERFORMANCE OF OHS & F SERVICES & RESCUE SERVICES

Performance	Performance	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Turn out/ response time of Fire Team	Fire team reached at site within benchmark of response time.	3	
Turn out/ response time of OHC Team	OHC team & Ambulance reached at site within benchmark of response time.	3	
Turn out/ response time of Safety Team and in coordination with incident controller mobilisation of personnel and resources.	Response time of Safety team is within benchmark and will coordinate with incident controller for mobilisation of personnel, resources, PPE's etc.	3	
Firefighting at the site	Reported to incident Controller and standby at location till declaration of all clear.	3	
Medical attention at the site	Reported to incident Controller and ensure no causality.	3	
Rescue of person	NA		

B. PERFORMANCE OF MAINTENANCE DEPARTMENT

Performance	Performance	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Power shut down/ cut off	Maintenance team reached on time, but power shut off will not ensured.	2	1
Immediate arrangements at the site	All arrangement were mobilised.	3	



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

Mobilizing of personnel and resources	Maintenance team reached at site with tool kit. Appropriate PPEs used.	3	
Maintenance activities being carried out at the site	Necessary maintenance to stop the leakage	3	
Clearing debris	Spill containment within dyke wall after clearance from incident controller was done.	3	
Other arrangement at required to meet emergency	Emergency Lights for night hours is not arrange.	2	1

C. PERFORMANCE OF SECURITY SERVICES

Performance	Performance Rating	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Turnout of Security	Security Team reached on time. Area barricading done.	3	
Performance of security guards	Vehicle were only allowed inside Liquid Terminal with spark arrestor by security guards from the LT gate.	3	
Security officer's command & control	Security officers took charge and restricted the entry of unauthorized persons / also ensure that vehicles do not enter the incident site.	3	
Area cordoned off	There was area barricading nearby incident spot by security team. But gate number 5 was not barricaded	2	1
Prevent unwanted/ unauthorized entry into this area	Security officers restrict the entry of unauthorized persons / also ensure that vehicles do not enter the gate also co-ordinate properly with incident controller. Security personal not stand by across all entry points of incident location.	2	1



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

Clouser of gates	Vehicle & man movement entry gates were not closed. And no security personal stand by on all entry gates.	2	1
Providing security coverage at main gate and directing concern person to the site.	Instead of security personal Liquid staff directing the way to emergency response department.	2	1

D. PERFORMANCE OF OPERATION/ CONCERN DEPARTMENT

Performance	Performance Rating	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Immediately pass the communication message through VHF / other available media to subordinates & emergency response team.	Communication / Information on emergency conveyed to all concern by incident controller. (Nearby MCP was not operate)	3	
Stopping of operation / like critical operations first & on priority basis	All operations stopped by incident controller.	3	
Emergency response of particular department at site	Response time of concern department found adequate. LT Person deputed for guided to emergency vehicle for scene.	3	
Support for evacuation of people at site and head count along with HR/ Admin	Evacuation and head count done by Operation team.	3	
Availability and response of emergency kit / equipment / Other.	Emergency spill kit was immediately mobilized at the incident spot.	3	
Audibility of the scenario on PA System by Persons	PA System was not clearly audible at incident location and all areas of LT for evacuation of people.	3	



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED MOCK DRILL REPORT

Observer – Mr. Kandarp Pandya and Santhosh Arunachalam

Good Observations:

1. The standby fire tender arrived at the site within 2 minutes of the incident, indicating a swift emergency response.
2. Cooling operations of the adjacent wagon began from the fixed line within 4 minutes of the incident, demonstrating quick action to prevent further escalation.
3. The deployment of the 2nd and 3rd fixed hoses for cooling operations of the adjoining wagon occurred within 5 minutes of the incident, showcasing effective resource management.
4. The disconnection of hoses for 5 wagons was completed within 6 minutes of the incident, indicating efficient coordination and quick execution of safety measures.
5. The fire was successfully extinguished at the 11-minute mark from the time of the incident, reflecting the effectiveness of the emergency response and firefighting efforts.

Observations / Area of Improvement:

1. The sound of the mobile/hand-operated siren was not audible across the length of "00" Line.
2. Emergency exit route / gate was not clearly visible during dark hour.
3. Currently, the way to the assembly point signage is not available. Proper installation will assist in safe and fast gathering of FCC and nearby workers during emergencies.
4. There may be a risk of Electrical Splashes during firefighting due to nearby Electrical panels.
5. The windsock fixed on top of the lighting tower on TLF-09 was not visible during dark hours.
6. The illumination level at the rail sliding is low during dark hour.
7. Its observed Visibility / Identification of incident controller is difficult during dark hour due to small sicker on his helmet.

Overall rating - 87

Marks from 96 to 100 - Excellent

Marks from 91 to 95 - Very Good

Marks below 90 - Needs Improvement

VOTE OF THANKS: -

SUPPORTING STAFF:

Drill Organized By : Gaurang Chudasama and Baiju Abraha
Drill guided By : Rama Rao and Rana Bambhaniya
Exercise Performance Assessor : Kandarp Pandya and Santhosh Arunachalam
Site incident controller : Mahendra Gadhvi
Report prepared By : Abhishek Panda

ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

Date	24.09.2024
Time	15:03 Hrs
Location	2L20B1 container AICTPL
Type/Text of the Scenario	Scenario was leakage observed in container MEDU4000038 (IMDG class 08, UN 1760) placed at 2L20B1, yard supervisor informed to duty superintendent by means of VHF and Duty superintendent informed to Tower control of AICTPL. Tower control informed to Fire services, OHC, Security, ERT, Terminal head, POC, department regarding emergency

INTRODUCTION:

Mock drill was decided, and advance information given Operation team, Fire team, OHC, Safety, Security, ERT, Terminal head, POC, admin team regarding emergency. Scenario and execution plan was decided as per scenario.

Pre-meeting and informed about roles and responsibility



Pre-meeting and informed about roles and responsibility

ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

LOCATION (WITH PHOTOGRAPH):



Yard 2L, AICTPL

SEQUENCE OF EVENTS WITH PHOTOGRAPHS:



Fire team reached at location with fire tender

ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT



Ambulance & Security team reached at location



Sharing of Observations by Observers and Incident Controller & Brief about importance of mock drill to strengthen emergency response during emergency



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

SEQUENCE OF EVENTS:

- Leakage was observed Class-08 cargo container placed at yard 2L20B1.
- Yard supervisor informed through VHF & to shift superintendent.
- Shift Superintendent immediate informed to tower control regarding emergency.
- Shift superintendent reached at location and taken responsibility as Incident Controller.
- Tower control informed to shift superintendent, Engineering, Fire services, OHC, Safety, Security, ERT, Terminal head, POC, admin department regarding emergency.
- Security team came at location and barricaded area.
- Fire team reached at location with fire tender and started extinguished the fire.
- Fire team checked nearest area using thermal imaging camera and declared normal.
- Shift Superintendent call off the emergency.

TEAM RESPONSE TIME

Sr No.	Particulars	Information provided
1	Yard supervisor and shift superintendent copied the message	15:02 Hrs



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

2	Duty superintendent informed to tower control copied the message	15:03 Hrs
3	Tower control informed to shift superintendent, Engineering, Fire services, OHC, Safety, Security, ERT, Terminal head, POC, admin department regarding emergency	15:03 Hrs

SERVICES RESPONSE TIME:

Description	Information Provided time	Service received
Yard Supervisor	15:02	He was at site
Shift Superintendent	15:02 Hrs	Reached at location @ 15:03 Hrs
Engineering team		Tower did not inform to engineering
Safety team		Tower did not inform to Safety
Security team	15:05 Hrs	Reached at location @ 15:15 Hrs
Ambulance / OHC team	15:04 Hrs	Reached at location @ 15:14 Hrs
Fire team	15:03 Hrs	Reached at location @ 15:13 Hrs
Security team barricaded area		15:17 Hrs
Fire team checked the leakage		15:18 Hrs
Fire team checked nearby area with thermal imaging camera and declared normal		15:18 Hrs
Fire and safety team informed to shift superintendent regarding emergency clear		15:22 Hrs



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

**COMMUNICATION TO MUTUAL AID GROUP
(IF REQUIRED, AS AND WHEN MUTUAL AID IS CALLED)**

To	By Whom/ Media	Standard	Performance
IOCL		Not Required	
HPCL			
JINDAL SAW			
ADANI POWER			
CGPL			
HMEL			

RESPONSE TIME PERFORMANCE OF ACTION

Agency	Standard Time	Performance	Rating (Max. 9/ Block)	
			+VE Marks	-VE Marks
Operation team	Response was good and they reached within 1 minutes	Good	5	2
Safety team	Response was good and they reached within 2 minutes	Good	8	1
Security team	Response was good and they reached within minutes	Good	8	1
OHC team	Response was good and they reached within 10 minutes	Good	7	2
Fire team	Response was good and they reached within 10 minutes	Good	8	1



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

A. PERFORMANCE OF OHS & F SERVICES & RESCUE SERVICES

Performance	Performance	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
OHS team reached at location and collecting information regarding emergency	Good	3	
Fire team reached at location within short time, checked container and nearby area using thermal imaging camera and declared normal	Good	3	
Medical team reached at location within short time	Good	3	

B. PERFORMANCE OF OPERATION/ CONCERN DEPARTMENT

Performance	Performance Rating	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Operation team immediate passed message to all concern departments regarding emergency, shifted nearby RTGC, Checked nearby stacked hazardous container, bring reach stacker and required resources.	Good	2	<u>2</u>
Security team reached at location and barricaded area	Good	3	

Observer – I (Mr. Vinod Rajput)

- Emergency siren not available to declared emergency



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

- Windsock not available to know the wind direction
- RTG which were working at vicinity area not informed regarding leakage and shift equipment out of danger radius
- Head count not done at site

Observer – II (Mr. Abdul Halim Khan)

- Message interpretation by tower controller was wrong
- MSDS of chemical did not provide at location
- Tower control did not inform Safety department

Observer – III (Mr. Vijay Chavda)

- Leak cart was not available to shift leakage container
- ISCR did not inform safety department
- Incident controller did not provide direction to services regarding wind direction
- Security team fail to provide safe access to services to reach the location

Overall rating

Marks from 85 to 100 - Good

Marks from 90 to 95 - Very Good

Marks below 90 - Needs Improvement



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

COMPLIANCE REPORT FOR MOCK DRILL

VOTE OF THANKS:

Vote of thanks by Mr. Vinod Rajput (Safety) and Mr. Nitin Prajapati (operation), Mr. Ratna dip Trivedi (Fire). Yashvant Zala (Security Services) and given to the special thanks to all team members of mock drill participants.

Drill Participation Staff:

Operation Team	Mr. Nitin Prajapati, Mr. Inder, Mr. Jaypalsinh Jadeja, Mr. Jaswant Sinh Rathod, Mr. Bhavesh,
Engineering Team	Mr. Naveendu Kumar, Mr. Tushar Chauhan, Mr. Mithul Patel, Mr. Harshil Patel, Mr. Goutam Prajapati
QHSE Team	Mr. Vinod Rajput, Mr. Abdul Halim Khan, Mr. Vijay Chavda, Mr. Hariprasanth, Mr. Thejus, Mr. Mayuraj Sinh
Fire team	Mr. Ratnadip Trivedi, Mr. Bhavin, Mr. Sachin Joshi, Mr. Harpal Sinh Zala
Security Team	Mr. Yashvant Sinh Zala, Ravindra Kumar Singh, Mr. Ravidas
OHC Team	Dr. Jeet, Mr. Gulam Ali, Mr. Ramesh



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

SUPPORTING STAFF:

Drill Organized By	:	Mr. Vinod Rajput, Mr. Vijay Chavda & Mr. Abdul Halim Khan
Drill guided By	:	Mr. Vijay Patel
Exercise Performance Assessor	:	Mr. Vinod Rajput, Mr. Abdul Halim Khan, Mr. Vijay Chavda
Site incident controller	:	Mr. Nitin Prajapati (Superintendent-AICTPL)
Report prepared By	:	Mr Vijay Chavda & Mr Abdul Halim Khan

MLTPL LPG TERMINAL - Mock Drill Report

1.	Date and Time of Mock Drill	24 th September 2024, 1140, Hrs.
2.	Location	FB-01 refrigerated storage tank, Mundra LPG Terminal Pvt Ltd. PO Box No 1, Mundra, Kutch 370 421, Gujrat, India.
3.	Details of Emergency Scenario	While monitoring the DCS at CCR, CCR operator recognize that Gas Detector #202, activates which resulted in alarm on DCS screen, CCR operator informs shift in charge and asked him to evaluate the situation, where shift in charge confirmed about the leak, CCR immediately informed all the stakeholders and further emergency declared by site incidence controller, fire team started precautionary water spraying by using water monitors further leak was arrested by mechanical team and ensured zero % LEL by safety team along with all the stakeholders. All clear message declared, and emergency scenario communicated to all the employees at assembly point.
4.	Details of initiation/ activation of emergency	Emergency was identified by CCR Operator through gas detector #202 and he immediately declared as emergency by activation siren.
5.	<p>Description of the Mock drill (the narrative of the situation, all actions) including response of emergency team and mitigation actions</p> <p>At Incident point: 1142: At FB01 propane leak identified from pump discharge by shift in charge. 1142: Incidence controller reached at site informed CCR operator for siren activation. 1143: Fire team reached at site and operates the hydrant, Mayur curtain and monitor, Fire tender with fire crew reached & stand by at location for instructions. 1145: Maintenance team reached at site, ensures zero LEL & started leak arrest job. 1200: Maintenance team arrested the identified leak & ensures zero LEL from source. 1200: Ambulance reached for standby. 1203: All clear siren activated after confirming incident under control.</p> <p>At Central Control Room: 1140: CCR operator recognize the alarm of GD #202 activation in DCS. 1142: CCR operator informs the shift in charge to evaluate the situation. 1145: CCR operator stops all the operations & active work permits of the terminal. 1147: Communication to stakeholders like OHC, Marine POC, APSEZ Fire & Security. 1151: CCR activated public announce system & siren to communicate emergency. 1157: CCR communicated 35% LEL to incidence controller. 1200: Ambulance reached at incident point. 1202: CCR received information about LPG leakage arrested by maintenance team. 1203: All clear siren activated after confirmation of site incidence controller. 1205: All the operation were started after clearance from emergency control team & completion of emergency scenario briefing at assembly point.</p>	

	At Assembly point & security gate B: 1151: After hearing siren security guard opens gate for emergency vehicle movement. 1152: First person reached at assembly point & Head count started. 1215: Mock drill briefed by site management & emergency control team to all persons			
6.	Communication and Response of Emergency teams: Emergency control team, Fire crew, Ambulance & Maintenance team reported at site timely.			
	Events	Expected Response time	Actual Response time	Remarks, if any
a)	Siren activation	1 Minute	0.5 Minute	GD activates & confirmation by site incidence controller.
b)	Reporting of SIC	10 Minutes	5 Minutes	SIC reported at site.
c)	Reporting of IC	2 Minute	1 Minute	IC was informed by VHF.
d)	Fire team	5 Minute	2 Minute	Fire team placed at site along with fire tendor, emergency rescue kit & PPE.
e)	Medical team	5 Minute	5 Minute	Ambulance reached at site with paramedics.
f)	Security Team	3 Minute	2 Minute	Security team placed at site.
g)	Mutual Aid	20 Minute	Not required	Not required as emergency was controllable on-site.
h)	E&M	10 Minute	3 Minute	Leak arrested by maintenance team with spark proof tools & cryogenic PPE's.
i)	others	Nil	Nil	
7.	Head Count	79 Nos.		
a)	Total persons present in the installation before the drill	Adani Employees: 10 Contractual: 49 Visitors: 00 Security: 07 Drivers: 13		
b)	Total persons available at Assembly point(s) and key locations	79 Nos at assembly points 06 Nos at key locations (CCR-03, Fire pump house-01, Security gate A- 01 & Security gate C- 01)		
c)	Difference of head count after drill	Nil.		

d)	Action taken to search the shortfall of head counts if any	Nil.			
8.	Time of 'All Clear'	1203 Hrs.			
9.	Duration of Mock Drill (in Minutes)	13 Minutes			
10.	Observations (including highlight the positives of the drill)				
	<p>Positive Points:</p> <ol style="list-style-type: none"> 1. Fire hydrant system is in auto mode, fire tendor reached site timely. 2. Maintenance team equipped with emergency kit. 3. Communication system was in well maintained condition. 4. Firefighting & Medical team was reached at site timely. 5. PPEs was available at site. 				
11.	Recommendations & Action Plan.				
SN	Observation	Action Plan	Responsibility	Target Date	Status
1.	CCTV Camera observed not in working condition.	CCTV to be repaired and made in operational during emergency.	Ritesh Bharadiya	1 st Oct 24	In Progress
2.	Communication sequence is not followed by CCR.	New joinee CCR operators to be trained on emergency procedure.	Gaurav Vyas	10 th Oct 24	In Progress
3.	Security Team has not reached to the site	Security person to be involved in mock drill after hearing siren	Security supervisor & Port security	Immediate	In Progress
4.	Siren is not audible at warehouse, workshop & CCR offices	Need to install the separate siren inside the buildings	Abdul Rahman	31 st Dec 24	In Progress
5.	Quarterly ERDMP training to be added in Training calendar.	Revised training calendar to be shared	Amit Abdeo	15 th Oct 24	In Progress

12. Emergency Exercise Observers

Name of the observer	Area of Observation
Amit Abdeo (adani)	LPG Terminal CCR
<i>Qaiser Husain</i> (adani)	Local incidence site (TLF-01)
<i>Mehul Chavda</i> (adani)	Security gate-B Assembly point

(Incidence Controller)

Dilip Rote.
Shift In-charge

(Location In-Charge)

Gaurav Vyas
HOS-LPG Terminal

SITE PHOTOS



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED MOCK DRILL REPORT

Date	:	25.09.2024
Time	:	11:25AM
Location	:	Encloser – 09, TLF-09, Loading Bay: -
Type/Text of the Scenario	:	Chemical Spillage (Methanol around 300 litter) on loading helper due to wrong opening of valve for tanker loading at TLF -09.

INTRODUCTION: On the above-mentioned day alcohol loading will be planned to start at TLF 09. Loading supervisor lineup all the requirements and brief the operation & safety requirements to loading helpers. After all arrangement, tanker was placed on loading bay number 65, and loading hose was connected. When all setups done then driver instructed to the loading helper to open the valve for loading. But at that time loading helper was open the valve of line number 115 instead of number 116 then suddenly methanol come out from the hose, and it spilled upon tanker driver Mr. Ranjit (IP) who stand upon the tanker top. Immediately he moved away from the oil spilling area and started shouting, Mr. Vaidik Velani (1st informer) listened the sound and reached quickly at loading bay 65 after observing the seriousness, he pass the message to Mr. Ganeswara Rao (Incident controller). IC immediately reached at site and measure the situation then he informed to control room and declared emergency. After that IC instructed to operation team for giving shower to the IP at nearby safety shower near pump house -09.

Immediately ISCR, OHC and fire were informed, and subsequently intimated the same through message/ call to concern departments

LOCATION (WITH PHOTOGRAPH):



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED MOCK DRILL REPORT

SEQUENCE OF EVENTS WITH PHOTOGRAPHS:

<p>Chemical Spilled upon the tanker driver</p>	<p>1st informer reached at site informed to Incident controller</p>
	
<p>Incident location barricaded and spill boom laying for control the oil contamination</p>	<p>Axillary support team reached at incident location</p>
	
<p>Operation team assist by showing direction to emergency respond team</p>	<p>Shower provided to the injured person</p>
	

ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED MOCK DRILL REPORT

<p>Fire team reached at location and arranging for fome spray to controll veporization</p>	<p>Fome spraying progress by fire services</p>
	
<p>OHC team check the condition of I.P and taken OHC by ambulance</p>	<p>Workmen went towards assembly point</p>
	
<p>Addressing to the gaeathering at assemlly point</p>	<p>Addressing to the gaeathering at assemlly point</p>
	



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED MOCK DRILL REPORT

RESPONSE TIME:

#	Description	Exact Time
1.	First responder informed to LT control room regarding emergency scenario	: 11:23
2.	Incident controller comes on site	: 11:25
3.	Declaration of Emergency	: 11:25
4.	Ambulance reaching time at incident Point	: 11:27
5.	Safety Shift in-charge reaching time at incident point	: -
6.	Security team reaching time at incident point	: -
7.	Fire Team reaching time at incident Point	: 11:30
8.	Rescue Arrangement at site	: -
9.	OHC Team Check the condition of person	: 11:31
10.	Person shift to OHC by ambulance	: 11:31
11.	First person at Assembly Point	: 11:28
12.	Last person at Assembly Point	: -
13.	Maintenance Arrangement at site	: 11:31
14.	Workers and supervisor reached at TLF-9 for spillage control	: 11:33
15.	Termination of Emergency and All clear siren	: 11:36
16.		

COMMUNICATION & ACTIONS:

Action By	Information To / Action By	Remarks
First Responder	Information given to incident controller about situation / scenario Operated VHF	
Site Incident Controller	Assess the site and declare on-site emergency.	
Concern Department/ Area In-charge	Inform to ISCR, Fire, Medical, Safety etc.	
Engineering Services	LT Maintenance team reached the site immediately after declaration of emergency	
Corporate Affairs	NA	
HR/ Admin	Not Required	



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED MOCK DRILL REPORT

Safety Team	Not Required	
OHC	OHC team response was quick. Ambulance reached on site	
Security Control Room	Security team didn't reach at emergency location	
Fire Control Room Inform	Fire tender reached at site in quick time.	

COMMUNICATION TO MUTUAL AID GROUP

(IF REQUIRED, AS AND WHEN MUTUAL AID IS CALLED) – Not Required.

To	By Whom/ Media	Standard	Performance
IOCL		2 min. after receiving information to Emergency Control Room	
HPCL			
JINDAL SAW			
ADANI POWER			
CGPL			
HMEL			

RESPONSE TIME PERFORMANCE OF ACTION

Agency	Standard Time	Performance	Rating (Max. 9/ Block)	
			+VE Marks	-VE Marks
Ambulance	1-2 Min	2 Min	9	
Safety	4-5 Min	4 Min	9	
Fire Services	4-5 Min	3 Min	9	

A. PERFORMANCE OF OHS & F SERVICES & RESCUE SERVICES

Performance	Performance	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Turn out/ response time of Fire Team	Fire team reached at site within benchmark of response time.	3	
Turn out/ response time of OHC Team	OHC team & Ambulance reached at site within benchmark of response time. Ambulance crossed the warm zone and reached near to incident location.	2	1
Turn out/ response time of Safety Team and in coordination with	Response time of Safety team is within benchmark and will	3	



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED MOCK DRILL REPORT

incident controller mobilisation of personnel and resources.	coordinate with incident controller for mobilisation of personnel, resources, PPE's etc.		
Firefighting at the site	Fire team apply foam upon the spilled chemical	3	
Medical attention at the site	Reported to incident Controller and ensure no any causality.	3	
Rescue of person	Person rescued by fire team on time and handover to OHC	3	

B. PERFORMANCE OF MAINTENANCE DEPARTMENT

Performance	Performance	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Power shut down/ cut off	Maintenance team reached on time.	3	
Immediate arrangements at the site	All arrangement were mobilised.	3	
Mobilizing of personnel and resources	Maintenance team reached at site with tool kit. Appropriate PPEs used.	3	
Maintenance activities being carried out at the site	Maintenance team standby at site	-	
Clearing debris	Spill containment within TLF bay after clearance from incident controller was partially done by operation team.	2	1
Other arrangement at required to meet emergency		-	

C. PERFORMANCE OF SECURITY SERVICES

Performance	Performance Rating	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Turnout of Security	Security Team not reached at incident site at time.	1	-2



**ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED
MOCK DRILL REPORT**

Performance of security guards	Vehicle were only allowed inside Liquid Terminal with spark arrestor by security guards from the LT gate.	3	
Security officer's command & control	Security officers took charge and restricted the entry of unauthorized persons / also ensure that vehicles do not enter the incident site.	3	
Area cordoned off	There was area barricading nearby incident spot by operation team.	3	
Prevent unwanted/ unauthorized entry into this area	Security officers restrict the entry of unauthorized persons / also ensure that vehicles do not enter the gate also co-ordinate properly with incident controller.	3	
Closer of gates	Vehicle & man movement entry gates were not closed.	3	
Providing security coverage at main gate and directing concern person to the site.	Security guard was guided to emergency vehicle for scene.	3	

D. PERFORMANCE OF OPERATION/ CONCERN DEPARTMENT

Performance	Performance Rating	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Immediately pass the communication message through VHF / other available media to subordinates & emergency response team.	Communication / Information on emergency conveyed to all concern by incident controller	3	
Stopping of operation / like critical operations first & on priority basis	All operations stopped by incident controller.	3	
Emergency response of particular department at site	Response time of concern department found adequate. LT deputed for guided to emergency vehicle for scene.	3	



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED MOCK DRILL REPORT

Support for evacuation of people at site and head count along with HR/ Admin	Evacuation done by Operation team and head count was done Liquid and Security team.	2	1
Availability and response of emergency kit / equipment / Other.	Emergency spill kit was immediately mobilized at the incident spot.	3	
Audibility of the scenario on PA System by Persons	PA System was not use for announcement of emergency.		3

Observer – Mr. Baiju Abraham, Mr. Amit Abdeo, Mr. Abhishek Panda and Mr. Keyur Brahmbhatt

Good Observations:

1. Incident Controller (IC) reached at site within 2 minutes and took charge.
2. Ambulance arrived near incident location within 2min
3. Fire and rescue team arrived with SCBA set for emergency.
4. Coordination between Incident Controller and Control Room
5. Emergency evacuation ensured by Incident Controller (IC).
6. Control room communicated to all the concern members on emergency.

Observations / Area of Improvement:

1. MSDS file not opened at CCR.
2. Siren is not audible as per siren code
3. Casual response of employees and surveyor during emergency evacuation.
4. Tractor driver moved the vehicle prior to close the door of Emergency response trolley door.
5. Security services involvement in mock drill is not as much visible as per emergency response plan.
6. During spillage of flammable cargo, tanker moved from loading bay during emergency scenario.
7. PA system not used to communicate the emergency evacuation.
8. Only one side containment was bunded.
9. No head count system at assembly point.
10. Ambulance crossed the warm zone and entered near to the incident location.

Overall rating – 88

Marks from 96 to 100 - Excellent

Marks from 91 to 95 - Very Good

Marks below 90 - Needs Improvement



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

VOTE OF THANKS:

- Gaurang Chudasama, Rama Rao, Amit Abdeo

SUPPORTING STAFF:

Drill Organized By : Gaurang Chudasama and Abhishek Panda
 Drill guided By : Rama Rao and Laxman Bhanushali
 Exercise Performance Assessor : Baiju Abraham & Amit Abdeo
 Site incident controller : Ganeswara Rao
 Report prepared By : Abhishek Panda

SI No	ATS Tracking ID	Observation	Recommendations	Responsibility	Target date of Completion
1	221625	MSDS file not opened at CCR	During any emergency with respect to cargo, MSDS of specific cargo should be available on the table of CCR-In charge	Laxman Bhanushali	05th Oct
2	221626	Siren is not audible as per siren code.	Siren should be audible as per the prescribed siren code as per ERDMP	HOS: LT-Ops	10th- Oct-2024
3	221627	Casual response of employees and surveyor during emergency evacuation.	Training and awareness should be more emphasized	Laxman Bhanushali, HOS: LT-Ops & ES-LTM	05th Oct
4	221628	Tractor driver moved the vehicle prior to close the door of Emergency response trolley door.	Vehicle should be move after clearance of the workmen involved / associated with the vehicle	Laxman Bhanushali	05th Oct
5	221630	Security services involvement in mock drill is not as much visible as per emergency response plan.	Security team should perform their role as described in ERDMP plan	B.K Krishna	05th Oct
6	221631	During spillage of flammable cargo, tanker moved from loading bay during emergency scenario.	During emergency no vehicle should be moved from the incident location before establishment of control measures	Laxman Bhanushali	05th Oct
7	221632	PA system not used to communicate the emergency from evacuation.	PA system should be used for announcement of emergency	Laxman Bhanushali	05th Oct
8	221633	Only one side containment was bunded.	All 4 side (360°) should be bunded for avoiding spreading of contamination	Laxman Bhanushali	05th Oct
9	221634	No head count system at assembly point.	Head count (In & Out) inside liquid terminal need to be established	HOS: LT-Ops	31st Oct
10	221635	Ambulance crossed the warm zone and red zone and entered near to the incident location.	Ambulance should be parked at warm zone.	CMO-OHS	05th Oct

ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

Date	30.09.2024
Time	11:27 Hrs
Location	Canteen area, ACMTPL
Type/Text of the Scenario	Assuming that one driver was started vomiting due to food poisoning while taking meal. Canteen supervisor Mr. Kiran Kumar Immediately informed to Admin in charge, OHC and Safety Department

INTRODUCTION:

Mock drill was decided, and advance information given to Canteen staffs, Safety Team, Security Team and OHC. Scenario and execution plan was decided as per scenario.

LOCATION (WITH PHOTOGRAPH): Canteen area, ACMTPL



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

SEQUENCE OF EVENTS WITH PHOTOGRAPHS:



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT



SEQUENCE OF EVENTS:

- Assuming that one driver Mr. Kiran Kumar was started vomiting due to food poisoning while taking meal.
- Canteen supervisor Mr. Pradeep Immediately informed to Admin in charge, OHC, Security and Safety Department



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

CANTEEN TEAM RESPONSE TIME

Sr No.	Particulars	Information provided	Service Received
1	Canteen Supervisor first informed to the ACMTPL In-gate security team	11:28	11:29
2	ACMTPL In-gate security team has informed to the ISCR	11:29	11:32
3	ACMTPL In-gate security team has informed to OHC	11:29	11:34
4	ACMTPL In-gate security team has informed to Safety Department	11:30	11:33

RESPONSE TIME:

Description	Information Provided time	Service received
OHC	11:29	11:34
Safety	11:30	11:33
Admin In charge	11:48	11:50

COMMUNICATION TO MUTUAL AID GROUP (IF REQUIRED, AS AND WHEN MUTUAL AID IS CALLED)

To	By Whom/ Media	Standard	Performance
IOCL		Not Required	
HPCL			
JINDAL SAW			
ADANI POWER			



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

CGPL			
HMEL			

RESPONSE TIME PERFORMANCE OF ACTION

Agency	Standard Time	Performance	Rating (Max. 9/ Block)	
			+VE Marks	-VE Marks
Ambulance	Response was good and they reached in 5 minutes	Good	8	
Safety	Response was good and they reached within 3 minutes	Good	8	
Security	Response was good and they reached in 3 minutes	Good	8	
Admin	Response was good and they reached within 2 minutes	Good	8	

A. PERFORMANCE OF OHS & F SERVICES & RESCUE SERVICES

Performance	Performance	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Turn out/ response time of OHC Team	Good	3	
Turn out/ response time of Safety Team and in coordination with incident controller mobilisation of personnel and resources.	Good	2	
Medical attention at the site	Good	2	



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

B. PERFORMANCE OF OPERATION/ CONCERN DEPARTMENT

Performance	Performance Rating	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Immediately pass the communication message VHF / other available media to subordinates & emergency response team.	Immediately passed the information to OHC and quick response from OHC team	3	
Stopping of operation / like critical operations first & on priority basis	NA		
Emergency response of department at site	Response time of concern department found good.	3	
Support for evacuation of people at site and head count along with HR/ Admin	NA		
Availability and response of emergency kit / equipment / Other.	First aid kit found not maintained	1	

Observer – I (General Observation)

- No First-Aid was available inside canteen
- Canteen staffs were not aware about the emergency contact numbers and the emergency numbers are not displayed inside canteen
- Canteen staff were not aware about whom to contact during the choking hazard



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

- Door of the canteen found in damaged condition

Observer – II NA

Overall rating

Marks from 95 to 100 - Excellent

Marks from 90 to 95 - Very Good

Marks below 90 - Needs Improvement

COMPLIANCE REPORT FOR MOCK DRILL

#	Recommendations	Department	Date of Completion
1	Display emergency contact numbers in canteen area and communicate with team	Admin	30.10.2024
2	Ensure to provide the first aid kit in well maintained condition	Admin	30.10.2024
3	First-aid training required for the canteen staff.	Admin	30.10.2024

Name & Signature of Concern HOD:

VOTE OF THANKS:

Vote of the thanks to Admin team, Security team, OHC team & Safety team.
Special thanks to all team members of mock drill participants.

Drill Participation Staff:



ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

MOCK DRILL REPORT

Admin Team: Admin In charge (Mr. Swarup Mukherjee), Admin Supervisor (Mr. Ratan Tapariya)

QHSE Team: Mr. Abdul Halim Khan

Observation Team: Mr. Ajaykumar Bhatt & Mr. Vinod Rajput

Contractors: **M/s Sodexo**
Mr. Amarish Kumar
Mr. Hardhan Mondal
Mr. Karan Boro
Ms. Giriju Kadapur
Ms. Ramin Saket
Mr. Maheshwari Kheraj

Drill Organized By : Mr. Vinod Rajput & Mr. Ajaykumar Bhatt

Drill guided by : Mr. Vinod Rajput

Exercise Performance Assessor : Mr. Ajaykumar Bhatt

Admin In charge : Mr. Swarup Mukherjee

Report prepared by : Mr. Vinod Rajput

Annexure – 17

PROJECT	MUNDRA LPG							
DOCUMENT TITLE	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA							
CONTRACTOR								
CONSULTANT	 TECHNIP INDIA LIMITED							
DOCUMENT NO.	H003-E-LPG-GEN-BP-R-E-008A					Rev No.	A	
CONSULTANT'S DOCUMENT No.								
REV.NO	DATE	DESCRIPTION	PREPARED		CHECKED		APPROVED	
			Init.	Sign	Init.	Sign	Init.	Sign
A	30-11-2016	ISSUED FOR BEP	YD		TK		TK	

This Document is the property of ADANI. It should not be used, copied or reproduced without their written Permission.

QUANTITATIVE RISK ASSESSMENT REPORT FOR JETTY AREA



MUNDRA PORT – NEW LPG FACILITIES



EC



PMC



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

Document Title : Quantitative Risk Assessment Report for Jetty area

Project Title : Mundra Port - New LPG Facilities

Client Company Name : Adani

Engineering consultant : Technip India Limited

PMC : HOWE Engineering Projects (India) Pvt. Ltd.

Consultant : iFluids Engineering

DISCLAIMER

The report rendered by consultants is in the nature of guidelines based on good engineering practices and generally accepted safety procedures. The recommendations shown in the report shall be considered as a Technical professional opinion and not binding on the parties involved viz. Technip and iFluids Engineering.

The technical recommendations and the conclusions thus expressed may have to be re-considered in light of any modifications or alterations that would invalidate the data shown in the documents which are referred to therein.

These recommendations and conclusions would become null and void should the consultants not be kept informed of such modifications or alterations with specific reference to the present report.

A	28-Nov-16	Final Report			
			VP	JS	
Rev	Date	Description	Prepared by	Reviewed by	Approved by

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

LIST OF ABBREVIATIONS

ALARP	As Low As Reasonably Practicable
EA	Environmental Assessment
ERP	Emergency Response Plan
ESD	Emergency Shutdown
HAZID	Hazard Identification
HAZOP	Hazard & Operability Study
HC	Hydrocarbon
HSE	Health Safety & Environment
IRPA	Individual Risk Per Annum
LFL/LEL	Lower Flammability Limit / Lower Explosive Limit
LOC	Loss of Containment
P&ID	Piping and Instrument Diagram
PLL	Potential Loss of Life
QRA	Quantitative Risk Assessment
SOP	Standard Operating Procedure

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

EXECUTIVE SUMMARY

Adani group intends to expand its current port facility at Adani Mundra Port Pvt Ltd. ADANI is developing LPG, Propane, Butane handling and storage facility at their Port in Mundra. Propylene and propane will be stored and handled in the terminal in a scenario where LPG business subsides. The Adani group has appointed iFluids engineering to carry out Quantitative Risk Assessment and recommend cost effective measures to address the hazardous scenarios.

Overall Facility Description

ADANI is developing LPG, Propane, Butane handling and storage facility at their Port in Mundra. Propylene and propane will be stored and handled in the terminal in a scenario where LPG business subsides.

ADANI has envisaged the following services for set up in Import/Export terminal at Mundra,

- Import of Propane / Butane in cryogenic state in jetties through ship tankers and transferring through unloading arms and pipelines.
- Transfer of product through the unloading line and storing in dedicated refrigerated / cryogenic tanks.
- Transfer of products from tanks through pumps to heating train and then to online blending system for mix of Domestic, Auto & Industrial LPG
- Mercaptan dosing of the LPG, Propane and Butane
- Transfer to loading gantry for loading in to road tankers for dispatch of following products through Tanker loading facility.
 - LPG (AUTOMOTIVE)/ (INDUSTRIAL)
 - LPG (DOMESTIC)
 - LPG PROPANE
 - BUTANE
 - PROPYLENE (In future when LPG demand subside BUTANE import would stop and PROPYLENE shall be imported and stored in Storage tank).
- Simultaneous operation of Berth 1 with Berth 2, 3 & 4 respectively

STUDY RESULTS

Risk Analysis

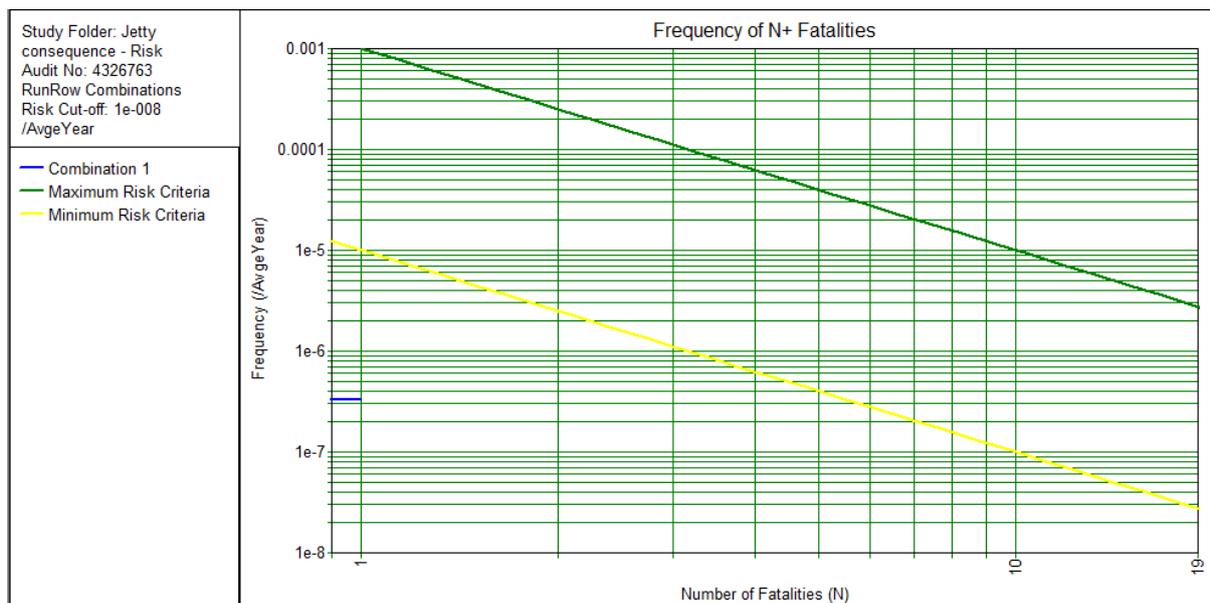
The risk estimated due to the activities conducted at the Mundra port is shown in the risk contour map provided **Figure 1**.

The F-N curve demonstrates the societal risk is within As Low as Reasonably Practicable (ALARP) level shown in the **Figure 2**.

Figure 1: Risk Contours



Figure 2: FN Curve



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

Individual & Societal Risk per Annum

Individual Risk per Annum	2.96E-07
Societal Risk per Annum	3.27E-07

Recommendations

Propane and butane Unloading arm rupture has maximum consequence effect in jetty operations at Mundra port

The Following measures shall be implemented for safe operation

- **Selection of the loading arms and commissioning checks to ensure proper operation of the PERC** in the event of ESD actuation (maximum time shall not exceed more than 2 min for complete isolation, loading arm release and ship pumps stop in case of hydrocarbon leak)
- Provide trip interlocks (ESD) in berth 2 to ensure isolation/tripping of the ship unloading pumps based on suitable leak detection system (LFL) in berth 2. Ensure unloading hose are designed for hydraulic surges in the event of ESD actuation.
- **Mechanical interlocking systems to ensure complete closure of the valves before releasing of coupling (PERC)**
- **Two independent level indicators.** High level alarms (1oo2) shall be set at not more than 85% level of the volumetric capacity of the drain vessel. Audio visual indication shall be at local panel & control room
- **Provision for stopping the transfer operation on high level of the drain system and low level permissive for unloading operation**
- **Drain drum shall have at least two safety relief valves with isolation arrangement, set at different values and at not more than 110% operating pressure of the vessel and each having 100 % relieving capacity adequate for limiting the pressure build up in the vessel not more than 120% of operating pressure**
- **Drain system to be designed to accommodate the capacity of the drain contents of both unloading arms**

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

- **Surge analysis** for the unloading arm and unloading line to be done to ensure proper design considerations in the event of ESD actuation bypassing of hydraulic surge protection systems to be done only after satisfactory protection measures implemented and with management clearance only
- **Selection of electrical and other instruments based on hazardous area classification (IS 5572:2008)**
- **All flanges shall be connected for bonding for electrical continuity**
- **Lightning protection shall be provided as per the requirements of IS: 2309. (High mast towers)**
- **Periodical maintenance schedule should be implemented and meticulously followed**
- **F&G systems management to be inspected periodically and availability ensured**
- **Periodical inspection of pipeline and drain systems**
- **SOP for critical operations** to be developed and displayed at critical locations in local/English languages.
- **SIL verification of the SIFs selected**

Mitigation measures

- **Water curtains shall be provided for segregation of unloading arms/piping manifold and ship tanker** in the event of fire on either of these facilities.
- **Kerb wall shall be provided around all sides of the unloading arm with concrete flooring of the ground under and extending up to minimum distance of at least 5 M (min.) from the edge of the unloading arm with a slope of 1:100 (min.). Grading of the ground underneath should be levelled and directed to an safe area connected with water seal**
- **Kerb wall height shall be minimum 30 cm but shall not exceed 60 cm.**

Other recommendations

- **During ship berthing/de-berthing conditions in berth 2, unloading operations in berth 1 to be stopped**

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

- Ship power generation systems and other electrical systems should be verified for possible ignition source, if safety measures are in place which eliminates ignition source (for all the ships), unloading activity in berth 1,2,3,4 can be done simultaneously after stabilization of LPG unloading operation
- If Motor spirit/SKO/HSD/ethanol/methanol unloading operations are in progress in berth 2/3, unloading operations to be stopped until LPG tanker secured and ignition sources eliminated.
- Hot works jobs for Berth 1 to be avoided during unloading in Berth 2
- Berth 3/4 can be used for unloading operation during construction and commissioning activities in Berth 1
- Any Hot work in the pipe corridor to be covered under PTW systems with continuous monitoring of LFL, running fire water hose (to avoid sparks), area barricading, proper hood to avoid spark spillage
- Continuous LFL monitors with audible alarms near the vessel being unloaded to identify any hydrocarbon leak

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

Table of Contents

EXECUTIVE SUMMARY	4
LIST OF FIGURES	11
LIST OF TABLES	11
1 INTRODUCTION	12
1.1 PROJECT OBJECTIVE	12
1.2 SCOPE OF WORK.....	12
2 FACILITIES OVERVIEW	13
2.1 PROPANE/BUTANE UNLOADING AND STORAGE TANK.....	13
2.2 PRECOOLING OPERATION	13
3 RISK TOLERABILITY CRITERIA.....	15
3.1 INDIVIDUAL RISK CRITERIA.....	15
3.2 SOCIETAL RISK CRITERIA	16
4 METROLOGICAL CONDITIONS	18
4.1 WIND DIRECTION.....	18
4.2 AMBIENT CONDITIONS.....	18
4.3 ATMOSPHERIC STABILITY	18
5 QUANTITATIVE RISK ASSESSMENT METHODOLOGY	21
5.1 GENERAL OVERVIEW	21
5.2 SCENARIO DESCRIPTION AND OPERATING CONDITIONS.....	22
5.3 QRA APPROACH.....	23
5.4 HAZARD IDENTIFICATION	23
5.4.1 Factors for Hazard Identification.....	24
5.5 ISOLATABLE SECTIONS.....	25
6 CONSEQUENCE ANALYSIS.....	26
6.1 OVERVIEW.....	26
6.2 CONSEQUENCE MODELLING.....	26
6.3 DAMAGE CRITERIA.....	28
7 FREQUENCY ANALYSIS	34
7.1 OVERVIEW.....	34
7.2 EVENT TREE ANALYSIS	34
8 RISK ASSESSMENT & PRESENTATION	37
8.1 OVERVIEW.....	37
8.2 RISK RESULTS	37

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

9 RECOMMENDATIONS39

APPENDIX 1 CONSEQUENCE CONTOURS 42

LIST OF FIGURES

FIGURE 1: RISK CONTOURS 5
 FIGURE 2: FN CURVE 5
 FIGURE 3: GOOGLE EARTH IMAGE OF THE FACILITY 14
 FIGURE 4: RISK ACCEPTANCE GRAPH 16
 FIGURE 5: RISK ACCEPTANCE CRITERIA- FN CURVE 17
 FIGURE 6: QUANTITATIVE RISK ASSESSMENT METHODOLOGY 22
 FIGURE 7: EVENT TREE..... 34
 FIGURE 8: RISK CONTOUR 38
 FIGURE 9: FN CURVE 38

LIST OF TABLES:

TABLE 1: PASQUILL’S STABILITY CLASS..... 19
 TABLE 2: WEATHER CONDITIONS 20
 TABLE 3: ISOLATABLE SECTIONS..... 25
 TABLE 4: EFFECTS DUE TO INCIDENT RADIATION INTENSITY 29
 TABLE 5: DAMAGES DUE TO BLAST OVERPRESSURE 30
 TABLE 6: IMPACT DISTANCE IN METER..... 31
 TABLE 7: FAILURE FREQUENCY OF AN EVENT 35

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

1 INTRODUCTION

Adani group intends to expand its current port facility at Adani Mundra Port Pvt Ltd. ADANI is developing LPG, Propane, Butane handling and storage facility at their Port in Mundra. Propylene and propane will be stored and handled in the terminal in a scenario where LPG business subsidises. The report prepared addresses risk assessment of unloading and transportation facilities to provide a better understanding of the risk posed to the plant and surrounding population.

This document describes the results after the completion of Quantitative Risk Assessment study for the Adani Mundra port-New LPG facility.

1.1 Project Objective

The objective of the QRA is to assess the risk levels associated with the facilities under scope; evaluate those risks based on the HSE UK Risk Acceptance Criteria, and if risks are outside the tolerable region, then risk reduction measures shall be proposed to bring the risks into tolerable or As Low As Reasonably Practicable (ALARP) Levels and lower levels.

1.2 Scope of Work

iFluids Engineering has been awarded the Project to carry out the QRA study to assess risks at the following in the Mundra port;

- Berth 2 (White oil-Motor Spirit representing worst case scenario) Pipeline transfer Facilities in the jetty area
- Berth 1 (Propane/Butane) Pipeline Transfer facilities in the jetty area
- Berth 3 & 4 - Berth 3 handling LPG (typical as Berth 1 in terms of inventory and process conditions) and Berth 4 (White oil-Motor Spirit representing worst case scenario)
- To study the impact of LPG pipeline on existing pipelines in the jetty area.
- To study the impact of Simultaneous berth operations of berth 1 with berth 2, 3 & 4 respectively.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

2 FACILITIES OVERVIEW

2.1 Propane/Butane Unloading and Storage Tank

Storage tank (2000-FB-01 and 2000-FB-02) is vertical flat bottom, double wall, full containment refrigerated storage tank, which is designed to store Propane/Butane/Propylene from jetty. The function of these tanks is to store Propane/Butane/Propylene. Both these tanks are identical in all respect and Propane/Butane/Propylene can be stored in any of these tanks. The capacity of each tank is 25000 MT.

Propane/Butane/Propylene is pumped by shipping pump through marine unloading arm to storage tanks through two marine unloading arms at the rate of 500 MT/hr each.

The tank operating pressure is 500 mm WC & temperature of approximately -45°C in case of propane, - 5°C in case of Butane and -47°C in case of Propylene will be maintained in Propane/Butane Storage Tank (2000-FB-01 and 2000-FB-02).

2.2 Precooling Operation

The pre-cooling operation is one of the requirements prior to the ship unloading operation. During precooling operation, cold Propane/ Butane from the Storage Tank I & II is pumped into one of the unloading line going to the Jetty Area, from where it flows towards the Propane/Butane Storage Area and returns into the tank through the other unloading line. Flash compressor will cater the flash gas generated during this operation.

For precooling during propylene/propane unloading scenario two additional lines shall be installed (in future) from storage tank till jetty to avoid any contamination of propylene and Propane inventory.



Figure 3: Google Earth image of the facility

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

3 RISK TOLERABILITY CRITERIA

The assessment and control of risk are essential requirements for a proactive HSE management system. In order to make a valued judgment and to decide on what risks are acceptable, an easily understood set of criteria should be set and followed rigorously. Risk criteria are required to promote consistency in evaluating the results of relevant studies and to formulate a proactive approach to incident prevention. The Risk Acceptance Criteria used in this assessment is from the UK HSE guidelines.

3.1 Individual Risk Criteria

Individual Risk Criteria is a measure of the risk to a person within an occupied area or building. This includes the nature of the injury to the individual, the likelihood of the injury occurring, and the time over which the injury might occur. It is the probability of death occurring because of accidents at a plant facility, installation or a transport route expressed as a function of the distance from such an activity. It is the frequency at which an individual or an individual within a group who may be expected to sustain a given level of harm (typically death) from the realization of specific hazards.

Occupancy is the proportion of exposure time of the individual to the hazard.

The exposure of an individual is related to:

- The likelihood of occurrence of an event involving a release and Ignition of hydrocarbon;
- The vulnerability of the person to the event; and
- The proportion of time the person will be exposed to the event (which is termed 'occupancy' in the QRA terminology).

There is a need to determine the limits for IR, based on numeric values (which would be regarded as intolerable. Figure 4 shows the principle of this framework.

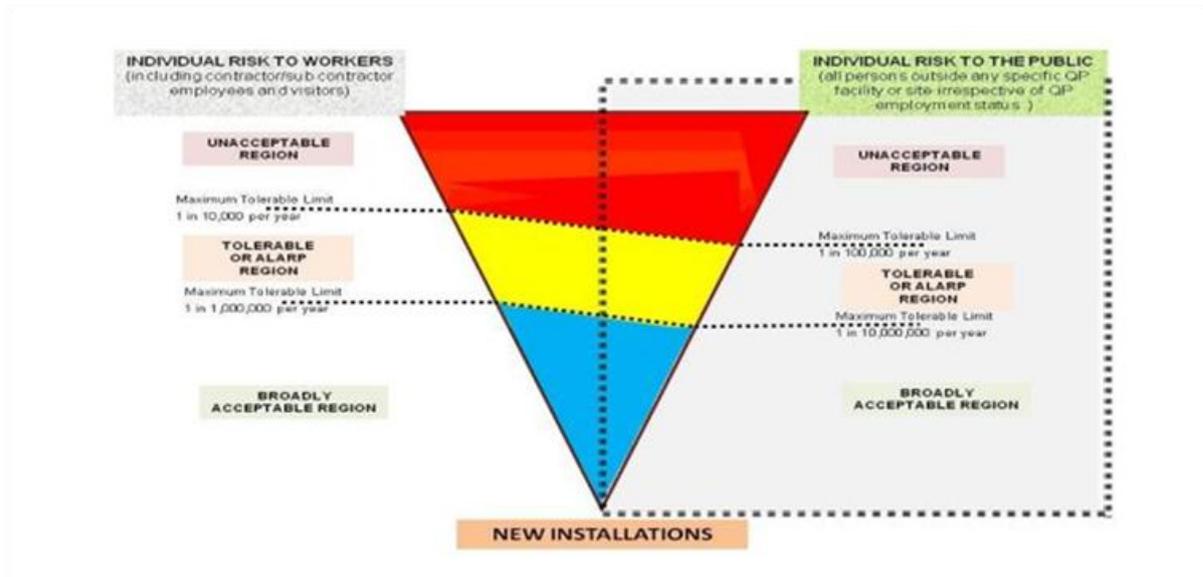


Figure 4: Risk Acceptance graph

3.2 Societal Risk Criteria

Assessment of societal risks is even more important than assessment of individual risk because they involve the likelihood of multiple fatalities. Societal risk is the risk to any person or group of persons who are not connected to project facilities and are outside the facility fence line.

F-N Curve

It is helpful to consider group risk in the demonstration that risks are ALARP. This allows consideration to be given to events, which, although low in frequency, may cause multiple injuries or fatalities. Group risk can be presented in the form of a plot of cumulative frequency versus number of fatalities (F-N curve).

F = Frequency (experienced or predicted)

N = No. of multiple fatalities.

'N' includes indirect deaths caused because of the main event occurring and can therefore be difficult to predict e.g. many people may die years after exposure to a toxic chemical. F-N Curve is generated for customers and benchmarked against risk acceptance criteria. The risk acceptance criteria used to compare the predicted risks for this proposed project can be understood from Figure 5.

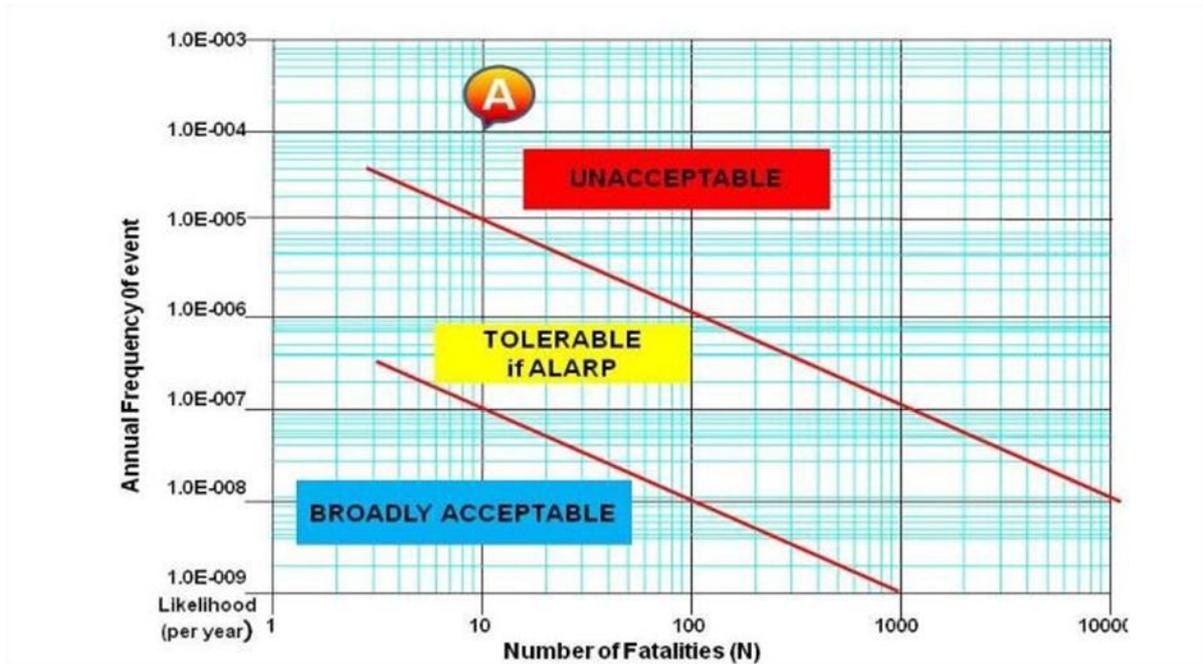


Figure 5: Risk acceptance criteria- FN Curve

4 METROLOGICAL CONDITIONS

This chapter describes the meteorological data, used for the risk assessment study of Adani Mundra Port.

The consequences of released flammable material are largely dependent on the prevailing weather conditions. For the assessment of major scenarios involving release of flammable materials, the most important meteorological parameters are those that affect the atmospheric dispersion of the escaping material. The crucial variables are wind speed, wind direction, atmospheric stability and temperature. Rainfall does not have any bearing on the results of the risk analysis; however, it can have beneficial effects by absorption/washout of released materials. Actual behaviour of any release would largely depend on prevailing weather condition at the time of release.

4.1 Wind Direction

N	NE	E	SE	S	SW	W	NW
0.0148	0.1211	0.1374	0.0404	0.0179	0.559	0.087	0.0225

4.2 Ambient Conditions

Maximum Ambient temperature	: 35°C
Minimum Ambient temperature	: 7°C
Relative humidity	: 70%
Atmospheric Pressure	: 1.013 Bar
Incident solar radiation	: 0.215 kW/m ²
Surface roughness parameter	: 0.3 m

4.3 Atmospheric Stability

Pasquill stability parameter, based on Pasquill – Gifford categorization, is such a meteorological parameter, which decreases the stability of atmosphere, e.g., the degree of convective turbulence.

Pasquill has defined six stability classes ranging from 'A' (extremely unstable) to 'F' (very stable). Wind speeds, intensity of solar radiation (daytime insolation) at night time sky cover have been identified as prime factors defining these stability categories. Below table indicates the various Pasquill stability classes.

Table 1: Pasquill’s Stability Class

Wind Speed (m/s)	Day: Solar Radiation			Night: cloud Cover		
	Strong	Moderate	Slight	Thinly < 40%	Moderate	Overcast > 80%
<2	A	A-B	B	-	-	D
2-3	A-B	B	C	E	F	D
3-5	B	B-C	C	D	E	D
5-6	C	C-D	D	D	D	D
>6	C	D	D	D	D	D

A – Very Unstable

B – Unstable

C – Slightly Unstable

D – Neutral

E – Stable

F – Very Stable

When the atmosphere is unstable and wind speeds are moderate or high or gusty, rapid dispersion of pollutants will occur. Under these conditions, pollutant concentrations in air will be moderate or low and the material will be dispersed rapidly. When the atmosphere is stable and wind speed is low, dispersion of material will be limited and pollutant concentration in air will be high. In general, worst dispersion conditions (i.e. contributing to greater hazard distances) occur during low wind speed and very stable weather conditions, such as that at 1F weather condition (i.e. 1 m/s wind speed and Pasquill stability F).

Stability category for the present study is identified based on the cloud amount and wind speed.

Based on the weather analysis, predominant weather stability of “F” and “D” was selected with wind speed 1.5m/s, 2 m/s and 5m/s for consequence analysis, respectively. 2F is the most prevalent weather condition for this location.

Table 2: Weather Conditions

Wind Speed in m/s	Pasquill Stability
1.5	F
2	F
5	D

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

5 QUANTITATIVE RISK ASSESSMENT METHODOLOGY

5.1 General Overview

Quantitative Risk Assessment (QRA) is used for risk management and safety improvement in many industries. It provides a quantitative assessment of potential risks identified and provides a basis for evaluating process safety with respect to a predetermined risk acceptance criterion. The usefulness of the QRA results is highly dependent on the availability and accuracy of the input data, with more complete input data providing a higher confidence on the validity and robustness of the results obtained.

In most practical applications, there will be uncertainties in both the key parameters used and the QRA model itself. The effect of these uncertainties should be evaluated to confirm there is no impact on the conclusion. The QRA model will include:

- Examination of flammable/toxic material related to Major Accident Hazards;
- Quantification of the likelihood of flammable/toxic Major Accident Hazardous events;
- Quantification of the consequences of flammable/toxic Major Accident Hazardous events;
- Combination of consequences and likelihood of Major Accident Hazard events to assess risk profiles for individuals, and assets;
- Identification of the predicted levels of risk with regard to Individual Risk (IR) levels and Societal Risk (SR);
- Identification and assessment of risk reduction solutions (to the extent required to reduce predicted risks to acceptable levels); and
- Demonstration that the risks have been reduced to As Low As Reasonably Practicable (ALARP), when risks cannot be reduced to acceptable levels).

The following schematic (**Figure 6**) displays the methodology used to perform the Quantitative Risk Assessment Study for the Adani Mundra Port – New LPG Facilities.

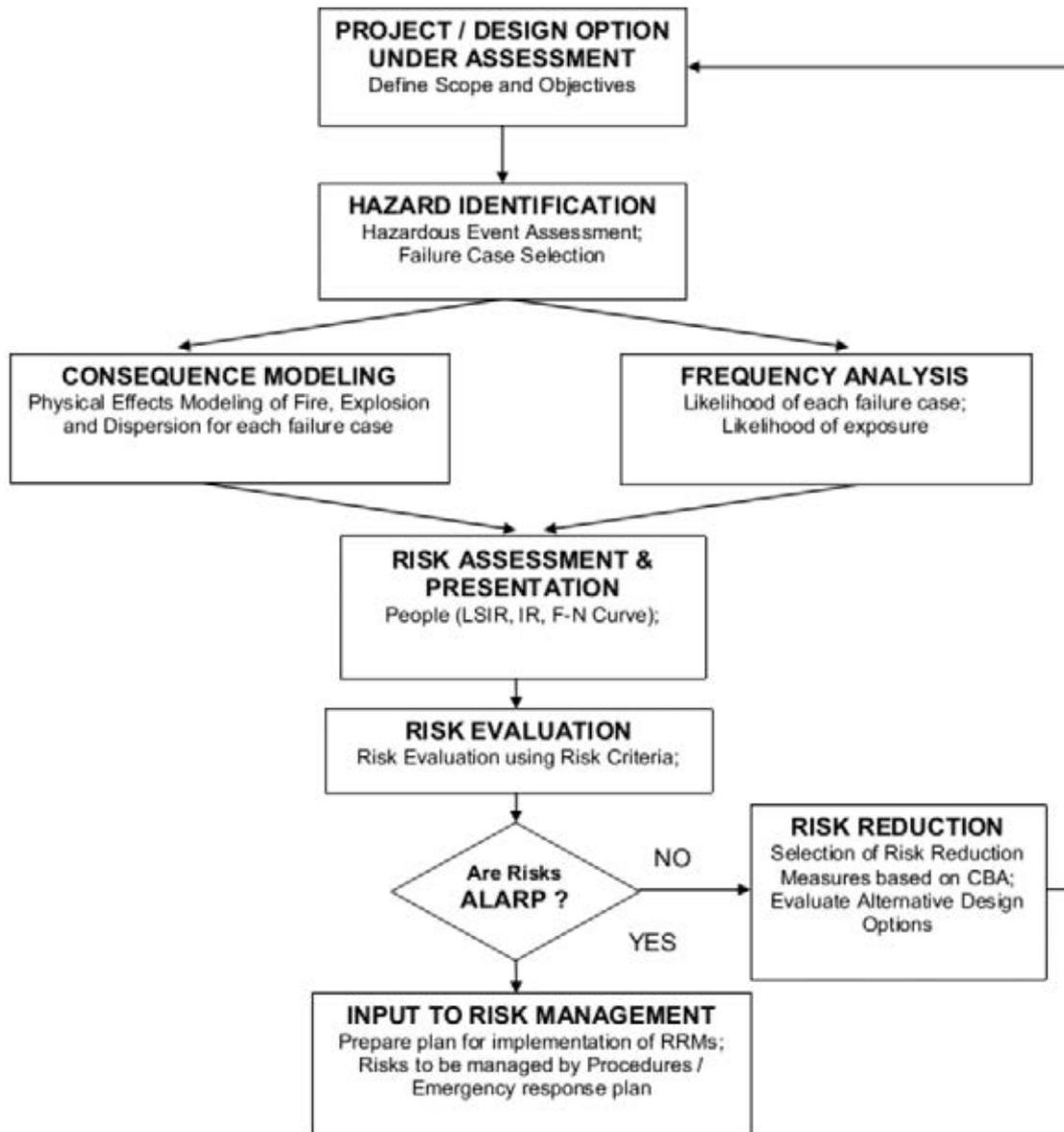


Figure 6: Quantitative Risk Assessment Methodology

5.2 Scenario Description and Operating Conditions

To carry out the QRA study the following basic data were used:

- Process parameters such as operating pressure, temperature & flow rate of equipment and process pipelines as well as the composition of the process streams etc.
- Manning details at strategic locations at site and meteorological details of Adani Mundra port area;
- Failure frequencies of leak sources, Ignition probabilities, operating probabilities etc. and

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

- Isolation and detection time, Impact criteria for consequences such as fire, explosion and toxic concentration.

5.3 QRA Approach

The QRA was carried out using the standard, internationally accepted approach consisting of the steps shown below:

Data used for the QRA were project and site specific; however, where this was not possible, the use of generic data was documented in the assumptions register prior to being applied within the study. As such, the QRA results was also specific to the planned operations, building design and personnel and general population occupancy levels expected at the time of data collection. Given the above, the consequence and risk results are only applicable to the site under study in this QRA and cannot be applied to any other location.

The following information was considered in the QRA:

- Facility design, function, location, capacity and layout;
- Environmental weather data e.g. wind rose, cloud coverage, stability class;
- Process engineering details e.g. composition, heat and mass balance, equipment items, process parameters - pressure and temperature regimes, inventories, flow schemes;
- Facility operation e.g. operational and emergency procedures; and
- Work force deployment, estimated occupancy and exposure.

5.4 Hazard Identification

A technique commonly used to generate an incident list is to consider potential leaks and major releases from fractures of all process pipelines and vessels. This compilation includes all pipe work and vessels in direct communication, as these may share a significant inventory that cannot be isolated in an emergency. The following data were collected to envisage scenarios:

- Composition of materials stored in vessels / flowing through pipeline;
- Inventory of materials stored in vessels;
- Flow rate of materials passing through pipelines;
- Vessels / Pipeline conditions (phase, temperature, pressure); and Connecting piping and piping dimensions.

Accidental release of flammable liquids / gases has the potential for severe consequences. Delayed ignition of flammable gases can result in blast overpressures covering large areas. This may lead to extensive loss of life and property. In contrast, fires have localized consequences. Fires can be extinguished or contained in most cases; there are few mitigating actions one can take once a flammable gas or a vapour cloud gets released.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

5.4.1 Factors for Hazard Identification

In any installation, main hazards arise due to loss of containment during handling of flammable liquids / gases. To formulate a structured approach to the identification of hazards, a list of contributory factors is provided below:

Blast over Pressures

Blast Overpressures depend upon the reactivity class of material and the amount of gas between two explosive limits. For example, Motor spirit/Gasoline once released and not ignited immediately is expected to give rise to a gas cloud. These gases in general have medium reactivity and in case of confinement of the gas cloud, on delayed ignition may result in an explosion and overpressures.

Operating Parameters

Potential gas release for the same material depends significantly on the operating conditions. The gases are likely to operate at atmospheric temperature (and hence high pressures). This operating range is enough to release a large amount of gas in case of a leak / rupture, therefore the pipeline leaks and ruptures need to be considered in the risk analysis calculations.

Inventory

Inventory Analysis is commonly used in understanding the relative hazards and short listing of release scenarios. Inventory plays an important role when considering a potential hazard. The large inventory of a vessel or a system can lead to a large quantity of potential release. A practice commonly used to generate an incident list is to consider potential leaks and major releases from fractures of pipelines and vessels/tanks containing sizable inventories.

Range of Incidents

Both the complexity of study and the number of incident outcome cases are affected by the range of initiating events and incidents covered. This not only reflects the inclusion of accidents and / or non-accident-initiated events, but also the size of those events. For instance, studies may evaluate one or more of the following:

- Catastrophic failure of container;
- Large hole (large continuous release);
- Smaller holes (continuous release); and
- Leaks at fittings or valves (small continuous release).

In general, quantitative studies do not include very small continuous releases or short duration small releases if past experience or preliminary consequence modelling shows that such releases do not contribute to the overall risk levels.

5.5 Isolatable Sections

The following table describes the isolatable section considered for the study:

Table 3: Isolatable Sections

Isolatable section identification	Description	Scenario	Diameter m	Pressure barg	Temperature C	Isolation time s	Total Inventory, kg
Berth 1							
IS-1	Propane unloading line	7	0.406	8	-42.67	120	1593
IS-2		25	0.406	8	-42.67	120	2615
IS-3		150	0.406	8	-42.67	120	18173
IS-4	Butane unloading line	7	0.406	8	-2.9	120	1637
IS-5		25	0.406	8	-2.9	120	2687
IS-6		150	0.406	8	-2.9	120	18215
IS-7	Propylene unloading line	7	0.406	8	-45	120	1422
IS-8		25	0.406	8	-45	120	2464
IS-9		150	0.406	8	-45	120	17999
Berth 2							
IS-10	Methanol Pipelines	10	0.305	10	35	120	11809
IS-11		150	0.305	10	35	120	24885
IS-12	MS Pipelines	10	0.406	10	35	120	18894
IS-13		150	0.406	10	35	120	35336
IS-14	HSD Pipelines	10	0.610	10	35	120	48967
IS-15		150	0.610	10	35	120	82050
IS-16	SKO Pipelines	10	0.305	10	35	120	12058
IS-17		150	0.305	10	35	120	21814
IS-18	Furnace Oil Pipelines	10	0.305	10	55	120	13848
IS-19		150	0.305	10	55	120	21916
IS-20	Crude Pipelines	10	0.9144	10	35	120	121023
IS-21		150	0.9144	10	35	120	177890

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

6 CONSEQUENCE ANALYSIS

6.1 Overview

Consequence is the measure of the expected outcomes for a given accidental release. For this project, consequence is defined as the hazard distance or hazard zone to various fatality endpoints. During the execution of site-specific consequence analysis, it is essential to accurately model the release, dilution, and dispersion of gases and aerosols if a precise assessment of potential exposure is to be attained. Consequence modelling, also known as physical effects modelling, is a technique in which computer based mathematical modelling is used to predict physical behaviour under accident conditions in order to make a quantitative estimation of risk. Internationally accepted and validated software PHAST v6.7 and PHAST RISK v.6.7, (both developed by DNV GL) have been used for this project.

PHAST v6.7 contains a set of complex models that calculate release conditions, initial dilution of the vapour (dependent upon the release characteristics), and the subsequent dispersion of the vapour introduced into the atmosphere. It permits the user to evaluate the downwind dispersion of the chemical cloud based on the toxicological/physical characteristics of the released chemical, atmospheric conditions, and specific circumstances of the release.

PHAST v6.7 will be used to estimate threat zones associated with several types of hazardous chemical releases, including toxic gas clouds, fires, and explosions.

It is most important that the QRA model effectively reflect reality, thus those familiar with the facilities and their operation are required for proper evaluation. This is particularly true in relation to the preparation of input data and assumptions and the review of results from the evaluation. The QRA model must identify the major hazard contributors to the work force and third parties, quantify risks, and identify and assess any risk reduction methods that may be proposed. In addition to modelling the current situation within the field, the model shall be extendible to add additional facilities as development occurs and provide an active method of planning any proposed development.

6.2 Consequence Modelling

Discharge Rate

The initial rate of release through a leak depends mainly on the pressure inside the equipment, size of the hole and phases of the release (liquid, gas or two phases). The release rate decreases with time as the equipment depressurizes. The reduction mainly on the inventory and the actions taken to isolate the leak and blow-down the equipment

Dispersion

A vapour cloud may be formed when a vaporizing liquid is released for an extended duration. If the gas cloud does not immediately ignite, it disperses based on the prevalent wind direction, speed and stability category (i.e. degree of turbulence).

The cloud dispersion simulation is carried out to provide the distance (from the leak) at which the concentration of flammable material falls below the Lower Flammability Limit (LFL).

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

Consequence Events

The following describes the probabilities associated with the sequence of events which must take place for the incident scenarios to produce hazardous effects. Considering the present case, the outcomes expected are:

- Flash Fire (FF);
- Jet fires;
- Pool fire;
- Vapour Cloud Explosion.

Flash Fire

The vapour/gas release from a pool would disperse under the influence of the prevailing wind; with material concentration in air reducing with distance. At a particular location downwind, the concentration will drop below its lower flammable level (LFL) value. If ignited within the flammable envelope, the mass of the material available between the LFL and ½ LFL will be likely to burn as a flash fire; rapidly spreading through the cloud from the point of ignition back to the source of release.

Although flash fires are generally low intensity transitory events, the burning velocity is quite high and escape following ignition is not possible. Flash fires often remain close to the ground, where most ignition sources are present. It is assumed that personnel caught inside a flash fire will not survive while those outside suffer no significant harm. If other combustible material is present within the flash fire it is also likely to ignite and a secondary fire could result.

Jet Fire

Jet fire causes damage due to the resulting heat radiation. The working level heat radiation impact will vary widely depending on the angle of the flame to the horizontal plane, which in turn mainly depends on the location of the leak. The flame direction was considered horizontal for consequence analysis of leaks and ruptures from process equipment. Jet fire heat radiation impacts were estimated for the identified credible and worst case scenarios.

Upon accidental leakage, the pressurized fluid will disperse as a jet, initially moving forward in the spatial direction of the leak until the kinetic energy is lost and gravity slumping or lifting of the cloud occurs, dependent upon whether the fluid is heavier or lighter than air.

The primary hazard associated with jet fires is thermal radiation and potential for flame impingement on adjacent pipelines/equipment, resulting in escalation. High pressure releases have the potential to cover large areas due to its relatively large flame length. However, the effects of escalation are minimized if the flame length reduces to less than the separation distance between other equipment and the jet fire source.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

Pool Fire

A liquid pool is formed during a prolonged leakage if the rate of leakage exceeds the rate of vaporization. On ignition, this would result in a pool fire whose size/radius would depend on the mass flow rate, ambient temperature, heat of vaporization of material released, vapour pressure, duration of discharge and effects of containment or dykes. The pool fire could cause damage to equipment or injury/fatality to personnel due to thermal radiation effects.

Vapour Cloud Explosion

Vapour cloud explosion is the result of flammable materials in the atmosphere, a subsequent dispersion phase, and after some delay an ignition of the vapour cloud. Turbulence is the governing factor in blast generation which could intensify combustion to the level that will result in an explosion. Turbulence is often created by obstacles in the path of vapour cloud or when the cloud finds a confined area, as under the bullets. Insignificant level of confinement will result in a flash fire. The VCE will result in overpressures.

6.3 Damage Criteria

Damage criteria give the relation between the extent of the physical effects (exposure) and the effect of consequences. For assessing the effects on humans, consequences are expressed in terms of injuries and the effects on equipment / property in terms of monetary loss. The consequences for release of toxic substances or fire can be categorized as:

- Damage caused by heat radiation on material and people;
- Damage caused by explosion on structure and people; and

In Consequence Analysis studies, three main types of exposure to hazardous effects are categorized as:

- Heat radiation due to fires.
- Jet fires and flash fires;
- Explosions;

The knowledge about these relations depends strongly on the nature of the exposure. The following discusses the criteria selected for damage estimation:

Heat Radiation:

The effect of fire on a human being is in the form of burns. There are three categories of burns: first degree, second degree and third degree burns being the most severe. The consequences caused by exposure to heat radiation are a function of:

- The radiation energy onto the human body [kW/m^2];
- The exposure duration [sec]; and
- The protection of the skin tissue (clothed or bare body).

The physical effects of hazard events are given in the table below:

Table 4: Effects due to Incident Radiation Intensity

Incident Radiation (kW/m^2)	Type of Damage
4.7	Sufficient to cause pain within 20 sec. Blistering of skin(first degree burns are likely)
12.5	Minimum energy required for piloted ignition of wood, melting plastic tubing's etc.
37.5	Sufficient to cause damage to the equipment

The actual results would be less severe due to the various assumptions made in the models arising out of the flame geometry, emissivity, angle of incidence, view factor and others. The radiation output of the flame would be dependent upon the fire size, extent of mixing with air and the flame temperature. Some fraction of the radiation is absorbed by carbon dioxide and water vapour in the intervening atmosphere. Finally, the incident flux at an observer location would depend upon the radiation view factor, which is a function of the distance from the flame surface, the observer's orientation and the flame geometry.

Blast Overpressure from Vapour cloud Explosion (VCE)

The assessment aims are to determine the impact of overpressure in the event that a flammable gas cloud is ignited. A Vapour cloud Explosion (VCE) results when a flammable vapour is released and mixes with the air to form a flammable vapour cloud. If ignited, the flame speed may accelerate to high velocities and produce significant blast overexposure.

The assessment goals are to determine the impact of overpressure in the event that a flammable gas cloud is ignited. The damage effects due to 0.01 bar, 0.1 bar & 0.3 bar are reported in terms of distance from the overpressure source.

In case of vapour cloud explosion, two physical effects may occur:

- A flash fire over the whole length of the explosive gas cloud;

- A blast wave, with typical peak overpressures circular around ignition source.

For the blast wave, the lethality criterion is based on:

- A peak overpressure of 0.1 bar will cause serious damage to 10% of the housing/structures;
- Falling fragments will kill one of each eight persons in the destroyed buildings.

The following damage criteria may be distinguished with respect to the peak overpressures resulting from a blast wave:

Table 5: Damages due to Blast Overpressure

Peak Overpressure	Damage Type	Description
0.30 bar	Heavy Damage	Major damage to plant equipment structure
0.10 bar	Moderate Damage	Repairable damage to plant equipment & structure
0.01 bar	Significant Damage	Shattering of glass



ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

The summary of the consequence modelling is shown below in

Table 6: Impact Distance in meter

Isolatable Section	Description	Release category	Flash Fire Effects: 100% LFL Ellipse			Flash Fire Effects: 50% LFL Ellipse			Radiation Effects: Jet Fire Ellipse			Radiation Effects: Pool Fire			Overpressure								
			Distance in meters			Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters					
			1.5F	2F	5D	1.5F	2F	5D		1.5F	2F	5D		1.5F	2F	5D		1.5F	2F	5D			
IS-1	Propane Unloading line	7	12.27	10.19	6.42	24.48	21.07	8.19	4	26.73	25.93	23.19	4	NR	NR	NR	0.01	74.95	70.11	NR			
										12.5	21.34	20.46	17.59	12.5	NR	NR	NR	0.1	29.53	28.69	NR		
										37.5	17.80	16.88	13.98	37.5	NR	NR	NR	0.3	24.76	24.34	NR		
IS-2		Propane Unloading line	25	59.61	54.52	35.64	73.68	68.08	52.16	4	84.21	81.90	73.89	4	NR	NR	NR	0.01	518.96	438.73	228.54		
											12.5	67.27	64.69	56.26	12.5	NR	NR	NR	0.1	147.88	125.70	80.97	
											37.5	56.64	53.96	45.55	37.5	NR	NR	NR	0.3	108.89	92.80	65.46	
IS-3			Propane Unloading line	150	255.99	227.90	175.34	342.85	308.57	249.72	4	410.32	400.22	364.35	4	225.82	226.55	210.65	0.01	1520.60	1481.14	1181.37	
												12.5	323.38	311.98	274.04	12.5	147.83	151.34	149.79	0.1	408.53	398.63	395.03
												37.5	270.11	258.10	219.76	37.5	90.24	93.49	101.49	0.3	351.57	324.51	312.40
IS-4	Butane Unloading line			7	12.90	10.41	6.47	24.75	21.42	8.36	4	27.01	26.27	23.68	4	NR	NR	NR	0.01	77.70	71.73	NR	
												12.5	21.31	20.48	17.75	12.5	NR	NR	NR	0.1	30.01	28.97	NR
												37.5	17.63	16.75	13.96	37.5	NR	NR	NR	0.3	25.00	24.48	NR
IS-5		Butane Unloading line		25	61.17	55.27	35.91	74.85	68.90	52.50	4	85.31	83.17	75.62	4	NR	NR	NR	0.01	531.00	445.16	232.21	
												12.5	67.28	64.85	56.81	12.5	NR	NR	NR	0.1	149.97	126.81	81.61
												37.5	56.20	53.65	45.54	37.5	NR	NR	NR	0.3	109.93	93.36	65.78
IS-6			Butane Unloading line	150	248.45	220.10	170.78	318.19	285.38	239.34	4	417.21	407.89	374.03	4	240.76	241.15	225.00	0.01	1512.39	1460.54	1211.13	
												12.5	324.58	313.85	277.69	12.5	157.30	160.70	158.92	0.1	408.43	390.08	400.19
												37.5	268.52	257.08	220.24	37.5	96.17	99.77	109.58	0.3	326.95	314.12	314.98
IS-7	Propylene Unloading line			7	12.80	10.41	6.47	25.11	21.62	8.48	4	26.96	26.14	23.32	4	NR	NR	NR	0.01	77.44	71.55	NR	
												12.5	21.59	20.69	17.76	12.5	NR	NR	NR	0.1	29.96	28.94	NR
												37.5	18.07	17.11	14.15	37.5	NR	NR	NR	0.3	24.98	24.47	NR
IS-8		Propylene Unloading line		25	61.42	55.55	36.02	76.62	70.60	53.30	4	84.85	82.48	74.25	4	33.27	29.36	NR	0.01	514.46	443.04	231.31	
												12.5	67.98	65.34	56.71	12.5	26.65	24.53	NR	0.1	147.10	134.71	81.45
												37.5	57.31	54.59	46.03	37.5	20.59	19.49	NR	0.3	108.50	102.31	65.70
IS-9			Propylene Unloading line	150	255.73	227.88	169.63	349.93	314.29	243.58	4	412.90	402.50	365.63	4	242.40	242.43	230.06	0.01	1529.10	1478.23	1132.59	
												12.5	326.40	314.72	275.88	12.5	160.76	162.51	159.81	0.1	409.22	397.65	378.30
												37.5	273.18	260.91	221.81	37.5	105.49	108.88	116.15	0.3	351.92	333.41	299.04



ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

Isolatable Section/	Description	Release category	Flash Fire Effects: 100% LFL Ellipse			Flash Fire Effects: 50% LFL Ellipse			Radiation Effects: Jet Fire Ellipse			Radiation Effects: Pool Fire			Overpressure						
			Distance in meters			Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters			
			1.5F	2F	5D	1.5F	2F	5D		1.5F	2F	5D		1.5F	2F	5D		1.5F	2F	5D	
IS-10	Methanol P/L	10	11.40	11.05	6.84	23.45	21.08	13.29	4	44.0716	42.1378	35.979	4	44.3716	43.1432	NR	0.01	65.8894	64.6327	37.965	
										12.5	37.1441	35.2776	29.5076	12.5	30.9147	30.7607	NR	0.1	27.96	27.7421	14.8509
										37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	23.9747	23.8659	12.4222
IS-11		150	70.62	69.21	50.04	121.93	107.00	76.68	4	235.718	226.635	209.858	4	136.037	136.988	142.032	0.01	294.232	298.903	226.029	
										12.5	199.537	190.182	171.207	12.5	97.0531	99.1266	108.836	0.1	125.426	133.727	97.0651
										37.5	NR	NR	139.528	37.5	72.4929	72.3265	75.5624	0.3	109.603	116.841	83.5145
IS-12	MS P/L	10	26.40	23.59	15.23	32.67	29.67	23.22	4	37.5937	36.724	33.671	4	NR	NR	NR	0.01	225.457	172.851	98.5467	
										12.5	29.3562	28.3433	24.9996	12.5	NR	NR	NR	0.1	63.9044	46.5137	33.6248
										37.5	24.3735	23.2947	19.8615	37.5	NR	NR	NR	0.3	46.9296	33.2392	26.8034
IS-13		150	169.59	148.07	113.80	207.40	185.21	155.25	4	326.379	321.139	303.961	4	136.482	142.569	168.27	0.01	1189.97	1184.48	818.819	
										12.5	249.763	243.019	224.278	12.5	79.7338	79.518	82.0953	0.1	317.542	308.385	266.014
										37.5	204.073	196.518	177.003	37.5	NR	NR	NR	0.3	248.759	241.121	207.93
IS-14	HSD P/L	10	11.37	11.25	12.86	11.58	11.44	13.60	4	9.23875	9.2571	11.9794	4	70.0438	73.0102	85.1624	0.01	30.4035	31.4317	32.693	
										12.5	7.02619	6.95779	8.73359	12.5	37.835	37.668	41.0876	0.1	13.5392	13.7176	13.9364
										37.5	5.43322	5.3477	6.71139	37.5	NR	NR	NR	0.3	11.7673	11.8563	11.9656
IS-15		150	29.56	29.44	33.04	29.56	29.45	33.09	4	28.7595	28.2825	29.4646	4	185.219	191.383	218.455	0.01	29.4186	29.6151	51.2393	
										12.5	22.1526	21.5302	21.557	12.5	113.912	113.79	118.02	0.1	21.6338	21.6678	33.6842
										37.5	18.1956	17.4941	16.9013	37.5	NR	NR	NR	0.3	20.8158	20.8328	31.8397
IS-16	SKO P/L	10	11.43	11.29	12.93	17.30	15.67	13.95	4	26.8337	26.8878	33.6751	4	66.7752	69.687	77.6411	0.01	53.7609	55.9137	57.5866	
										12.5	20.7828	20.5746	24.7386	12.5	35.1158	34.8127	36.4009	0.1	17.5908	17.9643	18.2545
										37.5	17.1296	16.783	19.4742	37.5	NR	NR	NR	0.3	13.7904	13.9768	14.1217
IS-17		150	29.25	29.14	32.75	37.39	37.77	39.80	4	88.3046	86.9503	90.2507	4	121.643	126.421	147.559	0.01	72.8802	73.4377	78.1448	
										12.5	67.6656	65.8591	65.7575	12.5	73.4972	73.3811	78.5757	0.1	37.4381	37.5348	38.3513
										37.5	55.4211	53.3769	51.4125	37.5	NR	NR	NR	0.3	33.7141	33.7624	34.1701
IS-18	FURNACE OIL	10	NR	11.37	13.43	NR	11.70	14.80	4	NR	NR	NR	4	67.7607	70.0269	79.8512	0.01	NR	NR	NR	
										12.5	NR	NR	NR	12.5	38.5883	38.4596	42.2865	0.1	NR	NR	NR
										37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
IS-19		150	NR	NR	NR	NR	NR	NR	4	NR	NR	NR	4	94.4439	97.0658	109.734	0.01	NR	NR	NR	
										12.5	NR	NR	NR	12.5	61.6346	61.5704	66.4692	0.1	NR	NR	NR
										37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR



ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A



Isolatable Section/	Description	Release category	Flash Fire Effects: 100% LFL Ellipse			Flash Fire Effects: 50% LFL Ellipse			Radiation Effects: Jet Fire Ellipse			Radiation Effects: Pool Fire			Overpressure						
			Distance in meters			Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters			
			1.5F	2F	5D	1.5F	2F	5D		1.5F	2F	5D		1.5F	2F	5D		1.5F	2F	5D	
IS-20	CRUDE	10	28.69	25.89	16.60	35.84	32.52	24.92	4	34.6209	34.0991	29.749	4	NR	NR	NR	0.01	237.787	206.342	104.653	
										12.5	25.8094	25.124	21.3767	12.5	NR	NR	NR	0.1	66.043	60.5885	34.6841
										37.5	20.6567	19.8868	16.4918	37.5	NR	NR	NR	0.3	47.9976	45.2739	27.3323
IS-21	CRUDE	150	332.30	283.90	202.34	403.72	348.47	269.54	4	325.533	314.373	268.919	4	164.136	170.158	163.372	0.01	2994.33	2733.84	1583.86	
										12.5	247.302	236.963	198.353	12.5	96.7701	95.8433	81.2582	0.1	791.031	754.644	489.64
										37.5	200.903	191.054	156.56	37.5	NR	NR	NR	0.3	590.249	547.046	374.667

*NH- No Hazard, NR- Not Reached

7 FREQUENCY ANALYSIS

7.1 Overview

Frequency of occurrence of the representative hazardous events needs to be evaluated by referencing appropriate generic industry data. Both generic industry and company / vendor based information has been used, and particular care has been taken to ensure its validity. Generic failure data was applied where site specific or company / vendor data is not available.

Initiating event failure frequencies for each case developed have been estimated using various sources (listed in order of preference) including:

- TNO Guidelines for Quantitative Risk Assessment (Purple Book);
- OGP Risk Assessment Data Directory, Process Release Frequencies, 2010; and
- Health & Safety Executive (HSE) failure rates & event data for land use planning.

Given the potential for release from each of these scenarios, an event tree of possible outcomes has been developed using this individual component failure data. The table given below shows the frequency of failure of the selected isolatable sections calculated by parts count.

7.2 Event tree analysis

A release can result in several possible outcomes or scenarios (fire, explosions, un-ignited release etc.). A specific outcome for a release scenario may be dependent on other unrelated events following the initial release. Event tree analysis is used to identify potential outcomes of a release and to quantify the risk associated with each of these outcomes. The event tree for this QRA study is shown in **Figure 7**:

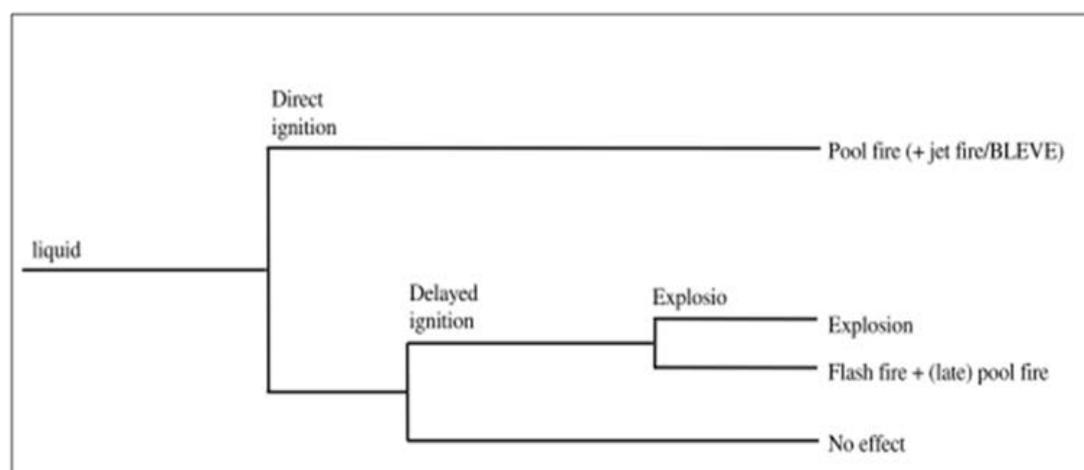


Figure 7: Event Tree

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

For calculating the frequency used for modeling, the following modification factors were taken into consideration:

- Design/Quality Maintenance
- Time is use

Table 7: Failure Frequency of an Event

Isolatable Sections	Description	Scenario	Total Frequency
IS-1	Propane unloading line	7	6.08E-06
IS-2		25	2.18E-06
IS-3		150	1.86E-07
IS-4	Butane unloading line	7	6.08E-06
IS-5		25	2.18E-06
IS-6		150	1.86E-07
IS-10	Methanol P/L	10	2.28E-06
IS-11		150	1.44E-08
IS-12	MS P/L	10	2.50E-06
IS-13		150	1.58E-08
IS-14	HSD P/L	10	7.03E-06
IS-15		150	4.56E-08
IS-16	SKO P/L	10	4.94E-06
IS-17		150	3.12E-08
IS-18	Furnace Oil	10	1.20E-05

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

Isolatable Sections	Description	Scenario	Total Frequency
IS-19		150	7.56E-08
IS-20	Crude	10	4.05E-07
IS-21		150	1.26E-08

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

8 RISK ASSESSMENT & PRESENTATION

8.1 Overview

Risk is often defined as a function of the likelihood that a specified undesired event will occur, and the severity of the consequences of that event. Risk is derived from the product of likelihood and potential consequence. Risk in general is a measure of potential economic loss or human injury in terms of the probability of the loss or injury occurring and magnitude of the loss or injury if it occurs.

$$Risk = f(Severity, Frequency)$$

Quantification of effects of the hazardous event was done using the Event Tree approach in which all the possible outcomes of the hazardous event were considered and the likelihood of each type of end event determined. This step in the process involves the use of consequence modelling to predict both physical phenomena such as dispersion of gas, size and duration of fires, overpressures due to explosions, and the performance of equipment and systems such as availability of a fire & gas detection system, availability of emergency shutdown system, and availability of fire protection system. The end result of this phase of the assessment is a **series of "end events", together with their estimated frequency of occurrence.**

8.2 Risk Results

The risk modelling has been performed using DNV PHAST RISK 6.7 software. Thereby, the details of the input data used for the risk modelling such as vulnerability criteria, ignition probability and occupancy data are given in the QRA Assumption Register. The results of a QRA are expressed using Individual Risk Contours and Societal Risk Graphs.

The Individual Risk represents the frequency of an individual dying due to loss of containment events (LOCs). The individual is assumed to be unprotected and to be present during the total exposure time. The Individual Risk is presented as contour lines on a topographic map.

The Societal Risk represents the frequency of having an accident with N or more people being killed simultaneously. The people involved are assumed to have some means of protection. The Societal Risk is presented as an F-N curve, where N is the number of deaths and F the cumulative frequency of accidents with N or more deaths.

The Individual Risk estimated due to the activities being conducted at the Adani Mundra port is represented by a risk contour in the Figure 8 below.



Figure 8: Risk Contour

The Societal Risk pertaining to group of individuals is represented in **Figure 9**.

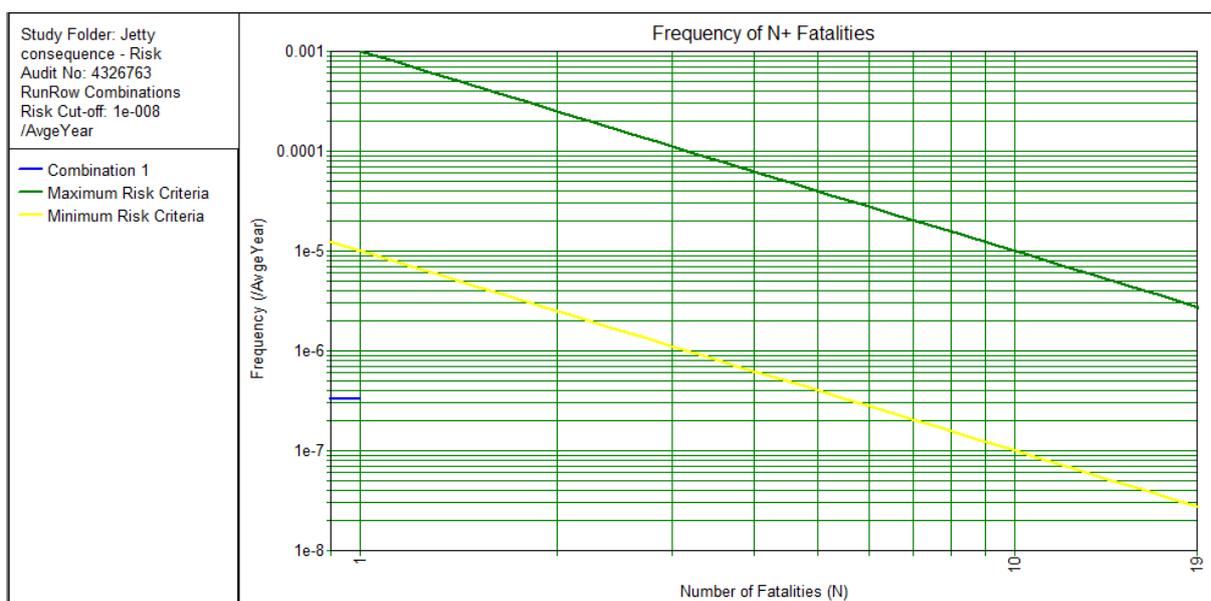


Figure 9: FN Curve

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

9 RECOMMENDATIONS

Propane and butane Unloading arm rupture has maximum consequence effect in jetty operations at Mundra port

The Following measures shall be implemented for safe operation

- **Selection of** the loading arms and commissioning checks to ensure proper operation of the PERC in the event of ESD actuation (maximum time shall not exceed more than 2 min for complete isolation, loading arm release and ship pumps stop in case of hydrocarbon leak)
- **Provide** trip interlocks (ESD) in berth 2 to ensure isolation/tripping of the ship unloading pumps based on suitable leak detection system (LFL) in berth 2. Ensure unloading hose are designed for hydraulic surges in the event of ESD actuation.
- **Mechanical** interlocking systems to ensure complete closure of the valves before releasing of coupling (PERC)
- **Two independent level indicators. High level alarms (1oo2) shall be set at not more than 85% level** of the volumetric capacity of the drain vessel. Audio visual indication shall be at local panel & control room
- **Provision for stopping the transfer operation on high level of the drain system and low level** permissive for unloading operation
- **Drain drum shall have at least two safety relief valves with isolation** arrangement, set at different values and at not more than 110% operating pressure of the vessel and each having 100 % relieving capacity adequate for limiting the pressure build up in the vessel not more than 120% of operating pressure
- **Drain system to be** designed to accommodate the capacity of the drain contents of both unloading arms
- **Surge analysis for the unloading arm and unloading line to be done to ensure proper design** considerations in the event of ESD actuation bypassing of hydraulic surge protection systems to be done only after satisfactory protection measures implemented and with management clearance only
- **Selection of electrical and other instruments based on hazardous area classification (IS 5572:2008)**

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

- All flanges shall be connected for bonding for electrical continuity
- Lightning protection shall be provided as per the requirements of IS: 2309. (High mast towers)
- Periodical maintenance schedule should be implemented and meticulously followed
- F&G systems management to be inspected periodically and availability ensured
- Periodical inspection of pipeline and drain systems
- SOP for critical operations to be developed and displayed at critical locations in local/English languages.
- SIL verification of the SIFs selected

Mitigation measures

- Water curtains shall be provided for segregation of unloading arms/piping manifold and ship tanker in the event of fire on either of these facilities.
- Kerb wall shall be provided around all sides of the unloading arm with concrete flooring of the ground under and extending up to minimum distance of at least 5 M (min.) from the edge of the unloading arm with a slope of 1:100 (min.). Grading of the ground underneath should be levelled and directed to an safe area connected with water seal
- Kerb wall height shall be minimum 30 cm but shall not exceed 60 cm.

Other recommendations

- During ship berthing/de-berthing conditions in berth 2, unloading operations in berth 1 to be stopped
- Ship power generation systems and other electrical systems should be verified for possible ignition source, if safety measures are in place that eliminates ignition source (for all the ships), unloading activity in berth 1,2,3,4 can be done simultaneously after stabilization of LPG unloading operation
- If Motor spirit/SKO/HSD/ethanol/methanol unloading operations are in progress in berth 2/3, unloading operations to be stopped until LPG tanker secured and ignition sources eliminated.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

- Hot works jobs for Berth 1 to be avoided during unloading in Berth 2
- Berth 3/4 can be used for unloading operation during construction and commissioning activities in Berth 1
- Any Hot work in the pipe corridor to be covered under PTW systems with continuous monitoring of LFL, running firewater hose (to avoid sparks), area barricading, proper hood to avoid spark spillage
- Continuous LFL monitors with audible alarms near the vessel being unloaded to identify any hydrocarbon leak

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- JETTY AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008A	

APPENDIX 1 CONSEQUENCE CONTOURS



ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

PROPANE PIPELINE FROM BERTH 1 - 25mm LEAK

FLASH FIRE



JET FIRE





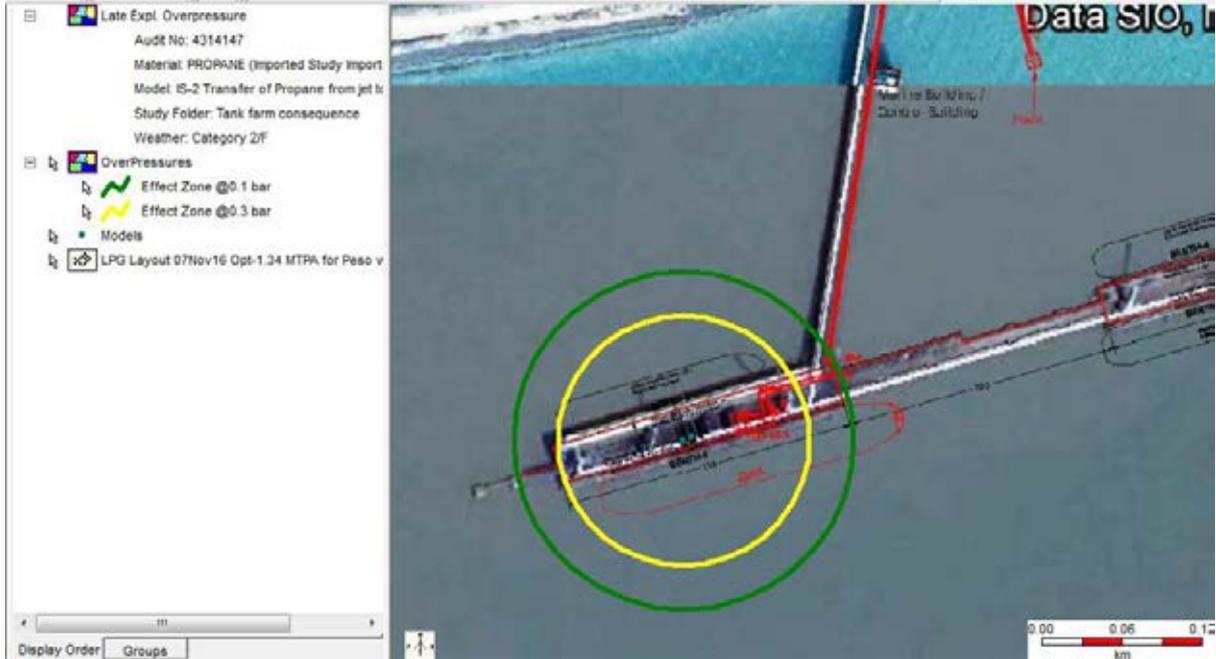
ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

EXPLOSION



BUTANE PIPELINE FROM BERTH 1- 25mm LEAK

FLASH FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

JET FIRE



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

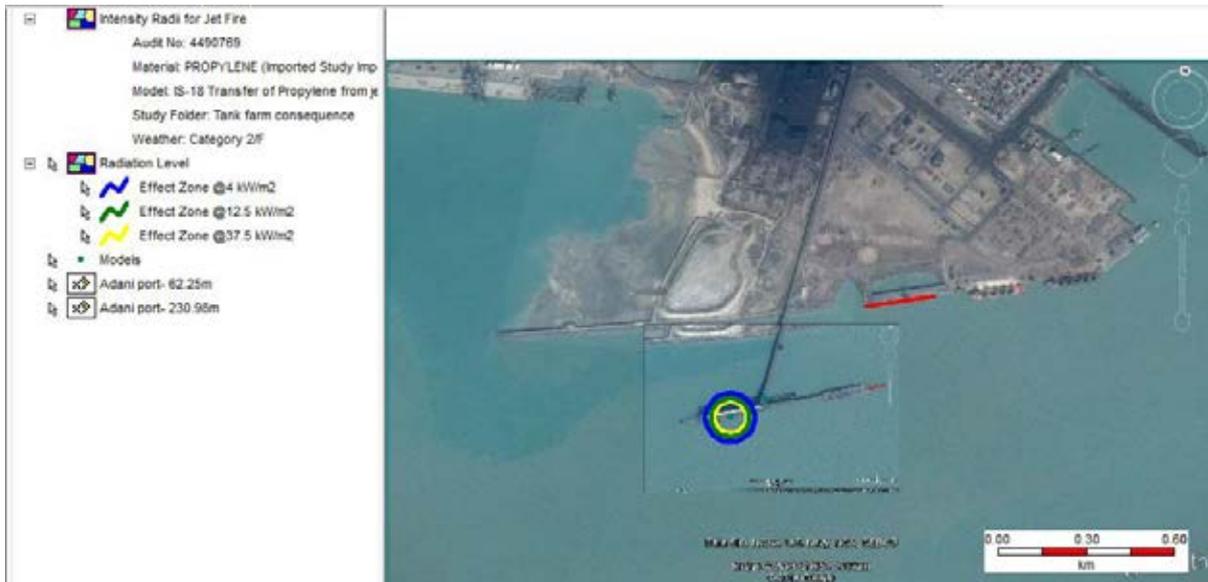
DOC NO: H003-E-LPG-GEN-BP-R-E-008A

PROPYLENE PIPELINE FROM BERTH 1-25 mm LEAK

FLASH FIRE



JET FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES



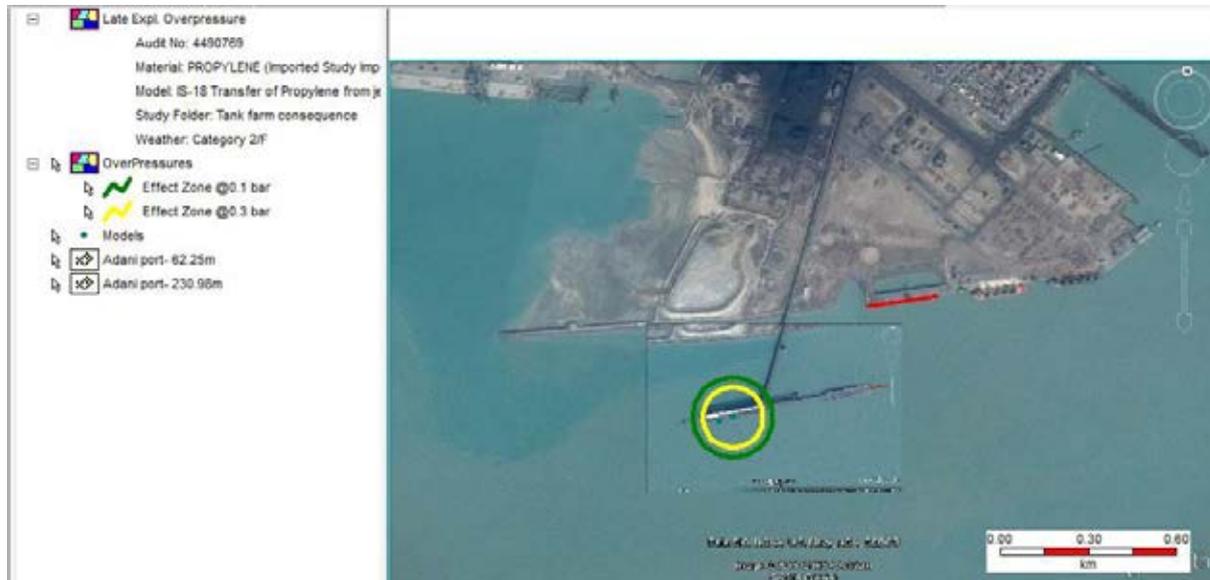
QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

POOL FIRE



EXPLOSION



METHANOL PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE



JET FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

EXPLOSION

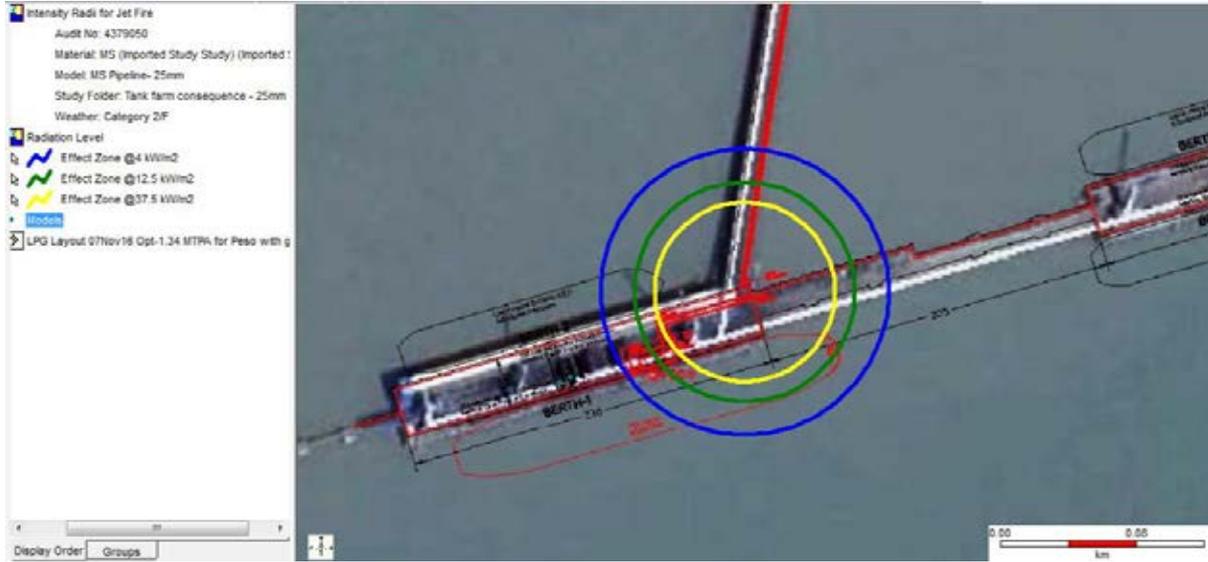


MS PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE



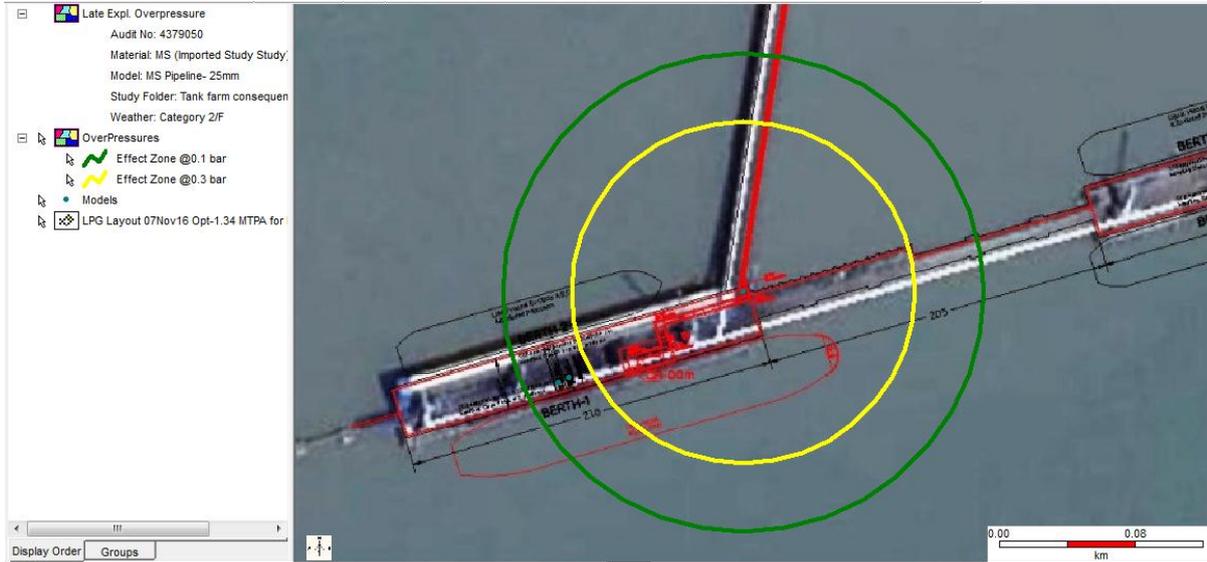
JET FIRE



POOL FIRE



EXPLOSION



HSD PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

JET FIRE



POOL FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

EXPLOSION



SKO PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES



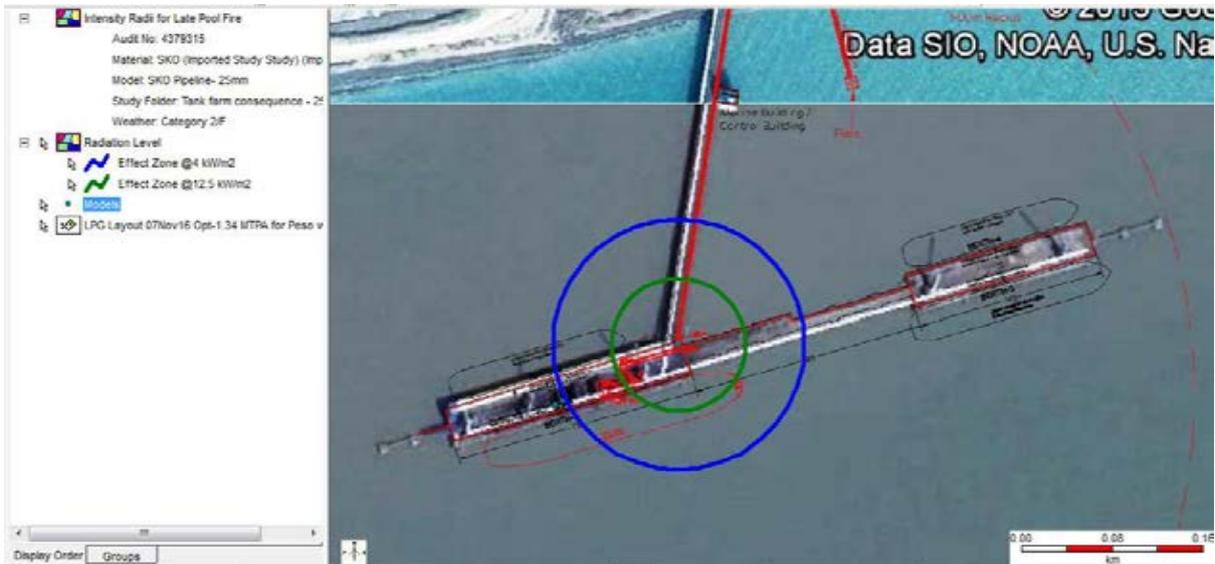
QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

JET FIRE



POOL FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

EXPLOSION



FURNACE OIL PIPELINE FROM BERTH 2-25 mm LEAK

POOL FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

CRUDE PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE



JET FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASSESSMENT STUDY REPORT- JETTY AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008A

EXPLOSION



PROJECT	MUNDRA LPG							
DOCUMENT TITLE	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES							
CONTRACTOR								
CONSULTANT	 TECHNIP INDIA LIMITED							
DOCUMENT NO.	H003-E-LPG-GEN-BP-R-E-008B					Rev No.	A	
CONSULTANT'S DOCUMENT No.								
REV.NO	DATE	DESCRIPTION	PREPARED		CHECKED		APPROVED	
			Init.	Sign	Init.	Sign	Init.	Sign
A	30-11-2016	ISSUED FOR BEP	YD		TK		TK	

This Document is the property of ADANI. It should not be used, copied or reproduced without their written Permission.

QUANTITATIVE RISK ASSESSMENT REPORT FOR PIPELINE AREA



MUNDRA PORT – NEW LPG FACILITIES



EC



PMC



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

Document Title : Quantitative Risk Assessment Report For Pipelines
Project Title : Mundra Port - New LPG Facilities
Client Company Name : Adani
Engineering consultant : Technip India Limited
PMC : HOWE Engineering Projects (India) Pvt. Ltd.
Consultant : iFluids Engineering

DISCLAIMER

The report rendered by consultants is in the nature of guidelines based on good engineering practices and generally accepted safety procedures. The recommendations shown in the report shall be considered as a Technical professional opinion and not binding on the parties involved viz. Technip and iFluids Engineering.

The technical recommendations and the conclusions thus expressed may have to be re-considered in light of any modifications or alterations that would invalidate the data shown in the documents which are referred to therein.

These recommendations and conclusions would become null and void should the consultants not be kept informed of such modifications or alterations with specific reference to the present report.

A	28-Nov-16	Final Report			
			VP	JS	
Rev	Date	Description	Prepared by	Reviewed by	Approved by

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

LIST OF ABBREVIATIONS

ALARP	As Low As Reasonably Practicable
EA	Environmental Assessment
ERP	Emergency Response Plan
ESD	Emergency Shutdown
HAZID	Hazard Identification
HAZOP	Hazard & Operability Study
HC	Hydrocarbon
HSE	Health Safety & Environment
IRPA	Individual Risk Per Annum
LFL/LEL	Lower Flammability Limit / Lower Explosive Limit
LOC	Loss of Containment
P&ID	Piping and Instrument Diagram
PLL	Potential Loss of Life
QRA	Quantitative Risk Assessment
SOP	Standard Operating Procedure

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

EXECUTIVE SUMMARY

Adani group intends to expand its current port facility at Adani Mundra Port Pvt Ltd. ADANI is developing LPG, Propane, Butane handling and storage facility at their Port in Mundra. Propylene and propane will be stored and handled in the terminal in a scenario where LPG business subsides. The Adani group has appointed iFluids engineering to carry out Quantitative Risk Assessment and recommend cost effective measures to address the hazardous scenarios.

OVERALL FACILITY DESCRIPTION

ADANI is developing LPG, Propane, Butane handling and storage facility at their Port in Mundra. Propylene and propane will be stored and handled in the terminal in a scenario where LPG business subsides.

ADANI has envisaged the following services for set up in Import/Export terminal at Mundra,

- Import of Propane / Butane in cryogenic state in jetties through ship tankers and transferring through unloading arms and pipelines.
- Transfer of product through the unloading line and storing in dedicated refrigerated / cryogenic tanks.
- Transfer of products from tanks through pumps to heating train and then to online blending system for mix of Domestic, Auto & Industrial LPG
- Mercaptan dosing of the LPG, Propane and Butane
- Transfer to loading gantry for loading in to road tankers for dispatch of following products through Tanker loading facility.
 - LPG (AUTOMOTIVE)/ (INDUSTRIAL)
 - LPG (DOMESTIC)
 - LPG PROPANE
 - BUTANE
 - PROPYLENE (In future when LPG demand subsides BUTANE import would stop and PROPYLENE shall be imported and stored in Storage tank).

- Simultaneous operation of Berth 1 with Berth 2, 3 & 4 respectively

This document only covers the Pipeline transfer of the products from the Jetties to the Storage Tanks

STUDY RESULT

RISK ANALYSIS

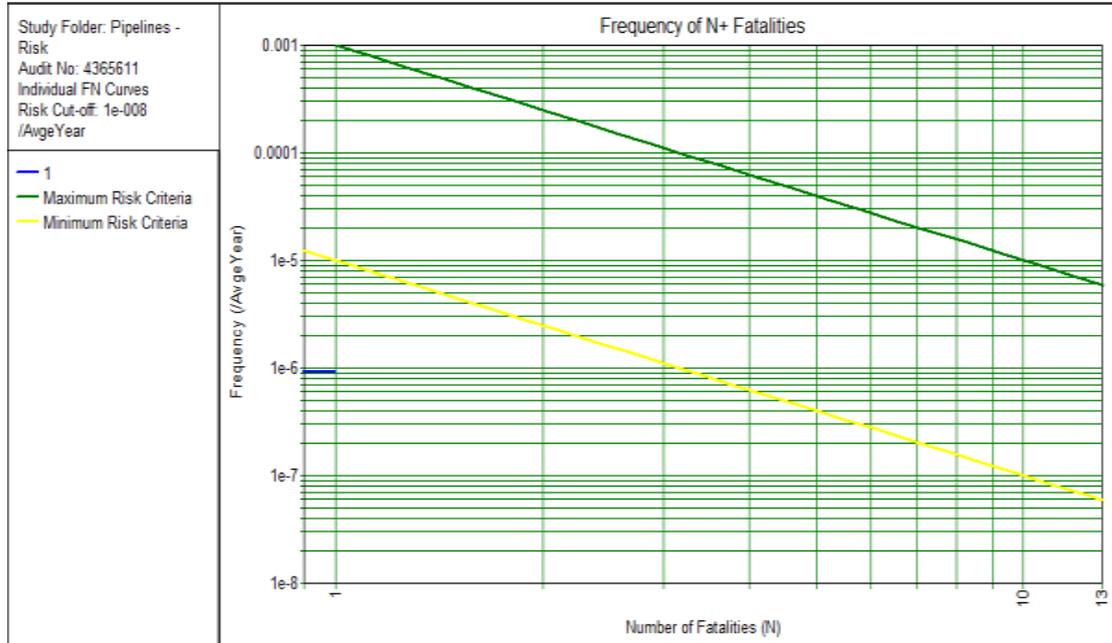
The risk estimated due to the activities conducted at the Mundra port is shown in the risk contour map provided **Figure 1**.

The F-N curve demonstrates the societal risk is within As Low as Reasonably Practicable (ALARP) level shown in the **Figure 2**.

FIGURE 1: RISK CONTOURS



FIGURE 2: FN CURVE



INDIVIDUAL & SOCIETAL RISK PER ANNUM

Individual Risk per Annum	3.98E-07
Societal Risk per Annum	4.74E-07

RECOMMENDATIONS

The Following measures shall be implemented for safe operation

- Periodical inspection of pipelines
- Leak detection systems based on pressure, temperature and flow
- CCTV monitoring of the pipeline corridor/jetty, in control room
- Surge Analysis shall be performed to ensure adequate time lag between closure of ROVs at jetty end and at the tank end. The time lag shall be engineered so that surge pressure does not increase beyond the design limit. While engineering the closure time of each ROV, a consideration shall be given so that the pressure due to surge does not exceed the design pressure.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

- A suitable continuous back-up power supply shall be provided for the control system and operation of ROVs both at jetty end and tank end.
- Electrical equipment including for lighting system shall conform to hazardous area classification and be selected in accordance with IS: 5571. These shall be tested by agencies such as CMRI, ERTL, CPRI or independent test laboratory of country of origin for such equipment. Indigenous Flameproof equipment shall comply with relevant BIS standard as per requirements of statutory authorities
- Pressure testing/ Low pressure leak check (with N₂) of the piping / flanged joints completed for entire pipeline and associated station piping before commissioning of the pipelines after any maintenance activity In case of displacement of Nitrogen with LPG, it should be done to flare

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
LIST OF FIGURES	10
LIST OF TABLES:.....	10
1. INTRODUCTION	11
1.1 PROJECT OBJECTIVE	11
1.2 SCOPE OF WORK.....	11
2. FACILITIES OVERVIEW	13
2.1 PROPANE/BUTANE UNLOADING AND STORAGE TANK	13
2.2 PRECOOLING OPERATION	13
2.3 OTHER UNLOADING OPERATIONS AND TRANSFER TO TANK FARM AREA.....	13
3. RISK TOLERABILITY CRITERIA.....	15
3.1 INDIVIDUAL RISK CRITERIA	15
3.2 SOCIETAL RISK CRITERIA.....	16
4. METROLOGICAL CONDITIONS.....	18
4.1 WIND DIRECTION	18
4.2 AMBIENT CONDITIONS.....	18
4.3 ATMOSPHERIC STABILITY	18
5. QUANTITATIVE RISK ASSESSMENT METHODOLOGY	21
5.1 GENERAL OVERVIEW	21
5.2 SCENARIO DESCRIPTION AND OPERATING CONDITIONS	22
5.3 QRA APPROACH	23
5.4 HAZARD IDENTIFICATION	24

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

5.4.1	Factors for Hazard Identification	24
5.5	ISOLATABLE SECTIONS	26
6.	CONSEQUENCE ANALYSIS	28
6.1	OVERVIEW.....	28
6.2	CONSEQUENCE MODELLING.....	29
6.3	DAMAGE CRITERIA.....	31
7.	FREQUENCY ANALYSIS.....	38
7.1	OVERVIEW.....	38
7.2	EVENT TREE ANALYSIS.....	38
8.	RISK ASSESSMENT & PRESENTATION	41
8.1	OVERVIEW.....	41
8.2	RISK RESULTS.....	41
9	RECOMMENDATIONS.....	44

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

LIST OF FIGURES

FIGURE 1: RISK CONTOURS	5
FIGURE 2: FN CURVE	6
FIGURE 3: GOOGLE EARTH IMAGE OF THE FACILITY	14
FIGURE 4: RISK ACCEPTANCE GRAPH.....	16
FIGURE 5: RISK ACCEPTANCE CRITERIA- FN CURVE.....	17
FIGURE 6: QUANTITATIVE RISK ASSESSMENT METHODOLOGY.....	22
FIGURE 7: EVENT TREE	39
FIGURE 8: RISK CONTOUR.....	42
FIGURE 9: FN CURVE	43

LIST OF TABLES

TABLE 1: PASQUILL’S STABILITY CLASS	19
TABLE 2: WEATHER CONDITIONS	20
TABLE 3: ISOLATABLE SECTIONS	26
TABLE 4: EFFECTS DUE TO INCIDENT RADIATION INTENSITY	32
TABLE 5: DAMAGES DUE TO BLAST OVERPRESSURE.....	33
TABLE 6: IMPACT DISTANCE IN METER...../.....	34
TABLE 7: FAILURE FREQUENCY OF AN EVENT	39

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

1. INTRODUCTION

Adani group intends to expand its current port facility at Adani Mundra Port Pvt Ltd. ADANI is developing LPG, Propane, Butane handling and storage facility at their Port in Mundra. Propylene and propane will be stored and handled in the terminal in a scenario where LPG business subsides. The report prepared addresses risk assessment of unloading and transportation facilities to provide a better understanding of the risk posed to the plant and surrounding population.

This document describes the results after the completion of Quantitative Risk Assessment study for the Adani Mundra port-New LPG facility.

1.1 Project Objective

The objective of the QRA is to assess the risk levels associated with the facilities under scope; evaluate those risks based on the HSE UK Risk Acceptance Criteria, and if risks are outside the tolerable region, then risk reduction measures shall be proposed to bring the risks into tolerable or As Low As Reasonably Practicable (ALARP) Levels and lower levels.

1.2 Scope of Work

IFluids Engineering has been awarded the Project to carry out the QRA study to assess risks at the following in the Mundra port;

- Berth 2 (White oil-Motor Spirit representing worst case scenario) Pipeline transfer Facilities
- Berth 1 (Propane/Butane) Pipeline Transfer facilities
- Berth 3 & 4 - Berth 3 handling LPG (typical as Berth 1 in terms of inventory and process conditions) and Berth 4 (White oil-Motor Spirit representing worst case scenario)
- To study the impact of LPG pipeline on existing pipelines.
- To study the impact of Simultaneous berth operations of berth 1 with berth 2 , 3 & 4 respectively.
- To study the impact of facilities around LPG plot

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

- a) T9, T10 handling fertilizers to the south of LPG plot.
- b) Steel yard to the east side of LPG Plot &
- c) Existing pipeline & conveyor to the west of LPG plot.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

2. FACILITIES OVERVIEW

2.1 Propane/Butane Unloading and Storage Tank

Storage tank (2000-FB-01 and 2000-FB-02) is vertical flat bottom, double wall, full containment refrigerated storage tank, which is designed to store Propane/Butane/Propylene from jetty. The function of these tanks is to store Propane/Butane/Propylene. Both these tanks are identical in all respect and Propane/Butane/Propylene can be stored in any of these tanks. The capacity of each tank is 25000 MT.

Propane/Butane/Propylene is pumped by shipping pump through marine unloading arm to storage tanks through two marine unloading arm at the rate of 500 MT/hr each.

The tank operating pressure is 500 mm WC & temperature of approximately -45°C in case of propane, - 5°C in case of Butane and -47°C in case of Propylene will be maintained in Propane/Butane Storage Tank (2000-FB-01 and 2000-FB-02).

2.2 Precooling Operation

The pre-cooling operation is one of the requirements prior to the ship unloading operation. During precooling operation, cold Propane/ Butane from the Storage Tank I & II is pumped into one of the unloading line going to the Jetty Area, from where it flows towards the Propane/Butane Storage Area and returns into the tank through the other unloading line. Flash compressor will cater the flash gas generated during this operation.

For precooling during propylene/propane unloading scenario two additional lines shall be installed (in future) from storage tank till jetty to avoid any contamination of propylene and Propane inventory.

2.3 Other unloading operations and Transfer to Tank farm area

Following Hazardous Chemicals are unloaded at berth 1, 2, 3 & 4 and transferred to the tank farm via pipelines

1. Propane

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

2. Butane
3. Propylene
4. Crude oil (future)
5. Furnace oil
6. Excluded petroleum products such as Furnace and vegetable oil

FIGURE 3: GOOGLE EARTH IMAGE OF THE FACILITY



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

3. RISK TOLERABILITY CRITERIA

The assessment and control of risk are essential requirements for a proactive HSE management system. In order to make a valued judgment and to decide on what risks are acceptable, an easily understood set of criteria should be set and followed rigorously. Risk criteria are required to promote consistency in evaluating the results of relevant studies and to formulate a proactive approach to incident prevention. The Risk Acceptance Criteria used in this assessment is from the UK HSE guidelines.

3.1 Individual Risk Criteria

Individual Risk Criteria is a measure of the risk to a person within an occupied area or building. This includes the nature of the injury to the individual, the likelihood of the injury occurring, and the time over which the injury might occur. It is the probability of death occurring because of accidents at a plant facility, installation or a transport route expressed as a function of the distance from such an activity. It is the frequency at which an individual or an individual within a group who may be expected to sustain a given level of harm (typically death) from the realization of specific hazards.

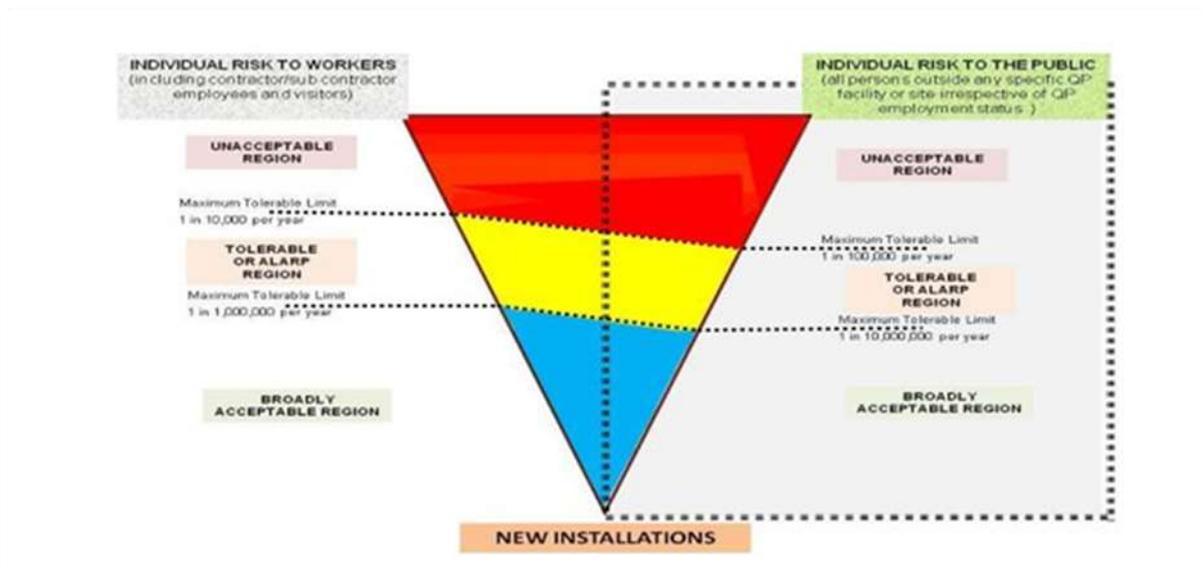
Occupancy is the proportion of exposure time of the individual to the hazard.

The exposure of an individual is related to:

- The likelihood of occurrence of an event involving a release and Ignition of hydrocarbon;
- The vulnerability of the person to the event; and
- The proportion of time the person will be exposed to the event (which is termed 'occupancy' in the QRA terminology).

There is a need to determine the limits for IR, based on numeric values (which would be regarded as intolerable. Figure 4 shows the principle of this framework.

Figure 4: Risk Acceptance graph



3.2 Societal Risk Criteria

Assessment of societal risks is even more important than assessment of individual risk because they involve the likelihood of multiple fatalities. Societal risk is the risk to any person or group of persons who are not connected to project facilities and are outside the facility fence line.

F-N Curve

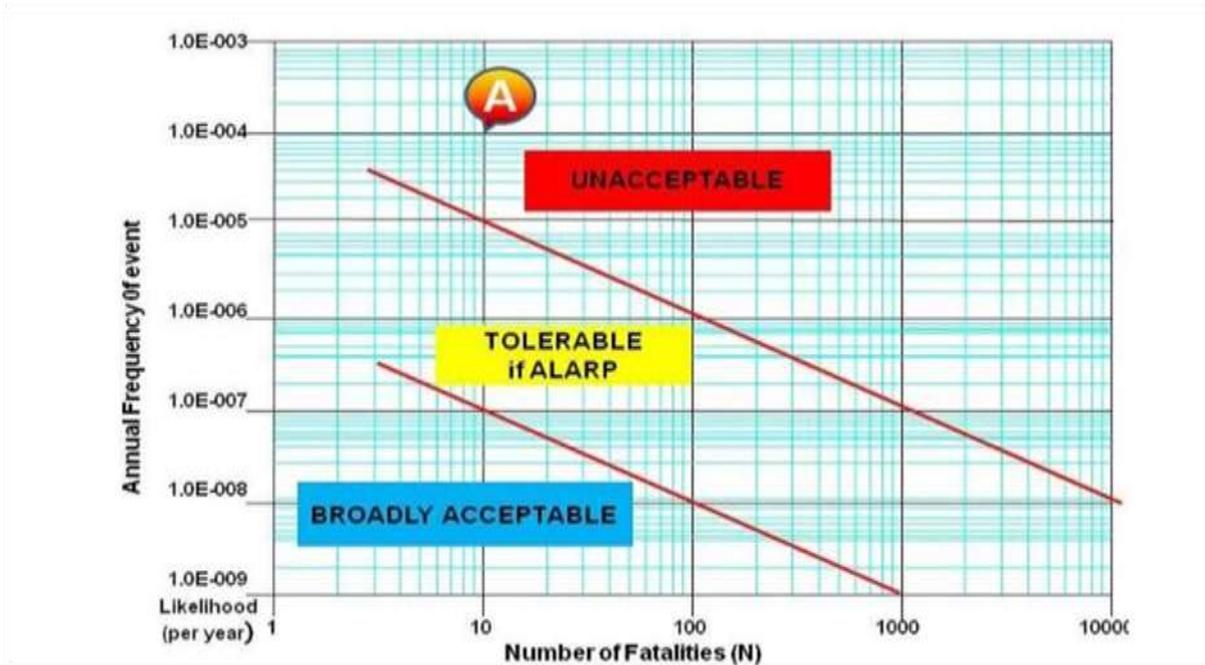
It is helpful to consider group risk in the demonstration that risks are ALARP. This allows consideration to be given to events, which, although low in frequency, may cause multiple injuries or fatalities. Group risk can be presented in the form of a plot of cumulative frequency versus number of fatalities (F-N curve).

F = Frequency (experienced or predicted)

N = No. of multiple fatalities.

„N” includes indirect deaths caused because of the main event occurring and can therefore be difficult to predict e.g. many people may die years after exposure to a toxic chemical. F-N Curve is generated for customers and benchmarked against risk acceptance criteria. The risk acceptance criteria used to compare the predicted risks for this proposed project can be understood from Figure 5.

Figure 5: Risk acceptance criteria- FN Curve



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

4. METROLOGICAL CONDITIONS

This chapter describes the meteorological data, used for the risk assessment study of Adani Mundra Port.

The consequences of released flammable material are largely dependent on the prevailing weather conditions. For the assessment of major scenarios involving release of flammable materials, the most important meteorological parameters are those that affect the atmospheric dispersion of the escaping material. The crucial variables are wind speed, wind direction, atmospheric stability and temperature. Rainfall does not have any bearing on the results of the risk analysis; however, it can have beneficial effects by absorption/washout of released materials. Actual behaviour of any release would largely depend on prevailing weather condition at the time of release.

4.1 Wind Direction

N	NE	E	SE	S	SW	W	NW
0.0148	0.1211	0.1374	0.0404	0.0179	0.559	0.087	0.0225

4.2 Ambient Conditions

Maximum Ambient temperature: 35°C

Minimum Ambient temperature: 7°C

Relative humidity: 70%

Atmospheric Pressure: 1.013 Bar

Incident solar radiation: 0.215 kW/m²

Surface roughness parameter: 0.3 m

4.3 Atmospheric Stability

Pasquill stability parameter, based on Pasquill – Gifford categorization, is such a meteorological parameter, which decreases the stability of atmosphere, e.g., the degree of convective turbulence.

Pasquill has defined six stability classes ranging from „A“ (extremely unstable) to „F“ (very stable). Wind speeds, intensity of solar radiation (daytime insolation) at night time sky cover have been identified as prime factors defining these stability categories. Below table indicates the various Pasquill stability classes.

TABLE 1: PASQUILL’S STABILITY CLASS

Wind Speed (m/s)	Day: Solar Radiation			Night: cloud Cover		
	Strong	Moderate	Slight	Thinly < 40%	Moderate	Overcast > 80%
<2	A	A-B	B	-	-	D
2-3	A-B	B	C	E	F	D
3-5	B	B-C	C	D	E	D
5-6	C	C-D	D	D	D	D
>6	C	D	D	D	D	D

A – Very Unstable

B – Unstable

C – Slightly Unstable

D – Neutral

E – Stable

F – Very Stable

When the atmosphere is unstable and wind speeds are moderate or high or gusty, rapid dispersion of pollutants will occur. Under these conditions, pollutant concentrations in air will be moderate or low and the material will be dispersed rapidly. When the atmosphere is stable and wind speed is low, dispersion of material will be limited and pollutant concentration in air will be high. In general, worst dispersion conditions (i.e. contributing to greater hazard distances) occur during low wind speed and very stable weather conditions, such as that at 1F weather condition (i.e. 1 m/s wind speed and Pasquill stability F).

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

Stability category for the present study is identified based on the cloud amount and wind speed.

Based on the weather analysis, predominant weather stability of “F” and “D” was selected with wind speed 1.5m/s, 2m/s and 5m/s for consequence analysis, respectively. 2F is the most prevalent weather condition for this location.

TABLE 2: WEATHER CONDITIONS

Wind Speed in m/s	Pasquill Stability
1.5	F
2	F
5	D

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

5 QUANTITATIVE RISK ASSESSMENT METHODOLOGY

5.1 General Overview

Quantitative Risk Assessment (QRA) is used for risk management and safety improvement in many industries. It provides a quantitative assessment of potential risks identified and provides a basis for evaluating process safety with respect to a predetermined risk acceptance criterion. The usefulness of the QRA results is highly dependent on the availability and accuracy of the input data, with more complete input data providing a higher confidence on the validity and robustness of the results obtained.

In most practical applications, there will be uncertainties in both the key parameters used and the QRA model itself. The effect of these uncertainties should be evaluated to confirm there is no impact on the conclusion. The QRA model will include:

- Examination of flammable/toxic material related to Major Accident Hazards;
- Quantification of the likelihood of flammable/toxic Major Accident Hazardous events;
- Quantification of the consequences of flammable/toxic Major Accident Hazardous events;
- Combination of consequences and likelihood of Major Accident Hazard events to assess risk profiles for individuals, and assets;
- Identification of the predicted levels of risk with regard to Individual Risk (IR) levels and Societal Risk (SR);
- Identification and assessment of risk reduction solutions (to the extent required to reduce predicted risks to acceptable levels); and
- Demonstration that the risks have been reduced to As Low As Reasonably Practicable (ALARP), when risks cannot be reduced to acceptable levels).

The following schematic (**Figure 6**) displays the methodology used to perform the Quantitative Risk Assessment Study for the Adani Mundra Port – New LPG Facilities.

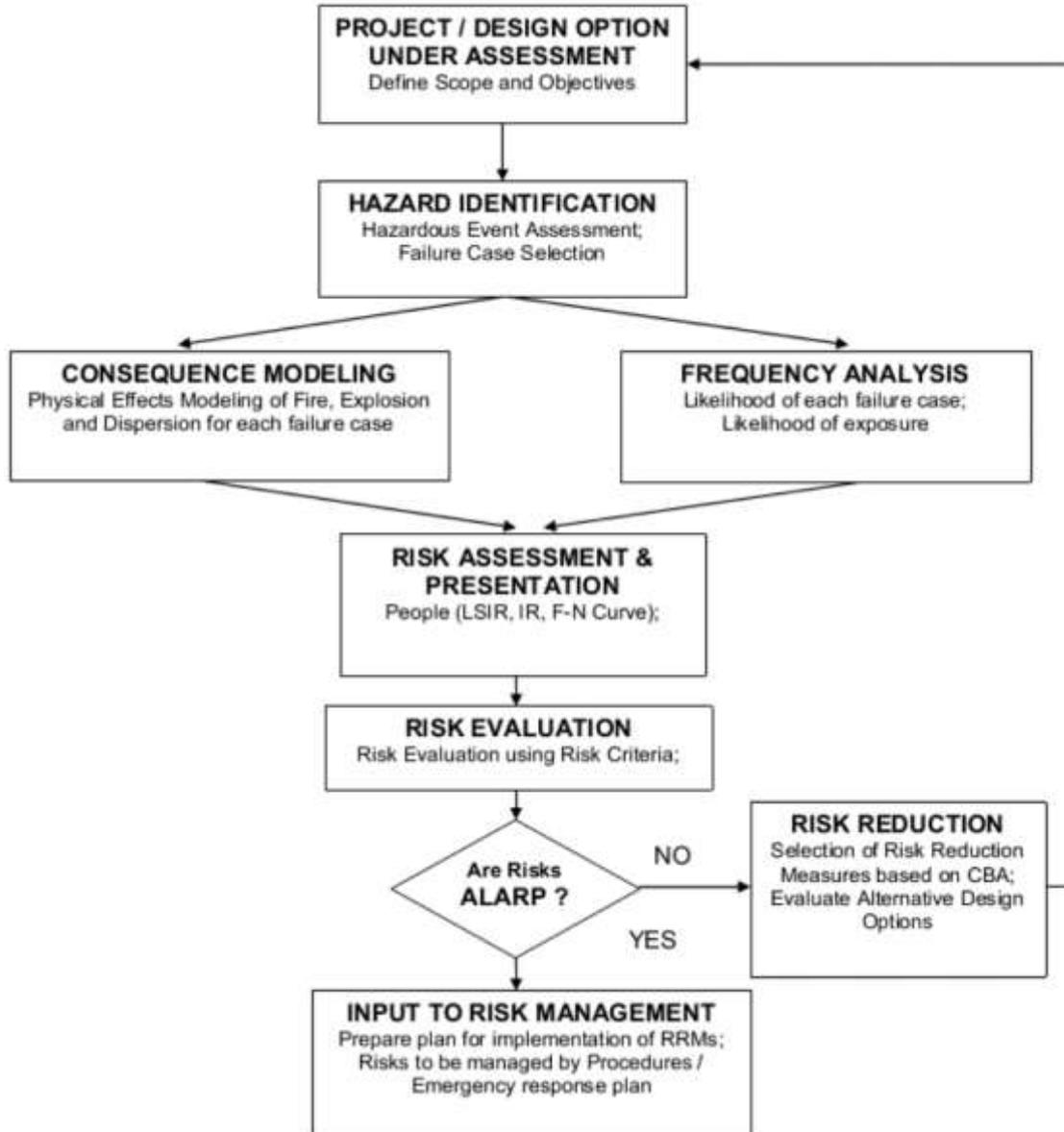


FIGURE 6: QUANTITATIVE RISK ASSESSMENT METHODOLOGY

5.2 Scenario Description and Operating Conditions

To carry out the QRA study the following basic data were used:

- Process parameters such as operating pressure, temperature & flow rate of equipment and process pipelines as well as the composition of the process streams etc;
- Manning details at strategic locations at site and meteorological details of Adani Mundra port area;

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

- Failure frequencies of leak sources, Ignition probabilities, operating probabilities etc.; and
- Isolation and detection time, Impact criteria for consequences such as fire, explosion and toxic concentration.

5.3 QRA Approach

The QRA was carried out using the standard, internationally accepted approach consisting of the steps shown below:

Data used for the QRA were project and site specific; however, where this was not possible, the use of generic data was documented in the assumptions register prior to being applied within the study. As such, the QRA results was also specific to the planned operations, building design and personnel and general population occupancy levels expected at the time of data collection. Given the above, the consequence and risk results are only applicable to the site under study in this QRA and cannot be applied to any other location.

The following information was considered in the QRA:

- Facility design, function, location, capacity and layout;
- Environmental weather data e.g. wind rose, cloud coverage, stability class;
- Process engineering details e.g. composition, heat and mass balance, equipment items, process parameters - pressure and temperature regimes, inventories, flow schemes;
- Facility operation e.g. operational and emergency procedures; and
- Work force deployment, estimated occupancy and exposure.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

5.4 Hazard Identification

A technique commonly used to generate an incident list is to consider potential leaks and major releases from fractures of all process pipelines and vessels. This compilation includes all pipe work and vessels in direct communication, as these may share a significant inventory that cannot be isolated in an emergency. The following data were collected to envisage scenarios:

- Composition of materials stored in vessels / flowing through pipeline;
- Inventory of materials stored in vessels;
- Flow rate of materials passing through pipelines;
- Vessels / Pipeline conditions (phase, temperature, pressure); and Connecting piping and piping dimensions.

Accidental release of flammable liquids / gases has the potential for severe consequences. Delayed ignition of flammable gases can result in blast overpressures covering large areas. This may lead to extensive loss of life and property. In contrast, fires have localized consequences. Fires can be extinguished or contained in most cases; there are few mitigating actions one can take once a flammable gas or a vapour cloud gets released.

5.4.1 Factors for Hazard Identification

In any installation, main hazards arise due to loss of containment during handling of flammable liquids / gases. To formulate a structured approach to the identification of hazards, a list of contributory factors is provided below:

Blast over Pressures

Blast Overpressures depend upon the reactivity class of material and the amount of gas between two explosive limits. For example, Motor spirit/Gasoline once released and not ignited immediately is expected to give rise to a gas cloud. These gases in general have medium reactivity and in case of confinement of the gas cloud, on delayed ignition may result in an explosion and overpressures.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

Operating Parameters

Potential gas release for the same material depends significantly on the operating conditions. The gases are likely to operate at atmospheric temperature (and hence high pressures). This operating range is enough to release a large amount of gas in case of a leak / rupture, therefore the pipeline leaks and ruptures need to be considered in the risk analysis calculations.

Inventory

Inventory Analysis is commonly used in understanding the relative hazards and short listing of release scenarios. Inventory plays an important role when considering a potential hazard. The larger the inventory of a vessel or a system, the larger the quantity of potential release. A practice commonly used to generate an incident list is to consider potential leaks and major releases from fractures of pipelines and vessels/tanks containing sizable inventories.

Range of Incidents

Both the complexity of study and the number of incident outcome cases are affected by the range of initiating events and incidents covered. This not only reflects the inclusion of accidents and / or non-accident-initiated events, but also the size of those events. For instance, studies may evaluate one or more of the following:

- Catastrophic failure of container;
- Large hole (large continuous release);
- Smaller holes (continuous release); and
- Leaks at fittings or valves (small continuous release).

In general, quantitative studies do not include very small continuous releases or short duration small releases if past experience or preliminary consequence modelling shows that such releases do not contribute to the overall risk levels.

5.5 Isolatable Sections

The following table describes the isolatable section considered for the study:

TABLE 3: ISOLATABLE SECTIONS

Isolatable section identification	Description	Scenario	Diameter m	Pressure barg.	Temperature C	Isolation time s	Total Inventory, kg
Berth 1							
IS-1	Transfer of Propane from Jetty to Storage Tank 2000-FB-01	7	0.406	8	-42.67	120	143322
IS-2		25	0.406	8	-42.67	120	144343
IS-3		150	0.406	8	-42.67	120	159902
IS-4	Transfer of Butane from Jetty to Storage Tank 2000-FB-02	7	0.406	8	-2.90	120	147605
IS-5		25	0.406	8	-2.90	120	148655
IS-6		150	0.406	8	-2.90	120	164183
IS-7	Transfer of Propylene from Jetty to Storage Tank 2000-FB-02	7	0.406	8	-44.86	120	150204
IS-8		25	0.406	8	-44.86	120	151247
IS-9		150	0.406	8	-44.86	120	166782
IS-10	Propylene precooling line	7	0.305	8	-45	120	90158
IS-11		25	0.305	8	-45	120	91201

Isolatable section identification	Description	Scenario	Diameter m	Pressure barg.	Temperature C	Isolation time s	Total Inventory, kg
IS-12		150	0.305	8	-45	120	94736
Berth 2							
IS-13	Methanol P/L	10	0.305	10	35	120	11809
IS-14		150	0.305	10	35	120	24885
IS-15	MS P/L	10	0.406	10	35	120	18894
IS-16		150	0.406	10	35	120	35336
IS-17	HSD P/L	10	0.610	10	35	120	48967
IS-18		150	0.610	10	35	120	82050
IS-19	SKO P/L	10	0.305	10	35	120	12058
IS-20		150	0.305	10	35	120	21814
IS-21	Furnace Oil	10	0.305	10	55	120	13848
IS-22		150	0.305	10	55	120	21916
IS-23	Crude	10	0.9144	10	35	120	121023
IS-24		150	0.9144	10	35	120	177890

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

6 CONSEQUENCE ANALYSIS

6.1 Overview

Consequence is the measure of the expected outcomes for a given accidental release. For this project, consequence is defined as the hazard distance or hazard zone to various fatality endpoints. During the execution of site-specific consequence analysis, it is essential to accurately model the release, dilution, and dispersion of gases and aerosols if a precise assessment of potential exposure is to be attained. Consequence modelling, also known as physical effects modelling, is a technique in which computer based mathematical modelling is used to predict physical behaviour under accident conditions in order to make a quantitative estimation of risk. Internationally accepted and validated software PHAST v6.7 and PHAST RISK v.6.7, (both developed by DNV GL) have been used for this project.

PHAST v6.7 contains a set of complex models that calculate release conditions, initial dilution of the vapour (dependent upon the release characteristics), and the subsequent dispersion of the vapour introduced into the atmosphere. It permits the user to evaluate the downwind dispersion of the chemical cloud based on the toxicological/physical characteristics of the released chemical, atmospheric conditions, and specific circumstances of the release.

PHAST v6.7 will be used to estimate threat zones associated with several types of hazardous chemical releases, including toxic gas clouds, fires, and explosions.

It is most important that the QRA model effectively reflect reality, thus those familiar with the facilities and their operation are required for proper evaluation. This is particularly true in relation to the preparation of input data and assumptions and the review of results from the evaluation. The QRA model must identify the major hazard contributors to the work force and third parties, quantify risks, and identify and assess any risk reduction methods that may be proposed. In addition to modelling the current situation within the field, the model shall be extendible to add additional facilities as development occurs and provide an active method of planning any proposed development.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

6.2 Consequence Modelling

Discharge Rate

The initial rate of release through a leak depends mainly on the pressure inside the equipment, size of the hole and phases of the release (liquid, gas or two phase). The release rate decreases with time as the equipment depressurizes. The reduction mainly on the inventory and the actions taken to isolate the leak and blow-down the equipment

Dispersion

A vapour cloud may be formed when a vaporizing liquid is released for an extended duration. If the gas cloud does not immediately ignite, it disperses based on the prevalent wind direction, speed and stability category (i.e. degree of turbulence).

The cloud dispersion simulation is carried out to provide the distance (from the leak) at which the concentration of flammable material falls below the Lower Flammability Limit (LFL).

Consequence Events

The following describes the probabilities associated with the sequence of events which must take place for the incident scenarios to produce hazardous effects. Considering the present case, the outcomes expected are:

- Flash Fire (FF);
- Jet fires;
- Pool fire;
- Vapour Cloud Explosion.

Flash Fire

The vapour/gas release from a pool would disperse under the influence of the prevailing wind; with material concentration in air reducing with distance. At a particular location downwind, the concentration will drop below its lower flammable level (LFL) value. If ignited within the flammable envelope, the mass of the material available between the LFL and $\frac{1}{2}$ LFL will be likely to burn as a flash fire; rapidly spreading through the cloud from the point of ignition back to the source of release.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

Although flash fires are generally low intensity transitory events, the burning velocity is quite high and escape following ignition is not possible. Flash fires often remain close to the ground, where most ignition sources are present. It is assumed that personnel caught inside a flash fire will not survive while those outside suffer no significant harm. If other combustible material is present within the flash fire it is also likely to ignite and a secondary fire could result.

Jet Fire

Jet fire causes damage due to the resulting heat radiation. The working level heat radiation impact will vary widely depending on the angle of the flame to the horizontal plane, which in turn mainly depends on the location of the leak. The flame direction was considered horizontal for consequence analysis of leaks and ruptures from process equipment. Jet fire heat radiation impacts were estimated for the identified credible and worst case scenarios.

Upon accidental leakage, the pressurized fluid will disperse as a jet, initially moving forward in the spatial direction of the leak until the kinetic energy is lost and gravity slumping or lifting of the cloud occurs, dependent upon whether the fluid is heavier or lighter than air.

The primary hazard associated with jet fires is thermal radiation and potential for flame impingement on adjacent pipelines/equipment, resulting in escalation. High pressure releases have the potential to cover large areas due to its relatively large flame length. However, the effects of escalation are minimized if the flame length reduces to less than the separation distance between other equipment and the jet fire source.

Pool Fire

A liquid pool is formed during a prolonged leakage if the rate of leakage exceeds the rate of vaporization. On ignition, this would result in a pool fire whose size/radius would depend on the mass flow rate, ambient temperature, heat of vaporization of material released, vapour pressure, duration of discharge and effects of containment or dykes. The pool fire could cause damage to equipment or injury/fatality to personnel due to thermal radiation effects.

A pool fire is not envisaged for liquid systems that are highly pressurized. Any leak or rupture would result in a pressurized release leading to a liquid jet fire or flash fire.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

Vapour Cloud Explosion

Vapour cloud explosion is the result of flammable materials in the atmosphere, a subsequent dispersion phase, and after some delay an ignition of the vapour cloud. Turbulence is the governing factor in blast generation which could intensify combustion to the level that will result in an explosion. Turbulence is often created by obstacles in the path of vapour cloud or when the cloud finds a confined area, as under the bullets. Insignificant level of confinement will result in a flash fire. The VCE will result in overpressures.

6.3 Damage Criteria

Damage criteria gives the relation between the extent of the physical effects (exposure) and the effect of consequences. For assessing the effects on humans, consequences are expressed in terms of injuries and the effects on equipment / property in terms of monetary loss. The consequences for release of toxic substances or fire can be categorized as:

- Damage caused by heat radiation on material and people;
- Damage caused by explosion on structure and people; and

In Consequence Analysis studies, three main types of exposure to hazardous effects are categorized as:

- Heat radiation due to fires.
- Jet fires and flash fires;
- Explosions;

The knowledge about these relations depends strongly on the nature of the exposure. The following discusses the criteria selected for damage estimation:

Heat Radiation:

The effect of fire on a human being is in the form of burns. There are three categories of burns: first degree, second degree and third degree burns being the most severe. The consequences caused by exposure to heat radiation are a function of:

- The radiation energy onto the human body [kW/m²];
- The exposure duration [sec]; and
- The protection of the skin tissue (clothed or bare body).

The physical effects of hazard events are given in the table below:

Table 4: Effects due to Incident Radiation Intensity

Incident Radiation (kW/m ²)	Type of Damage
4.7	Sufficient to cause pain within 20 sec. Blistering of skin (first degree burns are likely)
12.5	Minimum energy required for piloted ignition of wood, melting plastic tubing's etc.
37.5	Sufficient to cause damage to the equipment

The actual results would be less severe due to the various assumptions made in the models arising out of the flame geometry, emissivity, angle of incidence, view factor and others. The radiation output of the flame would be dependent upon the fire size, extent of mixing with air and the flame temperature. Some fraction of the radiation is absorbed by carbon dioxide and water vapour in the intervening atmosphere. Finally, the incident flux at an observer location would depend upon the radiation view factor, which is a function of the distance from the flame surface, the observer's orientation and the flame geometry.

Blast Overpressure from Vapour cloud Explosion (VCE)

The assessment aims are to determine the impact of overpressure in the event that a flammable gas cloud is ignited. A Vapour cloud Explosion (VCE) results when a flammable vapour is released and

mixes with the air to form a flammable vapour cloud. If ignited, the flame speed may accelerate to high velocities and produce significant blast overexposure.

The assessment goals are to determine the impact of overpressure in the event that a flammable gas cloud is ignited. The damage effects due to 0.01 bar, 0.1 bar & 0.3 bar are reported in terms of distance from the overpressure source.

In case of vapour cloud explosion, two physical effects may occur:

- A flash fire over the whole length of the explosive gas cloud;
- A blast wave, with typical peak overpressures circular around ignition source.

For the blast wave, the lethality criterion is based on:

- A peak overpressure of 0.1bar will cause serious damage to 10% of the housing/structures;
- Falling fragments will kill one of each eight persons in the destroyed buildings.

The following damage criteria may be distinguished with respect to the peak overpressures resulting from a blast wave:

TABLE 5: DAMAGES DUE TO BLAST OVERPRESSURE

Peak Overpressure	Damage Type	Description
0.30 bar	Heavy Damage	Major damage to plant equipment structure
0.10 bar	Moderate Damage	Repairable damage to plant equipment & structure
0.01 bar	Significant Damage	Shattering of glass

The summary of the consequence modelling is shown below in

TABLE 6: IMPACT DISTANCE IN METER

Isolatable Section	Description	Release category	Flash Fire Effects:			Radiation Effects: Jet Fire Ellipse			Radiation Effects: Pool Fire			Overpressure					
			100% LFL Ellipse			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters		
			Distance in meters				5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F
			5D	1.5F	2F												
IS - 1	Transfer of Propane from Jetty to Storage Tank 2000-FB-01	7	6.41862	12.2659	10.1915	4	23.1853	26.7283	25.9291	4	NR	NR	NR	0.01	NR	74.9525	70.1064
			6.41862	12.2659	10.1915	12.5	17.5949	21.3412	20.4624	12.5	NR	NR	NR	0.1	NR	29.5322	28.6915
			6.41862	12.2659	10.1915	37.5	13.9777	17.7971	16.878	37.5	NR	NR	NR	0.3	NR	24.7597	24.34
IS - 2		25	35.6415	59.6057	54.5213	4	73.8934	84.2143	81.9038	4	NR	NR	NR	0.01	228.541	518.96	438.727
			35.6415	59.6057	54.5213	12.5	56.2605	67.2694	64.6926	12.5	NR	NR	NR	0.1	80.97	147.877	125.695
			35.6415	59.6057	54.5213	37.5	45.5539	56.6361	53.9634	37.5	NR	NR	NR	0.3	65.4644	108.887	92.8036
IS - 3		150	179.492	272.883	239.639	4	364.347	410.315	400.219	4	329.126	371.147	370.567	0.01	1302.15	2534.23	2207.2
			179.492	272.883	239.639	12.5	274.039	323.382	311.984	12.5	226.117	234.372	238.39	0.1	432.507	745.411	655.622
			179.492	272.883	239.639	37.5	219.755	270.113	258.104	37.5	146.3	134.926	139.299	0.3	341.132	557.456	492.594
IS - 4	Transfer of Butane from Jetty to Storage Tank 2000-FB-02	7	6.46825	12.8952	10.4079	4	23.6816	27.0127	26.2689	4	NR	NR	NR	0.01	NR	77.6978	71.7312
			6.46825	12.8952	10.4079	12.5	17.7488	21.3121	20.4816	12.5	NR	NR	NR	0.1	NR	30.0084	28.9734
			6.46825	12.8952	10.4079	37.5	13.9617	17.6272	16.7539	37.5	NR	NR	NR	0.3	NR	24.9975	24.4807
IS - 5		25	35.9099	61.1679	55.2733	4	75.6169	85.3103	83.1708	4	NR	NR	NR	0.01	232.205	530.996	445.155
			35.9099	61.1679	55.2733	12.5	56.808	67.2758	64.8483	12.5	NR	NR	NR	0.1	81.6056	149.965	126.81
			35.9099	61.1679	55.2733	37.5	45.5372	56.1973	53.6472	37.5	NR	NR	NR	0.3	65.7818	109.929	93.3604
IS - 6		150	178.137	283.149	243.278	4	374.027	417.208	407.894	4	376.004	423.016	421.929	0.01	1344.39	2577.29	2292.63
			178.137	283.149	243.278	12.5	277.694	324.579	313.853	12.5	256.289	266.515	270.538	0.1	439.835	735.63	662.175
			178.137	283.149	243.278	37.5	220.237	268.515	257.08	37.5	167.521	153.603	158.552	0.3	344.791	547.565	490.86
IS - 7	Transfer of Propylene	7	6.47378	12.7954	10.4078	4	23.322	26.962	26.1355	4	NR	NR	NR	0.01	NR	77.4421	71.5503

Isolatable Section	Description	Release category	Flash Fire Effects:			Radiation Effects: Jet Fire Ellipse			Radiation Effects: Pool Fire			Overpressure					
			100% LFL Ellipse			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters		
			Distance in meters				5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F
			5D	1.5F	2F												
IS - 8	from Jetty to Storage Tank 2000-FB-02	25	6.47378	12.7954	10.4078	12.5	17.7566	21.5923	20.6914	12.5	NR	NR	NR	0.1	NR	29.964	28.942
			6.47378	12.7954	10.4078	37.5	14.1527	18.0722	17.1118	37.5	NR	NR	NR	0.3	NR	24.9754	24.4651
			36.0195	61.4873	55.5823	4	74.246	84.8547	82.4757	4	NR	33.8476	29.8157	0.01	231.313	517.363	445.217
			36.0195	61.4873	55.5823	12.5	56.714	67.9793	65.3411	12.5	NR	27.0093	24.8155	0.1	81.4509	147.6	135.086
			36.0195	61.4873	55.5823	37.5	46.0263	57.3125	54.5893	37.5	NR	20.7604	19.6272	0.3	65.7046	108.749	102.5
			177.169	273.005	242.261	4	365.626	412.901	402.501	4	404.296	446.482	443.088	0.01	1332.93	2598.88	2281.88
IS - 9		150	177.169	273.005	242.261	12.5	275.88	326.399	314.715	12.5	271.459	287.83	288.582	0.1	446.112	772.777	685.107
			177.169	273.005	242.261	37.5	221.805	273.177	260.912	37.5	190.319	183.969	187.903	0.3	352.932	581.134	517.331
			7.41065	17.6767	15.5991	4	23.5639	27.2164	26.3892	4	11.926	15.4551	14.9825	0.01	50.9971	125.56	108.471
IS - 10		7	7.41065	17.6767	15.5991	12.5	18.1806	22.0249	21.1171	12.5	10.3905	12.0427	11.9505	0.1	17.1114	38.3107	35.3463
			7.41065	17.6767	15.5991	37.5	14.8198	18.6104	17.6889	37.5	8.59991	9.03457	8.83125	0.3	13.551	29.1432	27.663
			37.2279	50.7936	46.5364	4	74.3176	84.9283	82.548	4	56.441	70.0417	68.7812	0.01	261.617	529.885	449.768
IS - 11	Propylene precooling line	25	37.2279	50.7936	46.5364	12.5	56.8288	68.0994	65.4597	12.5	41.0686	47.3376	47.2271	0.1	86.7074	141.507	119.345
			37.2279	50.7936	46.5364	37.5	46.2006	57.4791	54.7526	37.5	29.0907	30.0176	30.6312	0.3	68.3293	100.699	84.6261
			156.477	238.735	210.132	4	365.639	394.67	385.972	4	412.21	428.202	427.84	0.01	1250.69	2285.99	2098.45
IS - 12		150	156.477	238.735	210.132	12.5	275.903	312.104	301.894	12.5	273.449	272.883	275.502	0.1	415.316	627.962	609.652
			156.477	238.735	210.132	37.5	221.838	261.274	250.357	37.5	188.759	171.12	176.19	0.3	327.542	455.408	464.633
			6.83624	11.399	11.0517	4	35.979	44.0716	42.1378	4	NR	44.3716	43.1432	0.01	37.965	65.8894	64.6327
IS - 13	Methanol P/L	10	6.83624	11.399	11.0517	12.5	29.5076	37.1441	35.2776	12.5	NR	30.9147	30.7607	0.1	14.8509	27.96	27.7421
			6.83624	11.399	11.0517	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	12.4222	23.9747	23.8659
			50.0444	70.6208	69.2059	4	209.858	235.718	226.635	4	142.032	136.037	136.988	0.01	226.029	294.232	298.903
IS - 14		150	50.0444	70.6208	69.2059	4	209.858	235.718	226.635	4	142.032	136.037	136.988	0.01	226.029	294.232	298.903

Isolatable Section	Description	Release category	Flash Fire Effects:			Radiation Effects: Jet Fire Ellipse			Radiation Effects: Pool Fire			Overpressure					
			100% LFL Ellipse			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters		
			Distance in meters				5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F
			5D	1.5F	2F												
			50.0444	70.6208	69.2059	12.5	171.207	199.537	190.182	12.5	108.836	97.0531	99.1266	0.1	97.0651	125.426	133.727
			50.0444	70.6208	69.2059	37.5	139.528	NR	NR	37.5	75.5624	72.4929	72.3265	0.3	83.5145	109.603	116.841
IS - 15	MS P/L	10	15.2315	26.4028	23.5931	4	33.671	37.5937	36.724	4	NR	NR	NR	0.01	98.5467	225.457	172.851
			15.2315	26.4028	23.5931	12.5	24.9996	29.3562	28.3433	12.5	NR	NR	NR	0.1	33.6248	63.9044	46.5137
			15.2315	26.4028	23.5931	37.5	19.8615	24.3735	23.2947	37.5	NR	NR	NR	0.3	26.8034	46.9296	33.2392
IS - 16		150	113.8	169.587	148.074	4	303.961	326.379	321.139	4	168.27	136.482	142.569	0.01	818.819	1189.97	1184.48
			113.8	169.587	148.074	12.5	224.278	249.763	243.019	12.5	82.0953	79.7338	79.518	0.1	266.014	317.542	308.385
			113.8	169.587	148.074	37.5	177.003	204.073	196.518	37.5	NR	NR	NR	0.3	207.93	248.759	241.121
IS - 17	HSD P/L	10	12.8557	11.3689	11.2462	4	11.9794	9.23875	9.2571	4	85.1624	70.0438	73.0102	0.01	32.693	30.4035	31.4317
			12.8557	11.3689	11.2462	12.5	8.73359	7.02619	6.95779	12.5	41.0876	37.835	37.668	0.1	13.9364	13.5392	13.7176
			12.8557	11.3689	11.2462	37.5	6.71139	5.43322	5.3477	37.5	NR	NR	NR	0.3	11.9656	11.7673	11.8563
IS - 18		150	33.0364	29.5573	29.4445	4	29.4646	28.7595	28.2825	4	218.455	185.219	191.383	0.01	51.2393	29.4186	29.6151
			33.0364	29.5573	29.4445	12.5	21.557	22.1526	21.5302	12.5	118.02	113.912	113.79	0.1	33.6842	21.6338	21.6678
			33.0364	29.5573	29.4445	37.5	16.9013	18.1956	17.4941	37.5	NR	NR	NR	0.3	31.8397	20.8158	20.8328
IS - 19	SKO P/L	10	12.9275	11.4289	11.2942	4	33.6751	26.8337	26.8878	4	77.6411	66.7752	69.687	0.01	57.5866	53.7609	55.9137
			12.9275	11.4289	11.2942	12.5	24.7386	20.7828	20.5746	12.5	36.4009	35.1158	34.8127	0.1	18.2545	17.5908	17.9643
			12.9275	11.4289	11.2942	37.5	19.4742	17.1296	16.783	37.5	NR	NR	NR	0.3	14.1217	13.7904	13.9768
IS - 20		150	32.7517	29.2454	29.1351	4	90.2507	88.3046	86.9503	4	147.559	121.643	126.421	0.01	78.1448	72.8802	73.4377
			32.7517	29.2454	29.1351	12.5	65.7575	67.6656	65.8591	12.5	78.5757	73.4972	73.3811	0.1	38.3513	37.4381	37.5348
			32.7517	29.2454	29.1351	37.5	51.4125	55.4211	53.3769	37.5	NR	NR	NR	0.3	34.1701	33.7141	33.7624
IS - 21	FURNACE OIL	10	13.4331	11.3746	13.4331	4	NR	NR	NR	4	79.8512	67.7607	70.0269	0.01	NR	NR	NR

Isolatable Section	Description	Release category	Flash Fire Effects:			Radiation Effects: Jet Fire Ellipse			Radiation Effects: Pool Fire			Overpressure					
			100% LFL Ellipse			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters		
			Distance in meters				5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F
			5D	1.5F	2F												
IS - 22			13.4331	11.3746	13.4331	12.5	NR	NR	NR	12.5	42.2865	38.5883	38.4596	0.1	NR	NR	NR
			13.4331	11.3746	13.4331	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
		150	NR	NR	NR	4	NR	NR	NR	4	109.734	94.4439	97.0658	0.01	NR	NR	NR
			NR	NR	NR	12.5	NR	NR	NR	12.5	66.4692	61.6346	61.5704	0.1	NR	NR	NR
			NR	NR	NR	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
		IS - 23	CRUDE	10	16.6034	28.6941	25.8864	4	29.749	34.6209	34.0991	4	NR	NR	NR	0.01	104.653
16.6034	28.6941				25.8864	12.5	21.3767	25.8094	25.124	12.5	NR	NR	NR	0.1	34.6841	66.043	60.5885
16.6034	28.6941				25.8864	37.5	16.4918	20.6567	19.8868	37.5	NR	NR	NR	0.3	27.3323	47.9976	45.2739
IS - 24	150	202.34		332.297	283.898	4	268.919	325.533	314.373	4	163.372	164.136	170.158	0.01	1583.86	2994.33	2733.84
		202.34		332.297	283.898	12.5	198.353	247.302	236.963	12.5	81.2582	96.7701	95.8433	0.1	489.64	791.031	754.644
		202.34		332.297	283.898	37.5	156.56	200.903	191.054	37.5	NR	NR	NR	0.3	374.667	590.249	547.046

*NH- No Hazard, NR- Not Reached

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

7 FREQUENCY ANALYSIS

7.1 Overview

Frequency of occurrence of the representative hazardous events needs to be evaluated by referencing appropriate generic industry data. Both generic industry and company / vendor based information has been used, and particular care has been taken to ensure its validity. Generic failure data was applied where site specific or company / vendor data is not available.

Initiating event failure frequencies for each case developed have been estimated using various sources (listed in order of preference) including:

- TNO Guidelines for Quantitative Risk Assessment (Purple Book);
- OGP Risk Assessment Data Directory, Process Release Frequencies, 2010; and
- Health & Safety Executive (HSE) failure rates & event data for land use planning.

Given the potential for release from each of these scenarios, an event tree of possible outcomes has been developed using this individual component failure data. The table given below shows the frequency of failure of the selected isolatable sections calculated by parts count.

7.2 Event tree analysis

A release can result in several possible outcomes or scenarios (fire, explosions, un-ignited release etc.). A specific outcome for a release scenario may be dependent on other unrelated events following the initial release. Event tree analysis is used to identify potential outcomes of a release and to quantify the risk associated with each of these outcomes. The event tree for this QRA study is shown in **Figure 7**:

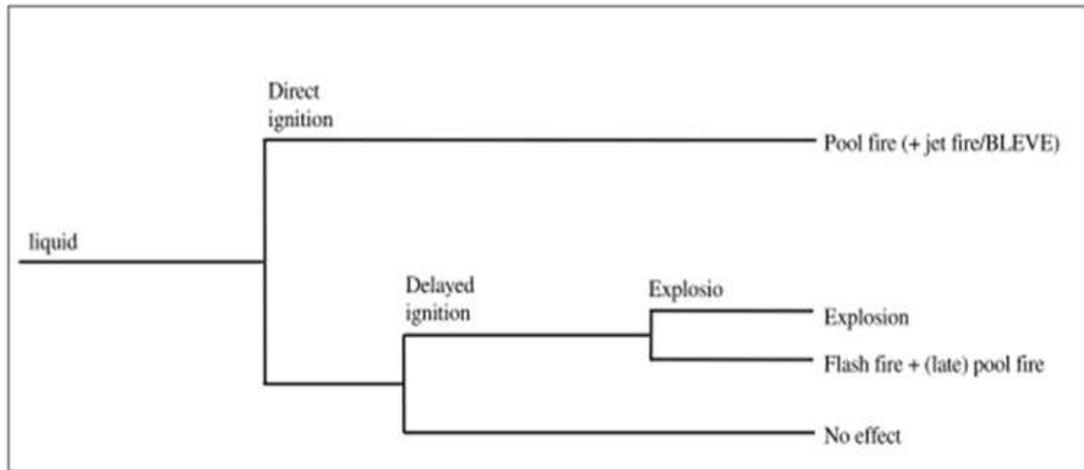


Figure 7: Event Tree

For calculating the frequency used for modeling, the following modification factors were taken into consideration:

- Design/Quality Maintenance
- Time is use

Table 7: Failure Frequency of an Event

Isolatable Sections	Description	Scenario	Total Frequency
IS-1	Transfer of Propane from Jetty to Storage Tank 2000-FB-01	7	1.94E-04
IS-2		25	1.06E-06
IS-3		150	1.25E-07
IS-4	Transfer of Butane from Jetty to Storage Tank 2000-FB-02	7	1.49E-04
IS-5		25	8.78E-07
IS-6		150	6.83E-08
IS-7	Transfer of Propylene from Jetty to Storage	7	1.49E-04



ADANI MUNDRA PORT – NEW LPG FACILITIES
**QUANTITATIVE RISK ASSESSMENT STUDY REPORT-
 PIPELINES**
DOC NO: H003-E-LPG-GEN-BP-R-E-008B



Isolatable Sections	Description	Scenario	Total Frequency
IS-8	Tank 2000-FB-02	25	8.78E-07
IS-9		150	6.83E-08
IS-10		7	1.69E-04
IS-11	Propylene precooling line	25	5.00E-06
IS-12		150	5.00E-06
IS-13		10	2.28E-06
IS-14	Methanol P/L	150	1.44E-08
IS-15		10	2.50E-06
IS-16	MS P/L	150	1.58E-08
IS-17		10	7.03E-06
IS-18	HSD P/L	150	4.56E-08
IS-19		10	4.94E-06
IS-20	SKO P/L	150	3.12E-08
IS-21		10	1.20E-05
IS-22	Furnace Oil	150	7.56E-08
IS-23		10	4.05E-07
IS-24	Crude	150	1.26E-08

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

8 RISK ASSESSMENT & PRESENTATION

8.1 Overview

Risk is often defined as a function of the likelihood that a specified undesired event will occur, and the severity of the consequences of that event. Risk is derived from the product of likelihood and potential consequence. Risk in general is a measure of potential economic loss or human injury in terms of the probability of the loss or injury occurring and magnitude of the loss or injury if it occurs.

$$Risk = f(\text{Severity, Frequency})$$

Quantification of effects of the hazardous event were done using the Event Tree approach in which all the possible outcomes of the hazardous event were considered and the likelihood of each type of end event determined. This step in the process involves the use of consequence modelling to predict both physical phenomena such as dispersion of gas, size and duration of fires, overpressures due to explosions, and the performance of equipment and systems such as availability of a fire & gas detection system, availability of emergency shutdown system, and availability of fire protection system. The end result of this phase of the assessment is a series of “end events”, together with their estimated frequency of occurrence.

8.2 Risk Results

The risk modelling has been performed using DNV PHAST RISK 6.7 software. Thereby, the details of the input data used for the risk modelling such as vulnerability criteria, ignition probability and occupancy data. The results of a QRA are expressed using Individual Risk Contours and Societal Risk Graphs.

The Individual Risk represents the frequency of an individual dying due to loss of containment events (LOCs). The individual is assumed to be unprotected and to be present during the total exposure time. The Individual Risk is presented as contour lines on a topographic map.

The Societal Risk represents the frequency of having an accident with N or more people being killed simultaneously. The people involved are assumed to have some means of protection. The Societal Risk is presented as an F-N curve, where N is the number of deaths and F the cumulative frequency of accidents with N or more deaths.

The Individual Risk estimated due to the activities being conducted at the Adani Mundra port is represented by a risk contour in the Figure 8 below. The risk reaching beyond the Pipeline transfer facility is less than $1E-06$ /Avg. year.

Figure 8: Risk Contour



The Societal Risk pertaining to group of individuals is represented in **Figure 9**.

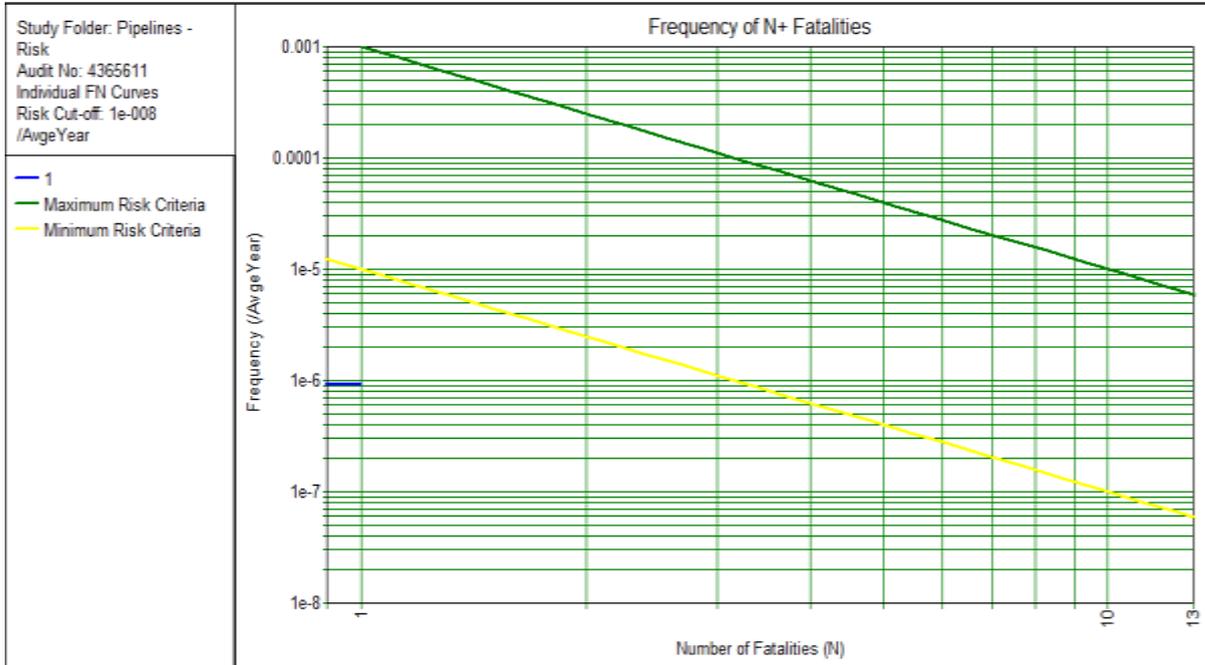


ADANI MUNDRA PORT – NEW LPG FACILITIES
QUANTITATIVE RISK ASSESSMENT STUDY REPORT-
PIPELINES



DOC NO: H003-E-LPG-GEN-BP-R-E-008B

Figure 9: FN Curve



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

9 RECOMMENDATIONS

The Following measures shall be implemented for safe operation

- Periodical inspection of pipelines
- Leak detection systems based on pressure, temperature and flow
- CCTV monitoring of the pipeline corridor/jetty, in control room
- Surge Analysis shall be performed to ensure adequate time lag between closure of ROVs at jetty end and at the tank end. The time lag shall be engineered so that surge pressure does not increase beyond the design limit. While engineering the closure time of each ROV, a consideration shall be given so that the pressure due to surge does not exceed the design pressure.
- A suitable continuous back-up power supply shall be provided for the control system and operation of ROVs both at jetty end and tank end.
- Electrical equipment including for lighting system shall conform to hazardous area classification and be selected in accordance with IS:5571. These shall be tested by agencies such as CMRI, ERTL, CPRI or independent test laboratory of country of origin for such equipment. Indigenous Flameproof equipment shall comply with relevant BIS standard as per requirements of statutory authorities
- Pressure testing/ Low pressure leak check (with N₂) of the piping / flanged joints completed for entire pipeline and associated station piping before commissioning of the pipelines after any maintenance activity In case of displacement of Nitrogen with LPG, it should be done to flare

	<p>ADANI MUNDRA PORT – NEW LPG FACILITIES</p>	
	<p>QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES</p>	
	<p>DOC NO: H003-E-LPG-GEN-BP-R-E-008B</p>	

APPENDIX 1 CONSEQUENCE CONTOURS

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

PROPANE PIPELINE FROM BERTH 1 - 25mm LEAK

FLASH FIRE



JET FIRE



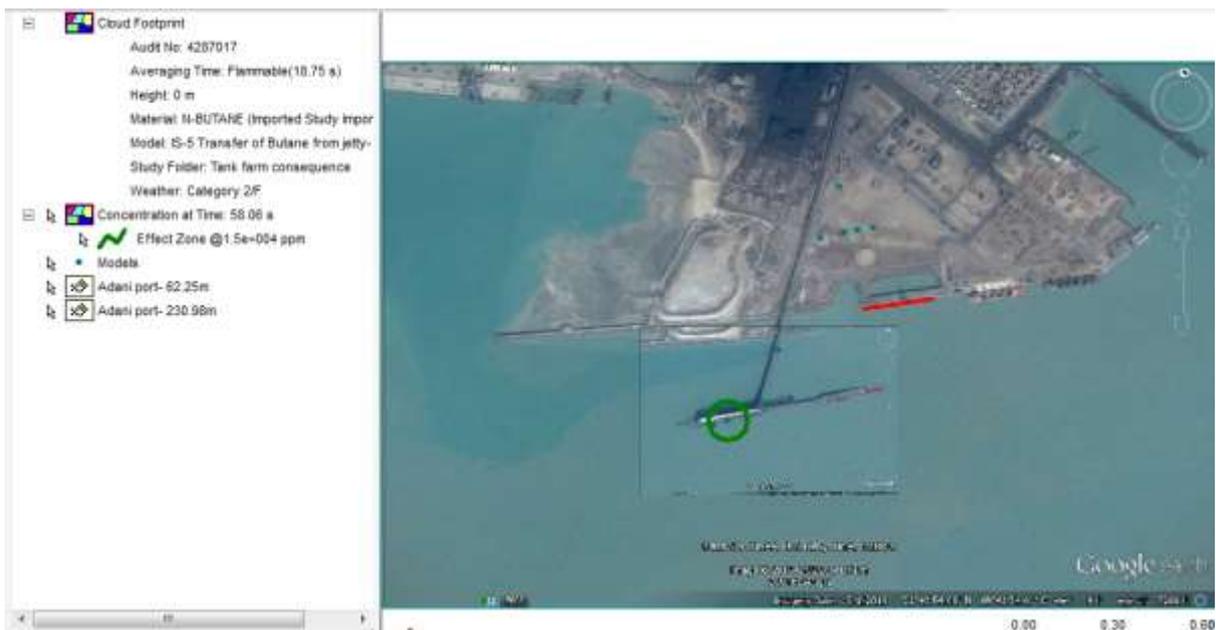
	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

EXPLOSION



BUTANE PIPELINE FROM BERTH 1- 25mm LEAK

FLASH FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES
QUANTITATIVE RISK ASSESSMENT STUDY REPORT-
PIPELINES



DOC NO: H003-E-LPG-GEN-BP-R-E-008B

JET FIRE



EXPLOSION



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

PROPYLENE PIPELINE FROM BERTH 1-25 mm LEAK

FLASH FIRE



JET FIRE

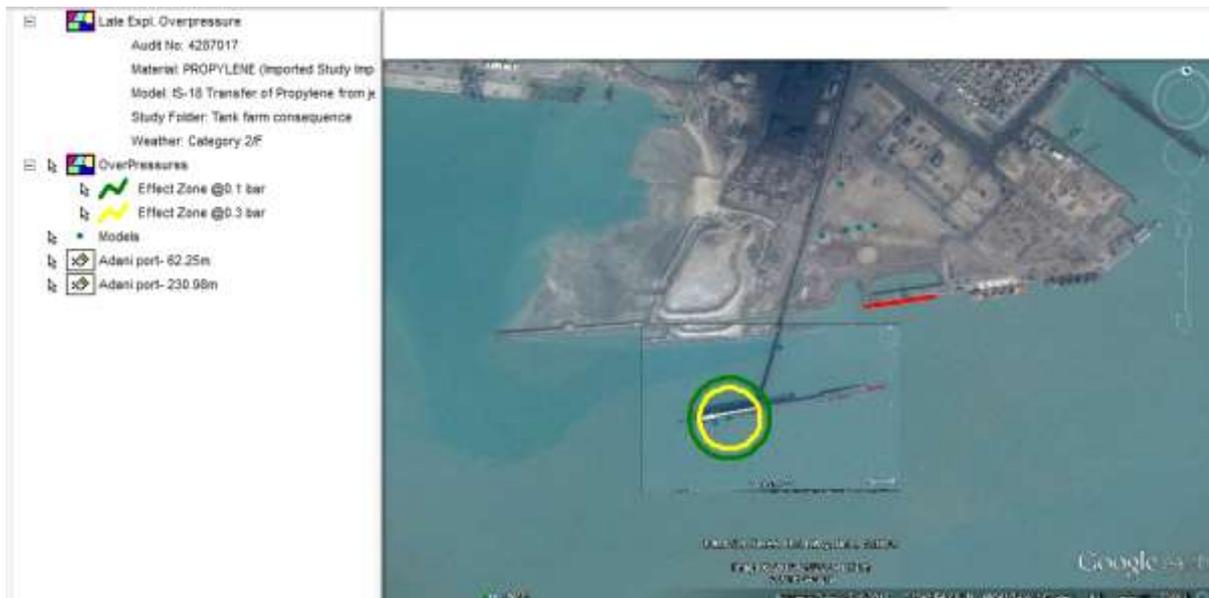


	ADANI MUNDRA PORT – NEW LPG FACILITIES		
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES		
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B		

POOL FIRE



EXPLOSION



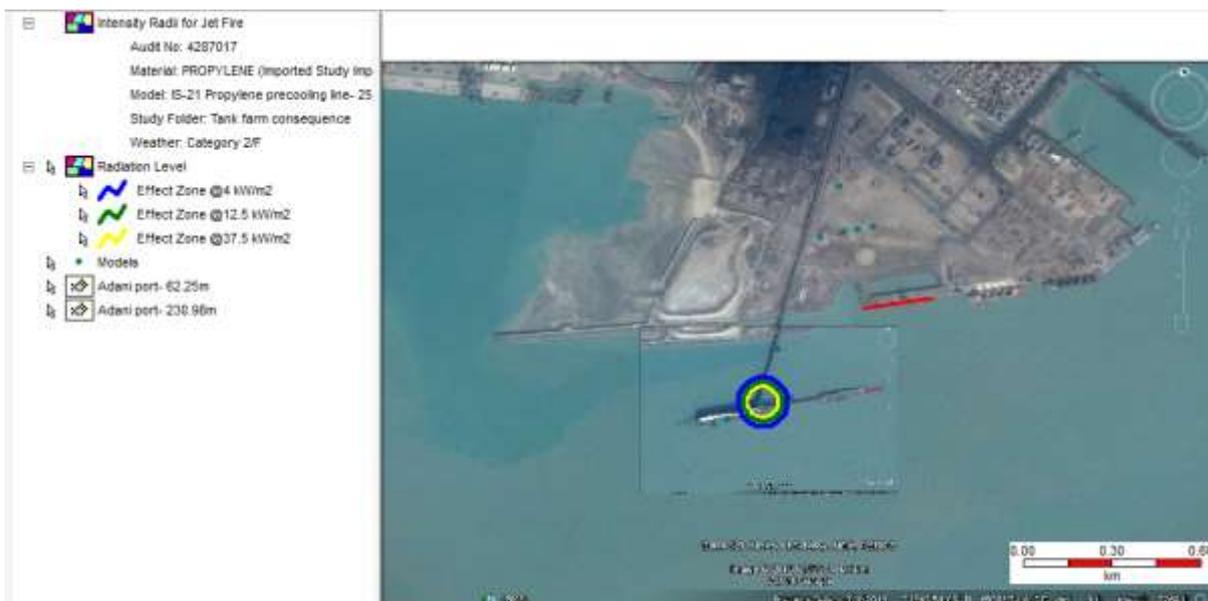
	ADANI MUNDRA PORT – NEW LPG FACILITIES		
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES		
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B		

PROPYLENE PRECOOLING PIPELINE FROM BERTH 1-25 mm LEAK

FLASH FIRE



JET FIRE



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

POOL FIRE



EXPLOSION



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

METHANOL PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE



JET FIRE



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

EXPLOSION



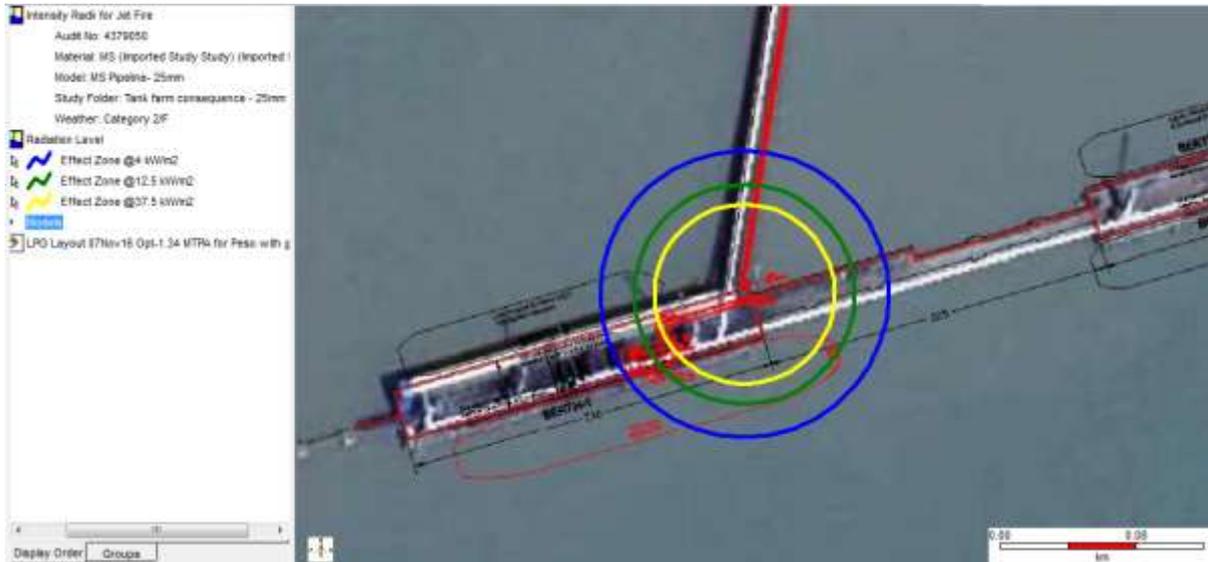
MS PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

JET FIRE

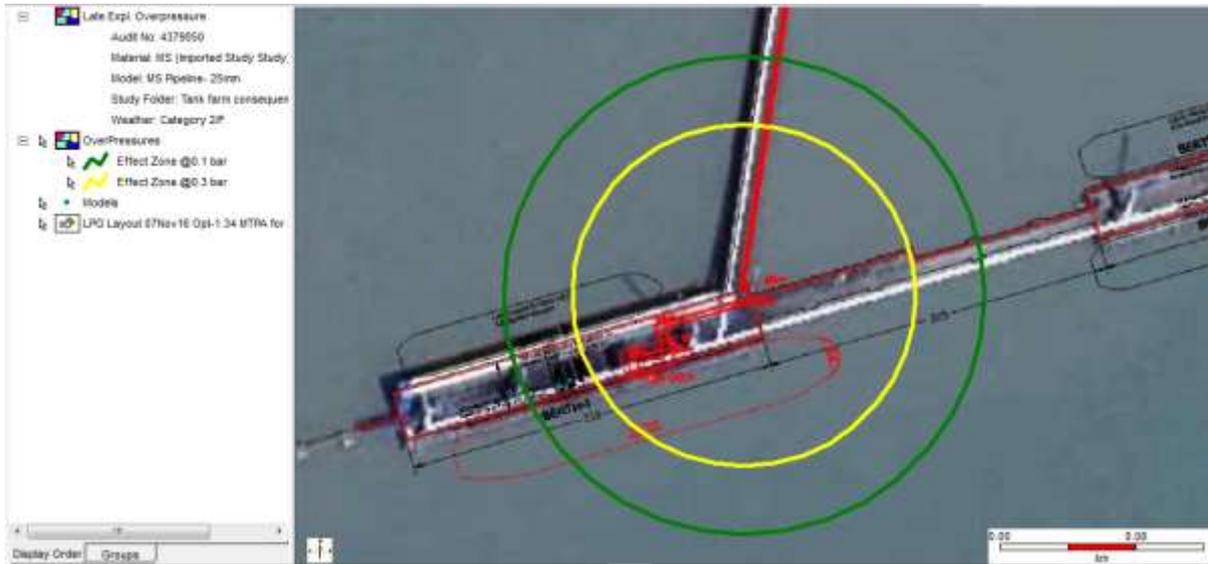


POOL FIRE



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

EXPLOSION



HSD PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

JET FIRE



POOL FIRE



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

EXPLOSION



SKO PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE



JET FIRE



POOL FIRE



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

EXPLOSION



FURNACE OIL PIPELINE FROM BERTH 2-25 mm LEAK

POOL FIRE



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

CRUDE PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE



JET FIRE



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- PIPELINES	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008B	

EXPLOSION





HOWE ENGINEERING PROJECTS (INDIA) PVT. LTD.
(Successor-in-interest with respect to the Engineering Consultancy Business of Howe (India) Pvt. Ltd.)

PROJECT	MUNDRA LPG							
DOCUMENT TITLE	QUANTITATIVE RISK ASSESSMENT STUDY REPORT- TANK FARM AREA							
CONTRACTOR								
CONSULTANT	 TECHNIP INDIA LIMITED							
DOCUMENT NO.	H003-E-LPG-GEN-BP-R-E-008C					Rev No.	A	
CONSULTANT'S DOCUMENT No.								
REV.NO	DATE	DESCRIPTION	PREPARED		CHECKED		APPROVED	
			Init.	Sign	Init.	Sign	Init.	Sign
A	30-11-2016	ISSUED FOR BEP	YD		TK		TK	

This Document is the property of ADANI. It should not be used, copied or reproduced without their written Permission.

QUANTITATIVE RISK ASSESSMENT REPORT FOR TANK FARM AREA



MUNDRA PORT – NEW LPG FACILITIES



EC



PMC



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

Document Title : Quantitative Risk Assessment Report for Tank farm area
Project Title : Mundra Port - New LPG Facilities
Client Company Name : Adani
Engineering consultant : Technip India Limited
PMC : HOWE Engineering Projects (India) Pvt. Ltd.
Consultant : iFluids Engineering

DISCLAIMER

The report rendered by consultants is in the nature of guidelines based on good engineering practices and generally accepted safety procedures. The recommendations shown in the report shall be considered as a Technical professional opinion and not binding on the parties involved viz. Technip and iFluids Engineering. The technical recommendations and the conclusions thus expressed may have to be re-considered in light of any modifications or alterations that would invalidate the data shown in the documents which are referred to therein. These recommendations and conclusions would become null and void should the consultants not be kept informed of such modifications or alterations with specific reference to the present report.

A	28-Nov-16	Final Report			
			VP	JS	
Rev	Date	Description	Prepared by	Reviewed by	Approved by

LIST OF ABBREVIATIONS

ALARP	As Low As Reasonably Practicable
EA	Environmental Assessment
ERP	Emergency Response Plan
ESD	Emergency Shutdown
HAZID	Hazard Identification
HAZOP	Hazard & Operability Study
HC	Hydrocarbon
HSE	Health Safety & Environment
IRPA	Individual Risk Per Annum
LFL/LEL	Lower Flammability Limit / Lower Explosive Limit
LOC	Loss of Containment
P&ID	Piping and Instrument Diagram
PLL	Potential Loss of Life
QRA	Quantitative Risk Assessment
SOP	Standard Operating Procedure

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

EXECUTIVE SUMMARY

Adani group intends to expand its current port facility at Adani Mundra Port Pvt Ltd. ADANI is developing LPG, Propane, Butane handling and storage facility at their Port in Mundra. Propylene and propane will be stored and handled in the terminal in a scenario when LPG business subsides. The Adani group has appointed iFluids engineering to carry out Quantitative Risk Assessment and recommend cost effective measures to address the hazardous scenarios.

OVERALL FACILITY DESCRIPTION

ADANI is developing LPG, Propane, Butane handling and storage facility at their Port in Mundra. Propylene and propane will be stored and handled in the terminal in a scenario when LPG business subsides.

ADANI has envisaged the following services for set up in Import/Export terminal at Mundra,

- Import of Propane / Butane in cryogenic state in jetties through ship tankers and transferring through unloading arms and pipelines.
- Transfer of product through the unloading line and storing in dedicated refrigerated / cryogenic tanks.
- Transfer of products from tanks through pumps to heating train and then to online blending system for mix of Domestic, Auto & Industrial LPG
- Mercaptan dosing of the LPG, Propane and Butane
- Transfer to loading gantry for loading into road tankers for dispatch of following products through Tanker loading facility.
 - LPG (AUTOMOTIVE)/ (INDUSTRIAL)
 - LPG (DOMESTIC)
 - LPG PROPANE
 - BUTANE
 - PROPYLENE (In future when LPG demand subsides BUTANE import would stop and PROPYLENE shall be imported and stored in Storage tank).
- Simultaneous operation of Berth 1 with Berth 2, 3 & 4 respectively

STUDY RESULT

RISK ANALYSIS

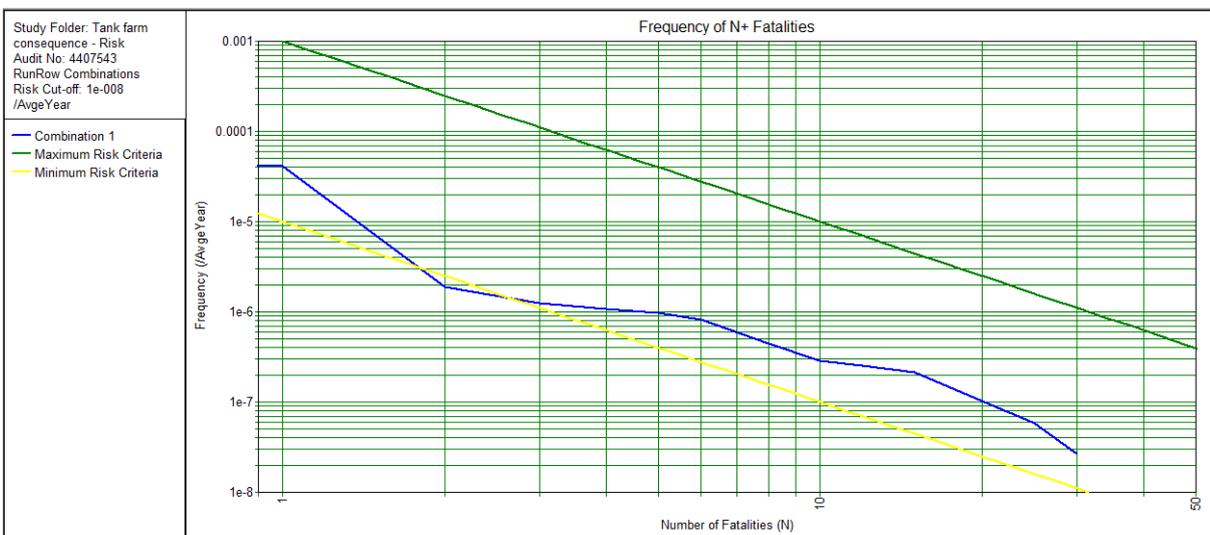
The risk estimated due to the activities conducted at the Mundra port is shown in the risk contour map provided **Figure 1**.

The F-N curve demonstrates the societal risk is within As Low as Reasonably Practicable (ALARP) level shown in the **Figure 2**.

FIGURE 1: RISK CONTOURS



FIGURE 2: FN CURVE



INDIVIDUAL & SOCIETAL RISK PER ANNUM

Individual Risk per Annum	4.328E-05
Societal Risk per Annum	5.125E-05

Location Specific Individual Risk

Area	LSIR indoor	LSIR outdoor
Jetty	3.56E-07	4.06E-07
Tank farm	1.40E-07	1.80E-07
BOG & FOG	5.57E-07	6.37E-07
Control room	1.57E-07	3.36E-07
Blending and heating	7.46E-05	1.00E-04
Truck loading area	7.21E-07	1.26E-06

RECOMMENDATIONS

The Following measures shall be implemented for safe operation

1. F&G mapping study to be carried to identify the location of the detectors and voting logic to be used to ensure tripping of the unit, in case of any hydrocarbon leak
2. Hydraulic analysis and simulation study to be carried out, to operate heating trains at the minimum pressure possible to reduce the effects of LFL and jet fire scenarios
3. Consider converting level indications on Propane BOG / Flash Condensate Receiver (2000-FA-05) and Butane BOG / Flash Condensate Receiver (2000-FA-06) as 1oo2 voting logic for tripping on low level and average selection control philosophy for controlling the level to improve the reliability
4. Consider shifting the PSV on the inlet of the CW supply header of Propane BOG / Flash Condenser (2000-EA-03) and Butane BOG / Flash Condenser (2000-EA-04) to return header with reduced set point and LFL sensors at the outlet of the PSV
5. Consider providing discharge PT on 2000-GA-05/06 discharge common header with low pressure alarm
6. Revisit fail safe conditions of ROV-063/64 (considered as fail open) by HAZOP study

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

7. Consider additional PSV on Propane BOG / Flash Condensate Receiver (2000-FA-05) and Butane BOG / Flash Condensate Receiver (2000-FA-06) to increase the reliability and standby condition in case of maintenance of other PSV (same nozzle with separate isolation valves)
8. Consider providing remote operated sprinklers systems based on LFL sensors covering Propane BOG / Flash Condensate Receiver (2000-FA-05) and Butane BOG / Flash Condensate Receiver (2000-FA-06) and propane and butane handling pumps.
9. Consider trip logic for the steam boilers based LFL sensors on the tank farm
10. Consider shifting the PSV-063/PSV-034 provided downstream ROV-063 and ROV-064 relocated to Propane BOG / Flash Condensate Pumps (2000-GA-05) and Butane BOG / Flash Condensate Pumps (2000-GA-06) common discharge headers.
11. Consider voting logic between PT-016/017/018 for tripping on high and low pressure interlocks of the propane and butane tanks and MID point selection control philosophy for controlling the tank pressure to improve the reliability
12. Provide flow meters in N2 line to PSV headers to ensure continuous flow of N2
13. Ensure SOP developed and followed on all critical activities, interlocks checking before unloading operations
14. SOP and work instructions on display in local and English near the critical activity locations
15. Consider HAZOP and SIL study before commissioning the facility and concerns addressed
16. Ensure CCTV coverage of critical locations and remote monitoring is done continuously
17. Ensure all portable electrical equipment used in the location are Ex rated and covered under PTW systems, and certified
18. Selection of electrical and other instruments based on hazardous area classification (IS 5572: 2008)
19. All flanges shall be connected for bonding for electrical continuity and earthing of the equipment's to be ensured as per IS-3043
20. Lightning protection shall be provided as per the requirements of IS: 2309.
21. Periodical maintenance schedule should be implemented and meticulously followed
22. F&G systems management to be inspected periodically and availability ensured
23. Periodical inspection of pipeline and drain systems

TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
LIST OF FIGURES	10
LIST OF TABLES:	10
1 INTRODUCTION	11
1.1 PROJECT OBJECTIVE	11
1.2 SCOPE OF WORK	11
2 FACILITIES OVERVIEW	13
2.1 PROPANE/BUTANE UNLOADING AND STORAGE TANK	13
2.2 PRECOOLING OPERATION	13
2.3 OTHER UNLOADING OPERATIONS AND TRANSFER TO TANK FARM AREA	13
3 RISK TOLERABILITY CRITERIA	14
3.1 INDIVIDUAL RISK CRITERIA	14
3.2 SOCIETAL RISK CRITERIA	15
4 METROLOGICAL CONDITIONS	17
4.1 WIND DIRECTION	17
4.2 AMBIENT CONDITIONS	17
4.3 ATMOSPHERIC STABILITY	17
5 QUANTITATIVE RISK ASSESSMENT METHODOLOGY	20
5.1 GENERAL OVERVIEW	20
5.2 SCENARIO DESCRIPTION AND OPERATING CONDITIONS	21
5.3 QRA APPROACH	22
5.4 HAZARD IDENTIFICATION	22
5.4.1 Factors for Hazard Identification	24

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

5.5	ISOLATABLE SECTIONS.....	26
6	CONSEQUENCE ANALYSIS.....	31
6.1	OVERVIEW.....	31
6.2	CONSEQUENCE MODELLING	32
6.3	DAMAGE CRITERIA	34
7	FREQUENCY ANALYSIS	44
7.1	OVERVIEW.....	44
7.2	EVENT TREE ANALYSIS	44
8	RISK ASSESSMENT & PRESENTATION	49
8.1	OVERVIEW.....	49
8.2	RISK RESULTS	50
9	RECOMMENDATIONS	52

LIST OF FIGURES

FIGURE 1: RISK CONTOURS.....	5
FIGURE 2: FN CURVE	5
FIGURE 3: GOOGLE EARTH IMAGE OF THE FACILITY.....	14
FIGURE 4: RISK ACCEPTANCE GRAPH.....	15
FIGURE 5: RISK ACCEPTANCE CRITERIA- FN CURVE.....	16
FIGURE 6: QUANTITATIVE RISK ASSESSMENT METHODOLOGY	21
FIGURE 7: EVENT TREE	45
FIGURE 8: RISK CONTOUR.....	51
FIGURE 9: FN CURVE	51

LIST OF TABLES

TABLE 1: PASQUILL'S STABILITY CLASS	18
TABLE 2: WEATHER CONDITIONS	19
TABLE 3: ISOLATABLE SECTIONS	26
TABLE 4: EFFECTS DUE TO INCIDENT RADIATION INTENSITY	35
TABLE 5: DAMAGES DUE TO BLAST OVERPRESSURE	36
TABLE 6: IMPACT DISTANCE IN METER.....	37
TABLE 7: FAILURE FREQUENCY OF AN EVENT.....	46

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

1. INTRODUCTION

Adani group intends to expand its current port facility at Adani Mundra Port Pvt Ltd. ADANI is developing LPG, Propane, Butane handling and storage facility at their Port in Mundra. Propylene and propane will be stored and handled in the terminal in a scenario where LPG business subsidizes. The report prepared addresses risk assessment of unloading, storage and transportation facilities to provide a better understanding of the risk posed to the plant and surrounding population.

This document describes the results after the completion of Quantitative Risk Assessment study for the Adani Mundra port-New LPG facility.

1.1 Project Objective

The objective of the QRA is to assess the risk levels associated with the facilities under scope; evaluate those risks based on the HSE UK Risk Acceptance Criteria, and if risks are outside the tolerable region, then risk reduction measures shall be proposed to bring the risks into tolerable or As Low As Reasonably Practicable (ALARP) Levels and lower levels.

1.2 Scope of Work

iFluids Engineering has been awarded the Project to carry out the QRA study to assess risks at the following in the Mundra port;

- Berth 2 (White oil-Motor Spirit representing worst case scenario) Pipeline transfer Facilities
- Berth 1 (Propane/Butane) Pipeline Transfer facilities
- Berth 3 & 4 - Berth 3 handling LPG (typical as Berth 1 in terms of inventory and process conditions) and Berth 4 (White oil-Motor Spirit representing worst case scenario)
- To study the impact of LPG pipeline on existing pipelines.
- To study the impact of Simultaneous berth operations of berth 1 with berth 2, 3 & 4 respectively.
- To study the impact of facilities around LPG plot
 - a) T9, T10 handling fertilizers to the south of LPG plot.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

- b) Steel yard to the east side of LPG Plot
- c) Existing pipeline & conveyor to the west of LPG plot.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

2. FACILITIES OVERVIEW

2.1 Propane/Butane Unloading and Storage Tank

Storage tank (2000-FB-01 and 2000-FB-02) is vertical flat bottom, double wall, full containment refrigerated storage tank, which is designed to store Propane/Butane/Propylene from jetty. The function of these tanks is to store Propane/Butane/Propylene. Both these tanks are identical in all respect and Propane/Butane/Propylene can be stored in any of these tanks. The capacity of each tank is 25000 MT.

Propane/Butane/Propylene is pumped by shipping pump through marine unloading arm to storage tanks through two marine unloading arm at the rate of 500 MT/hr each.

The tank operating pressure is 500 mm WC & temperature of approximately -45°C in case of propane, -5°C in case of Butane and -47°C in case of Propylene will be maintained in Propane/Butane Storage Tank (2000-FB-01 and 2000-FB-02).

2.2 Precooling Operation

The pre-cooling operation is one of the requirements prior to the ship unloading operation. During precooling operation, cold Propane/ Butane from the Storage Tank I & II is pumped into one of the unloading line going to the Jetty Area, from where it flows towards the Propane/Butane Storage Area and returns into the tank through the other unloading line. Flash compressor will cater the flash gas generated during this operation.

For precooling during propylene/propane unloading scenario two additional lines shall be installed (in future) from storage tank till jetty to avoid any contamination of propylene and Propane inventory.

2.3 Other unloading operations and Transfer to Tank farm area

Following Hazardous Chemicals are unloaded at berth 1, 2, 3 & 4 and transferred to the tank farm via pipelines

1. Propane
2. Butane

3. Propylene
4. Crude oil (future)
5. Furnace oil
6. Excluded petroleum products such as Furnace and vegetable oil

FIGURE 3: GOOGLE EARTH IMAGE OF THE FACILITY



3 RISK TOLERABILITY CRITERIA

The assessment and control of risk are essential requirements for a proactive HSE management system. In order to make a valued judgment and to decide on what risks are acceptable, an easily understood set of criteria should be set and followed rigorously. Risk criteria are required to promote consistency in evaluating the results of relevant studies and to formulate a proactive approach to incident prevention. The Risk Acceptance Criteria used in this assessment is from the UK HSE guidelines.

3.1 Individual Risk Criteria

Individual Risk (IR) Criteria is a measure of the risk to a person within an occupied area or building. This includes the nature of the injury to the individual, the likelihood of the injury occurring, and the time over which the injury might occur. It is the probability of death occurring because of accidents at a plant facility, installation or a transport route expressed as a function of the distance from such an activity. It is

the frequency at which an individual or an individual within a group who may be expected to sustain a given level of harm (typically death) from the realization of specific hazards.

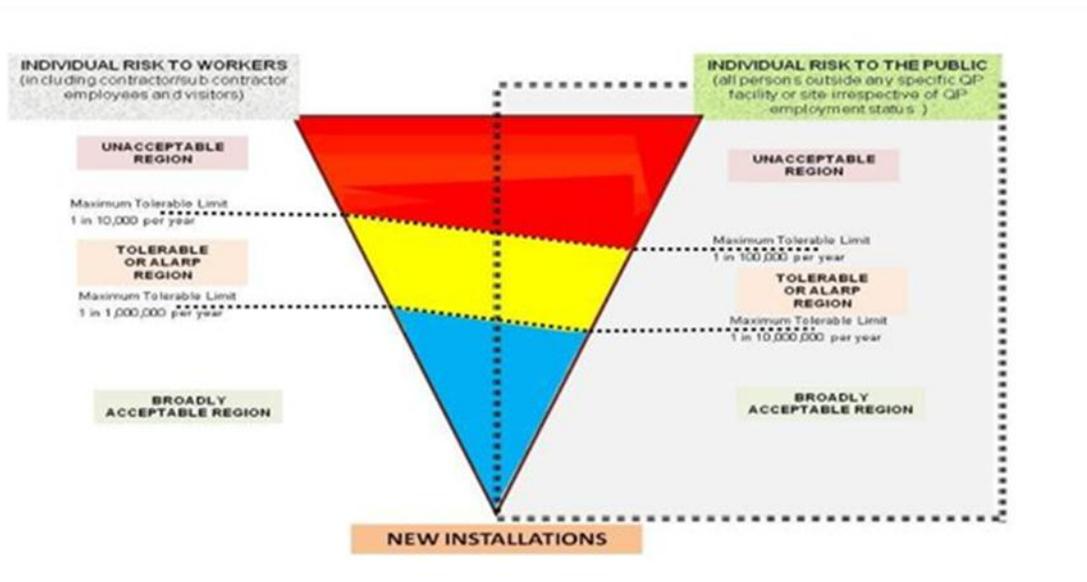
Occupancy is the proportion of exposure time of the individual to the hazard.

The exposure of an individual is related to:

- The likelihood of occurrence of an event involving a release and Ignition of hydrocarbon;
- The vulnerability of the person to the event; and
- The proportion of time the person will be exposed to the event (which is termed 'occupancy' in the QRA terminology).

There is a need to determine the limits for IR, based on numeric values (which would be regarded as intolerable. Figure 4 shows the principle of this framework.

Figure 4: Risk Acceptance graph



3.2 Societal Risk Criteria

Assessment of societal risks is even more important than assessment of individual risk because they involve the likelihood of multiple fatalities. Societal risk is the risk to any person or group of persons who are not connected to project facilities and are outside the facility fence line.

F-N Curve

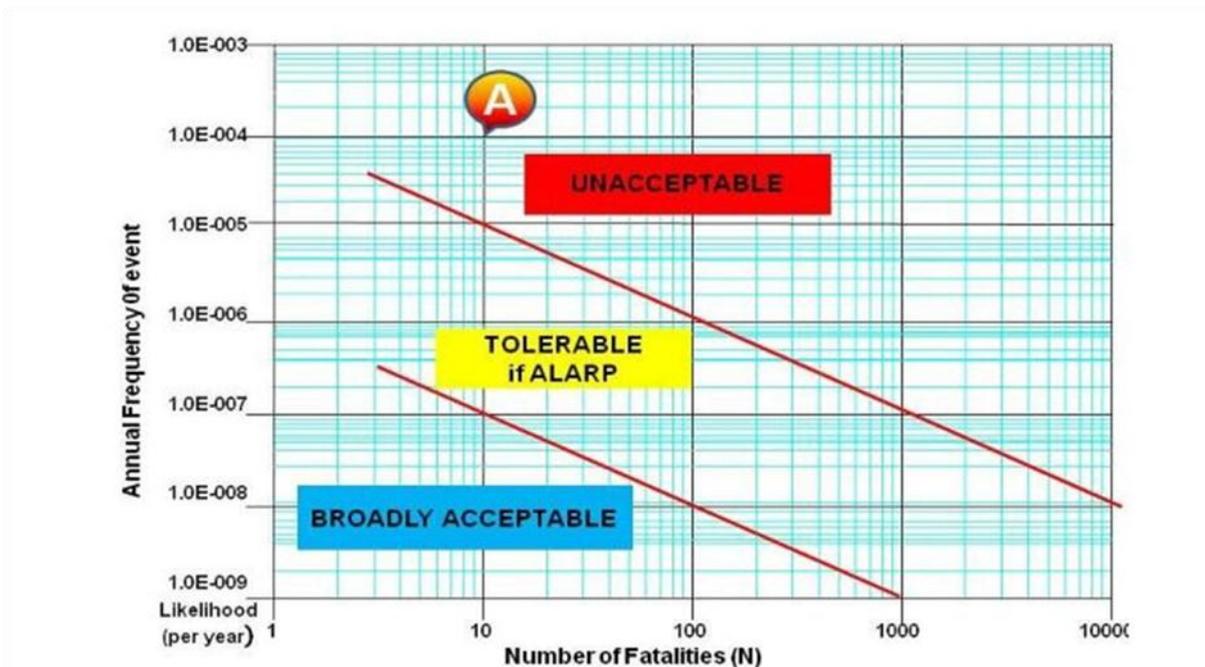
It is helpful to consider group risk in the demonstration that risks are ALARP. This allows consideration to be given to events, which, although low in frequency, may cause multiple injuries or fatalities. Group risk can be presented in the form of a plot of cumulative frequency versus number of fatalities (F-N curve).

F = Frequency (experienced or predicted)

N =No. of multiple fatalities.

'N' includes indirect deaths caused because of the main event occurring and can therefore be difficult to predict e.g. many people may die years after exposure to a toxic chemical. F-N Curve is generated for customers and benchmarked against risk acceptance criteria. The risk acceptance criteria used to compare the predicted risks for this proposed project can be understood from Figure 5.

Figure 5: Risk acceptance criteria- FN Curve



4 METROLOGICAL CONDITIONS

This chapter describes the meteorological data, used for the risk assessment study of Adani Mundra Port.

The consequences of released flammable material are largely dependent on the prevailing weather conditions. For the assessment of major scenarios involving release of flammable materials, the most important meteorological parameters are those that affect the atmospheric dispersion of the escaping material. The crucial variables are wind speed, wind direction, atmospheric stability and temperature. Rainfall does not have any bearing on the results of the risk analysis; however, it can have beneficial effects by absorption/washout of released materials. Actual behaviour of any release would largely depend on prevailing weather condition at the time of release.

4.1 Wind Direction

N	NE	E	SE	S	SW	W	NW
0.0148	0.1211	0.1374	0.0404	0.0179	0.559	0.087	0.0225

4.2 Ambient Conditions

Maximum Ambient temperature: 35°C

Minimum Ambient temperature: 7°C

Relative humidity: 70%

Atmospheric Pressure: 1.013 bar

Incident solar radiation: 0.215 kW/m²

Surface roughness parameter: 0.3 m

4.3 Atmospheric Stability

Pasquill stability parameter, based on Pasquill – Gifford categorization, is such a meteorological parameter, which decreases the stability of atmosphere, e.g., the degree of convective turbulence.

Pasquill has defined six stability classes ranging from ‘A’ (extremely unstable) to ‘F’ (very stable). Wind speeds, intensity of solar radiation (daytime insolation) at night time sky cover have been identified as prime factors defining these stability categories. Below table indicates the various Pasquill stability classes.

TABLE 1: PASQUILL'S STABILITY CLASS

Wind Speed (m/s)	Day: Solar Radiation			Night: cloud Cover		
	Strong	Moderate	Slight	Thinly < 40%	Moderate	Overcast > 80%
<2	A	A-B	B	-	-	D
2-3	A-B	B	C	E	F	D
3-5	B	B-C	C	D	E	D
5-6	C	C-D	D	D	D	D
>6	C	D	D	D	D	D

A – Very Unstable

B – Unstable

C – Slightly Unstable

D – Neutral

E – Stable

F – Very Stable

When the atmosphere is unstable and wind speeds are moderate or high or gusty, rapid dispersion of pollutants will occur. Under these conditions, pollutant concentrations in air will be moderate or low and the material will be dispersed rapidly. When the atmosphere is stable and wind speed is low, dispersion of material will be limited and pollutant concentration in air will be high. In general, worst dispersion conditions (i.e. contributing to greater hazard distances) occur during low wind speed and very stable weather conditions, such as that at 1F weather condition (i.e. 1 m/s wind speed and Pasquill stability F).

Stability category for the present study is identified based on the cloud amount and wind speed.

Based on the weather analysis, predominant weather stability of “F” and “D” was selected with wind speed 1.5m/s, 2m/s and 5m/s for consequence analysis, respectively. 2F is the most prevalent weather condition for this location.

TABLE 2: WEATHER CONDITIONS

Wind Speed in m/s	Pasquill Stability
1.5	F
2	F
5	D

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

5 QUANTITATIVE RISK ASSESSMENT METHODOLOGY

5.1 General Overview

Quantitative Risk Assessment (QRA) is used for risk management and safety improvement in many industries. It provides a quantitative assessment of potential risks identified and provides a basis for evaluating process safety with respect to a predetermined risk acceptance criterion. The usefulness of the QRA results is highly dependent on the availability and accuracy of the input data, with more complete input data providing a higher confidence on the validity and robustness of the results obtained. In most practical applications, there will be uncertainties in both the key parameters used and the QRA model itself. The effect of these uncertainties should be evaluated to confirm there is no impact on the conclusion. The QRA model will include:

- Examination of flammable/toxic material related to Major Accident Hazards;
- Quantification of the likelihood of flammable/toxic Major Accident Hazardous events;
- Quantification of the consequences of flammable/toxic Major Accident Hazardous events;
- Combination of consequences and likelihood of Major Accident Hazard events to assess risk profiles for individuals, and assets;
- Identification of the predicted levels of risk with regard to Individual Risk (IR) levels and Societal Risk (SR);
- Identification and assessment of risk reduction solutions (to the extent required to reduce predicted risks to acceptable levels); and
- Demonstration that the risks have been reduced to As Low As Reasonably Practicable (ALARP), when risks cannot be reduced to acceptable levels).

The following schematic (**Figure 6**) displays the methodology used to perform the Quantitative Risk Assessment Study for the Adani Mundra Port – New LPG Facilities.

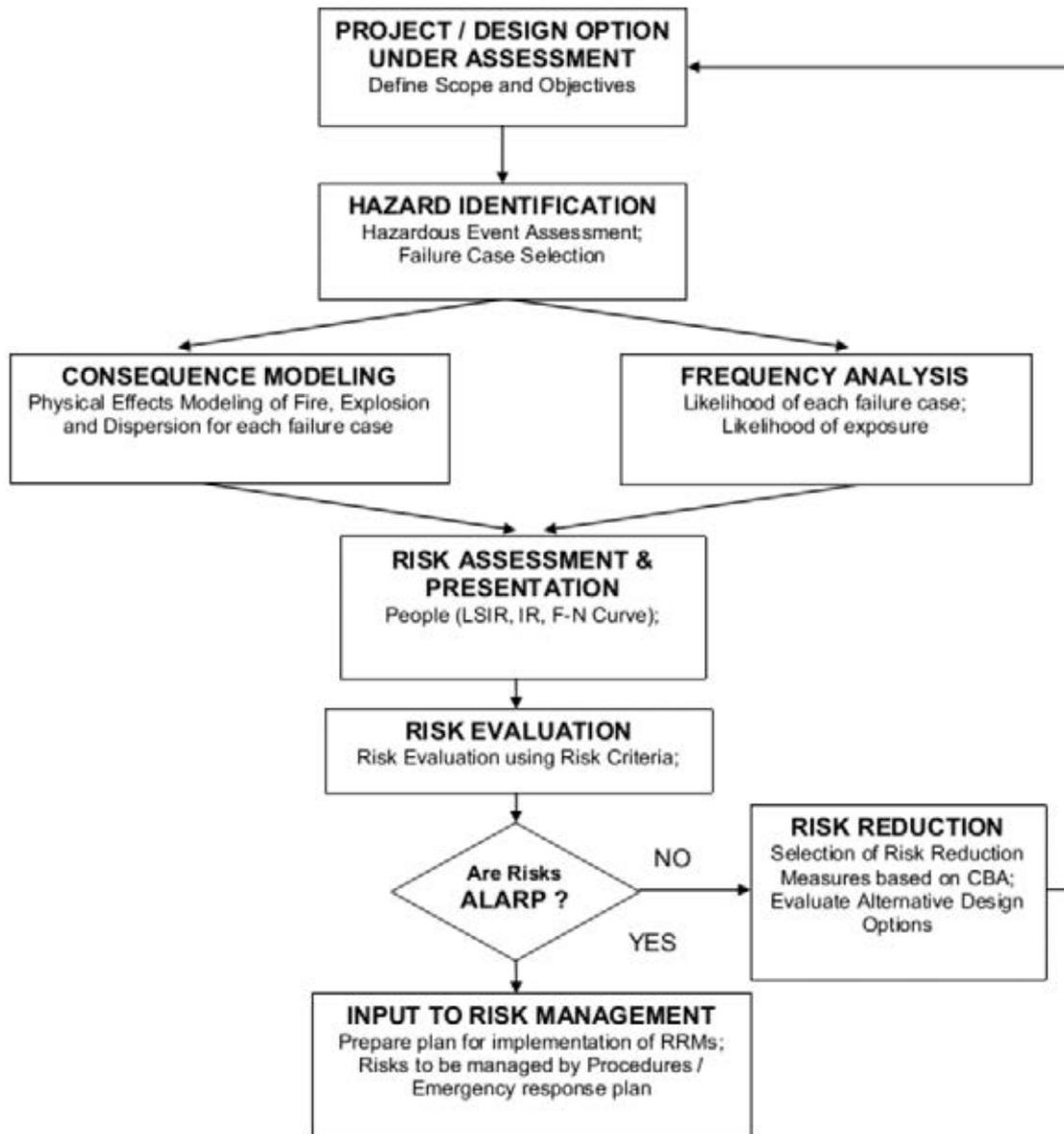


FIGURE 6: QUANTITATIVE RISK ASSESSMENT METHODOLOGY

5.2 Scenario Description and Operating Conditions

To carry out the QRA study the following basic data were used:

- Process parameters such as operating pressure, temperature & flow rate of equipment and process pipelines as well as the composition of the process streams etc.;
- Manning details at strategic locations at site and meteorological details of Adani Mundra port area;

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

- Failure frequencies of leak sources, Ignition probabilities, operating probabilities etc.; and
- Isolation and detection time, Impact criteria for consequences such as fire, explosion and toxic concentration.

5.3 QRA Approach

The QRA was carried out using the standard, internationally accepted approach consisting of the steps shown below:

Data used for the QRA were project and site specific; however, where this was not possible, the use of generic data was documented in the assumptions register prior to being applied within the study. As such, the QRA results was also specific to the planned operations, building design and personnel and general population occupancy levels expected at the time of data collection. Given the above, the consequence and risk results are only applicable to the site under study in this QRA and cannot be applied to any other location.

The following information was considered in the QRA:

- Facility design, function, location, capacity and layout;
- Environmental weather data e.g. wind rose, cloud coverage, stability class;
- Process engineering details e.g. composition, heat and mass balance, equipment items, process parameters - pressure and temperature regimes, inventories, flow schemes;
- Facility operation e.g. operational and emergency procedures; and
- Work force deployment, estimated occupancy and exposure.

5.4 Hazard Identification

A technique commonly used to generate an incident list is to consider potential leaks and major releases from fractures of all process pipelines and vessels. This compilation includes all pipe work and vessels in direct communication, as these may share a significant inventory that cannot be isolated in an emergency. The following data were collected to envisage scenarios:

- Composition of materials stored in vessels / flowing through pipeline;

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

- Inventory of materials stored in vessels;
- Flow rate of materials passing through pipelines;
- Vessels / Pipeline conditions (phase, temperature, pressure); and Connecting piping and piping dimensions.

Accidental release of flammable liquids / gases has the potential for severe consequences. Delayed ignition of flammable gases can result in blast overpressures covering large areas. This may lead to extensive loss of life and property. In contrast, fires have localized consequences. Fires can be extinguished or contained in most cases; there are few mitigating actions one can take once a flammable gas or a vapour cloud gets released.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

5.4.1 Factors for Hazard Identification

In any installation, main hazards arise due to loss of containment during handling of flammable liquids / gases. To formulate a structured approach to the identification of hazards, a list of contributory factors is provided below:

Blast over Pressures

Blast Overpressures depend upon the reactivity class of material and the amount of gas between two explosive limits. For example, Motor spirit/Gasoline once released and not ignited immediately is expected to give rise to a gas cloud. These gases in general have medium reactivity and in case of confinement of the gas cloud, on delayed ignition may result in an explosion and overpressures.

Operating Parameters

Potential gas release for the same material depends significantly on the operating conditions. The gases are likely to operate at atmospheric temperature (and hence high pressures). This operating range is enough to release a large amount of gas in case of a leak / rupture, therefore the pipeline leaks and ruptures need to be considered in the risk analysis calculations.

Inventory

Inventory Analysis is commonly used in understanding the relative hazards and short listing of release scenarios. Inventory plays an important role when considering a potential hazard. The larger the inventory of a vessel or a system, the larger the quantity of potential release. A practice commonly used to generate an incident list is to consider potential leaks and major releases from fractures of pipelines and vessels/tanks containing sizable inventories.

Range of Incidents

Both the complexity of study and the number of incident outcome cases are affected by the range of initiating events and incidents covered. This not only reflects the inclusion of accidents and / or non-accident-initiated events, but also the size of those events. For instance, studies may evaluate one or more of the following:

- Catastrophic failure of container;
- Large hole (large continuous release);

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT - TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

- Smaller holes (continuous release); and
- Leaks at fittings or valves (small continuous release).

In general, quantitative studies do not include very small continuous releases or short duration small releases if past experience or preliminary consequence modelling shows that such releases do not contribute to the overall risk levels.

5.5 Isolatable Sections

The following table describes the isolatable section considered for the study:

TABLE 3: ISOLATABLE SECTIONS

Isolatable section identification	Description	Scenario	Diameter m	Pressure barg.	Temperature C	Isolation time s	Total Inventory, kg
Berth 1							
IS-1	Transfer of Propane from Jetty to Storage Tank 2000-FB-01	7	0.406	8	-42.67	120	143322
IS-2		25	0.406	8	-42.67	120	144343
IS-3		150	0.406	8	-42.67	120	159902
IS-4	Transfer of Butane from Jetty to Storage Tank 2000-FB-02	7	0.406	8	-2.90	120	147605
IS-5		25	0.406	8	-2.90	120	148655
IS-6		150	0.406	8	-2.90	120	164183
IS-7	Transfer of Propylene from Jetty to Storage Tank 2000-FB-02	7	0.406	8	-44.86	120	150204
IS-8		25	0.406	8	-44.86	120	151247
IS-9		150	0.406	8	-44.86	120	166782
IS-10	Propylene precooling line	7	0.305	8	-45	120	90158

Isolatable section identification	Description	Scenario	Diameter m	Pressure barg.	Temperature C	Isolation time s	Total Inventory, kg
IS-11		25	0.305	8	-45	120	91201
IS-12		150	0.305	8	-45	120	94736
Berth 2							
IS-13	Methanol P/L	10	0.305	10	35	120	11809
IS-14		150	0.305	10	35	120	24885
IS-15	MS P/L	10	0.406	10	35	120	18894
IS-16		150	0.406	10	35	120	35336
IS-17	HSD P/L	10	0.610	10	35	120	48967
IS-18		150	0.610	10	35	120	82050
IS-19	SKO P/L	10	0.305	10	35	120	12058
IS-20		150	0.305	10	35	120	21814
IS-21	Furnace Oil	10	0.305	10	55	120	13848
IS-22		150	0.305	10	55	120	21916
IS-23	Crude	10	0.9144	10	35	120	121023
IS-24		150	0.9144	10	35	120	177890

Isolatable section identification	Description	Scenario	Diameter m	Pressure barg.	Temperature C	Isolation time s	Total Inventory, kg
Tank farm							
IS-25	Inlet of Boil Off Compressor 2000-GB-01A/B(Propane rich BOG)To Inlet of Bullet 2000-FA-07	7	0.203	20.00	100.46	120	101.8
IS-26		25	0.203	20.00	100.46	120	358.7
IS-27		150	0.203	20.00	100.46	120	10122.5
IS-28	Inlet of Boil Off Compressor 2000-GB-02A/B(Butane rich BOG) To Inlet of Bullet 2000-FA-08	7	0.203	4.52	61.30	120	51.6
IS-29		25	0.203	4.52	61.30	120	129.4
IS-30		150	0.203	4.52	61.30	120	3084.0
IS-31	Inlet of Boil Off Compressor 2000-GB-02A/B(Propylene rich BOG) To Inlet of Bullet 2000-FA-08	7	0.203	17.83	111.17	120	117.5
IS-32		25	0.203	17.83	111.17	120	389.2
IS-33		150	0.203	17.83	111.17	120	10544.9
IS-34	Propane from 2000 -GA-01A/B/C to Propane heater I, 2000-EA-05 &Propane heater II, 2000-EA-07	7	0.203	25.60	-44.27	120	20700.1
IS-35		25	0.203	25.60	-44.27	120	22534.5
IS-36		150	0.203	25.60	-44.27	120	92200.3
IS-37	Butane from 2000-GA-02A/B/C to Butane heater I, 2000-EA-08 & Butane heater II, 2000-EA-10 to Static blender	7	0.203	25.60	-4.17	120	21320.8
IS-38		25	0.203	25.60	-4.07	120	23200.4

Isolatable section identification	Description	Scenario	Diameter m	Pressure barg.	Temperature C	Isolation time s	Total Inventory, kg
IS-39		150	0.203	25.60	-4.07	120	94579.3
IS-40	Propylene from 2000-GA-02A/B/C to heater I, 2000-EA-08 & Propylene heater II, 2000-EA-10 to Static blender	7	0.203	24.10	-46.45	120	21685.2
IS-41		25	0.203	24.10	-46.45	120	23581.6
IS-42		150	0.203	24.10	-46.45	120	92338.2
IS-43	Inlet of Flash & Off Gas Compressor 2000-GB-03A/B(Propane rich FOG)To Inlet of Bullet 2000-FA-07	7	0.508	20.00	100.46	120	3218.8
IS-44		25	0.508	20.00	100.46	120	3475.7
IS-45		150	0.508	20.00	100.46	120	13229.1
IS-46	Inlet of Flash & Off Gas Compressor 2000-GB-04A/B(Butane rich FOG) To Inlet of Bullet 2000-FA-08	7	0.508	4.50	56.22	120	1178.6
IS-47		25	0.508	4.50	56.22	120	1256.4
IS-48		150	0.508	4.50	56.22	120	4211.0
IS-49	Inlet of Flash & Off Gas Compressor 2000-GB-04A/B(Propylene rich BOG) To Inlet of Bullet 2000-FA-08	7	0.508	17.70	106.39	120	2570.6
IS-50		25	0.508	17.70	106.39	120	2788.7
IS-51		150	0.508	17.70	106.39	120	11073.6
IS-52	Bullet 2000-FA-07 through Bullet Pump 2000-GA -07A/B To Static Blender(Propane Rich	7	0.203	23.30	46.00	120	339068.3
IS-53		25	0.203	23.30	46.00	120	340670.1

Isolatable section identification	Description	Scenario	Diameter m	Pressure barg.	Temperature C	Isolation time s	Total Inventory, kg
IS-54	stream)	150	0.203	23.30	46.00	120	395837.3
IS-55	Bullet 2000-FA-08 through Bullet Pump 2000-GA -08A/B To Static Blender(Butane Rich stream)	7	0.203	24.00	46.42	120	410938.9
IS-56		25	0.203	24.00	46.42	120	412677.4
IS-57		150	0.203	24.00	46.42	120	478702.0
IS-58	Bullet 2000-FA-08 through Bullet Pump 2000-GA -08A/B To Static Blender(Propylene Rich stream)	7	0.203	21.00	45.07	120	363254.2
IS-59		25	0.203	21.00	45.07	120	364797.1
IS-60		150	0.203	21.00	45.07	120	423390.1
IS-61	Mercaptan Dosing System 2000-CS-01 To Static Blender	7	0.025	12.30	36.29	120	1711.6
IS-62		25	0.025	12.30	36.29	120	3258.1
IS-63	Static Blender outlet to Tanker Loading Bay	7	0.356	12.30	15.39	120	27129.1
IS-64		25	0.356	12.30	15.39	120	28340.6
IS-65		150	0.356	12.30	15.39	120	74352.2

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT – TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

6 CONSEQUENCE ANALYSIS

6.1 Overview

Consequence is the measure of the expected outcomes for a given accidental release. For this project, consequence is defined as the hazard distance or hazard zone to various fatality endpoints. During the execution of site-specific consequence analysis, it is essential to accurately model the release, dilution, and dispersion of gases and aerosols if a precise assessment of potential exposure is to be attained. Consequence modelling, also known as physical effects modelling, is a technique in which computer based mathematical modelling is used to predict physical behaviour under accident conditions in order to make a quantitative estimation of risk. Internationally accepted and validated software PHAST v6.7 and PHAST RISK v.6.7, (both developed by DNV GL) have been used for this project.

PHAST v6.7 contains a set of complex models that calculate release conditions, initial dilution of the vapour (dependent upon the release characteristics), and the subsequent dispersion of the vapour introduced into the atmosphere. It permits the user to evaluate the downwind dispersion of the chemical cloud based on the toxicological/physical characteristics of the released chemical, atmospheric conditions, and specific circumstances of the release.

PHAST v6.7 will be used to estimate threat zones associated with several types of hazardous chemical releases, including toxic gas clouds, fires, and explosions.

It is most important that the QRA model effectively reflect reality, thus those familiar with the facilities and their operation are required for proper evaluation. This is particularly true in relation to the preparation of input data and assumptions and the review of results from the evaluation. The QRA model must identify the major hazard contributors to the work force and third parties, quantify risks, and identify and assess any risk reduction methods that may be proposed. In addition to modelling the current situation within the field, the model shall be extendible to add additional facilities as development occurs and provide an active method of planning any proposed development.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT – TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

6.2 Consequence Modelling

Discharge Rate

The initial rate of release through a leak depends mainly on the pressure inside the equipment, size of the hole and phases of the release (liquid, gas or two phase). The release rate decreases with time as the equipment depressurizes. The reduction mainly on the inventory and the actions taken to isolate the leak and blow-down the equipment

Dispersion

A vapour cloud may be formed when a vaporizing liquid is released for an extended duration. If the gas cloud does not immediately ignite, it disperses based on the prevalent wind direction, speed and stability category (i.e. degree of turbulence).

The cloud dispersion simulation is carried out to provide the distance (from the leak) at which the concentration of flammable material falls below the Lower Flammability Limit (LFL).

Consequence Events

The following describes the probabilities associated with the sequence of events which must take place for the incident scenarios to produce hazardous effects. Considering the present case, the outcomes expected are:

- Flash Fire (FF);
- Jet fires;
- Pool fire;
- Vapour Cloud Explosion.

Flash Fire

The vapour/gas release from a pool would disperse under the influence of the prevailing wind; with material concentration in air reducing with distance. At a particular location downwind, the concentration will drop below its lower flammable level (LFL) value. If ignited within the flammable envelope, the mass of the material available between the LFL and $\frac{1}{2}$ LFL will be likely to burn as a flash fire; rapidly spreading through the cloud from the point of ignition back to the source of release.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT – TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

Although flash fires are generally low intensity transitory events, the burning velocity is quite high and escape following ignition is not possible. Flash fires often remain close to the ground, where most ignition sources are present. It is assumed that personnel caught inside a flash fire will not survive while those outside suffer no significant harm. If other combustible material is present within the flash fire it is also likely to ignite and a secondary fire could result.

Jet Fire

Jet fire causes damage due to the resulting heat radiation. The working level heat radiation impact will vary widely depending on the angle of the flame to the horizontal plane, which in turn mainly depends on the location of the leak. The flame direction was considered horizontal for consequence analysis of leaks and ruptures from process equipment. Jet fire heat radiation impacts were estimated for the identified credible and worst case scenarios.

Upon accidental leakage, the pressurized fluid will disperse as a jet, initially moving forward in the spatial direction of the leak until the kinetic energy is lost and gravity slumping or lifting of the cloud occurs, dependent upon whether the fluid is heavier or lighter than air.

The primary hazard associated with jet fires is thermal radiation and potential for flame impingement on adjacent pipelines/equipment, resulting in escalation. High pressure releases have the potential to cover large areas due to its relatively large flame length. However, the effects of escalation are minimized if the flame length reduces to less than the separation distance between other equipment and the jet fire source.

Pool Fire

A liquid pool is formed during a prolonged leakage if the rate of leakage exceeds the rate of vaporization. On ignition, this would result in a pool fire whose size/radius would depend on the mass flow rate, ambient temperature, heat of vaporization of material released, vapour pressure, duration of discharge and effects of containment or dykes. The pool fire could cause damage to equipment or injury/fatality to personnel due to thermal radiation effects.

A pool fire is not envisaged for liquid systems that are highly pressurized. Any leak or rupture would result in a pressurized release leading to a liquid jet fire or flash fire.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT – TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

Vapour Cloud Explosion

Vapour cloud explosion is the result of flammable materials in the atmosphere, a subsequent dispersion phase, and after some delay an ignition of the vapour cloud. Turbulence is the governing factor in blast generation which could intensify combustion to the level that will result in an explosion. Turbulence is often created by obstacles in the path of vapour cloud or when the cloud finds a confined area, as under the bullets. Insignificant level of confinement will result in a flash fire. The VCE will result in overpressures.

6.3 Damage Criteria

Damage criteria gives the relation between the extent of the physical effects (exposure) and the effect of consequences. For assessing the effects on humans, consequences are expressed in terms of injuries and the effects on equipment / property in terms of monetary loss. The consequences for release of toxic substances or fire can be categorized as:

- Damage caused by heat radiation on material and people;
- Damage caused by explosion on structure and people; and

In Consequence Analysis studies, three main types of exposure to hazardous effects are categorized as:

- Heat radiation due to fires.
- Jet fires and flash fires;
- Explosions;

The knowledge about these relations depends strongly on the nature of the exposure. The following discusses the criteria selected for damage estimation:

Heat Radiation:

The effect of fire on a human being is in the form of burns. There are three categories of burns: first degree, second degree and third degree burns being the most severe. The consequences caused by exposure to heat radiation are a function of:

- The radiation energy onto the human body [kW/m²];

- The exposure duration [sec]; and
- The protection of the skin tissue (clothed or bare body).

The physical effects of hazard events are given in the table below:

Table 4: Effects due to Incident Radiation Intensity

Incident Radiation (kW/m ²)	Type of Damage
4.7	Sufficient to cause pain within 20 sec. Blistering of skin(first degree burns are likely)
12.5	Minimum energy required for piloted ignition of wood, melting plastic tubing's etc.
37.5	Sufficient to cause damage to the equipment

The actual results would be less severe due to the various assumptions made in the models arising out of the flame geometry, emissivity, angle of incidence, view factor and others. The radiation output of the flame would be dependent upon the fire size, extent of mixing with air and the flame temperature. Some fraction of the radiation is absorbed by carbon dioxide and water vapour in the intervening atmosphere. Finally, the incident flux at an observer location would depend upon the radiation view factor, which is a function of the distance from the flame surface, the observer's orientation and the flame geometry.

Blast Overpressure from Vapour cloud Explosion (VCE)

The assessment aims are to determine the impact of overpressure in the event that a flammable gas cloud is ignited. A Vapour cloud Explosion (VCE) results when a flammable vapour is released and mixes with the air to form a flammable vapour cloud. If ignited, the flame speed may accelerate to high velocities and produce significant blast overexposure.

The assessment goals are to determine the impact of overpressure in the event that a flammable gas cloud is ignited. The damage effects due to 0.01 bar, 0.1 bar & 0.3 bar are reported in terms of distance from the overpressure source.

In case of vapour cloud explosion, two physical effects may occur:

- A flash fire over the whole length of the explosive gas cloud;
- A blast wave, with typical peak overpressures circular around ignition source.

For the blast wave, the lethality criterion is based on:

- A peak overpressure of 0.1bar will cause serious damage to 10% of the housing/structures;
- Falling fragments will kill one of each eight persons in the destroyed buildings.

The following damage criteria may be distinguished with respect to the peak overpressures resulting from a blast wave

TABLE 5: DAMAGES DUE TO BLAST OVERPRESSURE

Peak Overpressure	Damage Type	Description
0.30 bar	Heavy Damage	Major damage to plant equipment structure
0.10 bar	Moderate Damage	Repairable damage to plant equipment & structure
0.01 bar	Significant Damage	Shattering of glass

The summary of the consequence modelling is shown below in

TABLE 6: IMPACT DISTANCE IN METER

Isolatable Section/Description	Release category	Flash Fire Effects: 0.5% LFL Ellipse			Flash Fire Effects: 100% LFL Ellipse			Radiation Effects: Jet Fire Ellipse			Radiation Effects: Pool Fire			Overpressure					
		Distance in meters			Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters		
		5D	1.5F	2F	5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F
Transfer of Propane from Jetty to Storage Tank 2000-FB-01	7	8.19104	24.4843	21.0653	6.41862	12.2659	10.1915	4	23.1853	26.7283	25.9291	4	NR	NR	NR	0.01	NR	74.9525	70.1064
		8.19104	24.4843	21.0653	6.41862	12.2659	10.1915	12.5	17.5949	21.3412	20.4624	12.5	NR	NR	NR	0.1	NR	29.5322	28.6915
		8.19104	24.4843	21.0653	6.41862	12.2659	10.1915	37.5	13.9777	17.7971	16.878	37.5	NR	NR	NR	0.3	NR	24.7597	24.34
	25	52.1634	73.6826	68.0846	35.6415	59.6057	54.5213	4	73.8934	84.2143	81.9038	4	NR	NR	NR	0.01	228.541	518.96	438.727
		52.1634	73.6826	68.0846	35.6415	59.6057	54.5213	12.5	56.2605	67.2694	64.6926	12.5	NR	NR	NR	0.1	80.97	147.877	125.695
		52.1634	73.6826	68.0846	35.6415	59.6057	54.5213	37.5	45.5539	56.6361	53.9634	37.5	NR	NR	NR	0.3	65.4644	108.887	92.8036
	150	258.749	375.621	337.936	179.492	272.883	239.639	4	364.347	410.315	400.219	4	329.126	371.147	370.567	0.01	1302.15	2534.23	2207.2
		258.749	375.621	337.936	179.492	272.883	239.639	12.5	274.039	323.382	311.984	12.5	226.117	234.372	238.39	0.1	432.507	745.411	655.622
		258.749	375.621	337.936	179.492	272.883	239.639	37.5	219.755	270.113	258.104	37.5	146.3	134.926	139.299	0.3	341.132	557.456	492.594
Transfer of Butane from Jetty to Storage Tank 2000-FB-02	7	8.35503	24.7542	21.424	6.46825	12.8952	10.4079	4	23.6816	27.0127	26.2689	4	NR	NR	NR	0.01	NR	77.6978	71.7312
		8.35503	24.7542	21.424	6.46825	12.8952	10.4079	12.5	17.7488	21.3121	20.4816	12.5	NR	NR	NR	0.1	NR	30.0084	28.9734
		8.35503	24.7542	21.424	6.46825	12.8952	10.4079	37.5	13.9617	17.6272	16.7539	37.5	NR	NR	NR	0.3	NR	24.9975	24.4807
	25	52.4963	74.8549	68.8995	35.9099	61.1679	55.2733	4	75.6169	85.3103	83.1708	4	NR	NR	NR	0.01	232.205	530.996	445.155
		52.4963	74.8549	68.8995	35.9099	61.1679	55.2733	12.5	56.808	67.2758	64.8483	12.5	NR	NR	NR	0.1	81.6056	149.965	126.81
		52.4963	74.8549	68.8995	35.9099	61.1679	55.2733	37.5	45.5372	56.1973	53.6472	37.5	NR	NR	NR	0.3	65.7818	109.929	93.3604
	150	252.695	369.884	327.053	178.137	283.149	243.278	4	374.027	417.208	407.894	4	376.004	423.016	421.929	0.01	1344.39	2577.29	2292.63
		252.695	369.884	327.053	178.137	283.149	243.278	12.5	277.694	324.579	313.853	12.5	256.289	266.515	270.538	0.1	439.835	735.63	662.175
		252.695	369.884	327.053	178.137	283.149	243.278	37.5	220.237	268.515	257.08	37.5	167.521	153.603	158.552	0.3	344.791	547.565	490.86
Transfer of Propylene from Jetty to Storage Tank 2000-FB-02	7	8.48215	25.1073	21.6186	6.47378	12.7954	10.4078	4	23.322	26.962	26.1355	4	NR	NR	NR	0.01	NR	77.4421	71.5503
		8.48215	25.1073	21.6186	6.47378	12.7954	10.4078	12.5	17.7566	21.5923	20.6914	12.5	NR	NR	NR	0.1	NR	29.964	28.942
		8.48215	25.1073	21.6186	6.47378	12.7954	10.4078	37.5	14.1527	18.0722	17.1118	37.5	NR	NR	NR	0.3	NR	24.9754	24.4651
	25	53.298	76.7204	70.6404	36.0195	61.4873	55.5823	4	74.246	84.8547	82.4757	4	NR	33.8476	29.8157	0.01	231.313	517.363	445.217
		53.298	76.7204	70.6404	36.0195	61.4873	55.5823	12.5	56.714	67.9793	65.3411	12.5	NR	27.0093	24.8155	0.1	81.4509	147.6	135.086
		53.298	76.7204	70.6404	36.0195	61.4873	55.5823	37.5	46.0263	57.3125	54.5893	37.5	NR	20.7604	19.6272	0.3	65.7046	108.749	102.5
	150	261.821	392.817	354.39	177.169	273.005	242.261	4	365.626	412.901	402.501	4	404.296	446.482	443.088	0.01	1332.93	2598.88	2281.88
		261.821	392.817	354.39	177.169	273.005	242.261	12.5	275.88	326.399	314.715	12.5	271.459	287.83	288.582	0.1	446.112	772.777	685.107

Isolatable Section/Description	Release category	Flash Fire Effects: 0.5% LFL Ellipse			Flash Fire Effects: 100% LFL Ellipse			Radiation Effects: Jet Fire Ellipse			Radiation Effects: Pool Fire			Overpressure					
		Distance in meters			Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters		
		5D	1.5F	2F	5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F
Propylene precooling line	7	261.821	392.817	354.39	177.169	273.005	242.261	37.5	221.805	273.177	260.912	37.5	190.319	183.969	187.903	0.3	352.932	581.134	517.331
		13.0493	22.6792	20.4644	7.41065	17.6767	15.5991	4	23.5639	27.2164	26.3892	4	11.926	15.4551	14.9825	0.01	50.9971	125.56	108.471
		13.0493	22.6792	20.4644	7.41065	17.6767	15.5991	12.5	18.1806	22.0249	21.1171	12.5	10.3905	12.0427	11.9505	0.1	17.1114	38.3107	35.3463
		13.0493	22.6792	20.4644	7.41065	17.6767	15.5991	37.5	14.8198	18.6104	17.6889	37.5	8.59991	9.03457	8.83125	0.3	13.551	29.1432	27.663
	25	52.6439	64.8035	59.6876	37.2279	50.7936	46.5364	4	74.3176	84.9283	82.548	4	56.441	70.0417	68.7812	0.01	261.617	529.885	449.768
		52.6439	64.8035	59.6876	37.2279	50.7936	46.5364	12.5	56.8288	68.0994	65.4597	12.5	41.0686	47.3376	47.2271	0.1	86.7074	141.507	119.345
		52.6439	64.8035	59.6876	37.2279	50.7936	46.5364	37.5	46.2006	57.4791	54.7526	37.5	29.0907	30.0176	30.6312	0.3	68.3293	100.699	84.6261
	150	241.63	361.827	341.00	156.477	238.735	210.132	4	365.639	394.67	385.972	4	412.21	428.202	427.84	0.01	1250.69	2285.99	2098.45
		241.63	361.827	341.00	156.477	238.735	210.132	12.5	275.903	312.104	301.894	12.5	273.449	272.883	275.502	0.1	415.316	627.962	609.652
241.63		361.827	341.00	156.477	238.735	210.132	37.5	221.838	261.274	250.357	37.5	188.759	171.12	176.19	0.3	327.542	455.408	464.633	
Methanol P/L	10	13.2879	23.4516	21.0787	6.83624	11.399	11.0517	4	35.979	44.0716	42.1378	4	NR	44.3716	43.1432	0.01	37.965	65.8894	64.6327
		13.2879	23.4516	21.0787	6.83624	11.399	11.0517	12.5	29.5076	37.1441	35.2776	12.5	NR	30.9147	30.7607	0.1	14.8509	27.96	27.7421
		13.2879	23.4516	21.0787	6.83624	11.399	11.0517	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	12.4222	23.9747	23.8659
	150	76.6849	121.93	106.998	50.0444	70.6208	69.2059	4	209.858	235.718	226.635	4	142.032	136.037	136.988	0.01	226.029	294.232	298.903
		76.6849	121.93	106.998	50.0444	70.6208	69.2059	12.5	171.207	199.537	190.182	12.5	108.836	97.0531	99.1266	0.1	97.0651	125.426	133.727
		76.6849	121.93	106.998	50.0444	70.6208	69.2059	37.5	139.528	NR	NR	37.5	75.5624	72.4929	72.3265	0.3	83.5145	109.603	116.841
MS P/L	10	23.2156	32.6662	29.6652	15.2315	26.4028	23.5931	4	33.671	37.5937	36.724	4	NR	NR	NR	0.01	98.5467	225.457	172.851
		23.2156	32.6662	29.6652	15.2315	26.4028	23.5931	12.5	24.9996	29.3562	28.3433	12.5	NR	NR	NR	0.1	33.6248	63.9044	46.5137
		23.2156	32.6662	29.6652	15.2315	26.4028	23.5931	37.5	19.8615	24.3735	23.2947	37.5	NR	NR	NR	0.3	26.8034	46.9296	33.2392
	150	155.249	207.395	185.209	113.8	169.587	148.074	4	303.961	326.379	321.139	4	168.27	136.482	142.569	0.01	818.819	1189.97	1184.48
		155.249	207.395	185.209	113.8	169.587	148.074	12.5	224.278	249.763	243.019	12.5	82.0953	79.7338	79.518	0.1	266.014	317.542	308.385
HSD P/L	10	13.5951	11.582	11.4441	12.8557	11.3689	11.2462	4	11.9794	9.23875	9.2571	4	85.1624	70.0438	73.0102	0.01	32.693	30.4035	31.4317
		13.5951	11.582	11.4441	12.8557	11.3689	11.2462	12.5	8.73359	7.02619	6.95779	12.5	41.0876	37.835	37.668	0.1	13.9364	13.5392	13.7176
		13.5951	11.582	11.4441	12.8557	11.3689	11.2462	37.5	6.71139	5.43322	5.3477	37.5	NR	NR	NR	0.3	11.9656	11.7673	11.8563
	150	33.0936	29.5643	29.4502	33.0364	29.5573	29.4445	4	29.4646	28.7595	28.2825	4	218.455	185.219	191.383	0.01	51.2393	29.4186	29.6151
		33.0936	29.5643	29.4502	33.0364	29.5573	29.4445	12.5	21.557	22.1526	21.5302	12.5	118.02	113.912	113.79	0.1	33.6842	21.6338	21.6678
		33.0936	29.5643	29.4502	33.0364	29.5573	29.4445	37.5	16.9013	18.1956	17.4941	37.5	NR	NR	NR	0.3	31.8397	20.8158	20.8328
SKO P/L	10	13.95	17.2974	15.6677	12.9275	11.4289	11.2942	4	33.6751	26.8337	26.8878	4	77.6411	66.7752	69.687	0.01	57.5866	53.7609	55.9137
		13.95	17.2974	15.6677	12.9275	11.4289	11.2942	12.5	24.7386	20.7828	20.5746	12.5	36.4009	35.1158	34.8127	0.1	18.2545	17.5908	17.9643

Isolatable Section/Description	Release category	Flash Fire Effects: 0.5% LFL Ellipse			Flash Fire Effects: 100% LFL Ellipse			Radiation Effects: Jet Fire Ellipse				Radiation Effects: Pool Fire				Overpressure			
		Distance in meters			Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters		
		5D	1.5F	2F	5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F
		5D	1.5F	2F	5D	1.5F	2F	5D	1.5F	2F	5D	1.5F	2F	5D	1.5F	2F			
	150	13.95	17.2974	15.6677	12.9275	11.4289	11.2942	37.5	19.4742	17.1296	16.783	37.5	NR	NR	NR	0.3	14.1217	13.7904	13.9768
		39.798	37.3946	37.767	32.7517	29.2454	29.1351	4	90.2507	88.3046	86.9503	4	147.559	121.643	126.421	0.01	78.1448	72.8802	73.4377
		39.798	37.3946	37.767	32.7517	29.2454	29.1351	12.5	65.7575	67.6656	65.8591	12.5	78.5757	73.4972	73.3811	0.1	38.3513	37.4381	37.5348
		39.798	37.3946	37.767	32.7517	29.2454	29.1351	37.5	51.4125	55.4211	53.3769	37.5	NR	NR	NR	0.3	34.1701	33.7141	33.7624
FURNACE OIL	10	14.7963	NR	11.7005	13.4331	NR	11.3746	4	NR	NR	NR	4	79.8512	67.7607	70.0269	0.01	NR	NR	NR
		14.7963	NR	11.7005	13.4331	NR	11.3746	12.5	NR	NR	NR	12.5	42.2865	38.5883	38.4596	0.1	NR	NR	NR
		14.7963	NR	11.7005	13.4331	NR	11.3746	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
	150	NR	NR	NR	NR	NR	NR	4	NR	NR	NR	4	109.734	94.4439	97.0658	0.01	NR	NR	NR
		NR	NR	NR	NR	NR	NR	12.5	NR	NR	NR	12.5	66.4692	61.6346	61.5704	0.1	NR	NR	NR
		NR	NR	NR	NR	NR	NR	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
CRUDE	10	24.9248	35.8405	32.5164	16.6034	28.6941	25.8864	4	29.749	34.6209	34.0991	4	NR	NR	NR	0.01	104.653	237.787	206.342
		24.9248	35.8405	32.5164	16.6034	28.6941	25.8864	12.5	21.3767	25.8094	25.124	12.5	NR	NR	NR	0.1	34.6841	66.043	60.5885
		24.9248	35.8405	32.5164	16.6034	28.6941	25.8864	37.5	16.4918	20.6567	19.8868	37.5	NR	NR	NR	0.3	27.3323	47.9976	45.2739
	150	269.536	403.72	348.47	202.34	332.297	283.898	4	268.919	325.533	314.373	4	163.372	164.136	170.158	0.01	1583.86	2994.33	2733.84
		269.536	403.72	348.47	202.34	332.297	283.898	12.5	198.353	247.302	236.963	12.5	81.2582	96.7701	95.8433	0.1	489.64	791.031	754.644
		269.536	403.72	348.47	202.34	332.297	283.898	37.5	156.56	200.903	191.054	37.5	NR	NR	NR	0.3	374.667	590.249	547.046
Inlet of Boil Off Compressor 2000-GB-01A/B(Propane rich BOG)To Inlet of Bullet 2000-FA-07	7	3.95939	5.69915	5.3805	2.59421	3.23132	3.13596	4	5.76976	6.14772	6.10136	4	NR	NR	NR	0.01	NR	NR	NR
		3.95939	5.69915	5.3805	2.59421	3.23132	3.13596	12.5	NR	NR	NR	12.5	NR	NR	NR	0.1	NR	NR	NR
		3.95939	5.69915	5.3805	2.59421	3.23132	3.13596	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
	25	25.2116	44.6141	41.4835	8.62918	11.9576	11.4839	4	25.77	25.6478	25.6709	4	NR	NR	NR	0.01	56.3862	83.3316	82.6209
		25.2116	44.6141	41.4835	8.62918	11.9576	11.4839	12.5	21.3237	20.4915	20.6151	12.5	NR	NR	NR	0.1	26.3116	47.5164	47.3931
		25.2116	44.6141	41.4835	8.62918	11.9576	11.4839	37.5	17.5892	16.2824	16.471	37.5	NR	NR	NR	0.3	23.1516	43.7532	43.6916
	150	200.447	319.821	319.826	134.394	244.158	237.316	4	144.978	145.496	145.553	4	NR	NR	NR	0.01	723.876	1134.21	1076.15
		200.447	319.821	319.826	134.394	244.158	237.316	12.5	111.284	106.445	107.231	12.5	NR	NR	NR	0.1	290.872	395.112	401.57
		200.447	319.821	319.826	134.394	244.158	237.316	37.5	86.3595	80.8619	81.6215	37.5	NR	NR	NR	0.3	245.376	342.868	330.691
Inlet of Boil Off Compressor 2000-GB-02A/B(Butan	7	2.45641	3.57427	3.36176	1.63578	2.06461	1.99585	4	NR	NR	NR	4	NR	NR	NR	0.01	NR	NR	NR
		2.45641	3.57427	3.36176	1.63578	2.06461	1.99585	12.5	NR	NR	NR	12.5	NR	NR	NR	0.1	NR	NR	NR
		2.45641	3.57427	3.36176	1.63578	2.06461	1.99585	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
	25	8.44544	16.9822	15.956	5.1015	6.99531	6.66499	4	14.7788	14.4225	14.4778	4	NR	NR	NR	0.01	NR	36.5785	35.9817
		8.44544	16.9822	15.956	5.1015	6.99531	6.66499	12.5	11.8075	11.0018	11.118	12.5	NR	NR	NR	0.1	NR	14.6104	14.5068

Isolatable Section/Description	Release category	Flash Fire Effects: 0.5% LFL Ellipse			Flash Fire Effects: 100% LFL Ellipse			Radiation Effects: Jet Fire Ellipse			Radiation Effects: Pool Fire			Overpressure					
		Distance in meters			Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters		
		5D	1.5F	2F	5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F
		5D	1.5F	2F	5D	1.5F	2F	5D	1.5F	2F	5D	1.5F	2F	5D	1.5F	2F			
e rich BOG) To Inlet of Bullet 2000-FA-08	150	8.44544	16.9822	15.956	5.1015	6.99531	6.66499	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	12.3021	12.2504
		106.375	192.361	154.192	71.0223	122.021	108.628	4	85.4202	85.5175	85.6015	4	NR	NR	NR	0.01	373.054	636.474	585.652
		106.375	192.361	154.192	71.0223	122.021	108.628	12.5	67.1765	62.8469	63.5541	12.5	NR	NR	NR	0.1	147.364	242.65	225.569
		106.375	192.361	154.192	71.0223	122.021	108.628	37.5	53.0092	47.5393	48.3427	37.5	NR	NR	NR	0.3	123.651	201.27	187.734
Inlet of Boil Off Compressor 2000-GB-02A/B(Propylene rich BOG) To Inlet of Bullet 2000-FA-08	7	3.74988	5.37039	5.07568	2.44292	3.03678	2.94537	4	5.11187	5.28508	5.27753	4	NR	NR	NR	0.01	NR	NR	NR
		3.74988	5.37039	5.07568	2.44292	3.03678	2.94537	12.5	NR	NR	NR	12.5	NR	NR	NR	0.1	NR	NR	NR
		3.74988	5.37039	5.07568	2.44292	3.03678	2.94537	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
	25	22.3451	39.7375	37.8588	7.89982	10.7341	10.3657	4	23.1513	23.1449	23.1507	4	NR	NR	NR	0.01	53.3822	69.0904	68.6161
		22.3451	39.7375	37.8588	7.89982	10.7341	10.3657	12.5	19.2151	18.622	18.7105	12.5	NR	NR	NR	0.1	25.7905	36.7807	36.6984
		22.3451	39.7375	37.8588	7.89982	10.7341	10.3657	37.5	15.7669	14.7774	14.9189	37.5	NR	NR	NR	0.3	22.8914	33.3858	33.3448
	150	195.067	329.94	297.749	129.692	244.385	199.975	4	134.061	134.213	134.277	4	NR	NR	NR	0.01	674.044	1067.71	1022.77
		195.067	329.94	297.749	129.692	244.385	199.975	12.5	103.747	99.3784	100.078	12.5	NR	NR	NR	0.1	273.963	408.373	417.108
		195.067	329.94	297.749	129.692	244.385	199.975	37.5	81.1141	76.0181	76.7142	37.5	NR	NR	NR	0.3	231.926	340.567	353.469
Propane from 2000 - GA-01A/B/C to Propane heater I, 2000-EA-05 & Propane heater II, 2000-EA-07 to static blender	7	19.761	31.425	28.524	11.2991	23.8286	21.2006	4	28.6403	32.5995	31.6409	4	NR	NR	NR	0.01	60.2337	152.037	120.419
		19.761	31.425	28.524	11.2991	23.8286	21.2006	12.5	21.9826	26.3452	25.2892	12.5	NR	NR	NR	0.1	18.7136	51.1687	37.4188
		19.761	31.425	28.524	11.2991	23.8286	21.2006	37.5	17.9353	22.4273	21.3381	37.5	NR	NR	NR	0.3	14.351	40.5703	28.6978
	25	69.8805	84.949	92.733	50.7261	75.225	67.8084	4	90.7644	102.242	99.4697	4	NR	NR	NR	0.01	331.136	713.254	606.746
		69.8805	84.949	92.733	50.7261	75.225	67.8084	12.5	69.0289	81.8424	78.7467	12.5	NR	NR	NR	0.1	107.032	198.111	171.37
		69.8805	84.949	92.733	50.7261	75.225	67.8084	37.5	56.0267	69.3661	66.1407	37.5	NR	NR	NR	0.3	83.4846	143.983	125.624
	150	332.293	511.80	452.15	228.004	373.582	319.509	4	448.824	499.767	487.531	4	384.649	388.834	392.24	0.01	1636.84	2534.65	2391.51
		332.293	511.80	452.15	228.004	373.582	319.509	12.5	337.395	394.824	380.99	12.5	264.012	246.374	252.914	0.1	548.421	705.959	710.059
		332.293	511.80	452.15	228.004	373.582	319.509	37.5	270.747	331.247	316.64	37.5	170.826	142.871	148.642	0.3	434.058	562.789	544.81
Butane from 2000-GA-02A/B/C to Butane heater I, 2000-EA-08 & Butane heater II,	7	20.040	31.591	28.678	11.5227	24.1719	21.5152	4	29.2466	32.9126	32.0248	4	NR	NR	NR	0.01	74.1382	156.082	123.826
		20.040	31.591	28.678	11.5227	24.1719	21.5152	12.5	22.1385	26.2542	25.2582	12.5	NR	NR	NR	0.1	29.3909	51.8705	38.0098
		20.040	31.591	28.678	11.5227	24.1719	21.5152	37.5	17.8779	22.1732	21.1338	37.5	NR	NR	NR	0.3	24.6892	40.9207	28.9929
	25	70.154	94.000	85.768	51.0051	77.1093	68.493	4	92.9257	103.529	100.971	4	NR	NR	NR	0.01	346.894	732.265	618.804
		70.154	94.000	85.768	51.0051	77.1093	68.493	12.5	69.7011	81.7708	78.8568	12.5	NR	NR	NR	0.1	118.031	201.408	173.462
		70.154	94.000	85.768	51.0051	77.1093	68.493	37.5	55.95	68.6765	65.5977	37.5	NR	NR	NR	0.3	93.9833	145.63	126.669
	150	315.764	467.07	422.24	221.611	363.052	316.332	4	441.45	507.849	496.596	4	422.199	427.104	430.462	0.01	1543.58	2571.79	2385.38

Isolatable Section/Description	Release category	Flash Fire Effects: 0.5% LFL Ellipse			Flash Fire Effects: 100% LFL Ellipse			Radiation Effects: Jet Fire Ellipse			Radiation Effects: Pool Fire			Overpressure					
		Distance in meters			Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters		
		5D	1.5F	2F	5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F
2000-EA-10 to Static blender		315.764	467.07	422.24	221.611	363.052	316.332	12.5	330.12	395.927	382.938	12.5	288.016	270.183	276.926	0.1	514.011	695.511	678.844
		315.764	467.07	422.24	221.611	363.052	316.332	37.5	263.714	328.735	314.856	37.5	188.405	156.971	163.396	0.3	406.863	542.383	524.217
Propylene from 2000-GA-02A/B/C to heater I, 2000-EA-08 & Propylene heater II, 2000-EA-10 to Static blender	7	19.844	31.462	28.529	11.3612	23.9377	21.3021	4	28.5746	32.6279	31.6498	4	NR	NR	NR	0.01	61.7557	155.459	123.806
		19.844	31.462	28.529	11.3612	23.9377	21.3021	12.5	22.0029	26.4434	25.3708	12.5	NR	NR	NR	0.1	18.9776	51.7623	38.0064
		19.844	31.462	28.529	11.3612	23.9377	21.3021	37.5	17.9849	22.5362	21.4337	37.5	NR	NR	NR	0.3	14.4829	40.8667	28.9912
	25	70.291	92.734	84.917	50.6028	74.3666	67.4316	4	90.4281	102.184	99.3588	4	NR	NR	NR	0.01	343.836	711.515	608.42
		70.291	92.734	84.917	50.6028	74.3666	67.4316	12.5	68.9988	82.0344	78.8932	12.5	NR	NR	NR	0.1	117.5	197.809	171.661
		70.291	92.734	84.917	50.6028	74.3666	67.4316	37.5	56.1259	69.6339	66.3678	37.5	NR	NR	NR	0.3	93.7184	143.833	125.769
	150	333.78	519.81	472.86	223.71	363.798	314.673	4	446.51	498.668	486.229	4	437.366	449.931	450.833	0.01	1632.17	2525.39	2390.76
		333.78	519.81	472.86	223.71	363.798	314.673	12.5	336.675	395.089	381.066	12.5	294.286	290.819	294.3	0.1	547.612	710.325	712.117
		333.78	519.81	472.86	223.71	363.798	314.673	37.5	270.824	332.113	317.333	37.5	207.007	186.668	192.342	0.3	433.655	556.628	540.831
Inlet of Flash & Off Gas Compressor 2000-GB-03A/B(Propane rich FOG)To Inlet of Bullet 2000-FA-07	7	3.95954	5.69831	5.38078	2.59431	3.23143	3.13617	4	5.77006	6.14799	6.10163	4	NR	NR	NR	0.01	NR	NR	NR
		3.95954	5.69831	5.38078	2.59431	3.23143	3.13617	12.5	NR	NR	NR	12.5	NR	NR	NR	0.1	NR	NR	NR
		3.95954	5.69831	5.38078	2.59431	3.23143	3.13617	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
	25	25.2116	44.6141	41.4835	8.62918	11.9576	11.4839	4	25.77	25.6478	25.6709	4	NR	NR	NR	0.01	56.3862	83.3316	82.6209
		25.2116	44.6141	41.4835	8.62918	11.9576	11.4839	12.5	21.3237	20.4915	20.6151	12.5	NR	NR	NR	0.1	26.3116	47.5164	47.3931
		25.2116	44.6141	41.4835	8.62918	11.9576	11.4839	37.5	17.5892	16.2824	16.471	37.5	NR	NR	NR	0.3	23.1516	43.7532	43.6916
	150	200.584	349.068	315.935	134.43	260.457	210.956	4	144.908	145.421	145.478	4	NR	NR	NR	0.01	723.645	1167.51	1124.99
		200.584	349.068	315.935	134.43	260.457	210.956	12.5	111.24	106.408	107.193	12.5	NR	NR	NR	0.1	290.832	425.683	451.37
		200.584	349.068	315.935	134.43	260.457	210.956	37.5	86.3319	80.8407	81.599	37.5	NR	NR	NR	0.3	245.356	367.265	380.591
Inlet of Flash & Off Gas Compressor 2000-GB-04A/B(Butane rich FOG) To Inlet of Bullet	7	2.47275	3.60481	3.38894	1.65008	2.08582	2.01659	4	NR	NR	NR	4	NR	NR	NR	0.01	NR	NR	NR
		2.47275	3.60481	3.38894	1.65008	2.08582	2.01659	12.5	NR	NR	NR	12.5	NR	NR	NR	0.1	NR	NR	NR
		2.47275	3.60481	3.38894	1.65008	2.08582	2.01659	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
	25	8.53475	17.3862	16.3397	5.14268	7.07018	6.72097	4	14.9219	14.5433	14.6019	4	NR	NR	NR	0.01	NR	36.868	36.1891
		8.53475	17.3862	16.3397	5.14268	7.07018	6.72097	12.5	11.9244	11.0832	11.2034	12.5	NR	NR	NR	0.1	NR	14.6606	14.5428
		8.53475	17.3862	16.3397	5.14268	7.07018	6.72097	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	12.3272	12.2684
	150	105.912	172.455	153.129	70.9915	122.296	108.688	4	85.6548	85.8061	85.8891	4	NR	NR	NR	0.01	374.617	654.652	591.271
		105.912	172.455	153.129	70.9915	122.296	108.688	12.5	67.3363	62.9594	63.6787	12.5	NR	NR	NR	0.1	147.636	254.069	226.544

Isolatable Section/Description	Release category	Flash Fire Effects: 0.5% LFL Ellipse			Flash Fire Effects: 100% LFL Ellipse			Radiation Effects: Jet Fire Ellipse				Radiation Effects: Pool Fire				Overpressure			
		Distance in meters			Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters		
		5D	1.5F	2F	5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F
		5D	1.5F	2F	5D	1.5F	2F	5D	1.5F	2F	5D	1.5F	2F	5D	1.5F	2F			
2000-FA-08		105.912	172.455	153.129	70.9915	122.296	108.688	37.5	53.1171	47.5709	48.3869	37.5	NR	NR	NR	0.3	123.786	211.978	188.221
Inlet of Flash & Off Gas Compressor 2000-GB-04A/B(Propylene rich BOG) To Inlet of Bullet 2000-FA-08	7	3.75984	5.39311	5.09535	2.45411	3.05385	2.96217	4	5.13068	5.29607	5.28927	4	NR	NR	NR	0.01	NR	NR	NR
		3.75984	5.39311	5.09535	2.45411	3.05385	2.96217	12.5	NR	NR	NR	12.5	NR	NR	NR	0.1	NR	NR	NR
		3.75984	5.39311	5.09535	2.45411	3.05385	2.96217	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
		3.75984	5.39311	5.09535	2.45411	3.05385	2.96217	37.5	NR	NR	NR	37.5	NR	NR	NR	0.3	NR	NR	NR
	25	22.5011	40.1051	37.9405	7.94576	10.8439	10.4094	4	23.2472	23.2237	23.232	4	NR	NR	NR	0.01	53.5631	79.4429	68.7383
		22.5011	40.1051	37.9405	7.94576	10.8439	10.4094	12.5	19.2892	18.6681	18.7608	12.5	NR	NR	NR	0.1	25.8219	46.8418	36.7196
		22.5011	40.1051	37.9405	7.94576	10.8439	10.4094	37.5	15.8213	14.7922	14.9399	37.5	NR	NR	NR	0.3	22.9071	43.4164	33.3553
	150	193.846	333.968	296.976	128.965	246.587	199.259	4	134.211	134.38	134.446	4	NR	NR	NR	0.01	674.291	1078.48	1029.12
		193.846	333.968	296.976	128.965	246.587	199.259	12.5	103.808	99.3808	100.096	12.5	NR	NR	NR	0.1	274.006	410.24	418.209
193.846		333.968	296.976	128.965	246.587	199.259	37.5	81.1133	75.9729	76.6781	37.5	NR	NR	NR	0.3	231.947	343.568	354.019	
Bullet 2000-FA-07 through Bullet Pump 2000-GA -07A/B To Static Blender(Propane Rich stream)	7	15.393	31.4454	27.8761	6.62655	9.94566	9.32763	4	21.9862	25.2871	24.4518	4	NR	NR	NR	0.01	39.9469	66.9189	55.8825
		15.393	31.4454	27.8761	6.62655	9.94566	9.32763	12.5	16.9759	20.5051	19.6324	12.5	NR	NR	NR	0.1	15.1946	36.404	26.2242
		15.393	31.4454	27.8761	6.62655	9.94566	9.32763	37.5	13.9611	17.5581	16.6875	37.5	NR	NR	NR	0.3	12.5939	33.1977	23.108
	25	73.9247	117.339	104.627	50.358	88.9154	77.6929	4	70.8513	80.8057	78.2743	4	NR	NR	NR	0.01	270.677	500.108	439.698
		73.9247	117.339	104.627	50.358	88.9154	77.6929	12.5	54.4237	65.1486	62.4967	12.5	NR	NR	NR	0.1	104.81	177.669	158.925
		73.9247	117.339	104.627	50.358	88.9154	77.6929	37.5	44.7288	55.7172	53.0473	37.5	NR	NR	NR	0.3	87.3817	143.789	129.423
	150	377.4	692.051	606.159	277.529	549.239	472.385	4	346.189	403.16	391.408	4	NR	NR	NR	0.01	1755.09	3733	3221.82
		377.4	692.051	606.159	277.529	549.239	472.385	12.5	264.98	321.556	309.162	12.5	NR	NR	NR	0.1	610.261	1217.84	1054.79
		377.4	692.051	606.159	277.529	549.239	472.385	37.5	216.785	272.573	259.986	37.5	NR	NR	NR	0.3	489.971	953.571	827.091
Bullet 2000-FA-08 through Bullet Pump 2000-GA -08A/B To Static Blender(Butane Rich stream)	7	18.0602	32.9234	29.4777	8.72707	18.2068	15.9082	4	25.873	29.166	28.3313	4	NR	NR	NR	0.01	49.2502	94.6799	80.357
		18.0602	32.9234	29.4777	8.72707	18.2068	15.9082	12.5	19.6235	23.304	22.3954	12.5	NR	NR	NR	0.1	16.8084	41.2195	30.4696
		18.0602	32.9234	29.4777	8.72707	18.2068	15.9082	37.5	15.8982	19.7442	18.8067	37.5	NR	NR	NR	0.3	13.3997	35.6023	25.2279
	25	72.3968	105.704	95.1811	51.8335	84.5054	75.4253	4	82.834	92.5141	90.0481	4	NR	NR	NR	0.01	314.625	635.469	549.553
		72.3968	105.704	95.1811	51.8335	84.5054	75.4253	12.5	62.3516	73.3069	70.5951	12.5	NR	NR	NR	0.1	112.433	192.883	169.715
		72.3968	105.704	95.1811	51.8335	84.5054	75.4253	37.5	50.299	61.8356	59.0224	37.5	NR	NR	NR	0.3	91.1883	146.38	129.804
	150	360.661	622.827	540.527	261.807	499.795	420.565	4	384.434	458.029	446.927	4	178.057	267.805	268.903	0.01	1828.95	4095.64	3440.8
		360.661	622.827	540.527	261.807	499.795	420.565	12.5	290.582	358.573	346.232	12.5	132.748	177.183	181.202	0.1	614.807	1222.89	1043.18
		360.661	622.827	540.527	261.807	499.795	420.565	37.5	234.759	299.176	286.246	37.5	97.9639	110.99	115.047	0.3	487.234	921.044	791.255
Bullet 2000-FA-08	7	15.5519	31.7013	28.0916	6.65713	10.0513	9.44351	4	21.362	24.6549	23.8245	4	NR	NR	NR	0.01	39.7807	66.7162	55.7614
		15.5519	31.7013	28.0916	6.65713	10.0513	9.44351	12.5	16.5553	20.0587	19.1968	12.5	NR	NR	NR	0.1	15.1658	36.3689	26.2032

Isolatable Section/Description	Release category	Flash Fire Effects: 0.5% LFL Ellipse			Flash Fire Effects: 100% LFL Ellipse			Radiation Effects: Jet Fire Ellipse				Radiation Effects: Pool Fire				Overpressure			
		Distance in meters			Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Radiation Levels (kW/m ²)	Distance in meters			Overpressure level bar	Distance in meters		
		5D	1.5F	2F	5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F		5D	1.5F	2F
through Bullet Pump 2000-GA-08A/B To Static Blender(Propylene Rich stream)	25	15.5519	31.7013	28.0916	6.65713	10.0513	9.44351	37.5	13.6536	17.215	16.35	37.5	NR	NR	NR	0.3	12.5795	33.1802	23.0975
		74.7468	118.35	105.513	50.9086	89.4158	78.2911	4	68.8686	78.8204	76.2963	4	NR	NR	NR	0.01	269.355	493.622	434.984
		74.7468	118.35	105.513	50.9086	89.4158	78.2911	12.5	53.1168	63.7821	61.1481	12.5	NR	NR	NR	0.1	104.58	176.544	158.107
		74.7468	118.35	105.513	50.9086	89.4158	78.2911	37.5	43.8033	54.6917	52.0498	37.5	NR	NR	NR	0.3	87.2672	143.228	129.015
	150	382.916	696.441	611.555	279.588	553.017	474.306	4	342.116	393.336	381.595	4	NR	NR	NR	0.01	1766.46	3690.47	3193.18
		382.916	696.441	611.555	279.588	553.017	474.306	12.5	262.03	314.896	302.567	12.5	NR	NR	NR	0.1	620.498	1210.47	1058.08
Mercaptan Dosing System 2000-CS-01 To Static Blender	7	8.76848	20.4176	17.7923	5.10721	7.68888	7.17258	4	23.5058	27.679	26.6694	4	21.3157	23.6326	23.3148	0.01	NR	50.025	39.1027
		8.76848	20.4176	17.7923	5.10721	7.68888	7.17258	12.5	18.7109	23.1002	22.0398	12.5	16.8955	17.0496	17.1706	0.1	NR	25.2082	15.0482
		8.76848	20.4176	17.7923	5.10721	7.68888	7.17258	37.5	15.5379	19.7614	18.7482	37.5	12.1308	12.8416	12.5558	0.3	NR	22.6006	12.5207
	25	41.7166	63.6041	57.0692	28.0319	49.5263	43.2257	4	74.0322	86.2239	83.2895	4	57.5445	58.5861	58.7422	0.01	159.92	287.457	244.99
		41.7166	63.6041	57.0692	28.0319	49.5263	43.2257	12.5	58.5121	71.4845	68.3505	12.5	43.5203	40.6053	41.6678	0.1	60.8016	99.4551	83.8234
		41.7166	63.6041	57.0692	28.0319	49.5263	43.2257	37.5	48.6416	61.5374	58.393	37.5	26.3682	25.5562	25.7562	0.3	50.387	79.7013	66.8892
Static Blender outlet to Tanker Loading Bay	7	13.6154	28.3587	25.1053	6.27307	10.5873	9.90391	4	20.7819	23.8571	23.0804	4	NR	NR	NR	0.01	39.8233	58.8711	57.8912
		13.6154	28.3587	25.1053	6.27307	10.5873	9.90391	12.5	16.0653	19.3962	18.5737	12.5	NR	NR	NR	0.1	15.1732	26.7426	26.5727
		13.6154	28.3587	25.1053	6.27307	10.5873	9.90391	37.5	13.1989	16.6142	15.7855	37.5	NR	NR	NR	0.3	12.5832	23.3668	23.282
	25	64.3399	96.2879	86.7139	44.8784	75.7985	66.7298	4	66.7074	75.8667	73.5449	4	NR	NR	NR	0.01	251.737	493.866	422.679
		64.3399	96.2879	86.7139	44.8784	75.7985	66.7298	12.5	51.2749	61.2991	58.8218	12.5	NR	NR	NR	0.1	93.2591	160.055	139.442
		64.3399	96.2879	86.7139	44.8784	75.7985	66.7298	37.5	42.111	52.4465	49.9368	37.5	NR	NR	NR	0.3	76.6074	124.981	109.681
	150	325.171	622.282	594.779	235.55	514.597	492.699	4	334.771	376.434	365.819	4	NR	NR	NR	0.01	1559.32	2656.32	2609.2
		325.171	622.282	594.779	235.55	514.597	492.699	12.5	254.438	300.485	289.077	12.5	NR	NR	NR	0.1	534.975	931.757	894.491
		325.171	622.282	594.779	235.55	514.597	492.699	37.5	206.721	254.722	243.02	37.5	NR	NR	NR	0.3	427.345	769.024	733.982

*NH- No Hazard, NR- Not Reached

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT-TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

7 FREQUENCY ANALYSIS

7.1 Overview

Frequency of occurrence of the representative hazardous events needs to be evaluated by referencing appropriate generic industry data. Both generic industry and company / vendor based information has been used, and particular care has been taken to ensure its validity. Generic failure data was applied where site specific or company / vendor data is not available.

Initiating event failure frequencies for each case developed have been estimated using various sources (listed in order of preference) including:

- TNO Guidelines for Quantitative Risk Assessment (Purple Book);
- OGP Risk Assessment Data Directory, Process Release Frequencies, 2010; and
- Health & Safety Executive (HSE) failure rates & event data for land use planning.

Given the potential for release from each of these scenarios, an event tree of possible outcomes has been developed using this individual component failure data. The table given below shows the frequency of failure of the selected isolatable sections calculated by parts count.

7.2 Event tree analysis

A release can result in several possible outcomes or scenarios (fire, explosions, un-ignited release etc.). A specific outcome for a release scenario may be dependent on other unrelated events following the initial release. Event tree analysis is used to identify potential outcomes of a release and to quantify the risk associated with each of these outcomes. The event tree for this QRA study is shown in **Figure 7**:

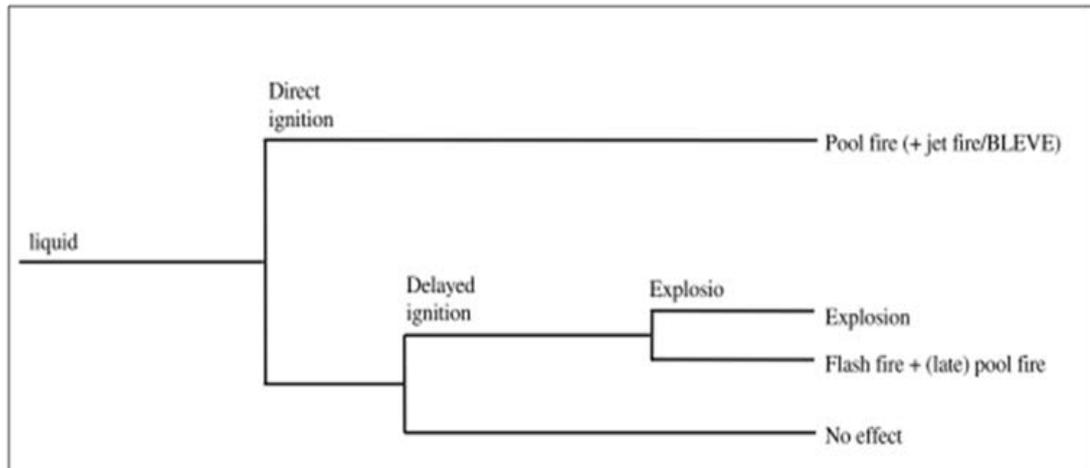


Figure 7: Event Tree

For calculating the frequency used for modeling, the following modification factors were taken into consideration:

- Design/Quality Maintenance
- Time is use

Table 7: Failure Frequency of an Event

Isolatable Sections	Description	Scenario	Total Frequency
IS-1	Transfer of Propane from Jetty to Storage Tank 2000-FB-01	7	1.94E-04
IS-2		25	1.06E-06
IS-3		150	1.25E-07
IS-4	Transfer of Butane from Jetty to Storage Tank 2000-FB-02	7	1.49E-04
IS-5		25	8.78E-07
IS-6		150	6.83E-08
IS-7	Transfer of Propylene from Jetty to Storage Tank 2000-FB-02	7	1.49E-04
IS-8		25	8.78E-07
IS-9		150	6.83E-08
IS-10	Propylene precooling line	7	1.69E-04
IS-11		25	5.00E-06
IS-12		150	5.00E-06
IS-13	Methanol P/L	10	2.28E-06
IS-14		150	1.44E-08
IS-15	MS P/L	10	2.50E-06
IS-16		150	1.58E-08
IS-17	HSD P/L	10	7.03E-06
IS-18		150	4.56E-08



ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASESMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



Isolatable Sections	Description	Scenario	Total Frequency
IS-19	SKO P/L	10	4.94E-06
IS-20		150	3.12E-08
IS-21	Furnace Oil	10	1.20E-05
IS-22		150	7.56E-08
IS-23	Crude	10	4.05E-07
IS-24		150	1.26E-08
IS-25	Inlet of Boil Off Compressor 2000-GB- 01A/B(Propane rich BOG)To Inlet of Bullet 2000-FA-07	7	1.92E-04
IS-26		25	1.32E-06
IS-27		150	2.88E-07
IS-28	Inlet of Boil Off Compressor 2000-GB- 02A/B(Butane rich BOG) To Inlet of Bullet 2000-FA-08	7	1.98E-04
IS-29		25	1.35E-06
IS-30		150	2.90E-07
IS-31	Inlet of Boil Off Compressor 2000-GB- 02A/B(Propylene rich BOG) To Inlet of Bullet 2000-FA-08	7	1.98E-04
IS-32		25	1.35E-06
IS-33		150	2.90E-07
IS-34	Propane from 2000 -GA- 01A/B/C to Propane heater I, 2000- EA-05 &Propane heater II, 2000- EA-07	7	2.99E-04
IS-35		25	1.35E-06
IS-36		150	2.90E-07
IS-37	Butane from 2000-GA- 02A/B/C to	7	2.97E-04



ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



Isolatable Sections	Description	Scenario	Total Frequency
IS-38	Butane heater I, 2000-EA-08 & Butane heater II, 2000-EA-10 to Static blender	25	1.57E-06
IS-39		150	1.97E-07
IS-40	Propylene from 2000-GA-02A/B/C to heater I, 2000-EA-08 & Propylene heater II, 2000-EA-10 to Static blender	7	2.97E-04
IS-41		25	1.57E-06
IS-42		150	1.97E-07
IS-43	Inlet of Flash & Off Gas Compressor 2000-GB-03A/B(Propane rich FOG)To Inlet of Bullet 2000-FA-07	7	8.98E-05
IS-44		25	4.36E-07
IS-45		150	4.02E-08
IS-46	Inlet of Flash & Off Gas Compressor 2000-GB-04A/B(Butane rich FOG) To Inlet of Bullet 2000-FA-08	7	1.19E-04
IS-47		25	7.76E-07
IS-48		150	1.53E-07
IS-49	Inlet of Flash & Off Gas Compressor 2000-GB-04A/B(Propylene rich BOG) To Inlet of Bullet 2000-FA-08	7	1.19E-04
IS-50		25	7.76E-07
IS-51		150	1.53E-07
IS-52	Bullet 2000-FA-07 through Bullet Pump 2000-GA -07A/B To Static Blender(Propane Rich stream)	7	9.77E-05
IS-53		25	4.60E-07
IS-54		150	5.36E-08
IS-55	Bullet 2000-FA-08 through Bullet Pump 2000-GA -08A/B To Static Blender(Butane Rich stream)	7	9.77E-05
IS-56		25	4.60E-07

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

Isolatable Sections	Description	Scenario	Total Frequency
IS-57		150	5.36E-08
IS-58	Bullet 2000-FA-08 through Bullet Pump 2000-GA -08A/B To Static Blender(Propylene Rich stream)	7	9.77E-05
IS-59		25	4.60E-07
IS-60		150	5.36E-08
IS-61	Mercaptan Dosing System 2000-CS-01 To Static Blender	7	1.75E-05
IS-62		25	1.08E-07
IS-63	Static Blender outlet to Tanker Loading Bay	7	1.26E-04
IS-64		25	7.95E-07
IS-65		150	8.37E-08

8 RISK ASSESSMENT & PRESENTATION

8.1 Overview

Risk is often defined as a function of the likelihood that a specified undesired event will occur, and the severity of the consequences of that event. Risk is derived from the product of likelihood and potential consequence. Risk in general is a measure of potential economic loss or human injury in terms of the probability of the loss or injury occurring and magnitude of the loss or injury if it occurs.

$$Risk = f(Severity, Frequency)$$

Quantification of effects of the hazardous event were done using the Event Tree approach in which all the possible outcomes of the hazardous event were considered and the likelihood of each type of end event determined. This step in the process involves the use of consequence modelling to predict both physical phenomena such as dispersion of gas, size and duration of fires, overpressures due to explosions, and the performance of equipment and systems such as availability of a fire & gas detection

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT-TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

system, availability of emergency shutdown system, and availability of fire protection system. The end result of this phase of the assessment is a series of “end events”, together with their estimated frequency of occurrence.

8.2 Risk Results

The risk modelling has been performed using DNV PHAST RISK 6.7 software. Thereby, the details of the input data used for the risk modelling such as vulnerability criteria, ignition probability and occupancy data are given in the QRA Assumption Register (Appendix 2). The results of a QRA are expressed using Individual Risk Contours and Societal Risk Graphs.

The Individual Risk represents the frequency of an individual dying due to loss of containment events (LOCs). The individual is assumed to be unprotected and to be present during the total exposure time. The Individual Risk is presented as contour lines on a topographic map.

The Societal Risk represents the frequency of having an accident with N or more people being killed simultaneously. The people involved are assumed to have some means of protection. The Societal Risk is presented as an F-N curve, where N is the number of deaths and F the cumulative frequency of accidents with N or more deaths.

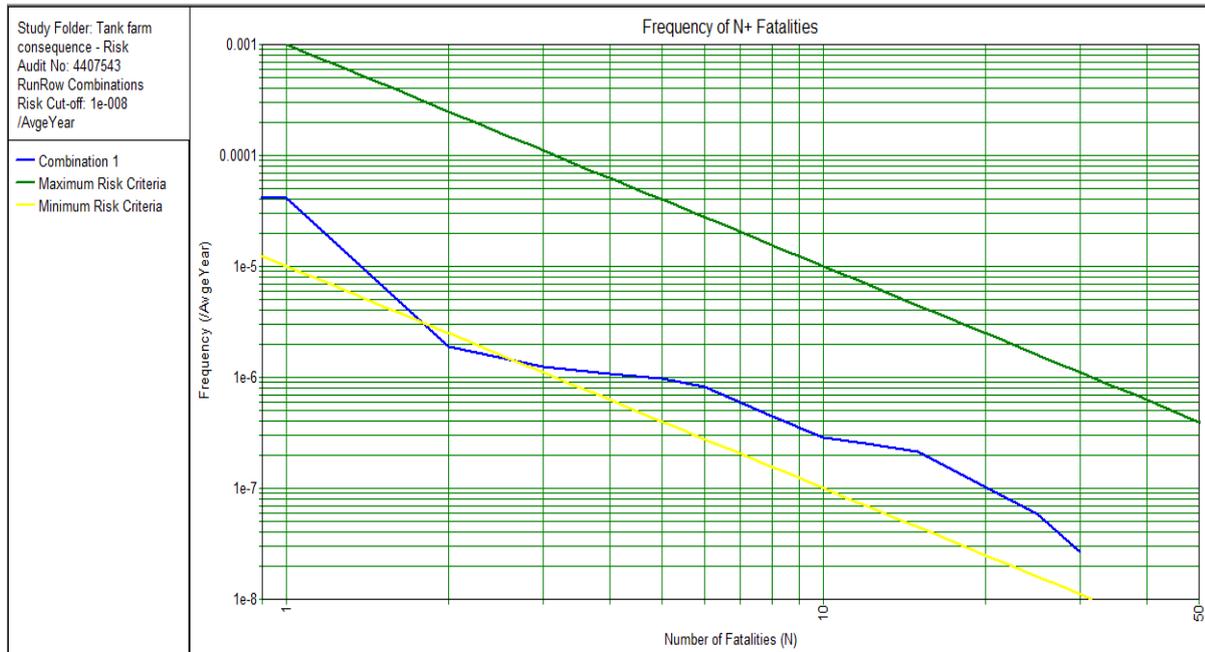
The Individual Risk estimated due to the activities being conducted at the Adani Mundra port is represented by a risk contour in the Figure 8 below.

Figure 8: Risk Contour



The Societal Risk pertaining to group of individuals is represented in **Figure 9**.

Figure 9: FN Curve



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT-TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

9 RECOMMENDATIONS

The Following measures shall be implemented for safe operation

1. F&G mapping study to be carried to identify the location of the detectors and voting logic to be used to ensure tripping of the unit, in case of any hydrocarbon leak
2. Hydraulic analysis and simulation study to be carried out, to operate heating trains at the minimum pressure possible to reduce the effects of LFL and jet fire scenarios
3. Consider converting level indications on Propane BOG / Flash Condensate Receiver (2000-FA-05) and Butane BOG / Flash Condensate Receiver (2000-FA-06) as 1oo2 voting logic for tripping on low level and average selection control philosophy for controlling the level to improve the reliability
4. Consider shifting the PSV on the inlet of the CW supply header of Propane BOG / Flash Condenser (2000-EA-03) and Butane BOG / Flash Condenser (2000-EA-04) to return header with reduced set point and LFL sensors at the outlet of the PSV
5. Consider providing discharge PT on 2000-GA-05/06 discharge common header with alarm provision
6. Revisit fail safe conditions of ROV-063/64 (considered as fail open) by HAZOP study
7. Consider additional PSV on Propane BOG / Flash Condensate Receiver (2000-FA-05) and Butane BOG / Flash Condensate Receiver (2000-FA-06) to increase the reliability and standby condition in case of maintenance of other PSV (same nozzle with separate isolation valves)
8. Consider providing remote operated sprinklers systems based on LFL sensors covering Propane BOG / Flash Condensate Receiver (2000-FA-05) and Butane BOG / Flash Condensate Receiver (2000-FA-06) and propane and butane handling pumps.
9. Consider trip logic for the steam boilers based LFL sensors on the tank farm
10. Consider shifting the PSV-063/PSV-034 provided downstream ROV-063 and ROV-064 relocated to Propane BOG / Flash Condensate Pumps (2000-GA-05) and Butane BOG / Flash Condensate Pumps (2000-GA-06) common discharge headers.

	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT-TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

11. Consider voting logic between PT-016/017/018 for tripping on high and low pressure interlocks of the propane and butane tanks and MID point selection control philosophy for controlling the tank pressure to improve the reliability
12. Provide flow meters in N2 line to PSV headers to ensure continuous flow of N2
13. Ensure SOP developed and followed on all critical activities, interlocks checking before unloading operations
14. SOP and work instructions on display in local and English near the critical activity locations
15. Consider HAZOP and SIL study before commissioning the facility and concerns addressed
16. Ensure CCTV coverage of critical locations and remote monitoring is done continuously
17. Ensure all portable electrical equipment used in the location are Ex rated and covered under PTW systems, and certified
18. Selection of electrical and other instruments based on hazardous area classification (IS 5572: 2008)
19. All flanges shall be connected for bonding for electrical continuity and earthing of the equipment's to be ensured as per IS-3043
20. Lightning protection shall be provided as per the requirements of IS:2309
21. Periodical maintenance schedule should be implemented and meticulously followed
22. F&G systems management to be inspected periodically and availability ensured
23. Periodical inspection of pipeline and drain systems

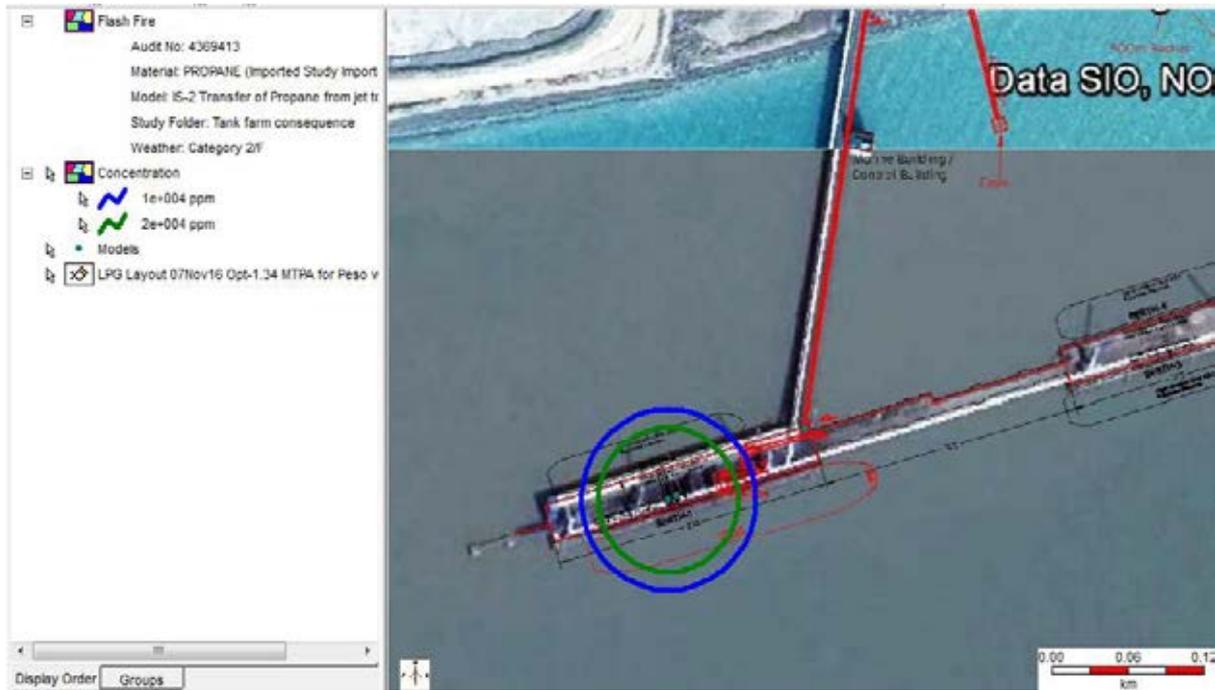
	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASESMENT-TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

APPENDIX 1 CONSEQUENCE CONTOURS

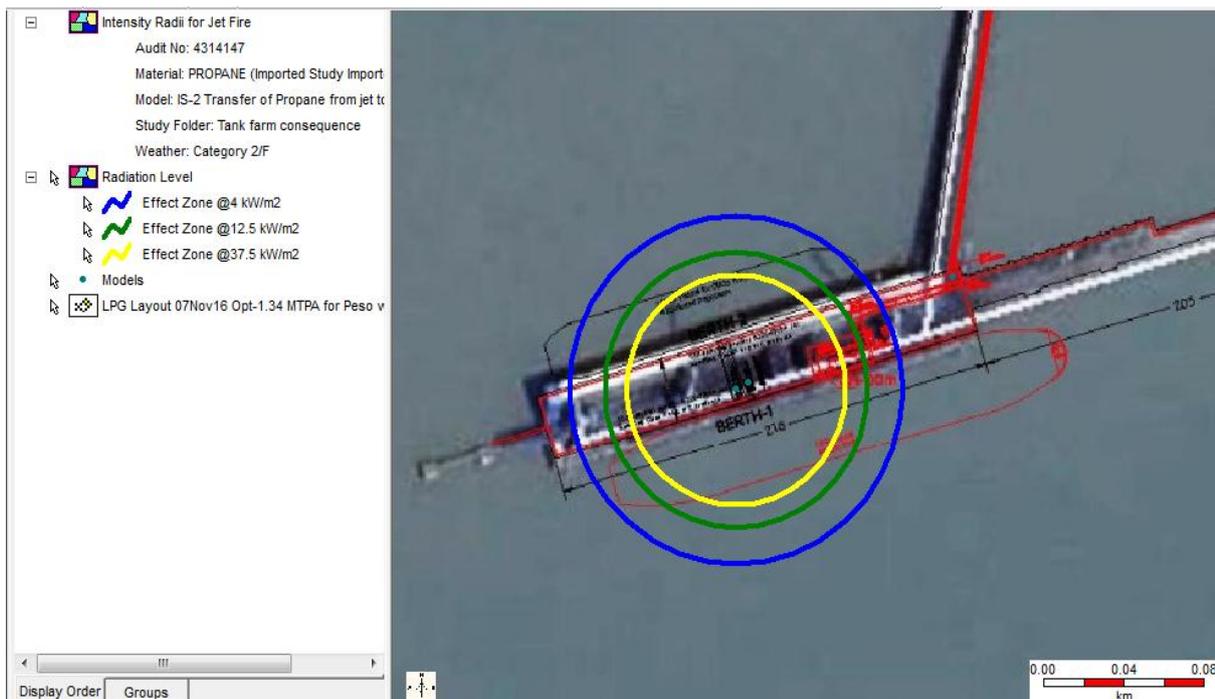
	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

PROPANE PIPELINE FROM BERTH 1 - 25mm LEAK

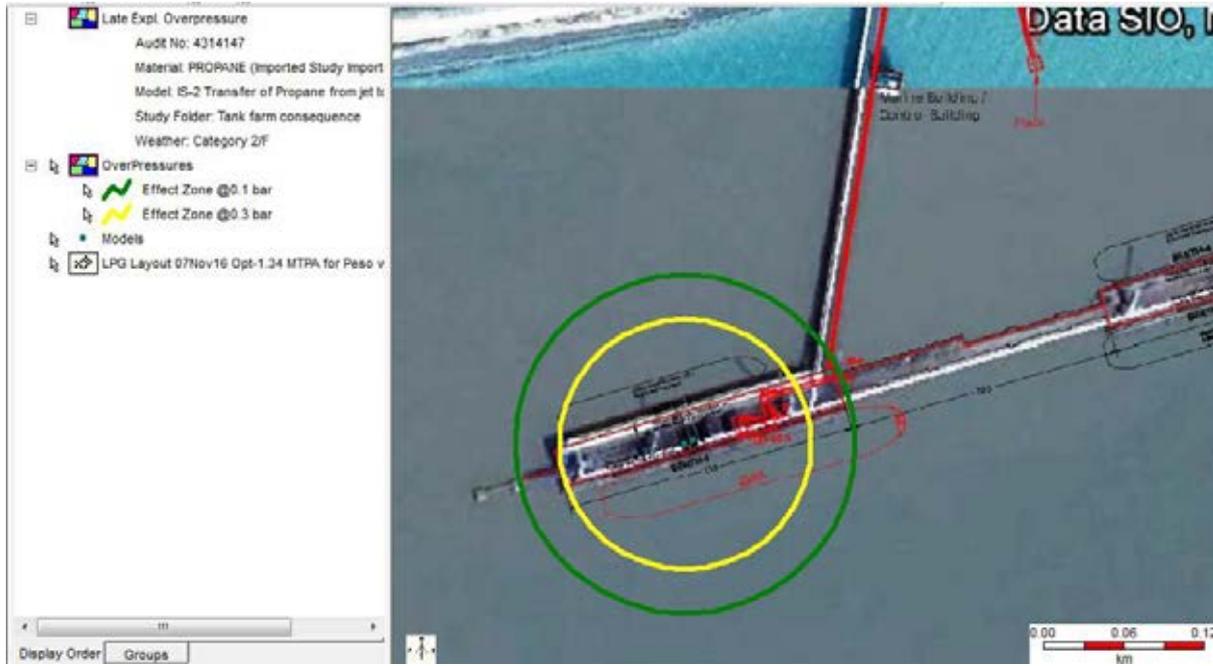
FLASH FIRE



JET FIRE



EXPLOSION



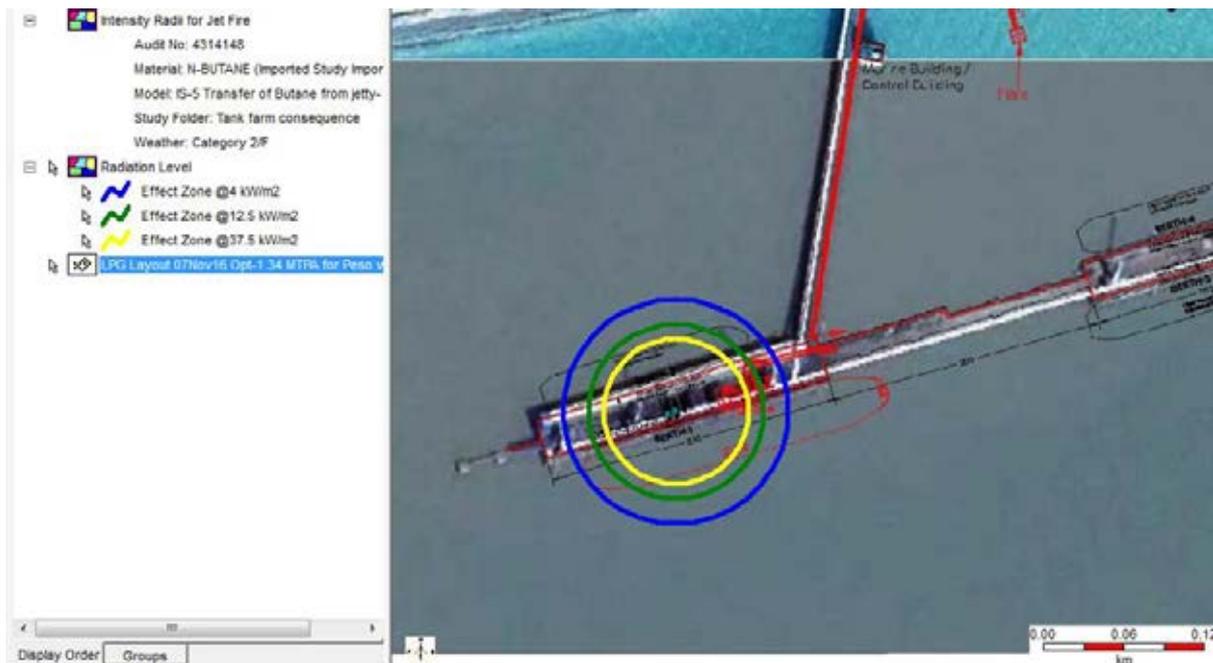


BUTANE PIPELINE FROM BERTH 1- 25mm LEAK

FLASH FIRE



JET FIRE

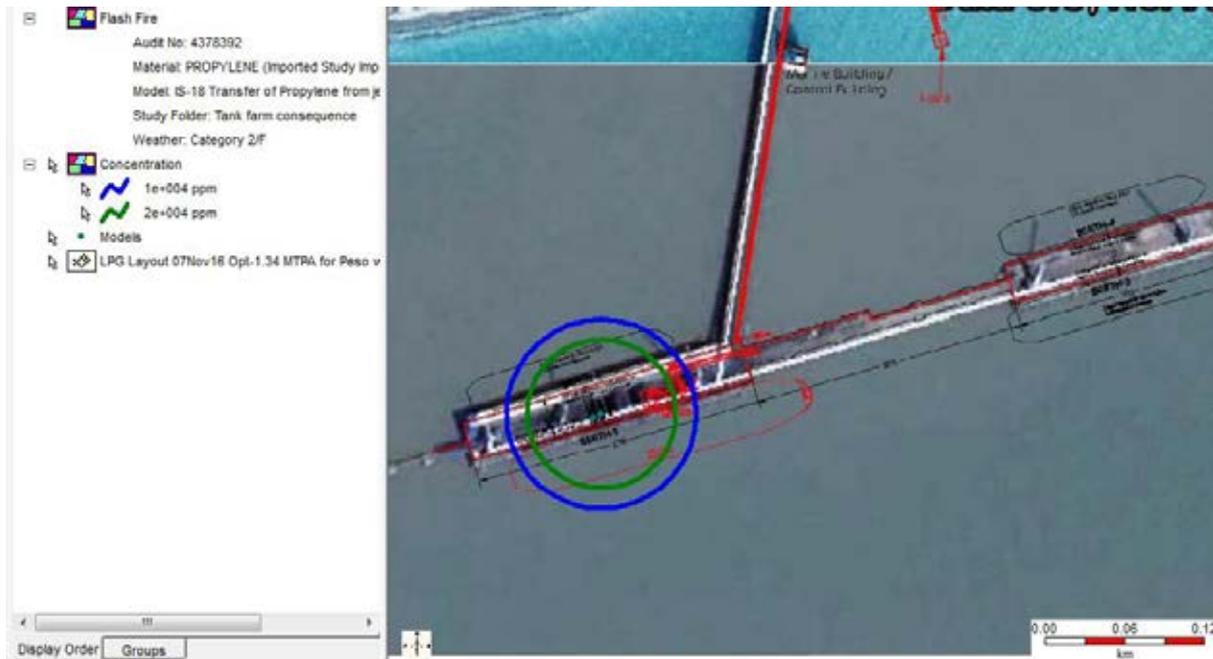


EXPLOSION

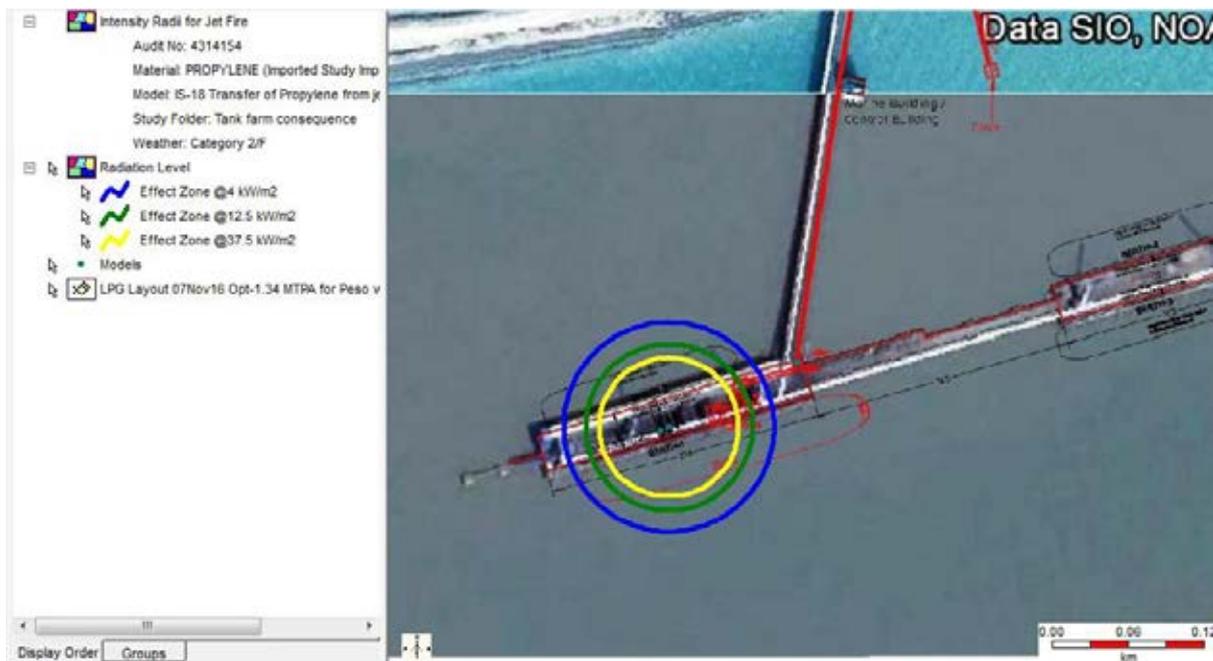


PROPYLENE PIPELINE FROM BERTH 1-25 mm LEAK

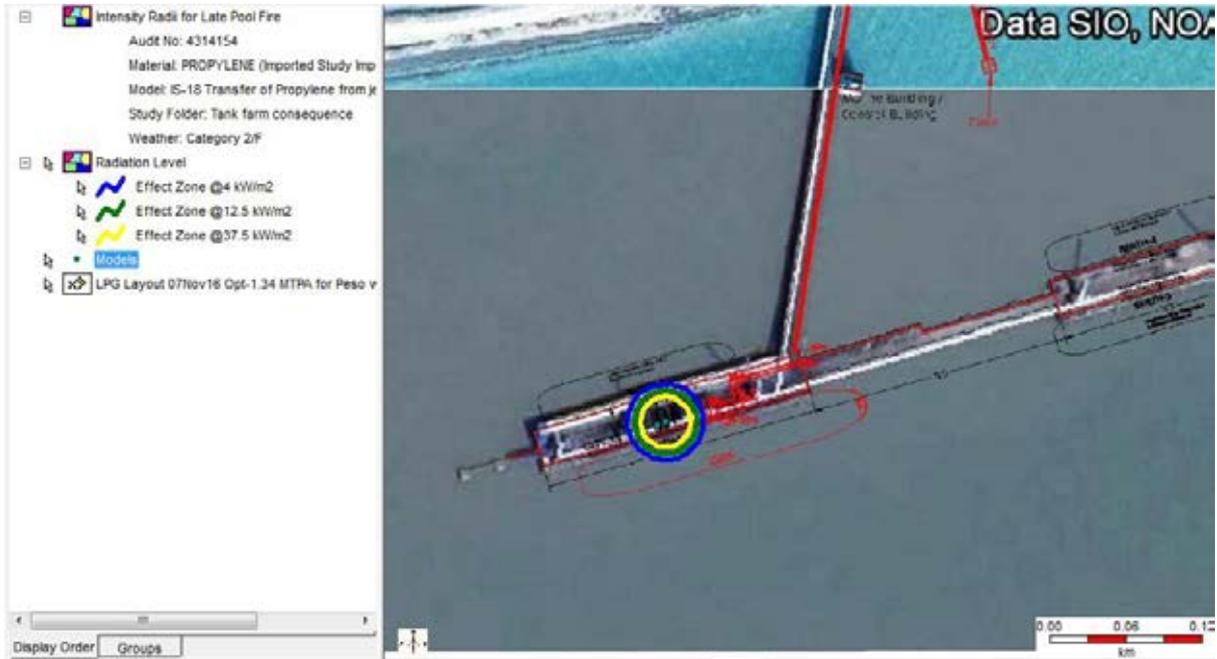
FLASH FIRE



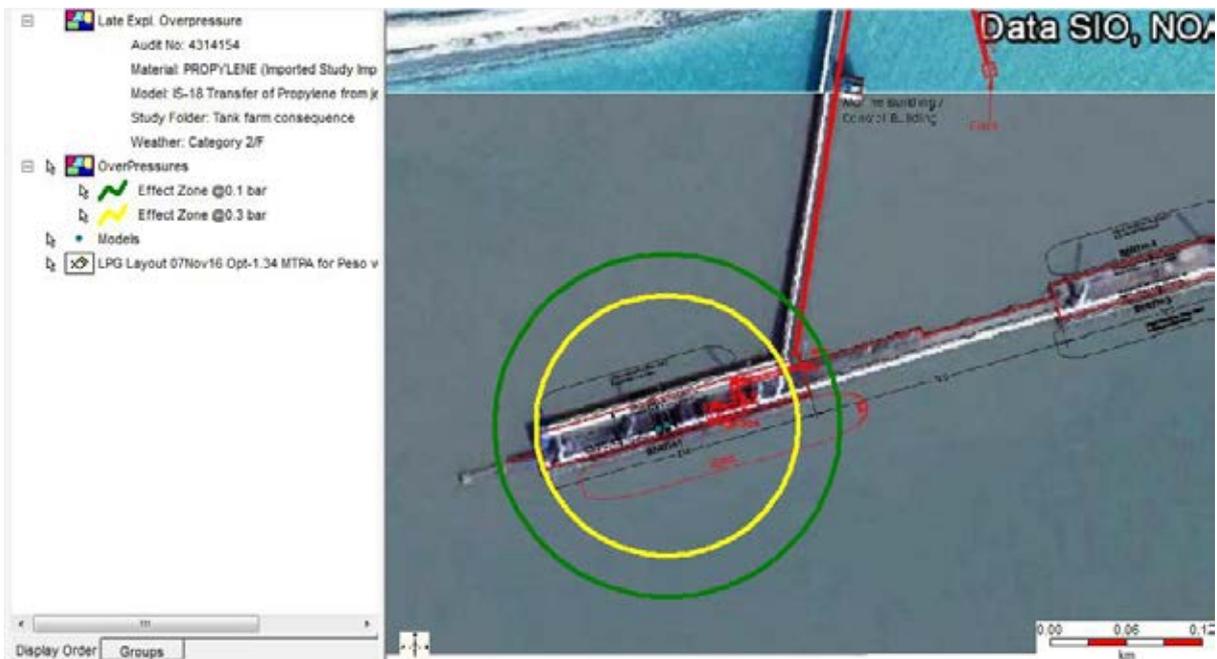
JET FIRE



POOL FIRE



EXPLOSION



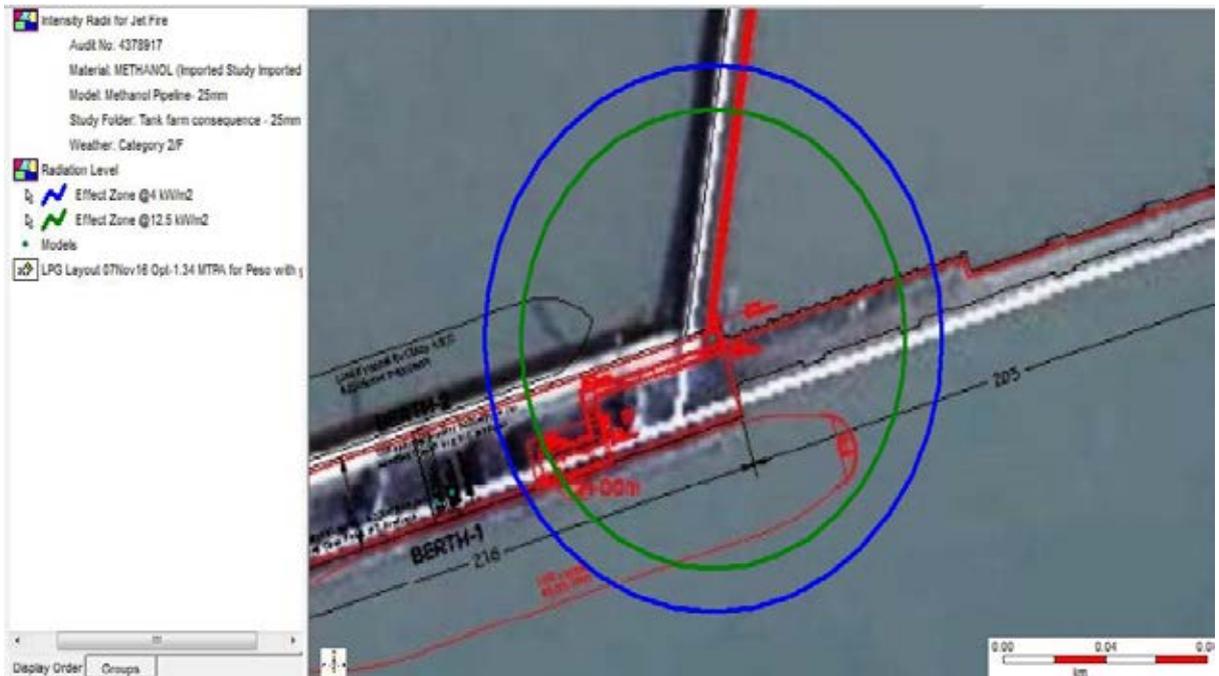


METHANOL PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE

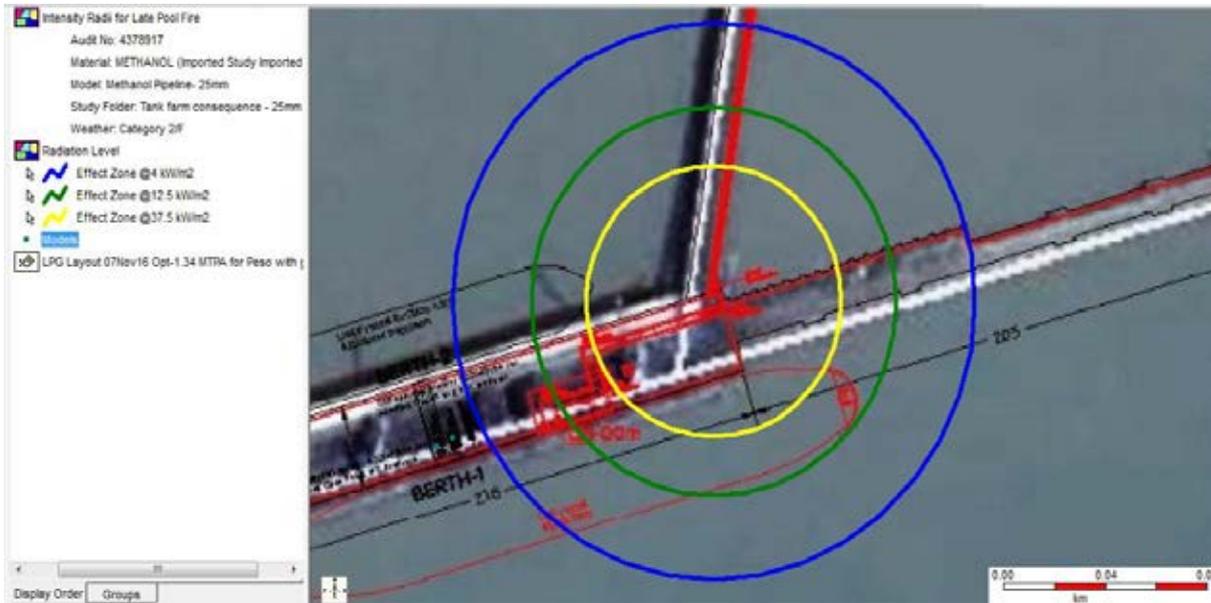


JET FIRE

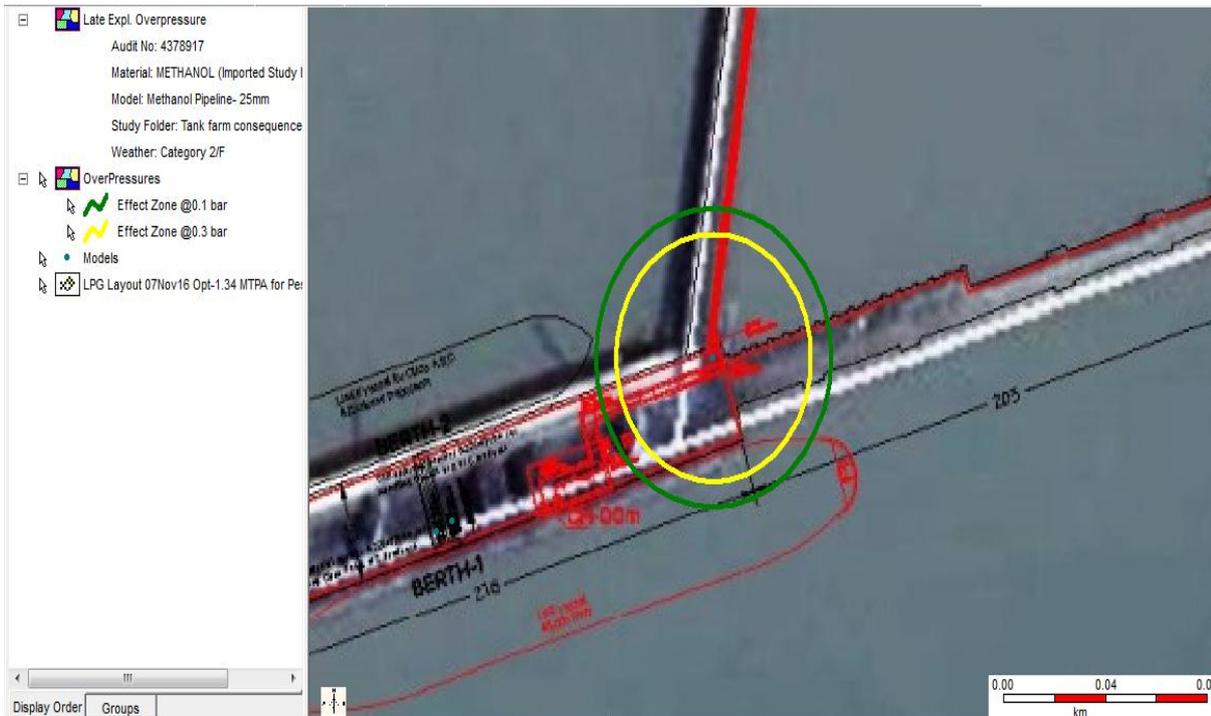




POOL FIRE



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



MS PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE



JET FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



POOL FIRE



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C

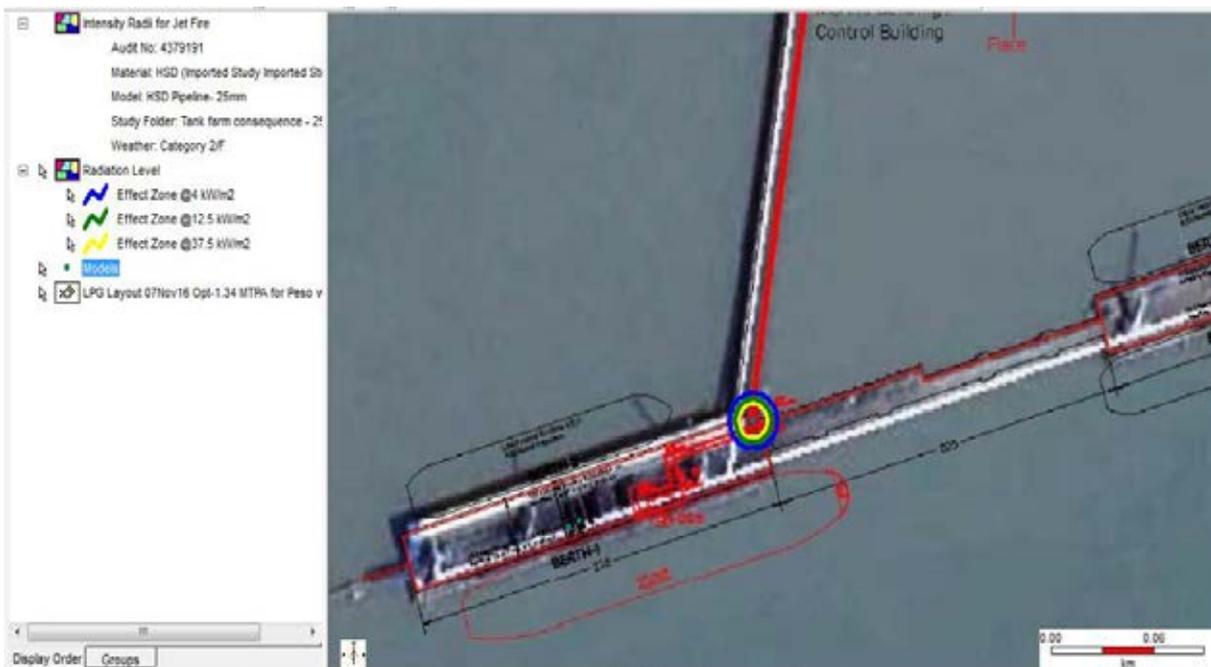


HSD PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE



JET FIRE





POOL FIRE



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C

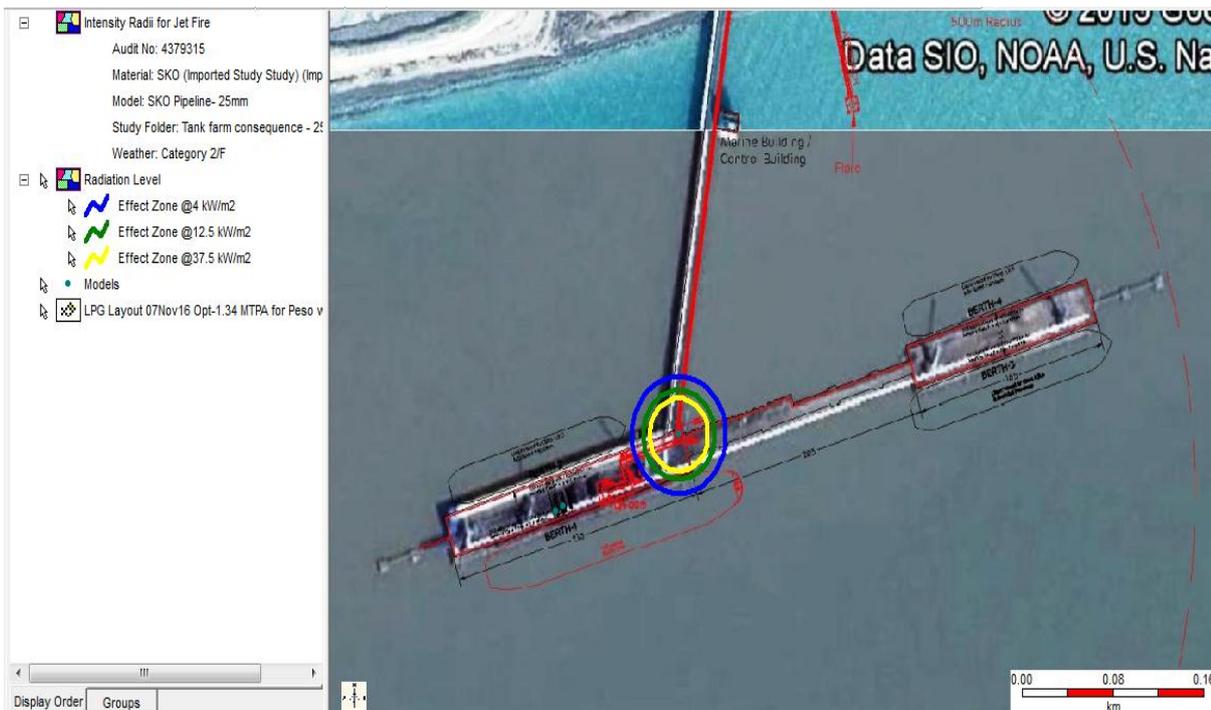


SKO PIPELINE FROM BERTH 2-25 mm LEAK

FLASH FIRE



JET FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



POOL FIRE



EXPLOSION



	ADANI MUNDRA PORT – NEW LPG FACILITIES	
	QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA	
	DOC NO: H003-E-LPG-GEN-BP-R-E-008C	

FURNACE OIL PIPELINE FROM BERTH 2-25 mm LEAK

POOL FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C

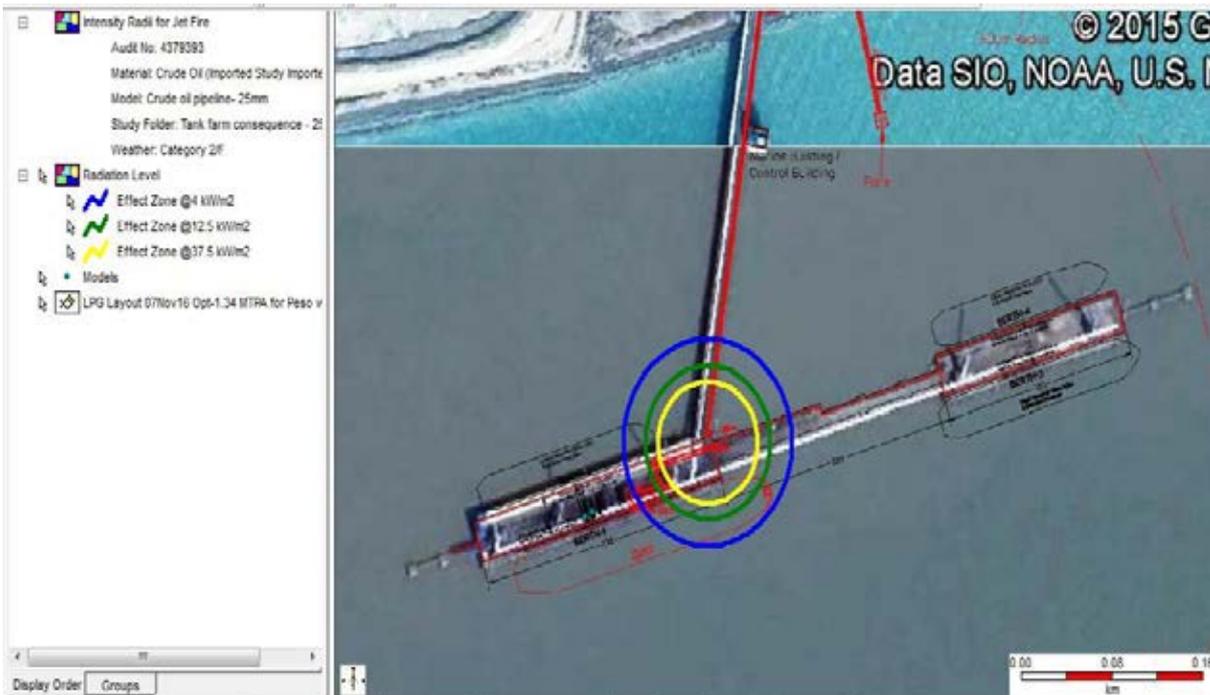


CRUDE OIL PIPELINE FROM BERTH 2-25 mm LEAK

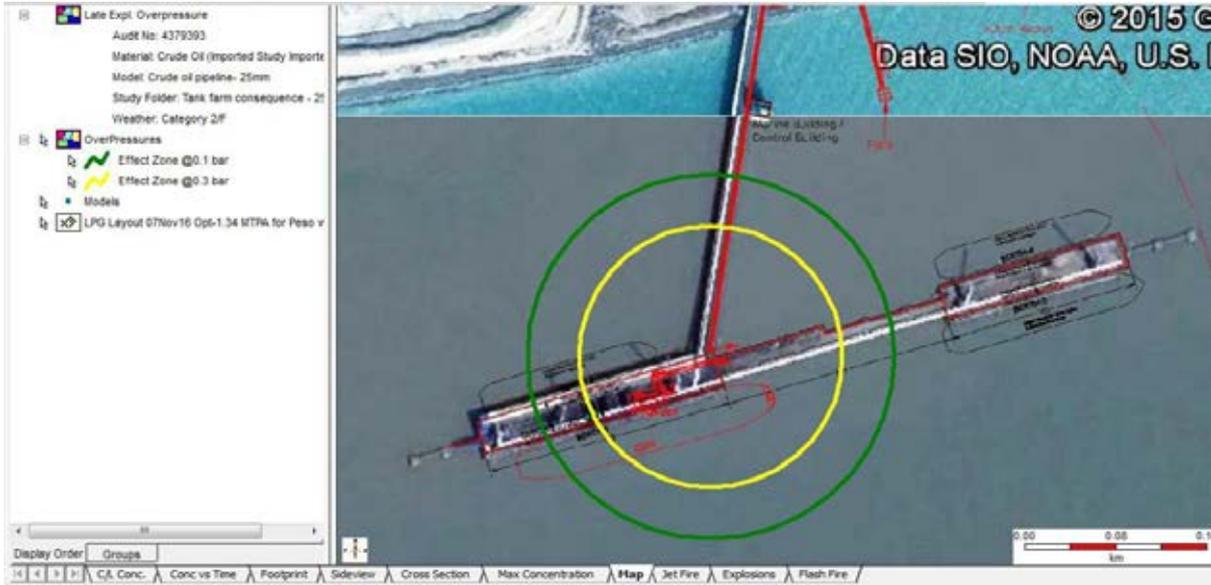
FLASH FIRE



JET FIRE



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

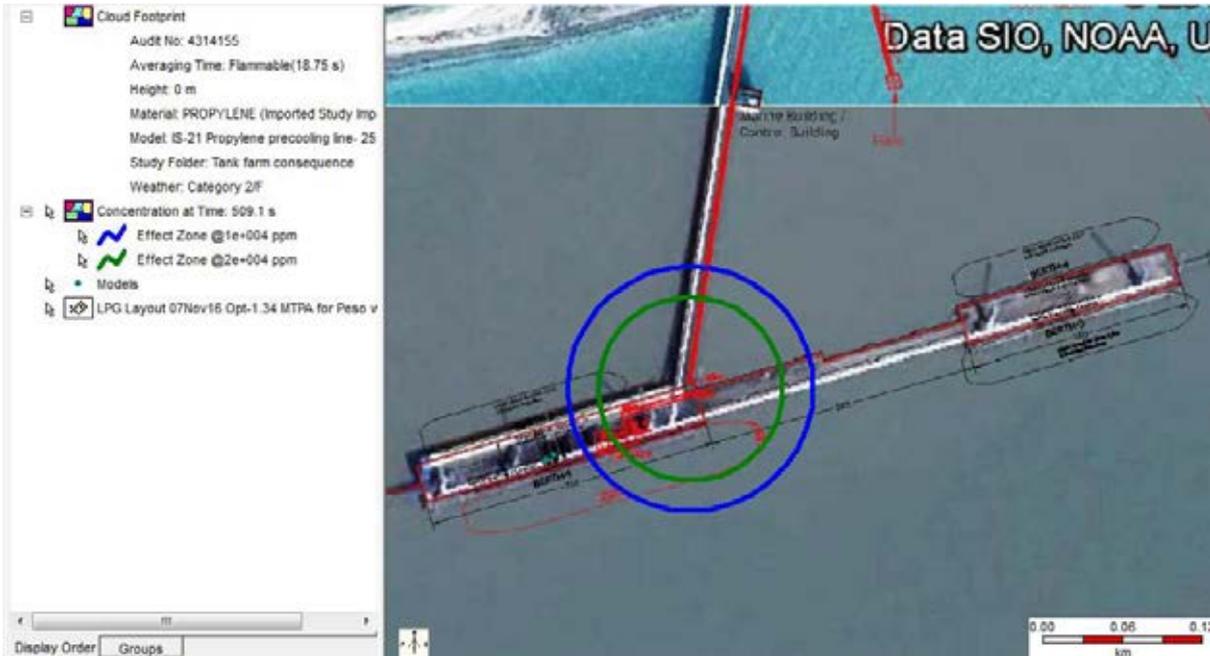
QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C

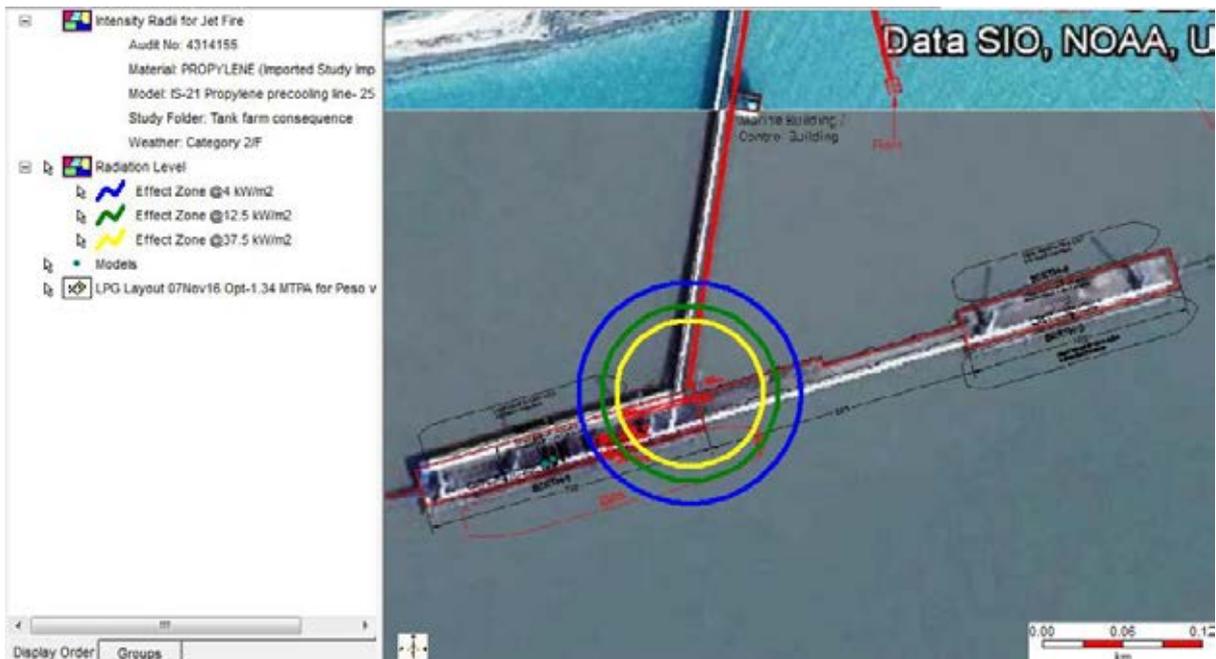


PROPYLENE PRECOOLING PIPELINE FROM BERTH 1-25 mm LEAK

FLASH FIRE



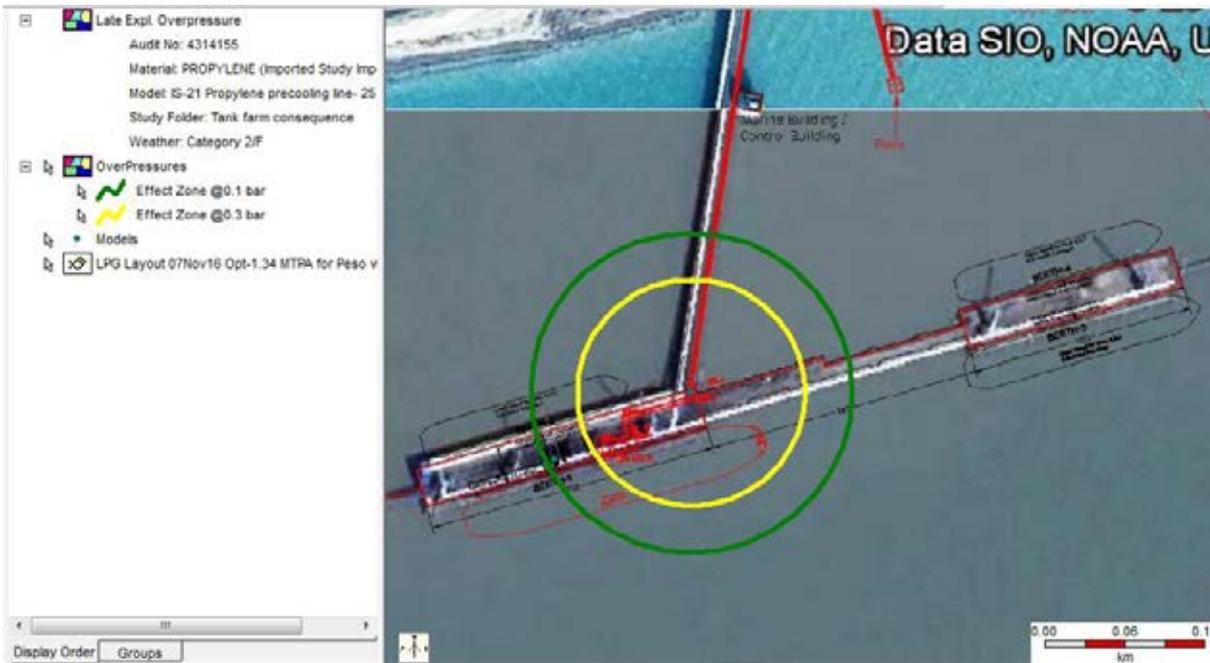
JET FIRE



POOL FIRE



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

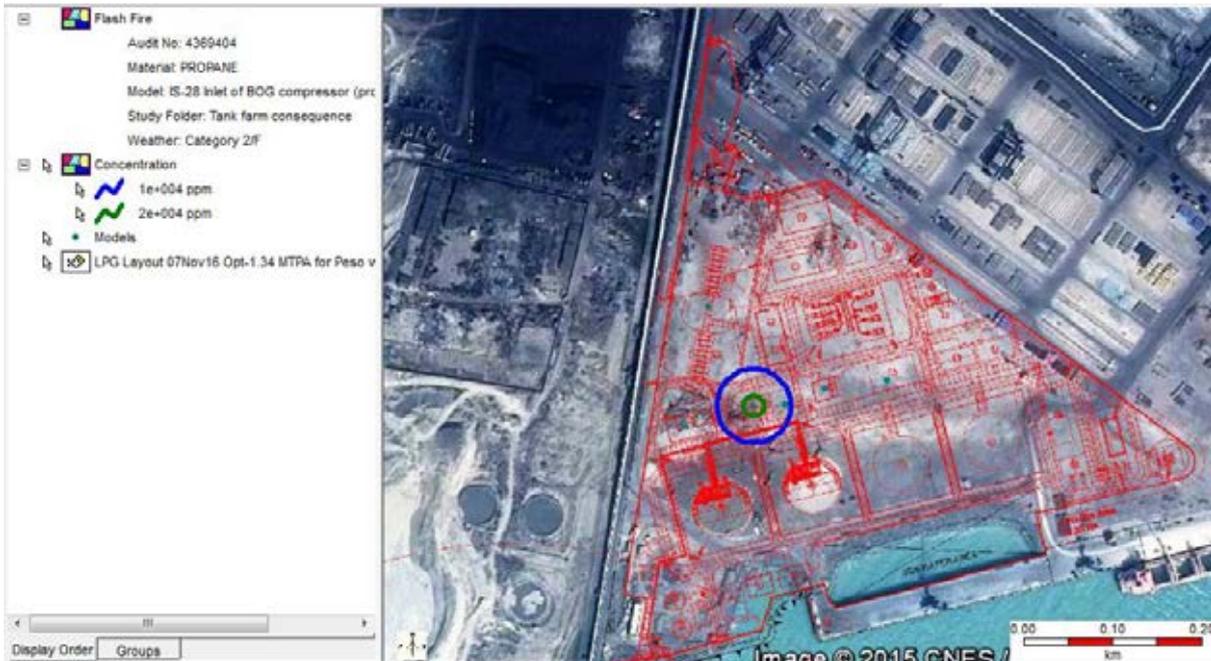
QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C

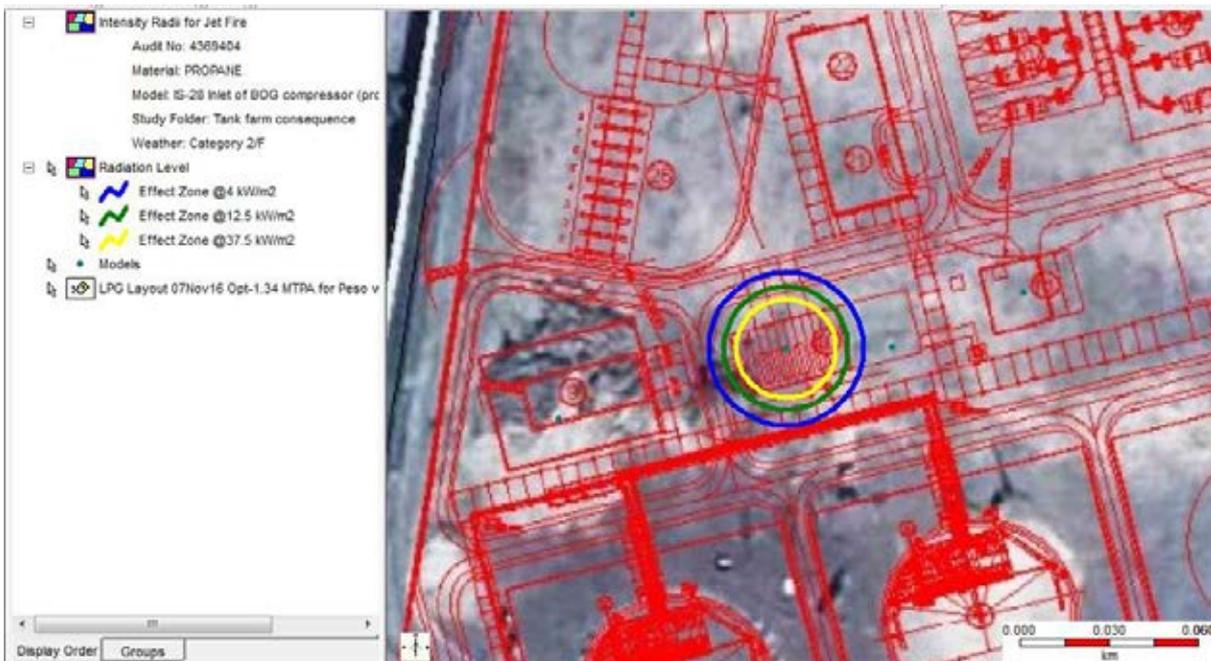


INLET OF BOIL OFF COMPRESSOR 2000-GB-01A/B(PROPANE RICH BOG)TO INLET OF BULLET 2000-FA-07 – 25 mm LEAK

FLASH FIRE



JET FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

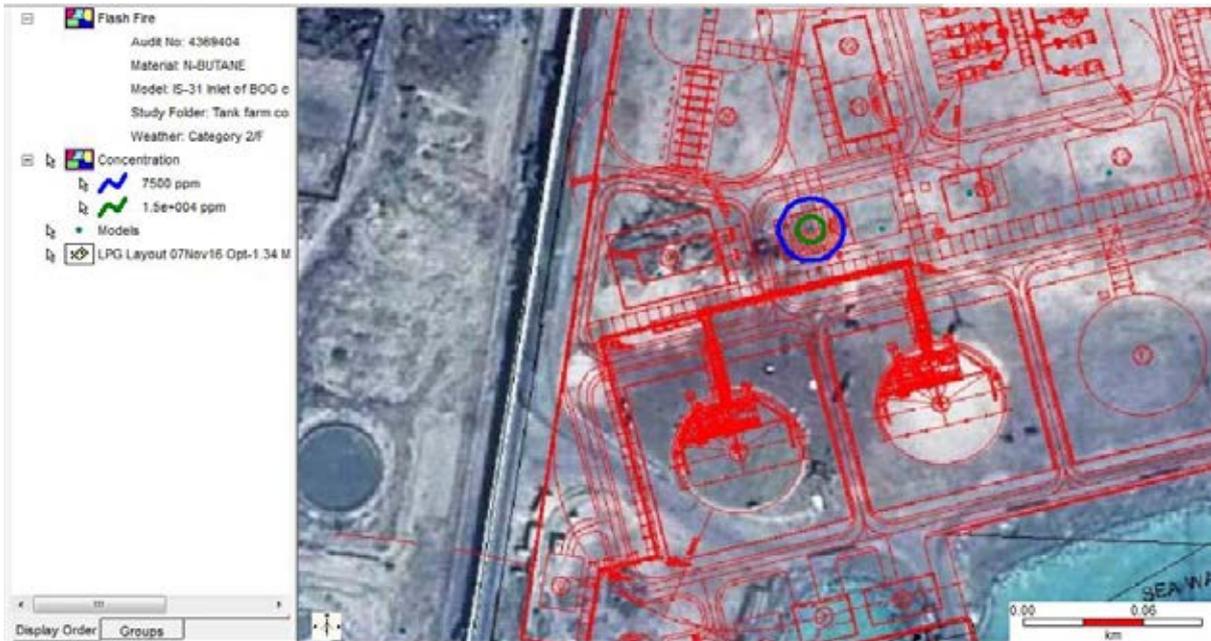
QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C

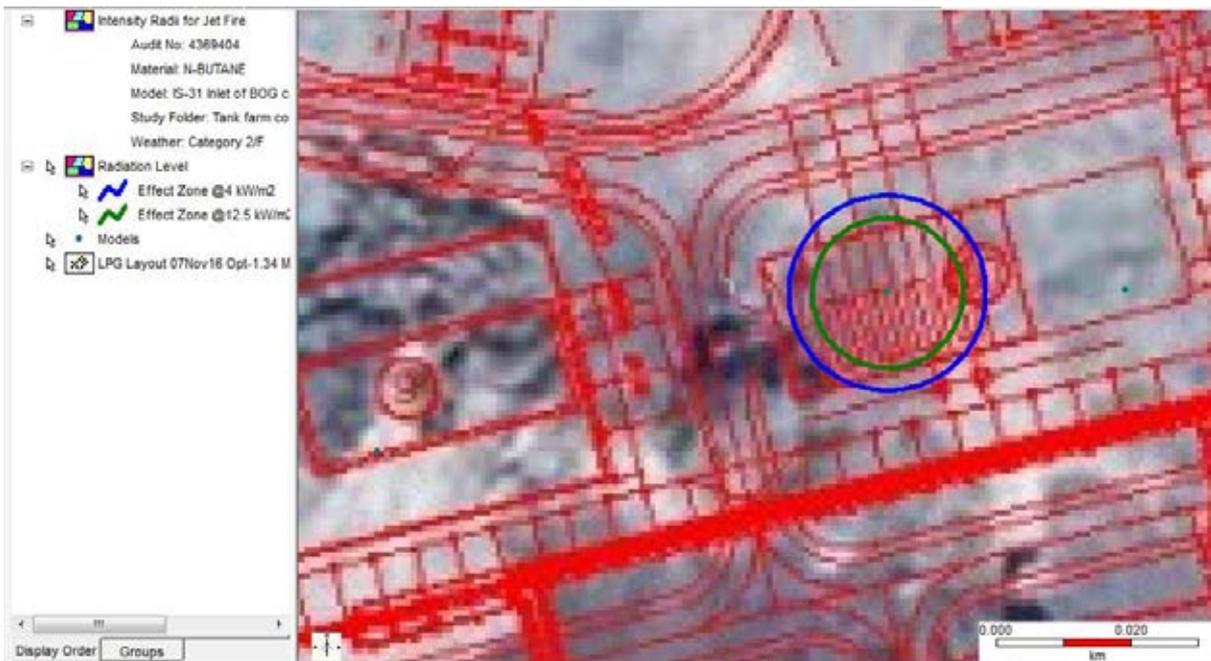


INLET OF BOIL OFF COMPRESSOR 2000-GB-02A/B (BUTANE RICH BOG) TO INLET OF BULLET 2000-FA-08 – 25 mm LEAK

FLASH FIRE

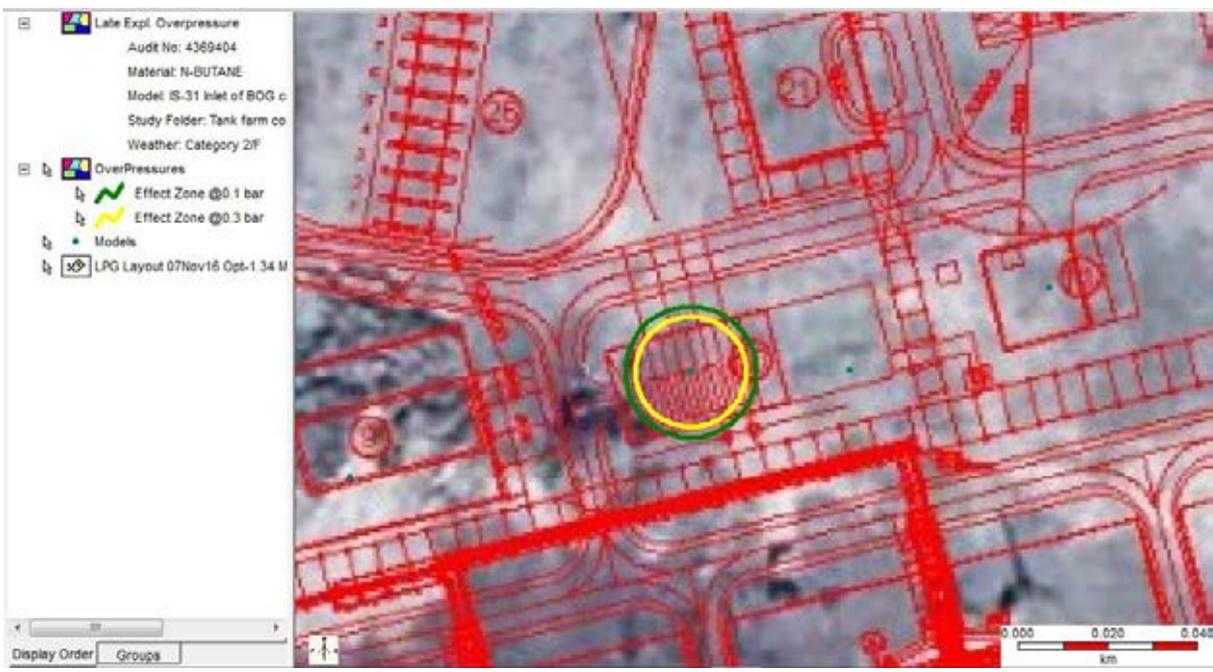


JET FIRE





EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

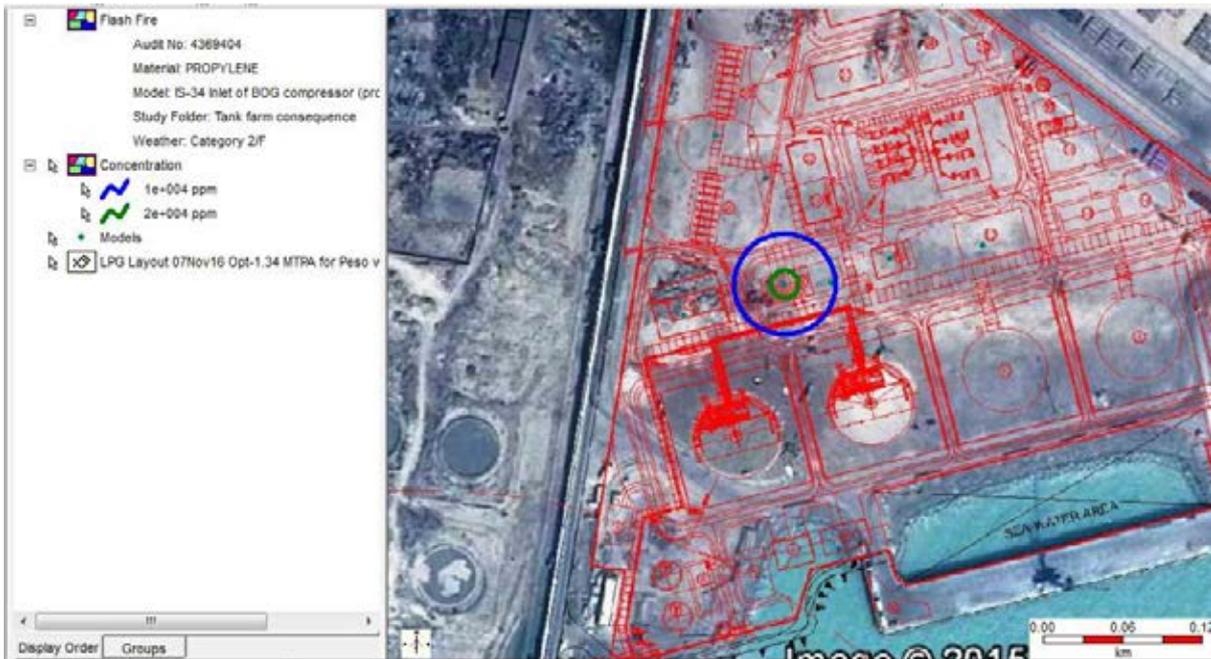
QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



INLET OF BOIL OFF COMPRESSOR 2000-GB-02A/B (PROPYLENE RICH BOG) TO INLET OF BULLET 2000-FA-08 – 25 MM LEAK

FLASH FIRE



JET FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

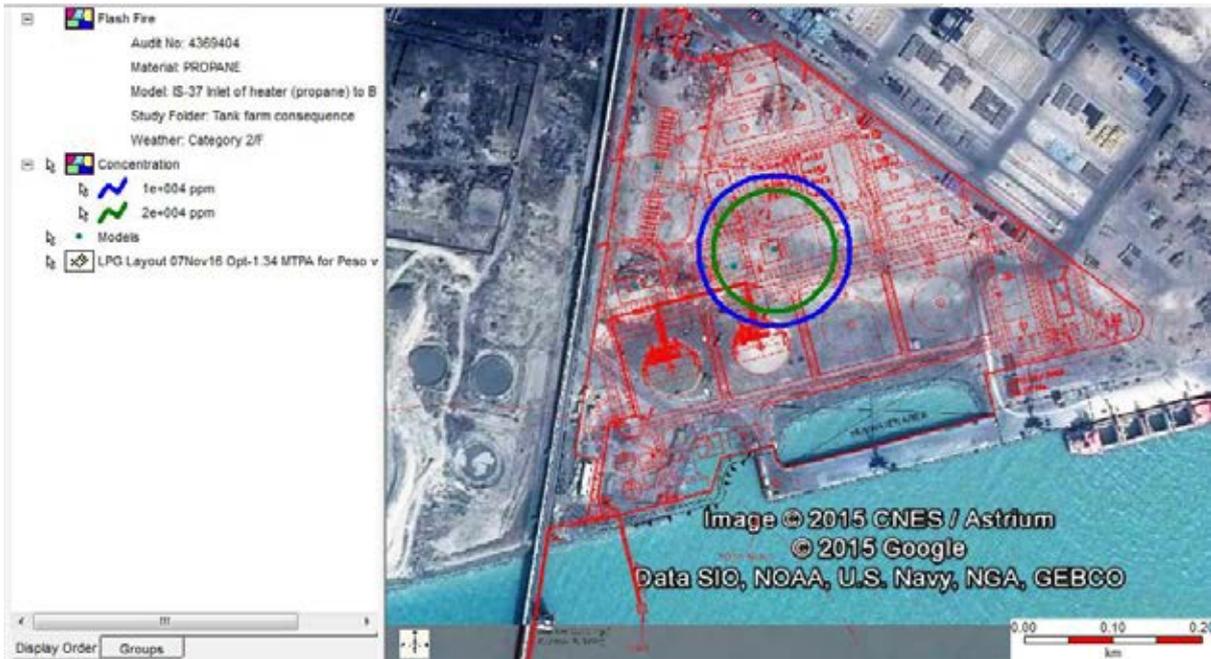
QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



Propane from 2000 -GA-01A/B/C to Propane heater I, 2000-EA-05 & Propane heater II, 2000-EA-07 to Static Blender - 25 mm LEAK

FLASH FIRE



JET FIRE



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



Butane from 2000-GA-02A/B/C to Butane heater I, 2000-EA-08 & Butane heater II, 2000-EA-10 to Static blender – 25 mm LEAK

FLASH FIRE



JET FIRE





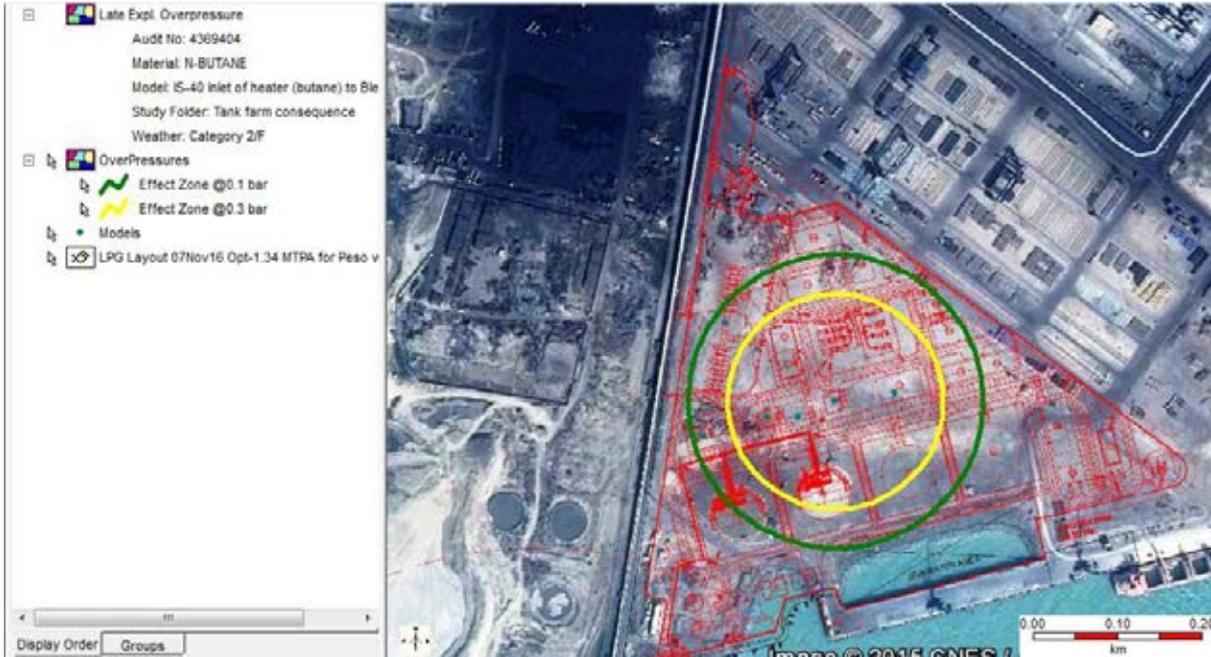
ADANI MUNDRA PORT – NEW LPG FACILITIES



QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C

EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

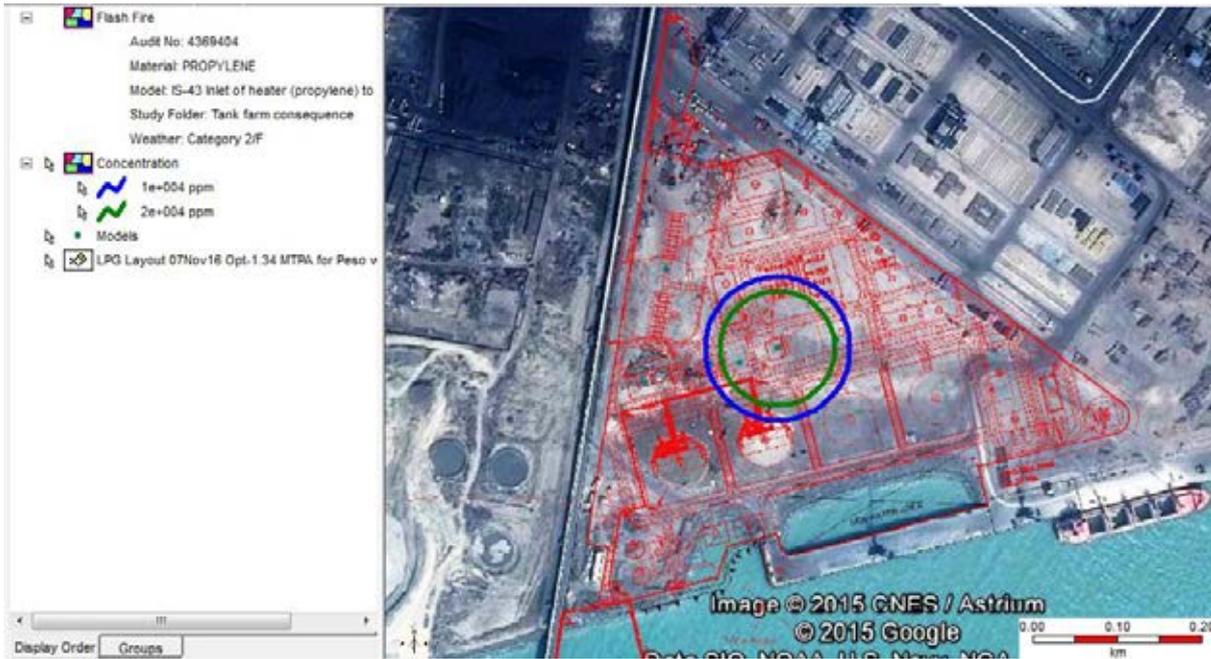
QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C

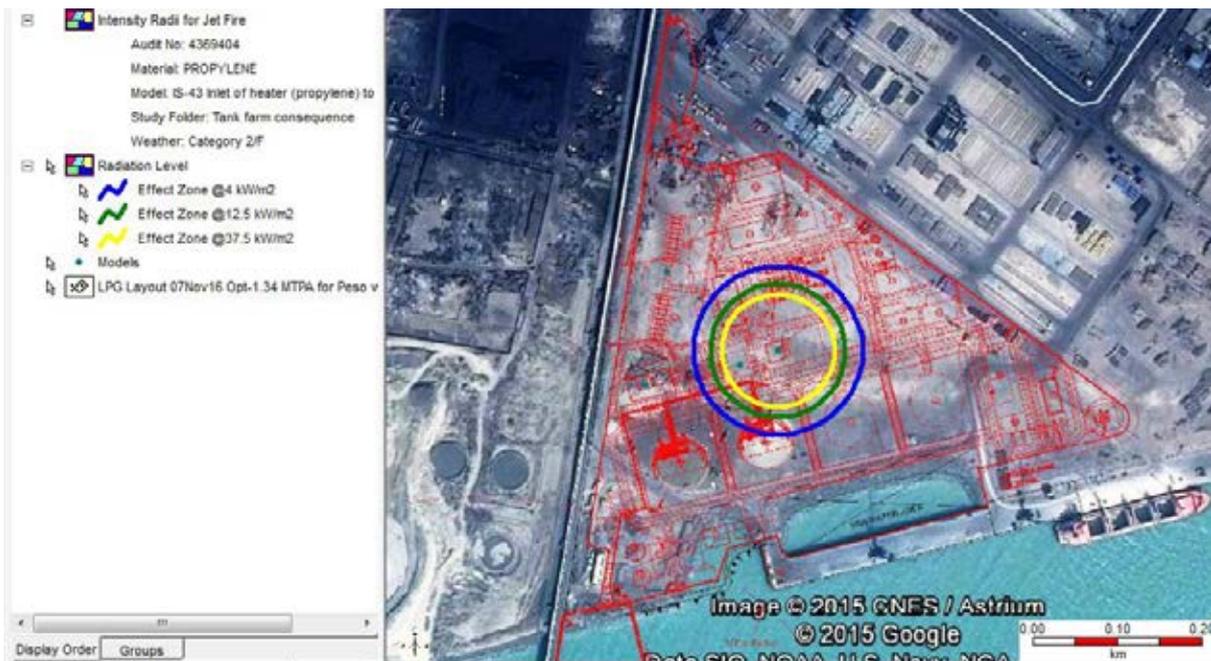


Propylene from 2000-GA-02A/B/C to heater I, 2000-EA-08 & Propylene heater II, 2000-EA-10 to Static blender – 25 mm LEAK

FLASH FIRE



JET FIRE

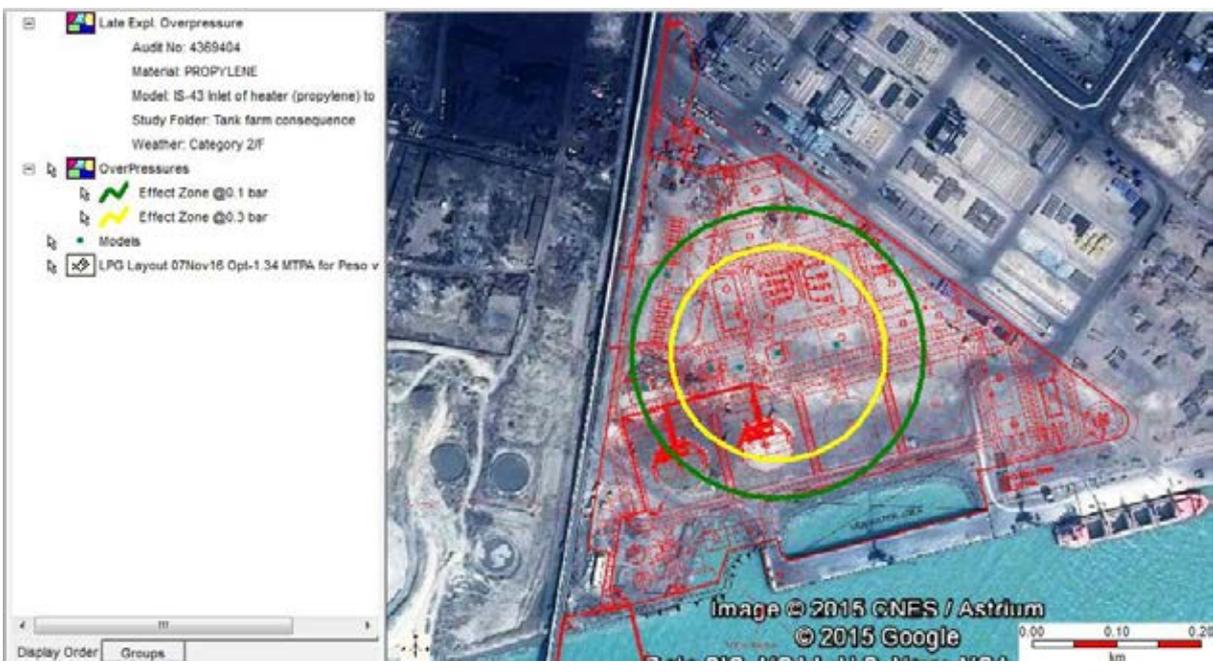




ADANI MUNDRA PORT – NEW LPG FACILITIES
QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA
DOC NO: H003-E-LPG-GEN-BP-R-E-008C



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



INLET OF FLASH & OFF GAS COMPRESSOR 2000-GB-03A/B(PROPANE RICH FOG)TO INLET OF BULLET 2000-FA-07 – 25 MM LEAK

FLASH FIRE



JET FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

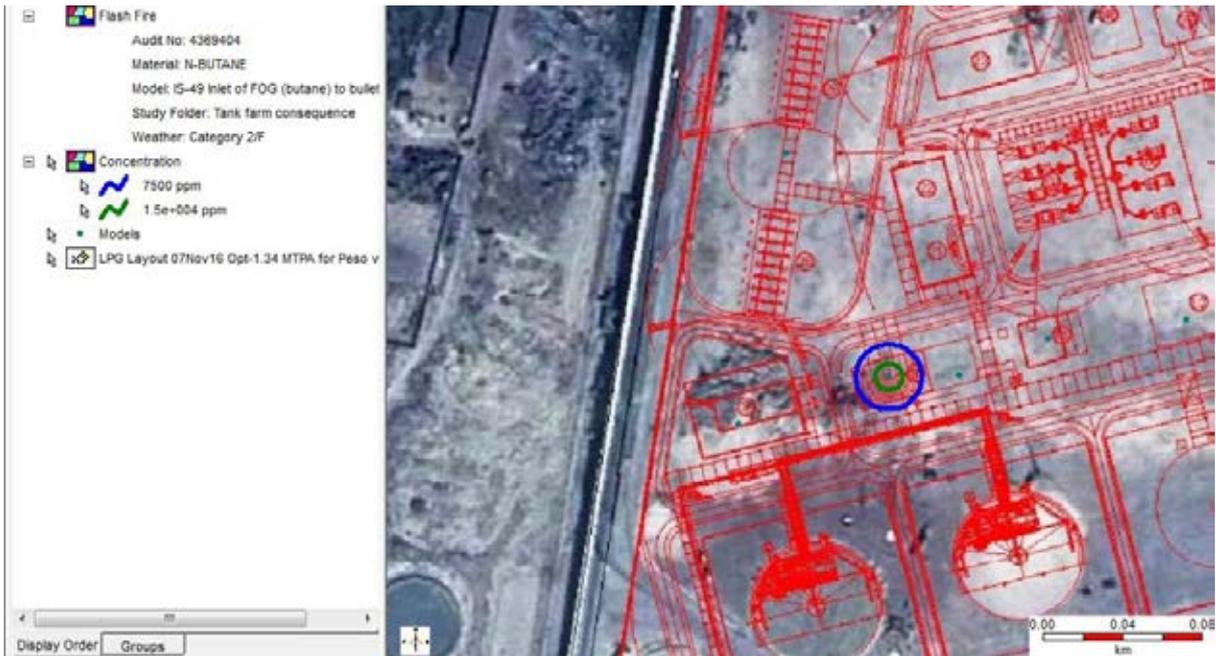
QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C

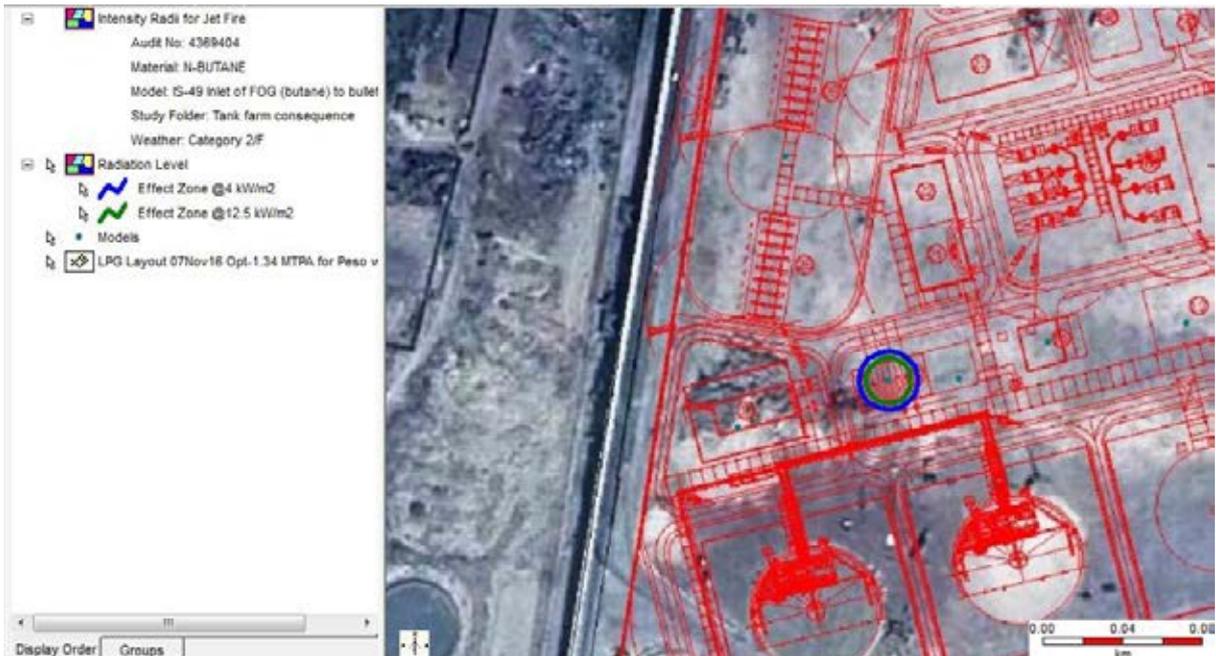


INLET OF FLASH & OFF GAS COMPRESSOR 2000- GB-04A/B(BUTANE RICH FOG) TO INLET OF BULLET 2000-FA-08 – 25 MM LEAK

FLASH FIRE



JET FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



INLET OF FLASH & OFF GAS COMPRESSOR 2000-GB-04A/B(PROPYLENE RICH BOG) TO INLET OF BULLET 2000-FA-08 – 25 MM LEAK

FLASH FIRE



JET FIRE



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



BULLET 2000-FA-07 THROUGH BULLET PUMP 2000-GA -07A/B TO STATIC BLENDER (PROPANE RICH STREAM) – 25 MM LEAK

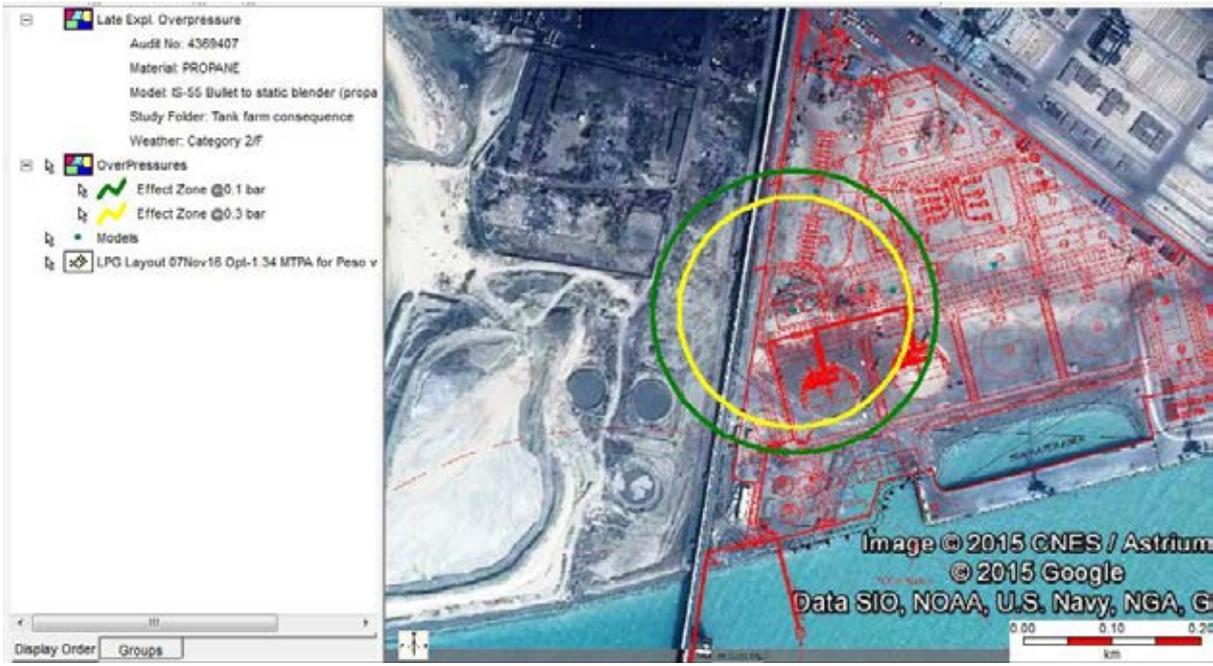
FLASH FIRE



JET FIRE



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



BULLET 2000-FA-08 THROUGH BULLET PUMP 2000-GA -08A/B TO STATIC BLENDER (BUTANE RICH STREAM) – 25 MM LEAK

FLASH FIRE



JET FIRE





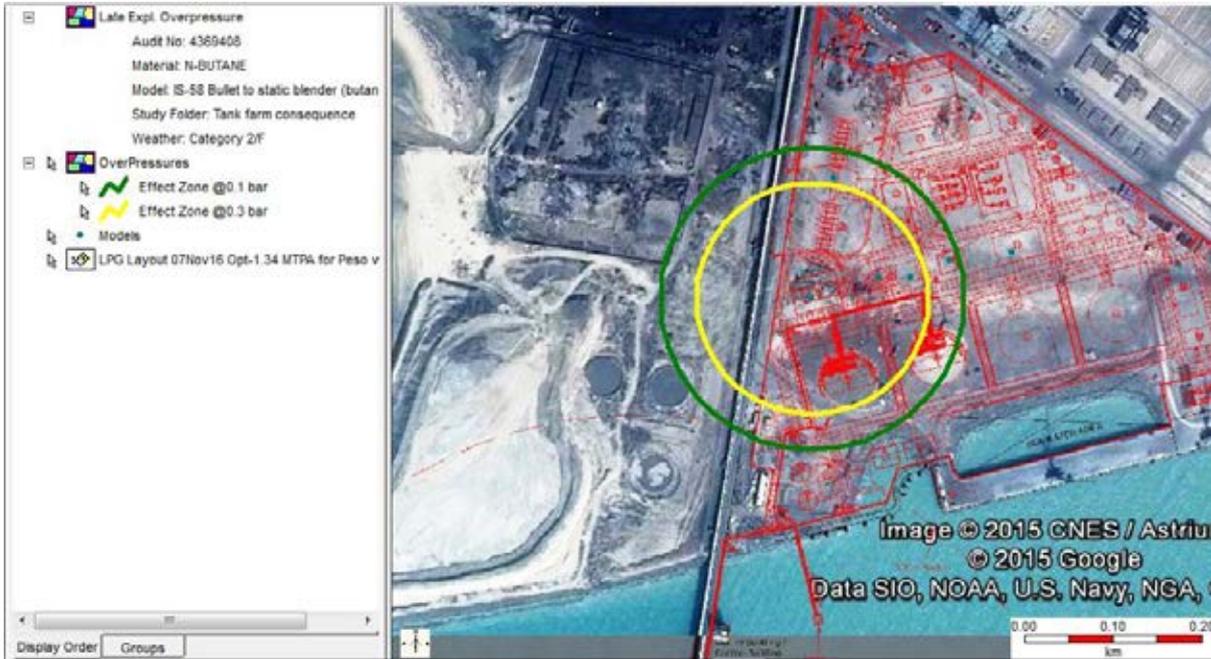
ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

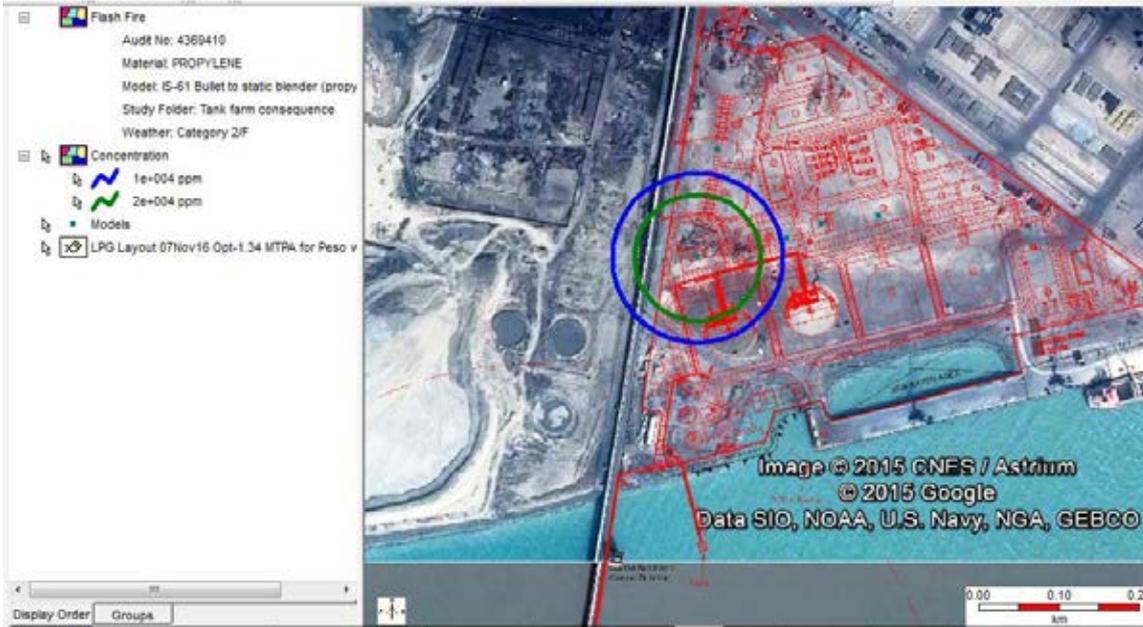
QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



**BULLET 2000-FA-08 THROUGH BULLET PUMP 2000-GA -08A/B TO STATIC BLENDER
(PROPYLENE RICH STREAM) – 25 MM LEAK**

FLASH FIRE



JET FIRE



EXPLOSION





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C

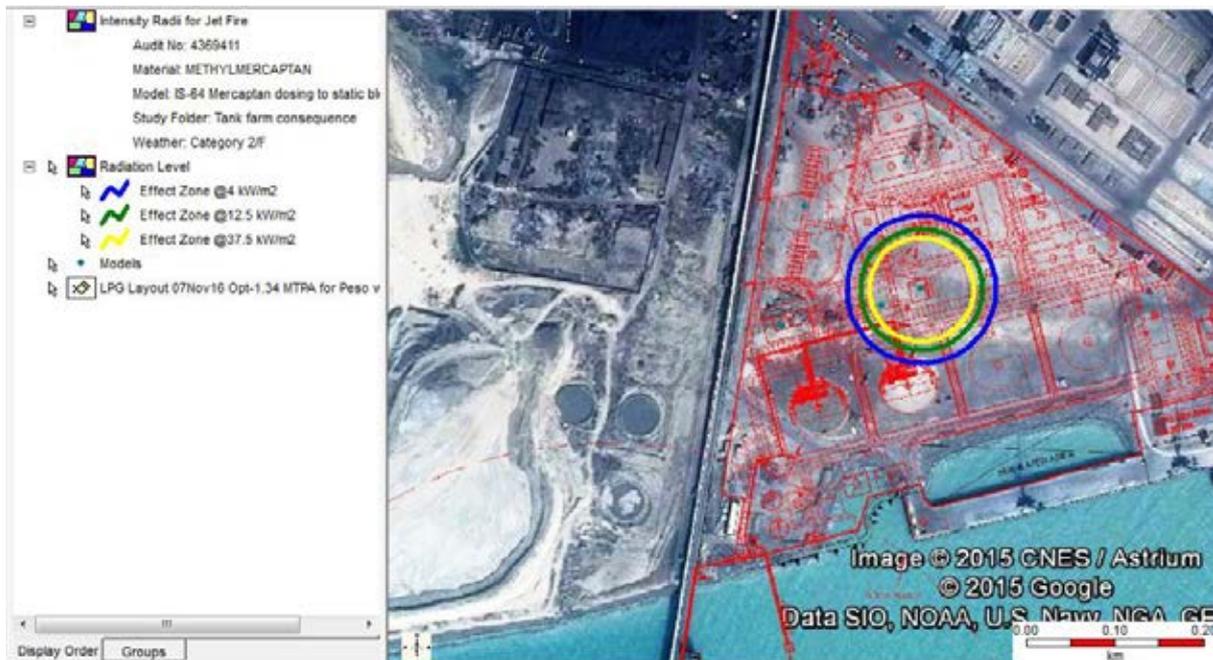


MERCAPTAN DOSING SYSTEM 2000-CS-01 TO STATIC BLENDER – 25 MM LEAK

FLASH FIRE



JET FIRE





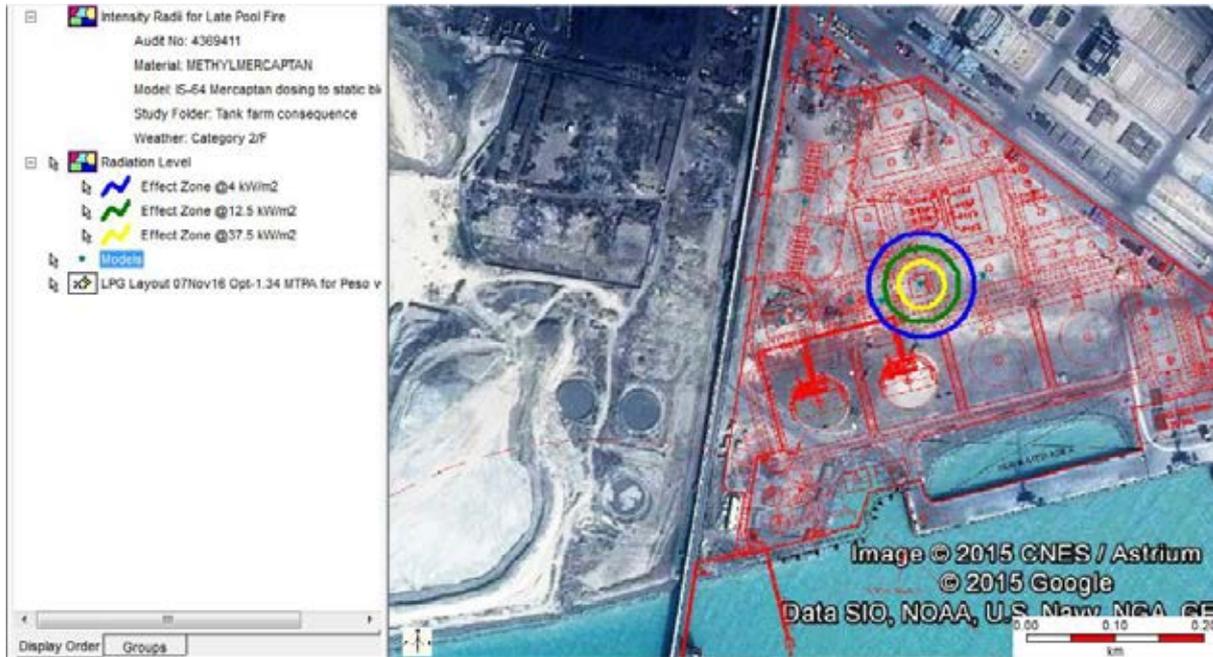
ADANI MUNDRA PORT – NEW LPG FACILITIES



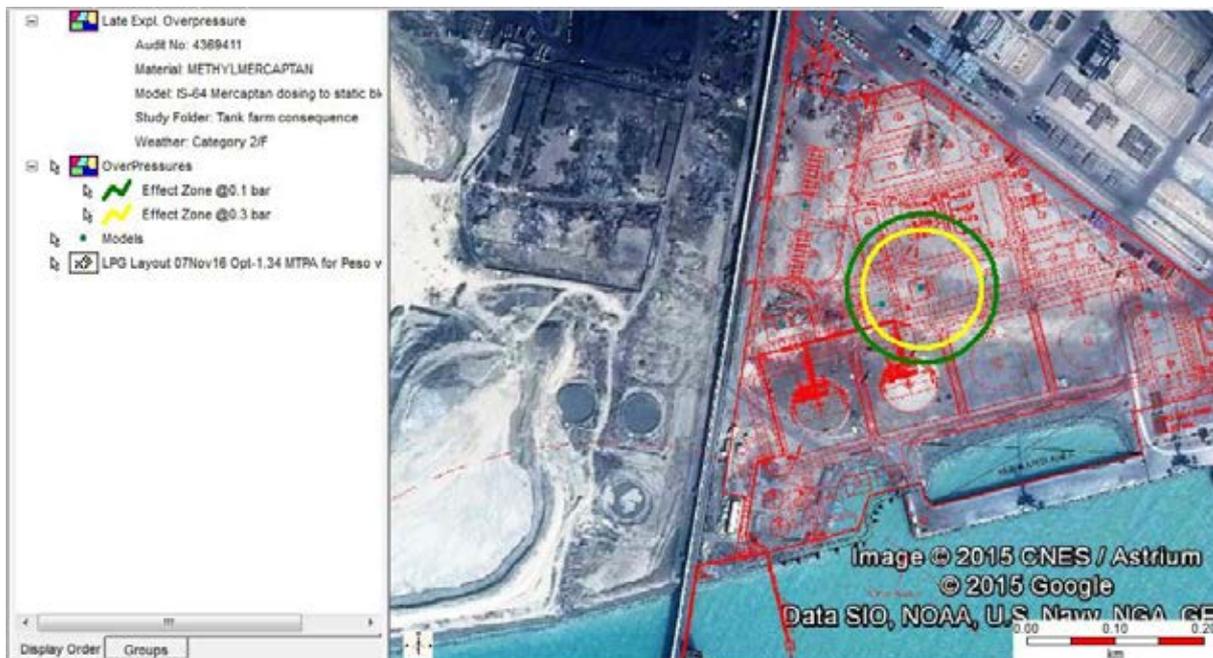
QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C

POOL FIRE



EXPLOSION





STATIC BLENDER OUTLET TO TANKER LOADING BAY – 25 mm LEAK

FLASH FIRE



JET FIRE





ADANI MUNDRA PORT – NEW LPG FACILITIES

QUANTITATIVE RISK ASSESSMENT-TANK FARM AREA

DOC NO: H003-E-LPG-GEN-BP-R-E-008C



EXPLOSION



Annexure – 18

Disaster Management Plan **Mundra** (Natural Calamities)

Cyclone



Earthquake

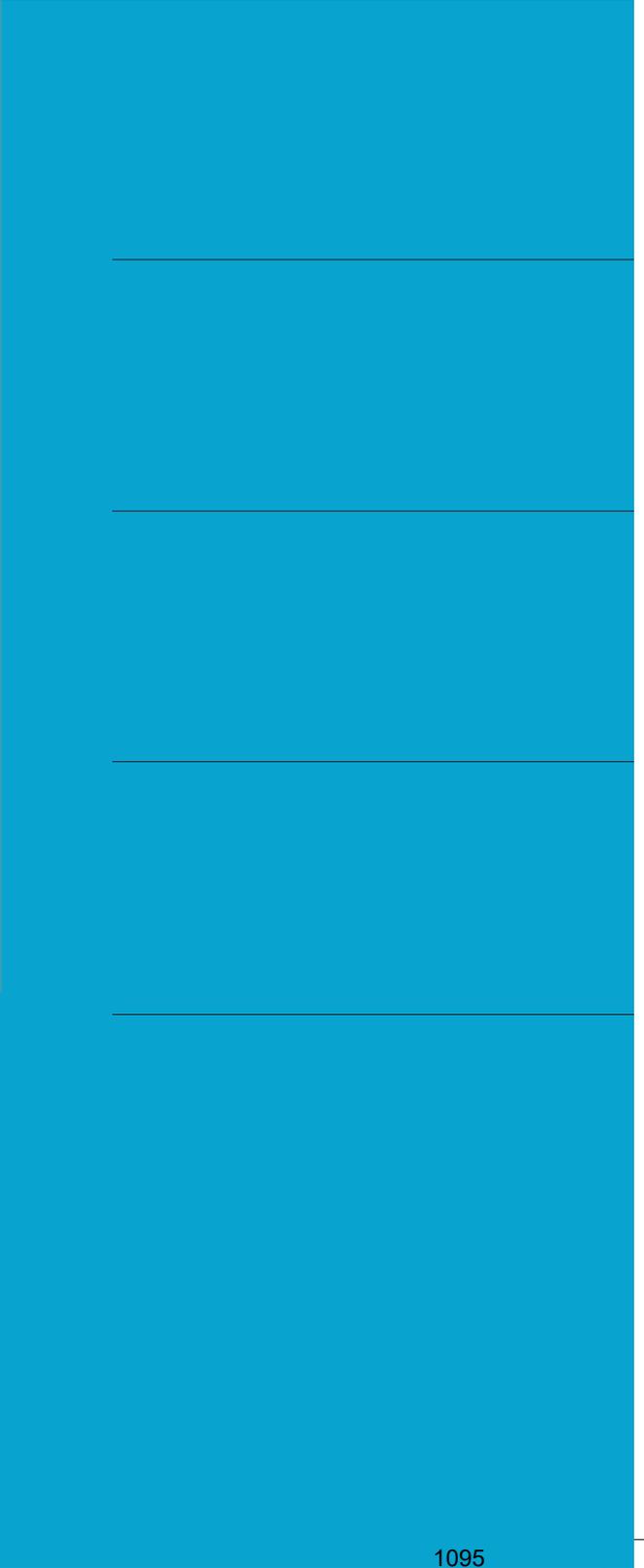
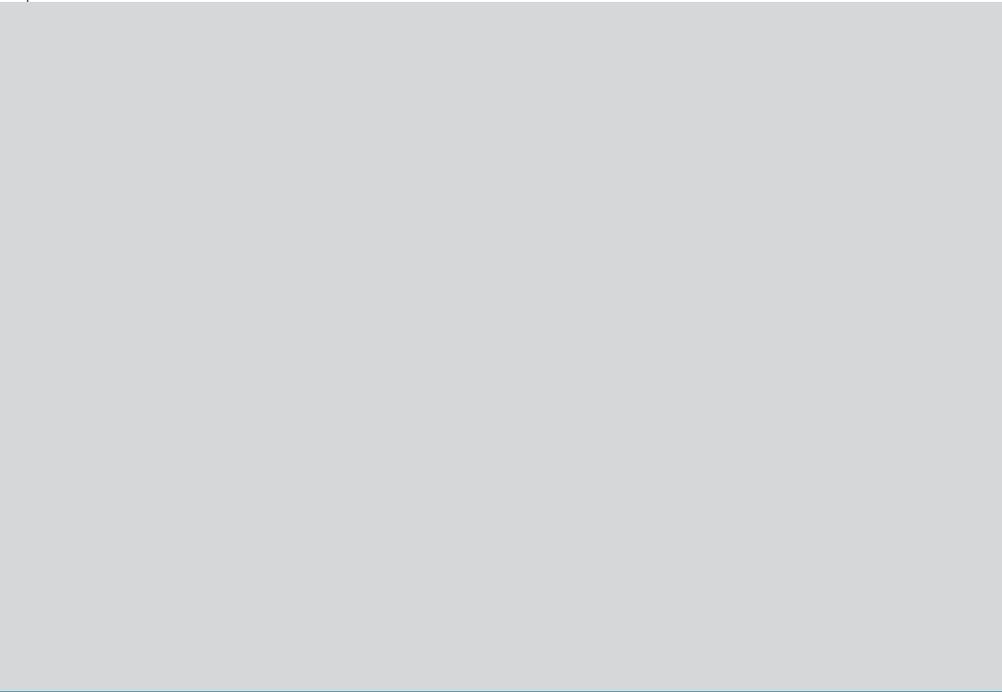


Flood/Heavy Rain



Tsunami





Contents

01 Cyclone

64 Earthquake

86 Flood/Heavy Rain

138 Tsunami

Disaster Management Plan for
Cyclone



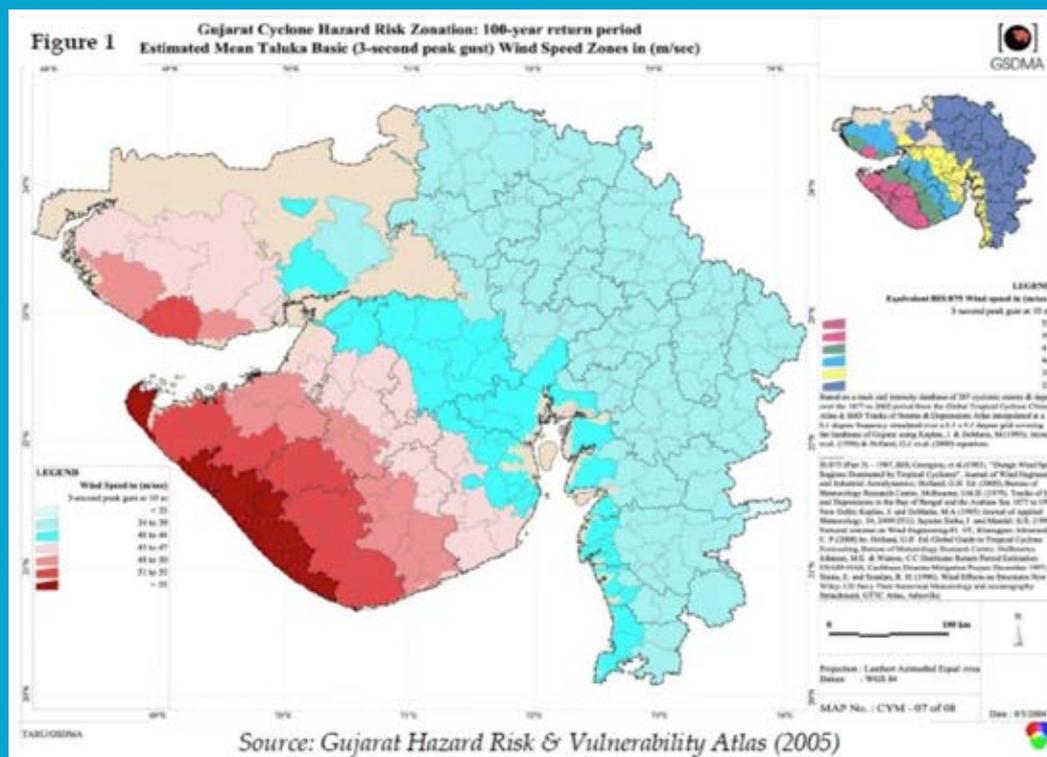


Cyclone

Important Information

- Regular power supply may be cut off for a considerable time (days) if the cyclone is severe, due to the failure of transmission lines.
- Both road and railway connectivity may be cut off for some time.
- Local villagers may try to forcibly enter port and local administration/police may be unable to help the port authorities.
- There may be unpredicted inundation from an unforeseen direction.
- All preparations to face such eventualities must be taken. Drinking water and adequate stock of essentials, for sustenance of the colony and nearby villages, have to be planned in advance.
- Adequate stock of essential medicines should be maintained.
- **Cyclone alarm and response** classification of tropical disturbances over the Indian seas. The cyclone currents rotate in clockwise direction in Indian subcontinent.
- If any other incident (i.e. fire, toxic release, oil spillage) occurs because of natural calamities, actions mentioned in the onsite emergency plan & oil spill contingency plan need to be taken.

Gujarat cyclone hazard risk zonations. Settlement-wise cyclone frequency



Classification of tropical disturbances	Speed (Kmph)	Speed (knots)
Low	< 31	< 17
Depression	31 – 51	17 – 27
Deep Depression	52 – 62	28 – 33
Cyclone	63 – 87	34 – 47
Severe Cyclone	88 – 117	48 – 63
Very Severe Cyclone	118 – 221	64 – 119
Super Cyclone	> 222	> 120

Useful web sites for tracking cyclones

- www.imd.ernrt.in
- www.supertyphoon.com/Indian.html
- www.npmoc.navy.mil/products
- www.solar.ifa.hawaii.edu/tropical/tropical.html
- www.underground.com/tropical

Generally port installations are designed, based on the following criteria

- To withstand maximum cyclonic wind speed of 55 mtrs/sec as per IS875 (Part III).
- Restricted operating wind speed of 26 mtrs/sec so that equipment can be moved to the parking position.
- Safe operating wind speed up to 20mtrs/sec

Action plan

- A. Actions – Pre-cyclone preparations till 24 hrs strike.
- B. Actions – 24 hours strikes to landfall.
- C. Actions – During cyclone till Dissipating.
- D. Actions – Post cyclone stage: recovery, insurance, restoration & relief.
- E. Checklists to be used at different stage of cyclone.

A Pre-cyclone Preparations till 24 hrs strike

This activity starts on intimation of possible cyclone hitting the Port (Normally before 3 to 4 days, and at least 48 hrs before the predicted cycle).

Marine Control (Signal Station)

- Prime duty of signal station is to collect the weather data, give warning to all by hoisting warning signals and control all marine activities.
- Marine Head of the Port is the controlling authority of Signal Station, who is assisted by 2 DGM Marine Operations.
- Marine Control is the eyes and ears of the port.
- Marine Control station is the Permanent Nodal Agency to gather information about low pressure formation, cyclone formation, and all details of cyclone. Marine control shall pass on all such information to the CEO and all HODs.
- The port's radar system is installed on top of the Marine Operation Building (MPT & WB) station; Vessel Traffic Management System (VTMS) is with the marine control.
- The information is to be collected from Indian Meteorological department, local radar system/Local TV networks news/Radio and Web-site.
- All information related to low pressure formation and cyclone shall be immediately sent to CEO and all HODs by mail, SMS, followed by telephone to ensure that they have received the message. In case any recipient is out of headquarters, the information shall be passed on to the HOS.
- The Marine Control Station shall maintain the contact details of CEO, all HODs and, HOSs, in addition to all installations (HR department shall supply contact details of all concerned and the list is to be kept updated every 3 months).
- On confirmation of cyclone, Marine Head shall make arrangements for food, water and all facilities necessary for the smooth functioning of the marine control, as proposed by Cyclone Management Centre.

Cyclone Management Centre:

- On receipt of information of approaching cyclone a Crisis Management Centre (CMC) at Adani house, First floor, Conference room shall be started at least 48hrs prior to the approach of cyclone.
- CMC formation shall be ordered by the CEO or the Executive Director (Corp. Affairs).
- First and Second floor of a permanent building is the ideal choice and hence the first floor of Adani House has been chosen for setting up of the CMC.
- CEO or the Executive Director (Corp. Affairs) shall be overall-in-charge of the CMC and shall take all necessary steps for proper functioning of the control room.
- All information shall be passed over to CMC by the Marine Control, when CMC starts functioning.
- All coordination and control shall be done by the CEO from the CMC.
- The CMC shall have stand-by power supply (Diesel powered Generator) which can last at least 48 hrs, in case of power failure. A diesel bowser shall be kept stand-by at a sheltered location near Adani House to supplement the existing 1800 ltrs of fuel which is available for the 320 KV Generator. The CMC shall be easily accessible and well connected through at least 3 modes of communication (telephone, walkie-talkie with charging facility and mobile phone) in addition to functional public address system.
- The communication system between marine control, CMC, CEO and HODs shall not fail at any cost.

Control Room shall have the following facility

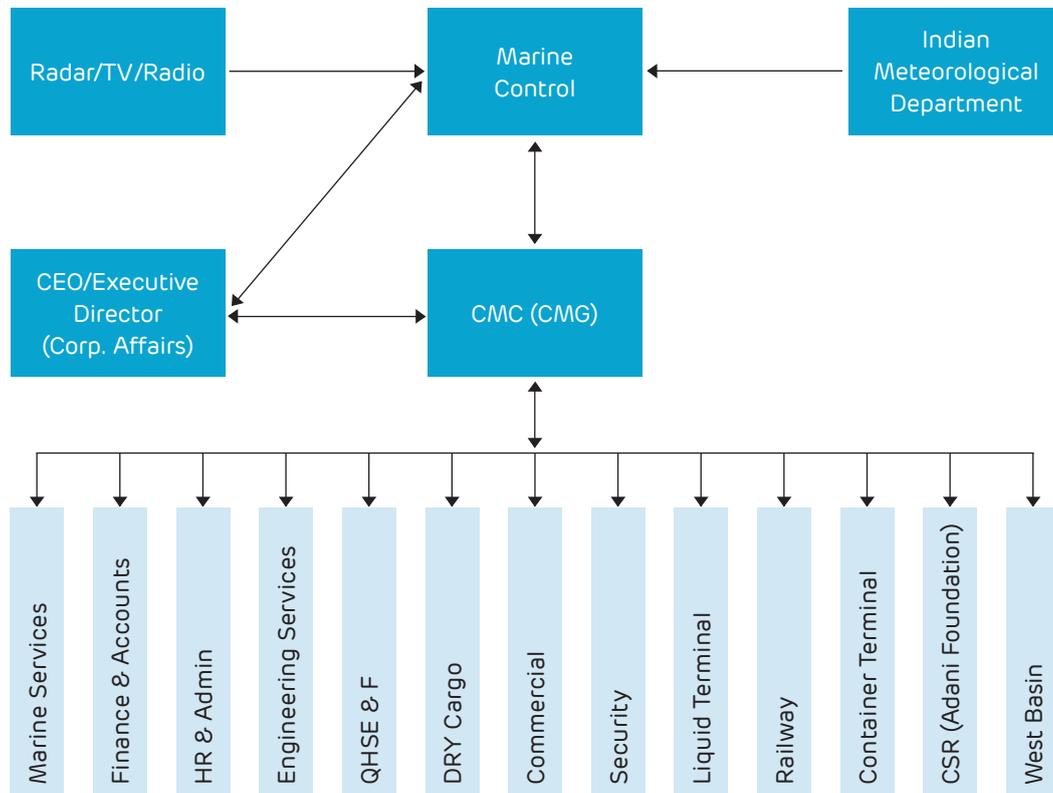
- Two numbers of laptop with internet link.
- Communication systems as described above.
- UPS and stand-by generator with fully charged battery and diesel for 4 days continuous running.
- Toilet facility with at least 2x1000 liters capacity overhead water tank.
- Dry food items and bottled water for 3 people for 4 days.
- One vehicle and one stand-by vehicle with adequate fuel and drivers.
- Adequate chairs, tables and sofas.
- Marine Head shall also arrange food and water for persons working at Marine Control round the clock during cyclone through HR & Admin.

Crisis Management Group:

- Crisis Management Group (CMG) will be a permanent body to deal with all crisis and it is formed by CEO.
- On confirmation of possible cyclone attack on the port, the Crisis Management Group (CMG) shall meet at the CMC or other convenient place as determined by the CEO.
- CEO Shall appoint departmental HOD/HOS as Coordinator and Convener of the CMG.
- All meetings of the Crisis Management Group (CMG) shall be conducted in the CMC.
- All HODs/HOS shall be members of CMG, in absence of CEO, Executive Director (Corp. Affairs) shall be the Chairman of CMG and Coordinator shall be the convener.
- CEO may declare emergency so that all staff and officers shall be at their duty stations and congregate at their designated stations for taking review of the situation and for implementing orders received from their respective HODs, who are CMG members.
- No officer shall leave his station during the emergency period.
- CMC shall be manned round the clock and shall be headed by CEO or someone nominated by CEO. He shall be at least of the rank of HOD.
- All advance preparations before the onset of cyclone, actions during cyclone and recovery shall be reviewed by CEO/Executive Director (Corp. Affairs) at CMC with the concerned CMG members.

Crisis Management Group – Responsibilities

All HOD's and HOS's shall be members of crisis group for cyclone management and post restoration activities in addition to members nominated by CEO as per the situation. The crisis management group shall be active till the full restoration of port activities.



Commands Structure/Designated Persons

- The following table shows the command structure for each department.
- In case the officer in the first column is not available, the second in command automatically takes over.
- Designation of the first column is the HOD and second column is the successor.
- In case of absence of both, the senior most officers of the dept. to assume charge.

Sr.No.	Head	Successor
1	CEO	Executive Director (Corporate Affairs)
2	HOD (Marine)	HOS (Marine)
3	HOD (Finance)	HOS (Finance)
4	HOD (HR & Admin)	HOS (HR & Admin)
5	HOD (ES)	HOS (ES)
6	HOD (QHSE & F)	HOS (QHSE & F)
7	HOD (Dry Cargo)	HOS (Dry Cargo)
8	HOD (Commercial)	HOS (Commercial)
9	HOD (Security)	HOS (Security)
10	HOD (Liquid)	HOS (Liquid)
11	HOD (Railway)	HOS (Railway)
12	HOD (Container Terminal)	HOS (Container Terminal)
13	HOD (West Basin)	HOS (West Basin)
14	HOD (CSR – Adani Foundation)	HOS (CSR – Adani Foundation)

* Roles of HODs [West basin (ES & DC)] and HODs [MPT (ES & DC)] are same. HODs [West Basin] will assist to Head – West Basin.

Duties and Responsibilities of CEO /Executive Director (Corp. Affairs) and HODs:

- On intimation of imminent cyclone, all HODs shall inform their subordinates to take all prescribed precautions as per the checklist and stand-by for further instruction.
- All HODs and officers shall have departmental walkie-talkie and mobile phones with them, with fully charged batteries.
- All HODs shall collect sufficient cash from the CFO, with the approval of CEO for contingency expenditure.
- All the members of the crisis group are required to inspect their area of responsibility to make sure all necessary precautions have been taken.
- In addition to the following, if there are any additional requirements, they shall be promptly attended to. Detailed duty and responsibility of the CEO and HODs are listed below.

• Group Position
• Port Position
• Alternative
• Site-Main Controller
CEO
Executive Director (Corp. Affairs)

- Keep close contact with marine control, CMG/Head Marine and get latest update on the cyclone and its course.
- Call for emergency meeting of the CMG for appraisal.
- Instruct all HODs to be ready. Also instruct HODs to form groups of officers and communicate the duties and responsibilities of all subordinate officers for their readiness (a group formed).
- Monitor cyclone management action plan/check list.
- Declare and ensure state of emergency and preparedness is maintained all throughout, till recovery and restoration is complete.
- Finalize the program for shutting down operations and evacuation and other operations as deemed necessary.
- CEO shall coordinate with CMG.
- Liaison with District Collector, Indian navy, Coast Guard, SP, Local Admin.

- Instruct the SEZ corporate affairs/Adani foundation to inform local villages of the danger arising from the imminent approach of cyclone and advise them to move to safer areas and offer all possible assistance.
- Review the condition of stack yard, stock of cargo inside transit shed, and initiate cargo safety action plan with all HODs.
- Review safety of dangerous cargo if any on board the ship, shed or nearby.
- Plan for casting off ships with dangerous cargo and dispatch of dangerous cargo from the port by road on priority basis.
- Finalise roster for removal of ships to roads from the port with Head Marine and HODs, marine operations.
- Review drainage, evacuation of surge/tidal water with ES-Civil dept. and instruct civil department to complete all related work within 24 hrs.
- Review action plan for safety of port and port equipment with Marine, Dry Cargo, ES, railway and CT.
- Review the plan for emergency power supply and water supply with MUPL.
- Finalize with Admin/HR and HSE, the action plan for the safety of employees to colony including emergency evacuation in case of tidal waves.
- Instruct Admin/HR to coordinate all arrangements for food and water.
- Ask all HODs to be ready with resources to meet unpredicted emergencies like Sea water inundation, and wind speeds being more than predicted speeds etc.
- Issue order to declare HOD finance as the coordinating officer for insurance.
- Review the insurance position and renew policies if lapsed.
- Sanction cash for emergencies, to be maintained by HODs.
- Review the preventive arrangements made by HODs as per checklist.
- Keep the corporate head office informed of all incidents and activities.

Crisis Management Group Responsibilities



- Have close coordination and supervision of the marine control to be fully alert day and night to monitor the cyclone and get the latest information.
- Pass on the latest cyclone updates to CEO/Executive Director (Corp. Affairs) and all CMG members for advance planning.
- Take active part in the formation of CMG with the approval of CEO.
- Take action to preserve all vital records and documents.
- Co-ordinate with HSE and take their advice for health, safety and environmental issues particularly if ships with dangerous or toxic cargoes are present in the port.
- Ensure that applicable implementation procedures are reviewed and are in position.
- Inform master of the ships about the cyclone and ask

them to be prepared to move out on short notice.

- Keep all the tugs and crafts on stand-by for emergency evacuation of ships to roads on short notice.
- Initiate emergency action plan for the safety of SPMs.
- Prepare a roster for evacuation of ships, in consultation with HOD of various SBUs.
- Arrange emergency kit for safety of personnel.
- Plan evacuation of all ships from the port on confirmation of the cyclone.
- Ship movements may not be feasible in the last 24 hrs period and wind may start increasing in advance. These aspects and tidal forecast may be taken into consideration in executing evacuation.
- Discuss and finalize with master of tugs and other officers necessary action to be taken for the protection and safety of tugs, port crafts and navigational aids, during cyclone after evacuation of ships.
- Keep all navigational survey equipment in good condition for use after passage of cyclone.
- Control of shipping.
- Obtain approval from CEO for taking all necessary action for the safety of the port and port crafts.
- Considering the condition of the channel depth, marine head shall prepare a chart for evacuation of the ships from the port.
- Marine head shall apprise CEO of all actions being undertaken.
- Even with all preplanning also, there may be occasioning that one or two ship remains in the port during cyclone. Action plan for such situation to be planned in advance.
- Additional movable fenders to be inserted between ship and berth and increasing the nos of mooring ropes etc are to be planned.
- Keep enough wire ropes ready for use in case of emergency.
- Coordinate for proper functioning Of CMC.
- Prepare duty roster for manning of Crisis Management Centre by officers of the Administration, Finance & Accounts and Commercial.
- Keep track of the cyclone and take all necessary action for cargo management with the help of various SBU's Head.
- Visit the port and coordinate with various SBU's Head to ensure safety of cargo stacked in stack yard and cargo stored in covered areas.
- Management of Hazardous waste may be done with the guidance of HOD, QHSE & F.
- Action plan to move Hazardous cargo to safe place to be finalized.
- Liaison with all stake holders to relieve their anxiety if any.
- The roster of all departments may be collected, combined and kept in the CMC for ready reference.
- Mobilize and monitor vehicles as per the checklist.
- Coordinate with Coast Guard to patrol the seafront.

- Liaison with Marine Police and ensure proper patrolling.
- During the course of cyclone Fishing Boats may try to berth on the vacant spaces and damage the berth or sink there.
- Plan in advance to prevent such incidents.
- Arranges food and water to the personnel on roster duty with the help of HOD Admin.
- Liaise with local administration and communicate inputs from and to the SEZ Corporate affairs/Adani foundation.
- Advance planning to keep audio/video records of all events.
- Ensure proper storage of valuable documents and equipment.
- News of weather forecast to be circulated frequently to the industries/units inside SEZ and surrounding areas.

• Group Position
 • Port Position
 • Alternative
 • Secondary Support Team
 Head F & A
 HOS F & A

- Maintain cash/funds for disbursement to all dept. as per requirement.
- Take over the function as nodal officer for all insurance related activity.
- Keep all valuable records and data in safe custody.
- Provide Disbursement Statement for processing claims.
- Depute officer to each dept. to assess the requirement and needs of affected dept.
- Assist in procurement and process purchasing/leasing of equipment.
- Prepare to help Admin/HR for hiring of special services for food, shelter and transport as the situation demands.
- Prepare to document all events, damages and claims.

• Position
 • Port position
 • Alternative
 • Primary support team
 HOD HR & Admin
 HOS HR & Admin

- Keep in touch with CMC/CMG, perform coordination with concurrence of CEO.
- Attend CMG meetings, as directed by CEO/Executive Director (Corp. Affairs).
- Have enough staff and vehicles ready to attend emergencies.
- Supply contact details of all officers and staff to Marine control and CMC.
- Discuss and finalize with HOD QHSE & F, the action plan for the safety and shelter of all officers, staff and people residing in the staff colony.
- HR department shall supply contact details of all concerned list is to be kept updated every 3 months
- Collect the duty roster of all dept. and their posting position to finalize arrangements for provisions, water and other essential for 4 to 5 days,
- Finalize arrangements for safety of colony in

consultation with HOD Admin.

- Advise colony occupants to store drinking water, cooking materials, cooking gas, candles etc. to meet emergencies.
- Ask the canteens to store adequate raw materials, gas etc for at least a week.
- Coordinate evacuation with transport and HOD Admin in township areas if situation so warranted with the clearance from CMC.
- Finalize in coordination with HOD Admin & HOD Security, the plan to ensure safety of Port properties and Colony.
- Coordinate with HSE and Medical officers for attending to emergencies.
- Coordinate with other field group (DC, Marine, ES, Container, CT, Liquid, Railway, Security, and QHSE&F) for food and drinking water for the persons engaged in cyclone duty and restoration work.

- May need additional help of HOD Commercial for procurement of large quantities of materials.
- Arrange emergency kit for safety of personnel.
- Make a list of staff that can be evacuated from all departments (DC, Marine, ES, Container, CT, Liquid, and Railway).

- Position
- Port Position
- Alternative
- Incident Controller

HOD – ES (MPT & WB)

HOS – ES (MPT & WB)

- Stay updated about the course of cyclone.
- Make detailed inspection of all facilities and plan for preventive actions in case of cyclone attack.
- Make responsibility chart for safe parking of all equipment and communicate the implementation system to field groups for on-site action.
- Plan for checking the condition of all stand-by equipment like DG sets, Diesel engine driven welding sets, De-watering pumps etc.
- Plan and advice the procedure for parking and anchoring of all equipment to the field group.
- Plan with HOD Commercial for the procurement of essential materials.
- Keep all valuable data and records in proper safe custody.
- Finalize a team of engineers and staff for round the clock emergency duty.
- Plan for adequate dry food and water, with the

assistance of HOD Admin for the people who may be required to be on emergency duty.

- Plan for emergency de-watering units, emergency lights etc.
- Draw available resource pool and keep a list of qualified contractors with contact number. Keep at least one team on stand-by for emergency power transmission line repairs and reconditioning.
- Call the officers and personally apprise them the action to be taken in the next 24 hrs (24 hrs pre cyclone).
- The last pre-cyclone period may be curtailed due to unexpected sudden increase of wind speed.
- Arrange emergency kit for safety of personnel.
- The action team should be apprised of such a situation taking place in advance.
- Cargo operation may have to be stopped early for moving equipment to safety and taking out Ships.
- Though the port operation shall continue till the time the wind speed permits, all preparatory arrange must be in place to complete all planned safety work before the wind speed reaches the threshold limit.
- Plan for parking all non-working equipment prior to the last 24hrs.
- Attend the CMG meeting and apprise CEO/Executive Director (Corp. Affairs) the action plan to be taken to prevent damage to the port equipment and installation in case the cyclone hit the port.
- Arrange sand-bags and heavy weights to prevent light materials from flying and to create a barrier to reduce the impact.

Instruction to be given to the designated groups for anchoring the equipment

- Stop operations in consultation with HOD Dry Cargo & Container Terminal when the wind speed increases.
- The loading and unloading booms of ship loader, ship unloader and container cranes, HMCs shall be lifted and latched.
- If latching is not functioning, repair it or tie with wire ropes for additional protection.
- Ship loader and ship unloader, HMC etc shall be travelled to the designated parking position lower the anchoring pins into hole and lock.
- In case of hydraulic locking, lower the locking jaws and lock it with rails.
- Park and secure the boom of all stacker & reclaimers at the designated place.
- In addition, block all the wheels of all rail-mounted equipment mechanically.
- Lock all control rooms and operators cabins.
- Switch-off power supply to equipment, after they are parked and secured.
- Check all MCCs and tunnels and ensure there is no possibility of surface water entry inside.

- Inspect all roads, culverts, drainage system and water supply system.
- Take action to rectify defects on war footings to complete within 24/30 hrs.
- Inspect all buildings, roof of temporary buildings, and top of conveyor galleries.
- Take action for repair and strengthening.
- Inspects the seashore of the port and take action for protection if warranted.
- Plan action group to attend to emergencies, co-ordinate with MUPL for maintaining water supply.
- Check all buildings, conveyor gallery and roofs tops and strengthen them to withstand the cyclonic wind.
- Coordinate with HOD Commercial to procure and store enough sand/cement and other construction material to tackle emergency.
- An experienced engineer may be attached with commercial to help in arranging civil construction materials.
- Take all necessary precautions to seal entry of surface water inside wagon tippler tunnel and MCCs and control rooms.
- Plan for a group of officers and staff for stand-by duty during cyclone.
- Plan to keep adequate diesel to operate the de-watering pumps.

- Position
- Port Position
- Alternative
- Primary Support Team

HOD – QHSE & F

HOS – QHSE & F

- Assist CEO as instructed.
- Co-ordinate with respective HOD/HOS with respect to emergency actions.
- HOS of all sections of QHSE&F will assist HOD – QHSE&F.
- Assist in evacuation of all personnel except key personnel.
- Provide HSE&F facilities (Assist for rescue, evacuation, and other necessary arrangements).
- Ensure availability of emergency kit (torch, PPEs, rope, first-aid, whistle, VHF sets, PA system, fire extinguisher etc)
- All Emergency vehicles are to be ready to operate, completely filled with fuel, and stand-by drivers.
- Liaison with mutual-aid partners for assistance.
- Arrange necessary staff of fire, medical & rescue with necessary arrangements.

- Assess high risk areas areas where there could be chance of major environmental pollution.
- Arrange emergency kit for safety of personnel.
- Remove/Securing of Hazardous and toxic cargo.
- Providing necessary arrangements to prevent pollution and to protect the environment.
- Suggest optimal strategies to conduct emergency isolation of damaged equipment, emergency transfer of materials etc.
- Render assistance for trapped personnel.
- Recommend the appropriate procedures to isolate damaged units without introducing new hazards.
- Coordinate as per plan for all preparations to meet the emergencies.
- Set up casualty collection centre and arrange first aid posts.
- Arrange enough stock of medicines, antidotes, oxygen, stretchers etc.
- Keeping in mind that Road and Rail connectivity may be cut off for required period of time.
- Maintains a list of blood groups of each employee with special reference to rare blood groups.
- Arranges additional medicine and equipment as required.
- Ensure fully equipped Ambulance in ready state.
- Ensures that the casualty section of Port hospital has specialists round the clock during cyclone.
- Arranges for extra beds and in emergency contact with the Adani Hospital and Bhuj Hospital for extra medical supplies.
- Make arrangements for mobile casualty to reach at incident sites and transporting for further treatment.
- Duty Doctor to be onsite with team who acts as liaison officer for all medical services.
- Advise regular medicine takers to keep adequate stock of medicine with them like BP patients,

diabetics etc through e-mail communication.

- Immediate disposal of hazardous waste and biomedical waste to disposal facility.
- Plan for securing ambient air quality monitoring instruments throughout the area.
- Co-ordinate with engineering services for securing the stakes.

- Position
- Port Position
- Alternative
- Incident Controller

HOD–Dry Cargo
(MPT & WB)

HOS–Dry Cargo
(MPT & WB)

- As soon as getting the information about cyclone, personally visit all stack yards, plots and other cargo storage area, including transit shed if any and inspect the condition of stacking.
- Inspect all drainages and if found blocked inform civil engineering to immediately clear the drainages to ensure free follow of flood water.
- Confirm that hazardous and toxic cargoes are properly protected to prevent environmental issues.
- Take action to evacuate all perishable cargo, and ask the owner to arrange for evacuation as quickly as possible.
- Arrange emergency kit for safety of personnel.
- Take action to identify all expensive materials and take action to protect them to prevent losses during cyclone.
- Arrange to segregate and protect cargo in sheds.
- Co-ordinate with HOD Marine in de-berthing vessel to vacate the berth.

- Discuss with DC team and HOD Marine and operations may have to be stopped early, so that they get time to move out all ships.
- Take all possible action in coordination with CMC and owners of cargo to ensure no or minimum loss of cargo during cyclone and possible tidal inundation.
- Have a final inspection of cargo before the onset of heavy wind.
- Liaison with HOD Security for safety of cargo.
- Preserve all records in safe place to save it from cyclone and possible inundation.
- All cargo handling equipment like, pay loaders, front end loaders, bull dozers, dumpers, trailers, cranes, forklifts etc. shall be kept ready with adequate fuel to use them on emergency, during cyclone and later during restoration. These equipment are to be parked in safe, protected area.
- Arrangement schedule of enough operators/workmen to operate equipment during cyclone in emergencies and for restoration.
- Mobilization of additional manpower and cargo handling equipment from the port, Stevedores and C & F agents to meet emergencies and later to segregate unaffected cargo and make arrangements to protect cargo, till evacuation.
- Officer of Dry Cargo will coordinate with Security about the local road network in case of road blockage, to clear the blockage in coordination with state government and local administration, through Corporate Affairs.
- Corporate Affairs will also explore alternative mode of connectivity, so that some form of connectivity with the main stream is immediately established.

- Position
- Port Position
- Alternative
- Secondary Support Team

HOD – Commercial

HOS – Commercial

- Collect details of all materials in store and plan for procurement of adequate stock of consumables and construction materials.
 - Discuss with all HODs about their possible requirements.
 - Make physical verification of the stores for proper stocking to prevent damage during cyclone.
 - Co-ordinate with ES-civil for repair of stores if found wanting.
 - During cyclonic season sufficient stock of consumables like tarpaulins, gunny bags, ropes and wires for port crafts, diesel oil, kerosene oil, hurricane lantern, candles, petromax lamps, torch lights with batteries and bulbs, electrical items, sand-bags, cement etc are kept in stock.
 - Stock adequate roofing materials and fixtures, for emergencies.
- Few sealed packets of bleaching powder shall be available in stores for sanitation.
 - Few gas cutting sets may be kept in stores for emergency. The quantity may be decided in consultation with ES.
 - All the materials which are likely to get damaged by water-inundation shall be protected by a tarpaulin cover and kept above ground level.
 - All electrical and electronic items shall be shifted to safe place fully wrapped.
 - Stores which needs to be kept in controlled temperature, like belt splicing materials etc. are to be moved to places where DG sets are available, or arrange one DG set for emergency supply.
 - Spares shall be sealed in polyethylene covers and kept to save it from cyclone damage.
 - Electrical items should be kept in high raised rake to prevent water contamination.
 - Cut edge of conveyor belts should be either covered or a coat of rubber solution shall be applied.
 - Arrange to keep stand-by staff round the clock to issue these materials any time during the emergency and restoration period.
 - All valuable records and computers shall be properly stored to save them.
 - Inform HOD-Finance of approximate funds required.
 - Selling of recyclable hazardous waste must be prioritized.

- Position
- Port Position
- Alternative
- Primary support team

HOD – Security

HOS –Security

- Plan for effective traffic control and its regulation in port area during and after cyclone.
 - Coordinate with QHSE&F for fire and safety issues.
 - Inspect the circumference of the port and in case of damages to compound wall get them repaired with the help of HOS civil Engg, immediately.
 - Close all possible vulnerable points.
 - Clear all internal roads within port area for smooth traffic.
 - Plan for posting extra watch and security guard team for intensifying patrolling of stores, substations, berths, transit sheds, warehouses, administrative building, loco sheds, workshops, water supply installations etc. in addition to all entry and exit points.
 - Arrange emergency kit for safety of personnel.
 - Issue orders to all gates to effectively control the entry of unauthorized persons or vehicles inside the protected area.
 - Plan to intensify the patrolling of periphery and inside the port, including the berth area.
- Liaison with police and local aid agencies after informing the CEO.
 - During the Pre-cyclone, Cyclone and recovery period no visitor shall be permitted inside the protected area.
 - In case of authorized visitors, they shall be apprised of the cyclone and its effect. They may be escorted to safe place. Liaison with Admin for their accommodation and transport

- Position
- Port Position
- Alternative
- Incident Controller

HOD – Liquid

HOS – Liquid

- Coordinate with Marine Control and CMG.
- Inform the masters of the ship regarding the progress of cyclone, and ask them to be prepared to move out on short notice.
- Discuss with Marine HOD and finalize the ship movement program in advance.
- Keep all officers and staff ready for emergency action on intimation of cyclone (Notice of 24 hrs or less only may be given for evacuation)
- Plan for a well-prepared emergency group to stand-by during cyclone to meet unpredicted emergencies.
- As soon as getting the information about cyclone, personally visit all the areas of Liquid Terminal.
- Make necessary arrangement for shifting of critical cargo.
- Inspect all drainages and if found blocked inform Admin/Civil to immediately clear the drainages to ensure free follow of drained water.

- Confirm that hazardous and toxic cargoes are properly protected to prevent environmental issues.
- Take action to evacuate all perishable cargo, and ask the owner to arrange for evacuation as quickly as possible.
- Co-ordinate with HOD Marine in de-berthing vessel to vacate the berth.
- Discuss with HOD Marine to stop operations early, so that they have time to move out all ships.
- Take all possible action in coordination with CMC and owners of cargo to ensure that there is no or minimum loss of cargo during the cyclone and possible tidal inundation.
- Arrange emergency kit for safety of personnel.
- Have a final inspection of cargo before the onset of heavy wind.
- Liaison with HOD Security for safety of cargo.
- Protect all records in safe place to save it from cyclone and possible inundation.
- All tankers and other equipment shall be kept ready with adequate fuel to use them in case of emergency, during cyclone and later during restoration. This equipment must be parked in a safe, protected area.
- Schedule enough staff to operate equipment during cyclone, in emergencies and for restoration.
- Inform QHSE&F about disposal of hazardous waste.
- Remove all loose material from the open areas and secure at proper place.

- Position
- Port position
- Alternative
- Incident Controller

HOD – Railway

HOS – Railway

- Maintain co-ordination with marine control regarding the status of the cyclone.
- Ensure that wagons and locomotives are parked in a safe area in case the wind speed increases
- Arrange an emergency kit for the safety of personnel.
- Liaison with Indian railway authority.
- Co-ordinate with Operations department for wagon loading.
- Railway team to stay in continuous contact with other emergency services (such as QHSE & F, Security, other services).
- Inspect the railway track, loco, signals and other assets belonging to Railway.
- As soon as information about the cyclone is received, personally visit the concern areas.
- Inspect all drainage/culverts and if found blocked inform civil engineering to immediately clear the drainages to ensure free follow of water.

- Confirm that oil/grease containers are secured.
- Arrange emergency kit for safety of personnel.
- Liaison with HOD Security for safety of cargo.
- Preserve all records in safe place to save them from cyclone and possible inundation.
- Arrange enough operators/workmen to operate equipment during cyclone in case of emergencies and for restoration.

- Position
- Port Position
- Alternative
- Incident Controller

HOD – CT

HOS – CT

- Maintain contact with Marine control for the status of the cyclone.
- Containers must be stacked in threes only (as per possibility)
- All hand held UHF/batteries, emergency torch, mobile phones must be fully charged for use in emergency in case of total power failure.
- Should be ready to stop activity in case increases of wind speed.
- As soon as getting the information about cyclone, personally visit wharf and back-up area.
- Ensure condition of storm lock-pin.
- Confirm that hazardous and toxic cargoes are properly protected to prevent environmental issues.
- Take action to evacuate all perishable cargo, and ask the owner to arrange for evacuation as quickly as possible.
- Arrange emergency kit for safety of personnel.

- Co-ordinate with HOD Marine in de-berthing vessel to vacate the berth.
- Discuss with HOD Marine to stop operations early, so that they get time to move out all ships.
- Take all possible action in coordination with CMC and owners of cargo to ensure no or minimum loss of cargo during cyclone and possible tidal inundation.
- Have a final inspection of cargo before the onset of heavy wind.
- Liaison with HOD Security for safety of cargo.
- Preserve all records in safe place to save them from the cyclone and possible inundation.
- Arrange fuel for equipment and cranes for emergency.
- All cargo handling equipment ITVs, cranes, forklifts etc. shall be arranged to use them on emergency and later during restoration. This equipment is to be parked in a safe, protected area.
- Arrange enough operators/workmen to operate equipment during cyclone in case of emergencies and for restoration.
- Mobilization of additional manpower and cargo handling equipment from port, stevedores and C & F agents to meet emergencies and later to segregate unaffected cargo and make arrangements to protect cargo, till evacuation.

B 24 Hours strikes to landfall

- Position
- Port position
- Alternative
- Site-main Controller

CEO

Executive Director
(Corp. Affairs)

- Ensure from HODs that all precautionary measures are completed in advance and obtain written feedback.
- To ensure that all documents and records are kept in safe places by HODs.
- Hold review meeting of the CMG at regular interval, minimum 3 times daily till full recovery and resumption of port operations.
- Have frequent overall physical verification inside the port area.
- Advise all members of CMG to be present at CMC or at temporary Emergency Control Room during cyclone.
- Authorize release of required funds.
- Appraise corporate office of the situation and action taken.
- Coordinate with District collector, Tahasildar, Indian Navy, Coast guard and Marine Police for advance precautionary actions.

- Take all necessary steps to help local authorities for evacuation and sheltering the people of nearby villages who may be affected.
- Approve information to the media.
- In case of high tidal prediction, employees and families staying in the colony need to be relocated. Also instruct Admin to look in to the possibility of shifting people on the ground floor to first floor or above.
- Instruct Admin/HR department to arrange enough grocery items, dry food and drinking water for emergency requirements.
- Provide timely status reports to the authorities.
- Take active role for corporate social responsibility along with Adani Foundation.

- Group Position
- Port Position
- Alternative
- Incident Controller
- HOD – Marine
- HOS – Marine

Directs and Co-ordinates all Field Operations/ Precautions:

- Keep track of the course of cyclone and inform all pilots and staff and officers about the latest position. Keep inform all HODs.
- On information from Marine Control about increasing wind speed, ask HOD of Dry Cargo, Container Terminal and Liquid Terminal to stop all loading, unloading of cargoes, discharging and bunkering operations.
- Discuss with CEO, HOD Dry Cargo, Container, Liquid and Pilot to start evacuation of the ship to the roads as per the roster finalized earlier.
- Ship on oil/liquid berth is to be given priority for evacuation.
- Coordinate with HSE to ensure ship with hazardous and toxic cargo are taken out first.
- Evacuation shall be completed before the wind speed reaches threshold value.

- To ensure this, evacuation may have to be started earlier.
- Preserve all records and documents safely.
- Keep all the necessary officers and staff stand-by for emergency duty.
- In coordination with HOD Security, ensure evacuation of all dock workers and private labour, visitors, shippers, consignees from the port area.
- Ensures implementation of the disaster response plan and coordinating with the Fire Fighting Authorities. .
- After evacuation of all ships, arranges to protect Tugs and Port crafts by proper docking and tie up to withstand simultaneous cyclone wind and destructive tides.
- Deploy craft- and mobilize resources to confine and clean up spill if any.
- Keep adequate provision of food and water for men on emergency duty.
- Inform possible time of return to normalcy to all cargo interests, shipping agents, stevedores.
- If due to any reason a ship could not be taken out, this ship needs to be protected well against breakage of mooring ropes and possible drifting and banging on to the berth.
- Several restraints, as situation demands, with bollards needs to be done.
- A team of staff along with DC/Pilot needs to be on stand-by duty for the period of cyclone to take spot decisions.
- Enough good quality ropes, shackles and other required materials, shall be supplied to the group.
- This matter shall be brought to the notice of the CEO and Corporate Head.

SPM Preparedness for Cyclone

- Flush both floating and subsea hose strings with seawater.
- Disconnect both floating hose strings from SPM buoy, shift and secure at safe location.
- Blind both j-piping arm flanges.
- Disconnect both mooring hawser assemblies and transfer to a safe location or on board of Diving support vessel.
- Secure:
 - > All loose and portable equipment & spares from SPM buoy.
 - > Hatches doors and replace seals if needed.
 - > All doors and latches for tightness.
 - > Locked close position of all deck & central chamber valves.
 - > Ensure that all hazardous and toxic cargo is identified.

• Co-Ordinator

• Marine Control (Shift Incharge)

- The coordinator shall work as the convener of CMG.
- The duty of the coordinator is to coordinate with all CMG members and help to implement all decisions.
- All officers on duty must have walkie-talkie and mobile phone with them with fully charged batteries.
- Keep few extra walkie-talkies ready at CMC for emergency work.
- Keep a record of walkie-talkies to prevent loss.
- He shall work as a convener of the CMG and shall report directly to CEO.

- He shall help all CMG members for the pre-cyclone arrangements and post cyclone re-commissioning.
- The extra man power required for all departments shall be arranged by him, by lateral shifting or by hiring for specific purpose and period.
- Circulate cyclone bulletins to all external customers at every 12 Hrs.
- A salvage team with a salvage vehicle shall be maintained at the Marine control under the control of the senior pilot, who shall be on duty during cyclone.
- This salvage team is to be used for attending to emergencies during cyclone.
- For manning the same, staffs have to be provided in coordination with HOD Marine & ES.
- This vehicle shall be able to move around in port area and shall be provided with, a DG set, portable welding machine, gas cutting sets, wire ropes, shackles, first aid box, emergency light, necessary tools and tackles etc.
- Liaise with Site Incident controller (HOD Marine) and is responsible for keeping the Fire and rescue Dept. in a state of alertness on a 24 hour.
- Keeps CMG, HOD Marine, HSE and HOD Security informed of any crisis & lead team directly to incident site.
- Initiates firefighting procedures immediately and ensures firefighting team reaches the incident location with the correct resources.
- The fire team also shall work as rescue /evacuation and other emergencies.
- Assist in the evacuation of workers to the assembly points in liaison with HR. Plan with assistance of HSE, for adequate men to stand-by duty in emergencies.
- Arrange safety equipment e.g. fire suits, protective gloves and goggles, breathing apparatus as required.
- The emergency set should be so arranged that it can start functioning immediately on reaching the emergency point (D/G set is ready with POL and battery, emergency light sets ready, gas cutting set is connected and ready, welding set ready, enough welding rods are available.)
- Men on duty should contain at least, one welder, an electrician, riggers etc.
- Coordinate with Medical department for maintaining mobile first aid centre.

- Support Staff
- Senior Pilot
- Pilot

- Senior Pilot to be stationed at Marine Control.
- Assist Pilots to take out ships on to the roads.
- Assist Pilots to secure port craft properly, taking into consideration of severity of the cyclone.
- Maintains 24 hour vigilance towards the channel / anchorage & port
- On receipt of any incidence inform CEO/HOD Marine refrains from exchanging any information with unauthorized persons unless authorized to do so by the CEO.

- Maintains contact with vessels on VHF.
- A salvage vehicle with tools and tackles, a portable welding set, portable DG sets, gas cutting set, ropes of different size, portable lights should be maintained at the Disposal of the Marine control station under the senior Pilot.
- To man the same, persons from different department shall be arranged by the Coordinator.

- Group Position
 - Port Position
 - Alternative
 - Incident Controller
- HOD–Dry Cargo (MPT & WB)
- HOS–Dry Cargo (MPT & WB)

- All normal operations to be stopped. Only emergency operations (securing of MHC/goliath/LMC/equipment/hoppers/dumpers/trailers) to be continued.
- Ensure that cranes are parked at safe locations with lowered and secured booms.
- All mobile truck-loading hoppers at jetty are arrested at their wheels to prevent horizontal movement due to wind and secured from above by arranging guy ropes.
- All equipment (pay loaders/excavators etc) to be parked at OSY 10 or nominated OSY with full fuel.
- All dumpers/trailers to be parked at OSY 5/nominated place with full fuel.
- All godown gates to be closed.
- Keep emergency kit ready.
- Communication mediums like VHF, mobile phones and PA systems checked and tested.
- As soon as the wind speed approaches 20mtrs/sec, issue instruction to stop all operation and move the equipment to parking position.

- Only emergency team members to remain in the port.
- 2 Pilot Vehicles stand-by near Tug berth building and FCC control room.
- Following team of operators remains at stand-by (at Tug Berth building) for emergency action.
 - > Crane operators- 3 Nos
 - > Loader operators - 6 Nos
 - > Excavator operators - 4 Nos.
 - > Forklift operators- 2 Nos.
- Emergency team in continuous contact with other emergency services (such as QHSE & F, security, other services)
- All costly and critical materials are secured properly to avoid loss due to wind or water inundation.

- Group Position
- Port Position
- Alternative
- Primary Support Team

HOD – Security

HOS – Security

- Maintain adequate personnel to man all exit and entry points and to make regular surveillance survey of the port, periphery and vulnerable points.
- Ensure sufficient security.
- Maintain patrols and ensure unsafe practices are eliminated.
- Liaise with Site Incident Controller (HOD Marine).
- Keeps CMG, HOD Marine, HSE and HOD Security informed of any crisis & lead team directly to incident site.
- Control the entry of unauthorized persons and vehicles.
- Permit the entry of authorized personnel and outside agencies for rescues operations without delay.
- Allows the entry of emergency vehicles such as ambulances without hindrances.
- Ensure that all people are aware of the assembly points, where the transportation vehicles are available.

- Match the headcount with the list available at the assembly point section of that area.
- Help Admin/HR with evacuation as and when asked for.
- Carry out reconnaissance of evacuated area before declaring the same as evacuated and report to HOD Security/CMG.
- Keep adequate fuel and vehicles for emergency duty.
- Disperses crowd and cordons off restricted areas to prevent looting.
- During heavy cyclone there may be instances of local villagers rushing inside the port area, HOD Security may be prepared to meet such emergencies.
- HOD Security and HOS Security shall frequently take rounds inside the port area to ensure that everything is in order and shall submit compliance to CMG.

- Position
- Port Position
- Alternative
- Incident Controller

HOD – ES
(MPT & WB)

HOS – ES
(MPT & WB)

- Maintain roster of officers and staff for duty during cyclone and restoration period.
- As soon as the cyclone is confirmed to strike within 24 hrs start preventive preparations.
- Apprise the team the modus operandi of parking and securing all equipment.
- Transport all non-operating equipment to the designated parking place, and lock all movements. Close the doors and windows of operators cabins and electrical control rooms.
- Form teams for safety and securing of all equipment and vital units.
- With coordination with all Department HODs like Dry Cargo, Container Terminal, Liquid Terminal and HSE etc. pull out equipment one by one from operation and move to safe, designated parking area.
- Instruct the leader of the team to be personally responsible and obtain feedback in writing, which may be submitted to CEO, after physical verification.

- Ship loader and ship unloader shall be parked at the designated area, lower the locking bar into the slot in the jetty.
- In case of hydraulically operated rail clamp, lower them to hold on to the rail, and block all wheels mechanically.
- Securing each equipment before submitting the clearance to higher ups.
- All equipment shall be stopped the moment wind approaches 20mtrs/sec, raise the booms and latch them, tie up if latch is not reliable.
- Move to and position at the respective earmarked parking position and lock.
- Loading boom of stacker reclaimers should be lowered and latched at the parking position.

-
- Make necessary arrangements to secure roof sheets.
 - In case of any difficulty to travel to the parking position lower the boom to the travelling rail, any one side and tie down with the rail.
 - Block the travelling wheels and slew wheels mechanically.
 - Additionally the rail mounted equipment may be tied to the rails by wire rope and clamps depending on the severity of the predicted cyclone.
 - Tie down all raised conveyor belt to prevent dismounting, especially belt on the tippers of stacker reclaimer, ship loaders and open conveyor belts at Berth.
 - Do not use wire rope to tie down conveyor belt, also ensure to use gunny bags or old belt pieces between the belt and rope to prevent damage to the belts.
 - Power supply to all points to be shut off after parking the equipment.
 - Ensure that all lighting towers are lowered to minimize damage to them during cyclone.
 - There shall be 3 level of inspection after the parking of all equipment by the leader of the anchoring team, HOS-ES and HOD-ES.
 - Personally inspect all equipment (Ship unloaders, HMCs, ship loaders, Stacker Reclaimers, portlines, transistor etc. and satisfy the safety of the parking done.
 - Parking done should as per the guide line of the manufactures.
 - The hoppers at the berth shall be locked with the rails to prevent movements at high wind speed.
 - Remove all locomotives to the loco shed and block all wheels.
 - Inspect the wagon tippers/Tunnels and ensure the de-watering pumps are in working condition. The motors may be wrapped to ensure that water does not spoil the insulation in case of power failure and inundation. (Ensure to remove the wrappings before switching on)
 - Ensure that no surface water make entry into the MCC tunnels etc, in coordination with ES-Civil.
 - The indexers and Side arm chargers may be parked at the parking position and movements blocked. Arrange for switching off power supply to all equipments from the MCCs and Switch yard after they are parked.
 - All DG sets to be made functional with adequate stock of fuel for at least 4 days of operation.
 - The DG sets should be installed on high pedestal to prevent it from getting submersed in water.
 - DG in the guest house, water supply system, signal station and CMC also need to be maintained.
 - Provide all assistance to maintain power supply to colony and water pumping system. Keep adequate drinking water and dry food in the substation for all the staff on emergency duty.
 - All important Sub stations have to be manned during cyclone.
 - Monitors the rendering of assistance for rescue of personnel.
 - Ensures the dept. group remains alert on duty for electrical isolation of equipment during an emergency.
 - Render all assistance for upkeep and restoration of water supply system.
 - Lead the group from the front to ensure prevention of damages.
 - Inspect the workshops and ensure the equipment are covered properly to save them from severe wind and water. (Temporary roof may be blown off, hence costly equipment may be wrapped with tarpaulin.
 - Personally inspect all ES auxiliary equipment.
 - Render help to others who request for help, such as Civil and Railways.
 - Ensure that all doors of transfer towers are closed and tied to prevent opening due to the gushing wind.
 - On intimation of imminent cyclone have a second inspection of the port in Co-ordination with Head of all SBU's.
 - Get up to date condition from the all officers and workmen on duty.
 - Ensure completion of cleaning of all roads culverts and drainages.
 - If any work is left out take action to complete it within 24 hrs Or cyclone strike.
 - Complete all necessary action to prevent flow of saline water into plain water storages.
 - Confirm that all rainwater entry points to the Substations & tunnels are sealed.
 - Offer all necessary assistance to HOD-ES for preventive actions.
 - Be prepared for tackling inundation due to tidal water.
 - When cyclone is confirmed keep contractors men stand-by, for emergency works during and immediately thereafter, men are not available.
 - Complete strengthening of shoreline, buildings and other civil works, including housing colonies.
 - Keep adequate construction material for taking up emergency works during cyclone.
 - Keep a set of engineers and workmen on stand-by duty for such works.
 - Help Admin co-ordinate evacuation of port areas and to mobilize, collect and distribute relief material.

- In coordination with HOD-ES, keep DG sets for the operation of tube wells.
- Coordinate with port railway officers for assistance they may require for preventive actions.
- In consultation with CMG keep adequate de-watering pumps operated with diesel engines.
- Attend CMG meetings.
- All equipment shall be stopped the moment wind approaches 20mtrs/sec, raise the booms and latch them, tie up if latch is not reliable.
- Keep adequate construction material for taking of emergency works.

- Position
- Port Position
- Alternative
- Primary Support Team

HOD – QHSE & F

HOS – QHSE & F

- Re-check the vulnerable areas with respect to safety and environment.
- Re-check for removal/securing of hazardous and toxic cargo.
- Arrange all necessary arrangements (rescue, medical, safety, environment, fire) ready.
- Liaison with mutual-aid partners for assistance.
- Assist CEO/Executive Director (Corp. Affairs) as instructed.
- Co-ordination with respective HOD/HOS with respect to emergency actions.
- Ensure necessary action through CMG. Provide necessary assistance to CMG.
- Assist with evacuation of all personnel except key personnel.
- Provide HSE & F facilities (Assist with rescue, evacuation, and other necessary arrangements).

- Set up casualty collection centre and arrange first aid posts.
- Arrange enough stock medicines, antidotes, oxygen, stretchers, keeping in mind that road and rail connectivity may be cut off for required period of time.
- Arranges additional medicine and equipment as required.
- Arrange a fully equipped ambulance in ready state.
- Make arrangements for mobile casualty to reach at incident sites and transporting for further treatment.
- Immediately co-ordinate with mutual aids for necessary help/support if required.

- Position
- Port Position
- Alternative
- Secondary Support Team

HOD – Finance

HOS – Finance

- Initiate action to keep cash as discussed with CEO.
- Inform HODs about the procedure of issuing of cash.
- A separate Insurance Cell under an AGM finance is being formed to deal with all insurance matters.
- As directed by CEO verify validity of all insurance.
- Issue circular to all HODs indicating the procedure to be followed for raising insurance claims.
- Form separate teams to handle the finance matters of each department so that all cash expenditure and accounts are properly maintained.

- Position
- Port Position
- Alternative
- Primary Support Team

HOD – HR & Admin

HOS – HR & Admin

- Keep close liaison with CMC/CMG/HSE and perform coordination with the concurrence of CEO.
 - Keep enough staff and vehicles for emergencies.
 - All activities related to safety and shelter of all officers' staff and staff colony is the responsibility of the administration and HR.
 - Issue instructions to all personnel to close all doors and windows and stay indoor during the actual cyclone period.
 - Opening of doors and windows will result in rushing of wind, force opening of other doors and windows and destruction of roof.
 - Circulate leaflets among all, including colony, on cyclone information.
 - Coordinate evacuation of townships and people staying in low lying areas situation so warranted with the clearance from CEO.
- Make announcement to colony and nearby villages by Adani Foundation/Corporate affairs about the severity of the imminent cyclone and advice local population to move to safer shelters.
 - Adani Foundation/Corporate affairs in coordination with local authorities to arrange for emergency drinking water and food materials to the evacuees.
 - Liaison arrangements for shelters and food for evacuated persons.
 - Collecting details of evacuated people. This will be necessary to settle claims, if any, at a later date.
 - Consult Legal Advisor and obtain their advice for legalizing all the port's actions.
 - Coordinate with other field group (all departments) for food and drinking water for the persons engaged in cyclone duty and restoration work.
 - Document all events and actions in coordination with other HODs for future reference.

- Position
- Port Position
- Alternative
- Incident Controller

HOD – LT

HOS – LT

- Emergency team in contact with Central Control Room for necessary preparedness.
- All concerned employees and contractual staff informed.
- Contractor staff evacuated from the port and verified.
- All personnel remaining in the port cautioned against venturing out during effective period
- Transportation arranged for evacuation of emergency team if required. (Employees and contractual staff)
- Emergency team to stay in continuous contact with other teams for emergency services (such as QHSE & F, Security, other services)
- Liquid Control (CTF and VEG Oil) Co-ordinate with Marine Control for cyclone bulletins every 6 Hrs.
- Stop all activities, remove all tanker lorries from Liquid Terminal and do not allow any tanker lorries to enter the Liquid Terminal area.
- Vessels at berth are to be informed to keep main engine

- on stand-by at short notice for emergency cast-off in coordination with marine.
- All equipment/computers in control to be covered and protected against water ingress due to heavy rain.
- All storage tanks' shell and roof manholes to be boxed up.
- Ensure flange joint connection are tightened.
- Ensure roads and pathways are cleaned and not obstruct for any vehicle movement during emergency.
- Jetty supervisor to ensure that no personnel are allowed on the jetty areas.
- Jetty supervisor to brief all workers/labors to remain alert and nominated shelters. Only minimal mooring member to remain in the port and no worker/labour to be on the berth.
- All hydra and jetty/technical vehicle to be parked in the safe shelter.

- Position
- Port Position
- Alternative
- Incident Controller

HOD – Railway

HOS – Railway

- All normal operations stopped. Only on emergency operations of evacuate of Locomotive and wagon shifting to safe places.
- All equipment (Locomotive & wagons etc) to be parked at suitable railway yard.
- Transportation arranged for evacuation of staff (employees and contractual staff)
- Only Emergency team members to remain in the port.
- 2 vehicles stand-by near Railway building and FCC control room.
- Following teams are nominated and tool talked for anticipated emergency action.
 - > Loco Pilot
 - > Loco Maintenance
 - > Track Maintenance
 - > Signal Maintenance

- Emergency team to stay in continuous contact with other teams for emergency services (such as QHSE & F, Security, other services)
- To ensure all contracted and company staff apart from emergency team is evacuated.
- To communicate any pending evacuation from port to emergency team.
- To be in continues touch with marine control room and Railway control room.

- Position
- Port Position
- Alternative
- Incident Controller

HOD – CT

HOS – CT

- Maintain close contact with Marine control for the status of the cyclone.
- All employees concerned and contractual staff informed contractor staff evacuated from the port and verified.
- All personnel remaining in the port cautioned against venturing out during effective period.
- Empty containers not to be stacked more than 3 high. loaded containers can be stacked up to 4 high.
- All hand held UHF/batteries, emergency torch, mobile phone fully charged for use in emergency in case of total power failure.
- Operation to be suspended based on information of marine control.
- Only emergency team to be available at site.
- Power supply to all points to be shut off after parking the equipment.

- Ensure that all lighting towers are lowered to minimize damage to them during cyclone.
- All equipment shall be stopped the moment wind approaches 20mtrs/sec, raise the booms and latch them, tie up if latch is not reliable.
- There shall be 3 level of inspection after the parking of equipment.
- By the leader of the anchoring team, HOS-ES, HOD-ES.
- Personally inspect all equipment (Ship unloaders, HMCs, ship loaders, stacker reclaimers, trailer etc.) and ensure correct parking of equipment.
- Move the equipment to parked position.
- Travel and position to the respective earmarked parking position and lock.
- Loading boom of Stacker Reclaimers should be lowered and latched at the parking position.
- In case of any difficulty to travel to the parking position lower the boom to the travelling rail, any one side and tie down with the rail.
- Block the travelling wheels and slew wheels mechanically.
- Additionally the rail mounted equipment may be tied to the rails by wire rope and clamps depending on the severity of the predicted cyclone.

C During cyclone till dissipating

1	Ensure that all emergency teams and mobile first aid centre are ready for meeting emergencies, as planned. The salvage team at signal station must be ready.
2	Before switching off the power supply ensure all the DG sets are in working condition and enough fuel and operating personnel are in place. The DG Sets should be installed on high pedestal to prevent it getting submersed in water.
3	Ensure that no one venture out of the office or shelter if the speed of wind is more than 100kmph. Personnel in open may be thrown by force of wind.
4	During cyclone, no one should open doors or windows, force of wind will force open other doors and windows. Opened windows or doors cannot be closed and chances of roof lifting upwards are high.
5	An emergency team with adequate man power, tools and plants, portable welding sets and gas cutting sets with adequate ropes and other consumables shall be maintained during cyclone for rescue and salvage operation.
6	Switch of power supply to all installations from the main power supply source. All important and vital installation shall be manned.

D Post cyclone stage: Recovery, insurance, restoration & relief

The purpose of post cyclone activity is to resume port operation as early as possible.

If the eye of the cyclone has passed over the port, wait for complete passing of the rear cyclone before inspection. Confirm the same from the radar station/signal station.

Site-Main Controller - CEO/Executive Director (Corp. Affairs)

- a. Collect the details of damages if any from HODs immediately.
- b. Ask all members of the CMG to immediately inspect their area of responsibility, along with their subordinate staff and officers and report their finding within 3 hrs. of ceasing of the heavy wind.
- c. Ask the HODs to submit preliminary estimate immediately, followed by detailed estimate.
- d. HOD - Marine to be asked to complete the survey of channel and berth as quickly as possible, to resume shipping activity.
- e. All required activities to resume port operations are to be discussed and finalized with HODs.
- f. A department-wise detailed programme is to be drawn up to resume normal port operations.
- g. Regular follow up to complete the work as programmed is to be done.
- h. Emergency powers for procurement and award of contract are to be evoked.
- i. HODs are required to submit the details and programs immediately.
- j. Reports on condition of tugs and other port crafts, ship unloader, ship loaders, HMCs and other auxiliary equipments after thoroughly inspection by HOD.
- k. All other cargo handling equipments like container handling equipment if any shall be inspected by HOD and detailed report to be obtained..
- l. MCCs, Stacker Reclaimers, Wagon tippler and Wagon tippler tunnel,
- m. Conveyor belts, conveyor galleries, Locomotives, Rail load out system etc shall also be inspected carefully by HOD and reports to be obtained condition of Liquid berth and equipments and SPM.
- n. Condition of all civil structures, Roads, Culverts and drainages and water supply system.
- o. Ask all HODs to submit details to HOD - Finance to process insurance claims.
- p. Coordinate the CSR activities.
- q. Keep contact with District Collector and local state Govt. official and offer all possible help for rehabilitation of displaced villagers.
- r. Inform all stockholders regarding all clear & restoration of the port operation. Also inform the same to the corporate office.
- s. Confirm the termination of the emergency after the threat is over.
- t. Lead the Crisis Management Group for early restoration of facilities and resume port activities.

Incident Controller: HOD – Marine [Marine & SPM]

- a. Marine – HOD shall immediately arrange for survey of channel and berth and inform the condition to CEO/COO, Who in turn inform the corporate office and stake holders.
 - b. Restoration work if any may be done in association with Head ES.
 - c. Shall check the navigational aid system take action for rectifications if required
 - d. Check all tugs and mooring crafts and they should be made fully functional as quickly as possible.
-

SPM

- a. Checking both mooring hawser assemblies and replace the components as required.
 - b. Replacements of both 9" PP pick ropes of mooring hawsers.
 - c. Inspection of each floating hoses on both floating hose strings.
 - d. Underwater inspection of each individual hoses on both subsea hose string and subsea umbilical.
 - e. Underwater inspection of all deep sea floats for their integrity.
 - f. Checking subsea hose strings configuration at low and high tide.
 - g. Verifying chain angle of all six anchor chains to be within limits, at low and high tide.
 - h. SPM buoy body inspection – integrity of seal on all hatches and doors.
 - i. Operational check of all navigational and safety equipment.
 - j. Carry out the system pressure test from floating hose string end to PLEM valve up to 15 bars and hold for 3 hours. Visual check by divers for any abnormalities on floating hoses and subsea hoses.
 - k. Carryout "Free Span and Lateral displacement" survey of subsea pipeline and provide support wherever necessary i.e. if it is beyond recommended allowable span.
-

Incident Controller: HOD – ES (MPT & WB)

- a. Shall immediately depute the electrical engineer to have an update of power supply.
- b. In case of power outage, coordinate with Electrical supply authorities for restoration of power supply
- c. If power is available, and MCCs are O.K, charge MCCs one by one after thorough checking.
- d. Depute the same team which has parked the equipment to release the equipment for operation after removing all blockages.
- e. If any equipment is found to be damaged report the matter to higher ups and take action for early repair or decommissioning.
- f. Do not start operating, until all parking locks & additional tie-ups are removed
- g. Equipments also can be charged one by one after charging the MCCs after obtaining written clearance from the engineer in charge.
- h. Ensure that the equipments electrical system is perfect before charging. Keep records of all measurements.
- i. Inspect the tunnel and dewater the accumulated water.
- j. Inspect all electrical and mechanical system thoroughly before trial run.
- k. All lighting towers which were lowered to be raised up.
- l. Damaged street lights and damaged internal lighting system to be repaired and re-commissioned.
- m. All belt clamping/tie-up must be removed before trial run of conveyors.
- n. Arrange for de-watering of tunnel with diesel pump if power supply is not readily available.
- o. Ensure all DG sets works till normal power supply is resumed.
- p. Inspect the water supply system and take all action to establish normal water supply immediately.
- q. In case of any difficulty, bring it to the notice of CEO/Executive Director (Corp. Affairs) (Corp. Affairs).
- r. In case of water logging, arrange diesel pumps and pump out water.
- s. Drainage system if damaged should be repaired immediately.
- t. Inspect all roof tops and if any roof is blown off, take action for replacement.
- u. Coordinate with Admin/HR for clean-up activities.
- v. HODs of West Basin will assist the Head – West Basin.

Primary support team: HOD – HR & Admin

- a. Shall take up rehabilitation work of port colony.
- b. Take all actions necessary to rehabilitate the officers and staff of the port.
- c. Coordinate with civil department to clean up the colony and premises.
- d. Arrange for provisions till normalcy is established.
- e. Food arrangements to people on resumption work to be coordinated.

Primary support team: HOD – QHSE&F

- a. Assist to CEO/Executive Director (Corp. Affairs)
- b. Assess damage (human) and send for further treatment.
- c. Assess the property damage and prepare report in consultation with concern department.
- d. Assist all HODs with restoration.
- e. Arrange for environmentally safe disposal of post emergency generated effluents/waste.
- f. Updating DMP based on faced natural calamities.

Secondary support team: HOD – Commercial

- a. Shall inspect all stores and estimate loss or damages if any and take immediate action for re-equipping the items.
- b. Coordinate with all HODs for requirements of consumables and spares.
- c. Discuss with CEO/Executive Director (Corp. Affairs) to ease norms of procurement for immediate supply of stores.
- d. He shall help HOD Commercial for procuring the items necessary for cyclone damage repairs. Post Cyclone

Incident controller: HOD – Railway

- a. Shall depute teams of staff to check the condition of all railway track and track electrification and signalling system.
- b. Contractor shall be instructed to depute adequate numbers of teams to survey the entire railway lines and system and submit feedback within the shortest possible time (fix the time period for feedback)
- c. Condition shall be reported to CEO/Executive Director (Corp. Affairs) (Corp. Affairs) and take action to repair and resume operations.
- d. If track electrification is damaged, coordinate with Indian Railways to press in diesel locos till the electric line is repaired, and resume operation with conventional signalling.
- e. Any help for repair and decommissioning may be taken from HOD - ES.
- f. He shall also inspect the Locomotives of the Port, and arrange for trial running to put them into operation.
- g. Inspect the Locomotives of the Port, and arrange for trial running to put them into operation.

Incident controller: HOD – Operations [DC (MPT & WB), CT, LT]

- a. Shall inspect all areas along with concerned HODs to estimate loss and damages if any. Prepare report and submit to CEO.
- b. The condition of stored hazardous/toxic cargo to be inspected along with HSE and immediate action as advised by HSE to be taken up.
- c. Deploy men and equipments to segregate and salvage all cargo.
- d. Coordinate with ES HOD, for assistance in de-watering and plot/shed repairs.
- e. Discuss with CEO/Executive Director (Corp. Affairs) and HODs for resumption of partial or full operations.
- f. Take all actions for early resumption of port activities.
- g. Coordinate with HOD - Marine to resume shipping operations.
- h. Coordinate with HOD - Finance for insurance claims.
- i. All costly and critical materials are stacked properly to avoid loss due to wind or water inundation.
- j. Estimate the losses and damages along with BD and inform CEO/Executive Director (Corp. Affairs).

Secondary support team: HOD – Finance & Accounts

Insurance claims

- a. All HODs to prepare loss and damage list and estimate the costs of rectification and submit the same to HOD - Finance, who is the nodal officer for claiming insurance, with copies to CEO/Executive Director (Corp. Affairs) (Corp. Affairs). The details shall contain photograph also.
- b. Shall coordinate with insurance company to arrange the surveyor as quickly as possible, so that rectification work can start immediately.
- c. May coordinate with all HODs to prepare additional documents if required.
- d. May collect the details of claims with supporting documents from HODs in a time frame to be fixed by him for early settlement of all claims.
- e. Timely submission of insurance claims necessary for claiming losses.

Primary support team: HOD – Security

- a. Restoration of road traffic & port entry system from and to the port disrupted due to the cyclone.
- b. Shall be well versed with all road communication of the area.
- c. Shall coordinate with local administration/State administration to clear the roads in consultation with Corporate Affairs.
- d. Port may also be required to engage men and machine to Clear the road blockages.

Secondary support team: CSR HOD – Adani foundation [General Responsibilities]

The company has a social responsibly to save the life and property of the people living in the peripheral areas. This work involves the following activities. These activities may be done in association with local administration.

- a. Inform the public by public announcement the danger level of the cyclone and its effects and consequences.
- b. Leaflets are to be circulated about the danger level.
- c. If Tidal inundation is expected the villagers may be informed of the consequences.
- d. Request them to move to safer places to escape from heavy wind and tidal actions.
- e. Moving to Cyclone shelter is the best option. If cyclone shelter is not nearby, they may be asked to move to permanent structures available nearby. Provide them all assistance for evacuation.
- f. Provide the villagers adequate dry food (chuda, gudo, biscuits, baby food etc.) items and potable water in adequate quantity.
- g. Water tankers with potable water may be kept stand-by.
- h. Services of medical team may be extended to the peripheral villages with necessary medicines and first aids.
- i. Advise them to remain indoors during cyclone.
- j. After the cyclone there may be shortage of food and water.
- k. Water has to be provided for their basic needs till normalcy is established.
- l. Start community Kitchens to provide them with food.
- m. Help in rehabilitation of all displaced people in coordination with local Govt. Agencies and NGOs.

- Position
- Port Position
- Alternative
- Secondary Support Team in-charge - Telecommunication

- Take charge of all communication systems of fixed and portable.
- Ensure availability of sufficient numbers of electronic communication equipment to the port control station, Base Control and anywhere else as necessary.

- Position
- Port Position
- Alternative
- Secondary Support Team in-charge - IT

- Take charge of all necessary communication system.
- Take all necessary back up of data.
- Assess damage of assets and restore

E Checklist

- Checklist for CEO/Executive Director (Corp. Affairs)
- Following Checklists prepared which shall be used at the time of declaration of Cyclone.

Checklist – 1	CEO/Executive Director (Corp. Affairs) (Corp. Affairs)
Checklist – 2	Marine Services
Checklist – 3	Engineering Services
Checklist – 4	Dry Cargo
Checklist – 5	Liquid Terminal
Checklist – 6	Container Terminal
Checklist – 7	HR & Admin
Checklist – 8	Security
Checklist – 9	Railway Services
Checklist – 10	West Basin
Checklist – 11	QHSE&F

CEO - Emergency Preparedness				
Cyclone-Check List				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency Control Room established at suitable location with communication facilities			
2	All teams have reported their readiness for dealing with emergencies.			
3	Testing of communication (PA System, Mega phones, VHF, UHF and Landline) with all on site Emergency Control Rooms.			
4	Assess the situation and declare emergency.			
5	Alarms sounded followed by verbal order by PA system.			
6	Evaluate transportation/evacuation/food arrangements.			
7	Confirm readiness of medical facilities.			
8	Liaise with government bodies, other stake holders and mutual aid, partners for providing support if necessary.			
9	Obtain status of situation from the government Emergency Control Room and disseminate information.			
10	All high value assets such as cranes, RTG"s, RMQC, GSU"s, Tugs, Craft, Railway Locos, Dredgers, Stacker, reclaimers are secured.			
11	All vehicles topped up with fuel.			
12	Walkie Talkie sets fully charged along with spare charged batteries.			
13	Emergency numbers to be kept with all emergency vehicles			
14	List of emergency contacts & suppliers.			
15	All non-essential persons have been evacuated from the port.			
16	Roads and pathways are clear for emergency movement.			
17	All departments are maintaining a diary noting down action taken.			
18	Reports on condition of Tugs and other Port crafts, ship un loader, ship loaders, HMCs and other auxiliary equipments after thoroughly inspection by HOD.			
19	Condition of Oil berth and equipments and SPM.			
During Effective Period				
1	All personnel notified against venturing out during effective period, All personnel to remain indoor, observant and be alert.			
2	Take frequent updates from departments for any damage to property or injury to personnel.			
3	Provide necessary support by on site emergency team.			
After Effective Period				
1	Announcement to be made declaring end of emergency or PA system and other means of communication.			
2	Advise emergency teams to carry out on-field assessment.			
3	Personnel to be advised not to enter damaged buildings/structures.			
4	Launch search and rescue operations for missing personal.			
5	Get reports on causalities and injuries to personnel. Arrange for medical assistance.			
6	Carry out assessment of damage to property and all high value assets within the port including ships.			
7	Reports to be consolidated with photographs from all departments for insurance claims.			
8	Gradual resumption of port operation.			

Marine Services - Emergency Preparedness				
Level - 1 When cyclone is 1000 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency team formed for dealing with the emergency			
2	Emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	All concerned employees and contractual staff informed. All personnel notified against venturing out during effective period.			
5	A team is formed to identify and removal of items from jetty which may fall into sea due to strong wind such as life buoy with stand, gangway etc.			
6	Electric equipment at jetty/Tug berth covered and protected against water ingress.			
7	If flood as consequence of Cyclonic Storm/Hurricane is anticipated, Oil Spill Management Plan is activated.			
8	Drinking water (10 bottles of 20 ltr) and dry non perishable food available at Marine Building.			
9	6 Nos of raincoats, charged emergency torches, 2 battery operated torches with spare batteries, 6 life jackets, ropes (50 meters x 6), life buoys available for emergency use.			
10	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
11	List of emergency contacts & suppliers available.			
SPM				
1	SPM Floating Hose to be flushed and removed 3 days before predicted arrival of cyclone. The Hoses may be brought to South Basin.			
Tugs/Marine Police & Coast Guard Crafts				
1	Tugs ME to be kept at short Notice to meet any emergency situation.			
Marine Control (MMPT & WB)				
1	WB Marine Control to issue cyclone bulletins every 6 Hrs.			
2	Vessel at berth and at anchorage informed about cyclone warning.			
3	Vessels at berth are informed to keep Main Engine stand-by at short notice for emergency castoff.			
4	All equipments/computers in MMPT control covered and protected against water ingress due to heavy rain.			
5	All hand held UHF/batteries, emergency torch, mobile phones are fully charged for use in emergency incase of total power failure.			
Jetty Supervisor				
1	Jetty supervisor to ensure all lines of vessels at berth are always kept taught.			
2	Jetty Supervisor briefed all mooring crew to remain alert, careful and to move in pairs. No Mooring Crew to stand close to the berth.			
3	All Hydra and jetty/technical vehicles parked at safe shelter.			

Marine Services - Emergency Preparedness				
Level - 2 When cyclone is 500 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Appropriate storm warning signal hoisted (as per GMB instruction)			
2	Emergency team to be in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	All concerned employees and contractual staff informed. Contractor informed to evacuate their staff. All personnel notified against venturing out during effective period.			
5	All operations must be stopped and personnel moved to a safe location from where they can be evacuated. Transportation arranged for evacuation of staff (employees and contractual staff)			
6	Team is formed to identify and remove items which may fall into the sea due to strong wind, from the jetty, such as life buoy with stand, gangway etc.			
7	Electric equipment at jetty/tug berth covered and protected against water ingress.			
8	Material & equipment that cannot be moved are covered.			
9	All loose items on jetty are secured.			
10	If flood as consequence of cyclonic storm/hurricane is anticipated, ensure Oil Spill Management Plan is activated			
11	Drinking water (10 bottles of 20 ltr) and dry non perishable food available at Marine Building.			
12	Arrangement made for stand-by vehicle.			
13	Vessels at berth to be casted off if wind speed > 30 Kts with HOD permission.			
14	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
Tugs/Marine Police & Coast Guard Crafts				
1	Tugs Main Engine kept at short Notice to meet any emergency situation.			
Marine Control (MMPT & WB)				
1	WB Marine Control to issue cyclone bulletins every 6 Hrs.			
2	WB Marine Control to send cyclone bulletin SMS from 3 day before predicted arrival of cyclone.			
3	All vessel at berth and at anchorage are informed about cyclone warning.			
4	Vessels at berth are to be informed to keep Main Engine on stand-by for emergency castoff, at short notice.			
5	All equipments/computers in MMPT control to be covered and protected against water ingress due to heavy rain.			
6	All hand held UHF/batteries, emergency torch, mobile phone to be fully charged for use in emergency incase of total power failure.			

Jetty Supervisor				
1	Jetty supervisor to ensure that all lines of vessels at berth are always kept taught. Vessel to be instructed to double up mooring lines, if required.			
2	Jetty Supervisor to brief all mooring crew to remain alert, careful and should move in pairs. No Mooring Crew to stand close to the berth.			
3	All Hydra and jetty/technical vehicle to be parked at safe shelter.			

Marine Services - Emergency Preparedness				
Level - 3 A day before when the cyclone is to strike				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Appropriate storm warning signal hoisted (as per GMB instruction)			
2	Emergency team in contact with Central Control Room for necessary preparedness.			
3	All concerned employees and contractual staff informed. Contractor staff evacuated from the port and verified, Contractor informed to evacuate their staff. All personnel notified against venturing out during effective period.			
4	All operations must be stopped and personnel moved to a safe location from where they can be evacuated Transportation arranged for evacuation of staff (employees and contractual staff)			
5	Electric equipment covered and protected against water ingress.			
6	Electric equipment at jetty/Tug berth covered and protected against water ingress.			
7	2 pilot vehicles stand-by near marine canteen shelter.			
8	Drinking water (10 bottles of 20 ltr) and dry non perishable food available at Marine Building.			
9	Vessels at berth to be casted off if wind speed > 30 Kts with HOD permission.			
10	Adequate no of raincoats, charged emergency torches, battery operated torches with spare batteries, life jackets, ropes , life buoys to be kept on stand-by for emergency use. Raincoats- 6 nos, gumboots- 6 nos, helmets- 6 nos, gantline- 50 meter x 6 nos available.			
11	All work permits revoked.			
12	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
13	List of emergency contacts & suppliers available.			
Tugs/Marine Police & Coast Guard Crafts				
1	MMPT Tugs anchored in South Basin (west of turning circle).			
2	Marine Police & Coast Guard Crafts secured at Ro Ro.			
3	West Basin Tugs secured at WB4.			
4	Doors and hatches on Tug's upper deck kept closed.			
5	Tugs Main Engine kept on stand-by to meet any emergency situation.			

Marine Control (MMPT & WB)				
1	WB Marine Control to issue cyclone bulletins every 6 Hrs.			
2	WB Marine Control to send cyclone bulletin SMS to all concerns.			
3	All vessel at berth and at anchorage are informed about cyclone warning.			
4	All vessels informed to keep Main Engine Sby at short notice.			
5	All equipments/computers in MMPT control covered and protected against water ingress due to heavy rain.			
6	All hand held UHF/batteries, Emergency torch, Mobile Phone fully charged for use in emergency incase of total power failure.			
7	MMPT and WB Radar/VHF Antennas are secured properly to prevent damage.			
Jetty Supervisor				
1	Jetty supervisor to ensure that no personnel are allowed on the Jetty areas.			
2	Jetty Supervisor to brief all mooring crew to remain alert and nominated shelters. Only minimal mooring crew member to remain in the port and no Mooring Crew to be on the berth.			
3	All Hydra and jetty/technical vehicle parked at safe shelter.			
During Effective Period				
1	All personnel notified against venturing out during effective period.			
2	All personnel to remain indoor, observant and be alert.			
3	DPC, MMPT Marine Control Officer and data entry operator to take shelter in New Marine Building with all hand held VHF, UHF, emergency light and mobile phones.			
4	People (Employees and Contractors) advised not to take shelter near old or damaged buildings or near tress.			
5	All doors and windows of buildings kept shut.			
6	Avoid top floor of buildings. Stay close to ground floor.			
After Effective Period				
1	Assess damage to equipments, building and unsafe condition.			
2	Initiate restart process.			

Engineering Service-MPT - Emergency Preparedness				
Level - 1 When cyclone is 1000 km away from Mundra				
Sr. No.	Activity	Yes	No	Remarks
1	Engineering Service-MPT Emergency team formed for dealing with the emergency			
2	Emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: develop an overview of the situation identify tasks to be undertaken identify resources available for tasking determine gaps in information and resources access expert advice as required develop and implement tactical plans for response and recovery operations			
4	People are made aware of do's and don'ts before, during and after Cyclone			part of training. List of do's and don'ts enclosed

5	A backup team is formed to identify potential flying objects (Roofing, sheeting, temp sheds etc.) and secure/remove them.			Team will comprise of backup and stevedoring shift Incharge from DC, shift Incharge of ES and safety.
6	Connection of all the electrical equipment/appliances are checked and if not required the same are disconnected. Electrical supply/ connection for all the unwanted items are disconnected			
7	Portacabins to be secured properly and relocation of electronic equipment from various porta cabins to designated location . Note : Equipment which are prone to be affected by cyclone should properly secured or tied such as pota cabin etc			
8	Following team of ES-MPT are nominated and tool talked for anticipated emergency action. A) Shift Incharge- Electrical ES-MPT (For LT , Dry Cargo & Common SBU) B) Shift Incharge-Mechanical ES-MPT (For LT , Dry Cargo & Common SBU) C) Shift Incharge-Civil ES-MPT (For LT , DRY Cargo & Common SBU)			
9	Coordination with labour contractors for making necessary arrangements towards evacuation of labours (Approx. 400 No's) deployed at FCC , Conveyor ,Jetty , Steel Yard & Liquid terminal . Actual evacuation to be done only after port shutdown is declared from CEO office.			List of average manpower in port on normal operation day is enclosed
10	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc.			
11	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
12	List and contact details of customers ,contractors and port emergency contacts. Refer List			
ES-MPT Coordination desk				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external contractor			
2	To appraise ES-MPT shift Incharge every 12 hrs who in turn will appraise their reportees & colleagues.			
3	All emergency equipment such as de-watering pump to be maintained up to operational condition . Hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency in case of total power failure.			
ES MPT -HOS				
1	Respective ES-MPT-HOS to ensure that all the arrangement for securing Cranes/Mobile Equipment is in order.			
2	Respective ES -MPT-HOS in coordination with emergency team to appraise the contracted labour supervisor at jetty and backup of the developments.			
3	Pictorial records of the sequence of events and preparedness (For Insurance Purpose) to be maintained			For insurance purpose

Note : At the time of cyclone & tsunami warning , priority to be given to worker, technician working on jetty or below jetty.

Engineering Service -MPT - Emergency Preparedness				
Level - 2 When cyclone is 500 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	ES-MPT squeezes to bare essential maintenance activity with limited resources to ensure quick rap up.			
2	ES-MPT Emergency team to be in contact with Central Control Room for necessary preparedness.			
3	Mobile harbour cranes & Goliath cranes is properly parked and lashed in boom down condition. .			
4	Appropriate team of technical staff is deployed for anticipated emergency action. A) Shift Incharge B) Engineers/Technician			
5	Material & equipment that cannot be moved are covered.			
6	All loose items on jetty/backup are secured.			
7	Nomination of Emergency response vehicles (2 No's)			
8	All work permits revoked. Work at height is stopped and not permitted.			
9	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
ES-MPT Coordination desk				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external contractor .			
2	To inform all contracted and company staff about cyclone to evacuate their staff.			
3	To take feedback of evacuation process and highlight progress/issues emergency team.			
4	To check all hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency in case of total power failure. Emergency equipment such as DG Set , de-watering pump , hydra , excavator , forklift to be maintained & operational condition.			
5	All computers/peripherals in MPT control to be covered and protected against water ingress due to heavy rain.			
ES-MPT HOS				
1	Respective ES-MPT-HOS to ensure that all the arrangement for securing Cranes/Mobile Equipment is in order.			
2	ES-MPT-HOS in coordination with emergency team to instruct the contracted labour supervisors at jetty and backup to ensure proper and adequate evacuation of labours and their staff			
3	Keep pictorial records of the sequence of events and preparedness(For Insurance Purpose)			For insurance purpose

Engineering Service -MPT - Emergency Preparedness				
Level - 3 A day before when the cyclone is to strike				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	All normal operations stopped. Only emergency operations (securing of MHC/Goliath/LMC/ equipment/Hoppers/dumpers/trailers) to be continued.			
2	Cranes are parked at safe locations with lowered and secured booms.			

3	All mobile truck loading hoppers at Jetty are arrested at their wheels to prevent horizontal movement due to wind and secured from its top by arranging guy ropes.			
4	ES-MPT Emergency Response team having nominated member of FCC control room , DG House substation , Workshop , ES-MPT coordination desk is handy with VHF sets , Emergency Torches, Rain Coat.			
5	Central control room (Adani House) issues Port closure notice			
6	All equipment (Pay loaders/excavators etc.) to be parked at OSY 10 or nominated OSY with full fuel.			
7	All dumpers/Trailers to be parked at OSY 5/nominated place with full fuel.			
8	All godown gates are kept closed.			
9	Transportation arranged for evacuation of staff (employees and contractual staff)			
10	Emergency Kit, Food supplies and drinking water checked and tested.			
11	Communication mediums like VHF, Mobile phones and PA systems checked and tested			
12	Only Emergency team members to remain in the port.			
13	2 pilot vehicles stand-by near Tug berth building and FCC control room.			
14	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
15	Shall immediately depute the electrical engineer to have an update of power supply.			
16	Ensure that the equipments electrical system is perfect before charging. Keep records of all measurements.			
17	Ensure all DG sets works till normal power supply is resumed.			
18	In case of power outage, Coordinate with Electrical supply authorities for restoration of power supply			
19	Drainage system if damaged should be repaired immediately. Inspect all roof tops and if any roof is blown off, take action for replacement.			
20	Necessary required sand bag to be kept as a send by to support the roof sheets.			
ES-MPT Coordination desk				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external contractor .			
2	To ensure all contracted and company staff apart from emergency response team is evacuated.			
3	To highlight any pending evacuation from port to emergency team.			
4	To be in continues touch with marine control room and FCC control room.			
During Effective Period				
1	All personnel notified against venturing out during effective period.			
2	All personnel to remain indoor, observant and be alert.			
3	Emergency team members, shift manager and coordination desk personnel t take shelter in their respective control rooms with all hand held VHF, UHF, emergency light and mobile phones.			
4	People (Employees and Contractors) advised not to take shelter near old or damaged buildings or near tress.			
5	All doors and windows of buildings kept shut.			
6	Avoid top floor of buildings. Stay close to ground floor.			

After Effective Period				
1	Take headcount of all the personnel. (FCC , Steel Yard, Jetty , tug berth building & Liquid terminal)			
2	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
3	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			
4	Assess damage to equipment, resources and cargo.			
5	Initiate restart process.			
6	Photographs to be taken for assessing damages to cargo and property for insurance.			For insurance purpose
7	Inspect all electrical and mechanical system thoroughly before Trial run.			
8	All lighting towers which were lowered to be raised up.			
9	Damaged street lights and damaged internal lighting system to be repaired and recommissioned.			
10	All belt clamping/tie-up must be removed before trial run of conveyors.			

Dry Cargo - Emergency Preparedness				
Level - 1 When cyclone is 1000 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Dry Cargo Emergency team formed for dealing with the emergency			
2	Emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	People are made aware of do's and don'ts before, during and after Cyclone			part of training. List of do's and don'ts enclosed
5	A backup team is formed to identify potential flying objects (Roofing, sheeting, temp sheds etc.) and secure/remove them.			Team will comprise of backup and stevedoring shift Incharge from DC, shift Incharge of ES and safety.
6	Connection of all the electrical equipment/appliances are cheked and if not required the same are disconnected. Electrical supply/ connection for all the unwanted items are disconnected			
7	All non-operating godowns gates closed.			

8	Cargo secured inside warehouse and Open Plots. Tarpaulin sheets kept ready where ever fertilizer and agri cargo stored. An inventory to cover 3 Lakh MT of cargo to be maintained.			
9	Steel cargo is properly stored and lashed. In case of rain or heavy storm sand to be reinforced with sand bags for securing of cargo from sliding.			
10	All Spare equipment (Pay loaders/excavators etc.) parked at OSY 10. In case of occupancy of OSY10, suitable open yard to be nominated.			
11	All Spare dumpers/Trailers to be parked at OSY 5/nominated place.			
12	Portacabins to be secured properly and relocation of electronic equipment from various porta cabins to designated location			
13	Following team of operators are nominated and tool talked for anticipated emergency action. A) Crane Operators- 3 No's B) Loader Operators - 6 No's C) excavator operators - 4 Nos. D) Forklift operators- 2 No's			List of average manpower in port on normal operation day is enclosed
14	Coordination with labour contractors for making necessary arrangements towards evacuation of labours (Approx. 650 No's) , Drivers (150 No's) , Surveyors (120 No's) and Equipment Operators (75 No's) deployed at FCC , Maruti , Steel Yard, Stevedoring and Backup . Actual evacuation to be done only after port shutdown is declared from CEO office.			
15	Drinking water (10 bottles of 20 litre) and dry non perishable food available for 30 people (2 days) at Tug berth building and FCC control room			
16	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc.			
17	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
18	List and contact details of customers ,contractors and port emergency contacts.			
Dry Cargo Coordination desk				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external customers .			
2	To appraise Jetty /Backup and FCC shift Incharge every 12 hrs who in turn will appraise their reportees.			
3	All hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency in case of total power failure.			
Dry cargo Shift manager				
1	DC Shift Manager to ensure that all the arrangement for securing Cranes/Mobile Equipment is in order.			
2	DC Shift Manager in coordination with emergency team to appraise the contracted labour supervisor at jetty and backup of the developments.			
3	Keep pictorial records of the sequence of events and preparedness (For Insurance Purpose)			For insurance purpose

Dry cargo - Emergency Preparedness				
Level - 2 When cyclone is 500 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Dry cargo operations squeeze to bare essential productivity with limited resources to ensure quick rap up.			
2	Emergency team to be in contact with Central Control Room for necessary preparedness.			
3	All jetty operations to stop if wind speed exceeds 30 Knots or heavy rainfall occurs.			
4	All non operational godown gates kept closed.			
5	Cargo secured inside warehouses and Open Plots. Cargo covered near gates inside warehouses.			
6	Steel cargo is properly stored and lashed. In case of rain or heavy storm sand to be reinforced with sand bags for securing of cargo from sliding.			
7	All spare equipment (Pay loaders/excavators etc.) parked at OSY 10 or nominated OSY.			
8	All Spare dumper/Trailers parked at OSY 5/nominated place.			
9	Following team of operators is deployed for anticipated emergency action. A) Crane Operators- 3 No's B) Loader Operators - 6 No's C) Excavator operators - 4 Nos. D) Forklift operators- 2 No's			
10	Material & equipment that cannot be moved are covered.			
11	All loose items on jetty/backup are secured.			
12	Nomination of Emergency response vehicles (2 No's)			
13	Vessels at Berth prepared for emergency cast off.			
14	All work permits revoked. Work at height is stopped and not permitted.			
15	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
Dry Cargo Coordination desk				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external customers .			
2	To inform all contracted and company staff about cyclone to evacuate their staff.			
3	To take feedback of evacuation process and highlight progress/issues emergency team.			
4	To check all hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency in case of total power failure.			
5	All computers/peripherals in MPT control to be covered and protected against water ingress due to heavy rain.			
Dry Cargo Coordination desk				
1	DC Shift Manager to ensure that all the arrangement for securing Cranes/Mobile Equipment is in order.			
2	DC Shift Manager in coordination with emergency team to instruct the contracted labour supervisors at jetty and backup to ensure proper and adequate evacuation of labours and their staff			
3	Providing other dept. including safety, security, etc. mobile equipment and vehicles as per requirement given by them.			
4	Keep pictorial records of the sequence of events and preparedness(For Insurance Purpose)			For insurance purpose

Dry cargo - Emergency Preparedness				
Level - 3 A day before when the cyclone is to strike				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	All normal operations stopped. Only emergency operations (securing of MHC/Goliath/LMC/ equipment/Hoppers/dumpers/trailers) to be continued.			
2	Cranes are parked at safe locations with lowered and secured booms.			
3	All mobile truck loading hoppers at Jetty are arrested at their wheels to prevent horizontal movement due to wind and secured from its top by arranging guy ropes.			
4	FCC control room and DC coordination desk is handy with VHF sets , Emergency Torches, Rain Coat.			
5	Central control room (Adani House) issues Port closure notice			
6	All equipment (Pay loaders/excavators etc.) to be parked at OSY 10 or nominated OSY with full fuel.			
7	All dumpers/Trailers to be parked at OSY 5/nominated place with full fuel.			
8	All godown gates are kept closed.			
9	Transportation arranged for evacuation of staff (employees and contractual staff)			
10	Emergency Kit, Food supplies and drinking water checked and tested.			
11	Communication mediums like VHF, Mobile phones and PA systems checked and tested			
12	Only Emergency team members to remain in the port.			
13	2 pilot vehicles stand-by near Tug berth building and FCC control room.			
14	Following team of operators remain at stand-by (at Tug Berth building) for emergency action. A) Crane Operators- 3 No's B) Loader Operators - 6 No's C) excavator operators - 4 Nos. D) Forklift operators- 2 No's			
15	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
16	All costly and critical materials are stacked properly to avoid loss due to Wind or water inundation.			
Dry Cargo Coordination desk				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external customers .			
2	To ensure all contracted and company staff apart from emergency team is evacuated.			
3	To highlight any pending evacuation from port to emergency team.			
4	To be in continues touch with marine control room and FCC control room.			
During Effective Period				
1	All personnel notified against venturing out during effective period.			
2	All personnel to remain indoor, observant and be alert.			
3	Emergency team members, shift manager and coordination desk personnel t take shelter in their respective control rooms with all hand held VHF, UHF, emergency light and mobile phones.			

4	People (Employees and Contractors) advised not to take shelter near old or damaged buildings or near tress.			
5	All doors and windows of buildings kept shut.			
6	Avoid top floor of buildings. Stay close to ground floor.			
After Effective Period				
1	Take headcount of all the personnel. (FCC, backup, steel yard, jetty & tug berth building)			
2	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
3	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			
4	Assess damage to equipment, resources and cargo.			
5	Initiate restart process.			
6	Photographs to be taken for assessing damages to cargo and property for insurance.			
7	Communication to be sent to all clients regarding assessed and potential damage to cargo.			
8	Estimate the losses and damages inform to CEO			
9	Discuss with CEO and HODs for resumption of partial or full operations. Take all actions for early resumption of Port activities.			

Liquid Terminal - Emergency Preparedness				
Level - 1 When cyclone is 1000 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Emergency team formed for dealing with the emergency			
2	Emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	All concerned employees and contractual staff informed. All personnel notified against venturing out during effective period.			
5	Drinking water (10 bottles of 20 ltr) and dry non perishable food available at Liquid Building.			
6	11 Nos of raincoats, charged emergency torches, 2 battery operated torches with spare batteries, 6 life jackets, ropes (50 meters x 6), life buoys available for emergency use.			
7	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
8	List of emergency contacts & O & M Agency contact number shall be available			

Liquid Control (CTF and VEG Oil)				
1	Co-ordinate with Marine Control for cyclone bulletins every 6 Hrs.			
2	Inform all contractors to remove all their equipment from liquid terminal area and put in proper location.			
3	Vessel at berth and at anchorage informed about cyclone warning.			
4	All hand held UHF/batteries, emergency torch, mobile phones are fully charged for use in emergency incase of total power failure.			
5	Check & clean of dyke wall for all tanks. (Ensure valves of dyke wall are in open condition)			
6	Floating roof tank ensure the tank roof draining system valves must be in open condition, and Pipe line shall be thoroughly cleared, NRV shall be in working condition.			
7	Material (i.e.. Oil Drums, sludge tanks etc.) & equipment that cannot be moved are to be covered.			
8	Check earthing of pipelines & tanks with help of ES E & I.			
9	Clean the spillage material for prevent slippery surface.			
10	All storm water drainage system(sumps and clear passage of line) should be clean and cover properly			
11	Kept appropriate PPE's.			
12	Electric machinery is covered and protected against water ingress.			
Jetty Supervisor				
1	Jetty supervisor to ensure all lines of vessels at berth are always kept tight			
2	Jetty Supervisor briefed all workers/labors be alert, careful and to move in pairs. No one to stand close to the berth.			
3	All Hydra and jetty/technical vehicles parked at safe shelter.			
4	Safe guard all loose material including Hose and drums and other loose material			

Liquid Terminal - Emergency Preparedness				
Level - 2 When cyclone is 500 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Appropriate storm warning signal hoisted (as per GMB instruction)			
2	Emergency team to be in contact with Central Control Room for necessary preparedness.			
3	All concerned employees and contractual staff informed. Contractor informed to evacuate their staff. All personnel notified against venturing out during effective period.			
4	All operations must be stopped and personnel moved to a safe location from where they can be evacuated. Only Emergency team members to remain in the port. Transportation arranged for evacuation of staff (employees and contractual staff)			
5	Material & equipment that cannot be moved are covered.			
6	All loose items on jetty are secured.			
7	Arrangement made for stand-by vehicle.			
8	Evacuate all tank trucks from Liquid Terminal			

9	All work permits revoked.			
10	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
11	Remove all loose materials(i.e Hoses shifted to be Hose shed) and equipment (i.e. MOBILE PUMPS etc.) from jetty & Liquid terminal area.			
Liquid Control (CTF and VEG Oil)				
1	Co-ordinate with Marine Control for cyclone bulletins every 6 Hrs.			
2	Stop all activities, remove all tanker Lorries from liquid terminal and do not allow any tanker Lorries to enter the liquid terminal area.			
3	All vessel at berth informed about cyclone warning. In case of severe cyclone, vessels to be informed to move out of Gulf of Kutch to keep well clear of the cyclone.			
4	Vessels at berth are to be informed to keep Main Engine Sby at short notice for emergency castoff.			
5	All equipment/computers in control to be covered and protected against water ingress due to heavy rain.			
6	All hand held UHF/batteries, emergency torch, mobile phone to be fully charged for use in emergency incase of total power failure.			
7	All storage tanks shell and roof manholes to be box up			
8	Ensure flange joint connection to be tighten.			
9	Check foundation of all tank & pumps.			
10	Removed all employees from the operational activity.			
11	If flood as consequence of Cyclonic Storm/Hurricane is anticipated, ensure Oil Spill Management Plan is activated.			
12	Adequate drinking water and dry non perishable food at jetty area.			
13	All electrical and diesel driven pumps should be ready in all respects for immediate use.			
14	Ensure roads and pathways are cleaned and not obstruct for any vehicle movement during emergency			
15	Safe guard surface heat tracing system of pipeline			
Jetty Supervisor				
1	Jetty supervisor to ensure that all lines of vessels at berth are always kept tight. Vessel to be instructed to double up mooring lines, if required.			
2	Jetty Supervisor to brief all Labors to remain alert, careful and should move in pairs. No one to stand close to the berth.			
3	All Hydra and jetty/technical vehicle to be parked at safe shelter.			
4	Dis-Connections of flexible hose with the shipping vessels and communicate Marine Dept./Shipping			
5	Adequate drinking water and dry non perishable food at jetty area.			
6	Safe guard all loose material including Hose and drums and other loose material			

Liquid Terminal - Emergency Preparedness				
Level - 3 A day before when the cyclone is to strike				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Appropriate storm warning signal hoisted			
2	Emergency team in contact with Central Control Room for necessary preparedness.			

3	All concerned employees and contractual staff informed. Contractor staff evacuated from the port and verified, All personnel remaining in the port cautioned against venturing out during effective period.			
4	Transportation arranged for evacuation of emergency team if required. (employees and contractual staff)			
5	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
Liquid Control (CTF and VEG Oil)				
1	Co-ordinate with Marine Control for cyclone bulletins every 6 Hrs.			
2	Stop all activities, remove all tanker Lorries from liquid terminal and do not allow any tanker Lorries to enter the liquid terminal area.			
3	Vessels at berth are to be informed to keep Main Engine Sby at short notice for emergency castoff in coordination with marine.			
4	All equipment/computers in control to be covered and protected against water ingress due to heavy rain.			
5	All hand held UHF/batteries, emergency torch, mobile phone to be fully charged for use in emergency incase of total power failure.			
6	VHF Antennas are secured properly to prevent damage.			
7	All storage tanks shell and roof manholes to be box up			
8	Ensure flange joint connection to be tighten.			
9	If flood as consequence of Cyclonic Storm/Hurricane is anticipated, ensure Oil Spill Management Plan is activated.			
10	Adequate drinking water and dry non perishable food at jetty area.			
11	All electrical and diesel driven pumps should be in stand-by position.			
12	Ensure roads and pathways are cleaned and not obstruct for any vehicle movement during emergency			
Jetty Supervisor				
1	Jetty supervisor to ensure that no personnel are allowed on the Jetty areas.			
2	Jetty Supervisor to brief all workers/Labors to remain alert and nominated shelters. Only minimal mooring member to remain in the port and no Worker/Labor to be on the berth.			
3	All Hydra and jetty/technical vehicle to be parked at safe shelter.			
During Effective Period				
1	All personnel notified against venturing out during effective period.			
2	All personnel to remain indoor, observant and be alert.			
3	Veg oil Control Staff and CTF Control Staff to take shelter in Liquid Office(Old Control) room with all hand held VHF, UHF, emergency light and mobile phones.			
4	People (Employees and Contractors) advised not to take shelter near old or damaged buildings or near tress.			
5	All doors and windows of buildings kept shut.			
6	Avoid top floor of buildings. Stay close to ground floor.			
After Effective Period				
1	Assess damage to equipment, building and unsafe condition.			
2	Initiate restart process.			
3	The condition of stored hazardous/toxic cargo to be inspect.			

Container Terminal - Emergency Preparedness				
Level - 1 When cyclone is 1000 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Emergency team formed for dealing with the emergency			
2	Emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	All employees concerned and contractual staff informed. All personnel notified against venturing out during effective period.			
5	A team is formed to identify and removal of items from jetty which may fall into sea due to strong wind such as life buoy with stand, gangway etc.			
6	Park the cranes and equipment at safe location, QC boom must be up and secure them			
7	If flood as consequence of Cyclonic Storm/Hurricane is anticipated, Oil Spill Management Plan is activated.			
8	Sufficient Drinking water and dry non perishable food available at CT2 and CT3 operation buildings.			
9	Adequate no of raincoats, charged emergency torches, 2 battery operated torches with spare batteries, 6 life jackets, ropes (50 meters x 6), life buoys available for emergency use.			
10	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
11	List of emergency contacts & suppliers available.			
Tower Control room (CT2 and CT3)				
1	Tower Control to issue cyclone bulletins every 6 Hrs.			
2	All hand held UHF/batteries, emergency torch, mobile phones are fully charged for use in emergency incase of total power failure.			
Wharf Supervisor				
1	Wharf supervisor to ensure all lines of vessels at berth are always kept taught and all hatch covers closed. Vessels instructed to double up mooring lines, if required.			
2	Wharf Supervisor briefed all to remain alert, careful and to move in pairs. No ITV , Operators, checker stand close to the QC, Vessel and on wharf.			
3	All golf cars, other cars and LMV vehicles parked at safe shelter.			

Container Terminal - Emergency Preparedness				
Level - 2 When cyclone is 500 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Appropriate storm warning signal hoisted (as per GMB instruction)			
2	Emergency team to be in contact with Central Control Room for necessary preparedness.			
3	All employees concerned and contractual staff informed. Contractor informed to evacuate their staff. All personnel notified against venturing out during effective period.			
4	All operations must be stopped and personnel moved to a safe location from where they can be evacuated. Only Emergency team members to remain in the port. Transportation arranged for evacuation of staff (employees and contractual staff)			
5	Material & equipment that cannot be moved are covered.			
6	All RTG, QC are secured.			
7	Arrangement made for stand-by vehicle.			
8	Vessels at berth to be casted off if wind speed > 30 Kts with container terminal head permission.			
9	All work permits revoked.			
10	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
Tower Control (CT2 & CT3)				
1	Tower Control to issue cyclone bulletins every 3 Hrs.			
2	Tower controller to send cyclone bulletin SMS from 3 day before predicted arrival of cyclone.			
3	Vessels at berth are to be informed to keep Main Engine Sby at short notice for emergency castoff.			
4	All hand held UHF/batteries, emergency torch, mobile phone to be fully charged for use in emergency incase of total power failure.			
Wharf Supervisor				
1	Wharf supervisor to ensure that all lines of vessels at berth are always kept taught. Hatch covers to be closed. Vessel to be instructed to double up mooring lines, if required.			
2	Wharf Supervisor to brief all to remain alert, careful and should move in pairs. No one to stand close to RTG, QC and on wharf.			
3	All loose materials, technical vehicle to be parked at safe shelter.			

Container Terminals - Emergency Preparedness				
Level - 3 A day before when the cyclone is to strike				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Appropriate storm warning signal hoisted (as per GMB instruction)			
2	Emergency team in contact with Central Control Room for necessary preparedness.			
3	All employees concerned and contractual staff informed. Contractor staff evacuated from the port and verified, All personnel remaining in the port cautioned against venturing out during effective period.			

4	Transportation arranged for evacuation of emergency team if required. (employees and contractual staff)			
5	All containers bring down up three high (as per possibility)			
6	Vessels at berth to be casted off if cyclone wind speed is expected to be > 30 Kts with HOD permission.			
7	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
Marine Police & Coast Guard Crafts				
1	Marine Police & Coast Guard Crafts to be cast off from RoRo pontoon.			
CT2 and CT3 Tower control room				
1	CT2 and CT3 Control to communicate cyclone bulletins every Hr.			
2	CT2 and CT3 Control to send cyclone bulletin SMS to all concerned.			
3	All hand held UHF/batteries, Emergency torch, Mobile Phone fully charged for use in emergency incase of total power failure.			
Wharf Supervisor				
1	Wharf supervisor to ensure that no personnel are allowed on the Jetty areas.			
2	Wharf Supervisor to brief all mooring crew to remain alert and nominated shelters. Only minimal mooring crew member to remain in the port and no Mooring Crew to be on the berth.			
3	All Cranes must be in anchored position.			
During Effective Period				
1	No personnel shall be allowed to be exposed himself to the cyclone during effective period.			
2	All personnel to remain indoor, observant and be alert.			
3	CT2 and CT3 Control Officer and Planners to take shelter in New CT operation Building with all hand held VHF, UHF, emergency light and mobile phones.			
4	People (Employees and Contractors) advised not to take shelter near old or damaged buildings or near tress.			
5	All doors and windows of buildings kept shut.			
6	Avoid top floor of buildings. Stay close to ground floor.			
After Effective Period				
1	Assess damage to equipments, building and unsafe condition.			
2	Initiate restart process.			

Administration - Emergency Preparedness				
Level - 1 When cyclone is 1000 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Emergency team formed for dealing with the emergency			
2	Emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources;			

4	All concerned employees and contractual staff informed. All personnel notified against venturing out during effective period.			
5	Drinking water (50 bottles of 20 ltr) and dry non perishable food available at all Canteens			
6	10 Nos of raincoats, 06 nos. charged emergency torches, 06 battery operated torches with spare batteries in each control room, ropes (50 meters) in each buses available for emergency use.			
7	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
8	List of emergency contacts & suppliers available.			

Administration - Emergency Preparedness				
Level - 2 When cyclone is 500 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Emergency team to be in contact with Central Control Room for necessary preparedness.			
2	Drinking water (50 bottles of 20 ltr) and dry non perishable food available at all Canteens			
3	All concerned employees and contractual staff informed. Contractor informed to evacuate their staff. All personnel notified against venturing out during effective period.			
4	All operations must be stopped and personnel moved to a safe location from where they can be evacuated. Only Emergency team members to remain in the port. Transportation arranged for evacuation of staff (employees and contractual staff)			
5	Arrangement made for stand-by vehicle.			
6	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			

Administration - Emergency Preparedness				
Level - 3 A day before when the cyclone is to strike				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency team in contact with Central Control Room for necessary preparedness.			
2	Drinking water (50 bottles of 20 ltr) and dry non perishable food available at all Canteens			
3	All concerned employees and contractual staff informed. Contractor staff evacuated from the port and verified, All personnel remaining in the port cautioned against venturing out during effective period.			
4	Transportation arranged for evacuation of emergency team if required. (employees and contractual staff)			
5	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			

During Effective Period				
1	All personnel notified against venturing out during effective period.			
2	All personnel to remain indoor, observant and be alert.			
3	People (Employees and Contractors) advised not to take shelter near old or damaged buildings or near tress.			
4	All doors and windows of buildings kept shut.			
After Effective Period				
1	Assess damage to equipments, building and unsafe condition.			
2	clean up the colony and premises			
3	Arrange for provisions till normalcy is established. Food arrangements to people on resumption work to be coordinated.			

Security Services - Emergency Preparedness				
Level - 1 When cyclone is 1000 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Obtain status of Cyclone at regular interval from Emergency Control Room and disseminate to others for their information and appropriate safety measures			
2	Be in touch with Marine Control Room for updates			
3	Establishment of Emergency Control Room at suitable location with communication facilities			
4	A team is to be formed for emergency.			
5	All vehicles to be topped up with fuel – prior to effective period and top up on daily basis.			
6	Walkie talkie sets to be fully charged along with stand-by batteries			
7	Keep mobiles (personal/official) fully charged			
8	Ensure emergency lights are functioning			
9	Ensure mega phones are functioning (change old batteries)			
10	Ensure public announcement (PA system) on ERT vehicle is functioning			
11	Ensure Digital Cameras and Handy Cam fully charged.(ERT, PSC, MSB, MWB)			
12	Ensure security guards in possession of all PPEs and whistle			
13	Ensure availability of rope (30 Mtr), life jacket & tarpaulin (If available), At respective gate & 01 at ISCR,			
14	Traffic Cone to be removed and kept in closed room (may be affected by high wind)			
15	Frontier from roads to be removed and kept in Covered Godown in stacking mode.			
16	Search lights to be kept ready dully functional.			
17	Hammer and cutting tools (available with Fire Dept).			
18	Bottled drinking water to be kept in all emergency vehicles			
19	First Aid Box to be kept with all emergency vehicles dully updated from medical wing.			
20	Emergency numbers to be kept with all emergency vehicles			
21	"Security Reinforcement to be kept ready at Guards colony with due provision of transport (whichever transport mode is available)			

22	Alternate route for Hospital and other locations to be checked and available with all emergency teams.			
23	Detailed briefing of security guards to be carried out			
24	Communication to be done as per requirement (to save battery of mobile & VHF)			
25	Removal of security guard from remote and isolated location as per instruction of ISCR.			
26	Ensure rain coat available with all Security personnel on duty			
27	List of emergency contacts & suppliers.			
28	Material & equipment that cannot be moved are to be covered.			
29	Hoist appropriate storm warning Signal.			
30	Remove all loose materials and equipment from jetty & other area.			
31	Ensure all workmen are sheltered at safe locations like canteens (concrete buildings).			
32	Stop all vehicle movement and ensure the vehicles are parked at safe location with blocked wheels			
33	Ensure roads and pathways are cleaned			

Security Services - Emergency Preparedness				
Level - 2 When cyclone is 500 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Obtain status of cyclone at regular interval from Emergency Control Room and disseminate to others for their information and appropriate safety measures			
2	Be in touch with Marine Control Room for updates			
3	Establishment of Emergency Control Room at suitable location with communication facilities			
4	A team is to be formed for emergency.			
5	All vehicles to be topped up with fuel – prior to effective period and top up on daily basis.			
6	Walkie talkie sets to be fully charged along with stand-by batteries			
7	Keep mobiles (personal/official) fully charged			
8	Ensure emergency lights are functioning			
9	Ensure mega phones are functioning (change old batteries)			
10	Ensure public announcement (PA system) on ERT vehicle is functioning			
11	Ensure Digital Cameras and Handy Cam fully charged.(ERT, PSC, MSB, MWB)			
12	Ensure security guards in possession of all PPEs and whistle			
13	Ensure availability of rope (30 Mtr), life jacket & tarpaulin (If available), At respective gate & O1 at ISCR,			
14	Traffic Cone to be removed and kept in closed room (may be affected by high wind)			
15	Frontier from roads to be removed and kept in Covered Godown in stacking mode.			
16	Search lights to be kept ready dully functional.			
17	Hammer and cutting tools (available with Fire Dept).			
18	Bottled drinking water to kept in all emergency vehicles			

19	First Aid Box to be kept with all emergency vehicles dully updated from medical wing.			
20	Emergency numbers to be kept with all emergency vehicles			
21	Security Reinforcement to be kept ready at Guards colony with due provision of transport (whichever transport mode is available).			
22	Alternate route for Hospital and other locations to be checked and available with all emergency teams.			
23	Detailed briefing of security guards to be carried out			
24	Communication to be done as per requirement (to save battery of mobile & VHF)			
25	Removal of security guard from remote and isolated location as per instruction of ISCR.			
26	Ensure rain coat available with all Security personnel on duty			
27	List of emergency contacts & suppliers.			
28	Material & equipment that cannot be moved are to be covered.			
29	Hoist appropriate storm warning Signal.			
30	Remove all loose materials and equipment from jetty & other area.			
31	Ensure all workmen are sheltered at safe locations like canteens (concrete buildings).			
32	Stop all vehicle movement and ensure the vehicles are parked at safe location with blocked wheels			
33	Ensure roads and pathways are cleaned			

Security Services - Emergency Preparedness				
Level - 3 A day before when the cyclone is to strike				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
General Points				
1	Obtain status of Cyclone at regular interval from Emergency Control Room and disseminate to others for their information and appropriate safety measures			
2	Be in touch with Marine Control Room for updates			
3	Establishment of Emergency Control Room at suitable location with communication facilities			
4	A team is to be formed for emergency			
5	All vehicles to be topped up with fuel – prior to effective period and top up on daily basis			
6	Walkie talkie sets to be fully charged along with stand-by batteries			
7	Keep mobiles (personal/official) fully charged			
8	Ensure emergency lights are functioning			
9	Ensure mega phones are functioning (change old batteries)			
10	Ensure public announcement (PA system) on ERT vehicle is functioning			
11	Ensure digital cameras and handy cam fully charged (ERT, PSC, MSB, MWB)			
12	Ensure security guards in possession of all PPEs and whistle			
13	Ensure availability of rope (30 Mtr), life jacket & tarpaulin (if available), at respective gate & 01 at ISCR			

14	Traffic cone to be removed and kept in closed room (may be affected by high wind)			
15	Frontier from roads to be removed and kept in covered godown in stacking mode.			
16	Search lights to be kept ready and fully functional.			
17	Hammer and cutting tools (available with Fire Dept).			
18	Bottled drinking water to kept in all emergency vehicles			
19	First Aid Box to be kept with all emergency vehicles duly updated from medical wing.			
20	Emergency numbers to be kept with all emergency vehicles			
21	Security Reinforcement to be kept ready at Guards colony with due provision of transport (whichever transport mode is available).			
22	Alternate route for Hospital and other locations to be checked and available with all emergency teams.			
23	Detailed briefing of security guards to be carried out			
24	Communication to be done as per requirement (to save battery of mobile & VHF)			
25	Removal of security guard from remote and isolated location as per instruction of ISCR.			
26	Ensure rain coat available with all Security personnel on duty			
27	List of emergency contacts & suppliers.			
28	Material & equipment that cannot be moved are to be covered.			
29	Hoist appropriate storm warning Signal.			
30	Remove all loose materials and equipment from jetty & other area.			
31	Ensure all workmen are sheltered at safe locations like canteens (concrete buildings).			
32	Stop all vehicle movement and ensure the vehicles are parked at safe location with blocked wheels			
33	Ensure roads and pathways are cleaned			
During Effective Period				
1	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present.			
2	All personnel to be notified against venturing out during effective period.			
3	All personnel to remain indoor, observant and be alert.			
4	Avoid taking shelter near old or damaged buildings or near tress.			
5	All doors and windows to be shut.			
6	Avoid the top floor of buildings. Stay close to ground floor.			
7	Close the visitors' gate.			
8	Occupy pre-determined post for controlling security of installation.			
9	Call up additional help from Barracks.			
10	Ensure that unauthorized persons/vehicles do not enter the gate.			
11	Provide security men for firefighting & rescue.			
12	Arrange for transport of higher authorities to the terminal.			
13	Transport vehicles would be provided near emergency control center.			
14	Depute security guards for controlling traffic at scene of disaster.			
15	Produce a list of port staff on duty in co-ordination with time office.			
16	Ensure availability of security men at gates so that they can lead authorities to disaster site.			

17	Ensure that non-essential persons do not crowd affected area.			
18	Instruct all drivers to take shelter at canteens (concrete buildings).			
19	Ensure vehicles are parked at designed parking areas, with wheels are blocked			
20	Close the gate ant stop allowing visitors and transport trucks either inward or out ward.			
21	If caught in open areas during cyclone find a safe shelter immediately			
After Effective Period				
1	Assess damage to equipment, building and unsafe condition.			
2	Do not enter in damaged buildings			
3	Use Mobile Phones only for emergency calls			
4	It is advisable to wait for all clear message on PA System/Walki-Talki			
5	Start search operation for Living Things			
6	Do not use any damaged electronic goods			
7	Drink boiled water			
8	Confirm with concerned that storm has subsided, before you move out.			
9	Start restorative measures & repairs.			

Railway Services - Emergency Preparedness				
Level - 1 When cyclone is 1000 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Railway emergency team formed for dealing with the emergency			List Enclosed
2	Emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	People are made aware of do's and don'ts before, during and after Cyclone			Part of training. List of do's and don'ts enclosed
5	A Railway team is formed to identify potential flying objects (Roofing, sheeting, temp sheds etc.) and secure/remove them.			Team will comprise of Railway Operation and Maintenance.
6	Connection of all the electrical equipment/appliances are cheked and if not required the same are disconnected. Electrical supply/ connection for all the unwanted items are disconnected			
7	All Spare equipment (Locomotive and wagon etc.) parked at suitable Railway yard.			
8	Portacabins to be secured properly and relocation of electronic equipment from various porta cabins to designated location			

9	Following teams are nominated and tool talked for anticipated emergency action. A) Loco Pilot B) Loco Maintenance C) Track Maintenance D) Signal Maintenance			
10	Coordination with contractors for making necessary arrangements towards evacuation of labours (Approx.250 No's) Actual evacuation to be done only after port shutdown is declared from CEO office.			List of average manpower in port on normal operation day is enclosed
11	Drinking water (10 bottles of 20 litre) and dry non perishable food available for 30 people (2 days) at Railway control room.			
12	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc.			
13	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
14	List and contact details of customers ,contractors and port emergency contacts.			
Railway Services - Emergency team Coordinator				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external customers .			
2	To appraise shift Incharge every 12 hrs who in turn will appraise their reportees.			
3	All hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency in case of total power failure.			
Railway Shift Incharge				
1	Railway Shift Incharge to ensure that all the arrangement for securing Assets Like locomotives,Wagons,Static cranes, Mobile Equipment Compressor.			
2	Railway Shift Incharge in coordination with emergency team to appraise the contracted labour supervisor at Railway Yard and Operation/Maintenance areas of the developments.			
3	Keep pictorial records of the sequence of events and preparedness (For Insurance Purpose)			For insurance purpose

Railway Services - Emergency Preparedness				
Level - 2 When cyclone is 500 km away from Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Railway operations squeezes to bare essential productivity with limited resources to ensure quick rap up.			
2	Emergency team to be in contact with Central Control Room for necessary preparedness.			
3	All Railway operations to stop if wind speed exceeds 30 Knots or heavy rainfall occurs.			
4	All Spare equipment (Locomotive and wagon etc.) parked at suitable Railway yard.			

5	Following teams are nominated and tool talked for anticipated emergency action. A) Loco Pilot B) Loco Maintenance C) Track Maintenance D) Signal Maintenance			
6	Material & equipment that cannot be moved are covered.			
7	All loose items at Railway Yard and Loco shed are secured.			
8	Nomination of emergency response vehicles (2 No's)			
9	All work permits revoked. Work at height is stopped and not permitted.			
10	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
Railway Services - Emergency team Coordinator				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external customers .			
2	To inform all contracted and company staff about cyclone to evacuate their staff.			
3	To take feedback of evacuation process and highlight progress/ issues emergency team.			
4	To check all hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency in case of total power failure.			
5	All computers/peripherals in MPT & West Basin control to be covered and protected against water ingress due to heavy rain.			
Railway Shift Incharge				
1	Railway Shift Incharge to ensure that all the arrangement for securing Assets Like locomotives,Wagons,Static cranes, Mobile Equipment Compressor.			
2	Railway Shift Incharge in coordination with emergency team to appraise the contracted labour supervisor at Railway Yard and Operation/Maintenance areas of the developments.			
3	Providing other dept. including Safety, Security, etc. mobile equipment and vehicles as per requirement given by them.			
4	Keep pictorial records of the sequence of events and preparedness			For insurance purpose

Railway Services - Emergency Preparedness				
Level - 3 A day before when the cyclone is to strike				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	All normal operations stopped. Only on emergency operations of evacute of Locomotive and wagon shifting to safe places.			
2	Railway emergency team is handy with VHF sets , Emergency Torches, Rain Coat.			
3	Central control room (Adani House) issues Port closure notice			
4	All equipment (Locomotive & wagons etc.) to be parked at suitable railway yard.			
5	Transportation arranged for evacuation of staff (employees and contractual staff)			
6	Emergency Kit, Food supplies and drinking water checked and tested.			

7	Communication mediums like VHF, mobile phones and PA systems checked and tested			
8	Only Emergency team members to remain in the port.			
9	2 vehicles stand-by near Railway building and FCC control room.			
10	Following teams are nominated and tool talked for anticipated emergency action. A) Loco Pilot B) Loco Maintenance C) Track Maintenance D) Signal Maintenance			
11	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
Railway Services - Emergency team Coordinator				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external customers .			
2	To ensure all contracted and company staff apart from emergency team is evacuated.			
3	To highlight any pending evacuation from port to emergency team.			
4	To be in continues touch with marine control room and Railway control room.			
During Effective Period				
1	All personnel notified against venturing out during effective period.			
2	All personnel to remain indoor, observant and be alert.			
3	Emergency team members, shift manager and coordination desk personnel t take shelter in their respective control rooms with all hand held VHF, UHF, emergency light and mobile phones.			
4	People (Employees and Contractors) advised not to take shelter near old or damaged buildings or near tress.			
5	All doors and windows of buildings kept shut.			
6	Avoid top floor of buildings. Stay close to ground floor.			
After Effective Period				
1	Personnel informed to vacate buildings,Cranes, RTG's and RMQC's. Lifts not to be used for evacuation.			
2	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
3	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			
4	Assess damage to equipment, resources.			
5	Initiate restart process.			
6	Photographs to be taken for assessing damages to cargo and property for insurance.			For insurance purpose
7	Communication to be sent to all clients regarding assessed and potential damage to cargo.			
8	Coordinate with port railway for complete inspection of Railway track and system.			
9	Condition shall be reported to CEO and take action to repair and resume operations.			
10	Inspect the Locomotives of the Port, and arrange for trial running to put them into operation.			

WEST BASIN - EMERGENCY PREPAREDNESS				
Level 1: When Cyclone is 1000 KM Away From Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	HODs have a meeting above the impending emergency steps			
2	Emergency team to be established and should know their roles and responsibilities.			List Enclosed
3	Emergency team is in contact with Central Control Room and Head West Basin for necessary preparedness.			
4	Ensure that all roads are free from any blockage.			
5	Emergency team to carry out the following tasks as per the direction of CEO & Head-West Basin: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
6	People are made aware of do's and don'ts before, during and after Cyclone			Part of training. List of do's and don'ts enclosed
7	A backup team is formed to identify potential flying objects (Roofing, sheeting, temp sheds etc.) and secure/remove them.			Team will comprise of Dry Cargo shift Incharge, MHS Shift Incharge, E&I Shift Incharge, Safety Shift Incharge, Admin Incharge etc.
8	Connection of all the electrical equipment/appliances are checked and if not required the same are disconnected. Electrical supply/connection for all the unwanted items are disconnected			
9	All non-operating godowns gates closed.			
10	Cargo secured inside warehouse and Open Plots. Tarpaulin sheets kept ready where ever fertilizer and agri cargo stored. An inventory to cover 3 Lakh MT of cargo to be maintained.			
11	In case of rain or heavy storm sand to be reinforced with sand bags for securing of cargo from sliding.			
12	Minimum equipment (2 pay loaders/2 excavators) to be parked near approach road of D - Yard (receiving side). Rest Spare equipment (2 Pay loaders/2 excavators) to be parked at the open space near the entrance of F&G Yard (discharge side). Rest of the equipment to be parked beyond ARD 8.			
13	All other spare equipment (trailer, hydra, boom-truck, bob-cat etc) to be parked in open space of Workshop.			
14	Portacabins to be secured properly and relocation of electronic equipment from various porta cabins to designated location.			
15	Minimum Numbers of Operators and Drivers to be Remain in a Shift; A) Crane Operators - 3 Nos B) Loader Operators - 4 Nos C) Excavator Operators - 4 Nos. D) Forklift Operators - 1 Nos E) Hydra Operator - 2 Nos F) Trailer Driver - 1 Nos G) Utility Drivers - 4 Nos H) Bus Drivers - 3 Nos I) JLG Operator - 1 Nos.			

16	Coordination with labour contractors for making necessary arrangements towards evacuation of labours, Drivers, Surveyors and Equipment Operators and Employees working at West Basin. Actual evacuation to be done only after port shutdown is declared from CEO office.			Considering full operation (all berths are occupied, Both WLS are working, 4 point of TLS are working, Maximum stacking & Reclaiming) see the sheet of Details of Routine Men-power at West Basin.
17	Drinking water (20 bottles of 20 litre) and dry non perishable food available for minimum 60 people (2 days). However the quantity shall be changed with respect to the staff to be deputed at West Basin during emergency after finalization with respective HODs and Head-West Basin.			
18	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc.			
19	Emergency team in continuous contact with other emergency services (such as Safety, Fire, Security, Other Services)			
20	List and contact details of customers, contractors and port emergency contacts to be available.			
21	All Individual Section Incharge have to get updated news frequently and the same to be communicated to contract agencies and other outsiders (i.e. surveyors, vendors, men-power providing agencies, transporters, coal customers etc).			
22	No visitors will be allowed.			
Central Control Room/Marine Control Room				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external customers.			
2	To appraise jetty/backup and WLS-TLS shift incharge [MHS, E&I and DC] every 12 hrs who in turn will appraise their reportees.			
3	To intimate or communicate any emergency to the operation, emergency departments, engineering services and other services.			
Shift Incharge of Individual Sections				
1	All hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency in case of total power failure.			
2	MHS Shift Incharge has to ensure that all the arrangement for securing Cranes, Staker Reclaimer and other Equipment is in order.			
3	DC Shift Incharge has to ensure that all the Equipment (i.e. payload, excavator) inside the vessel or jetty has been removed.			
4	DC - MHS Shift Incharge has to ensure that pota-cabins on jetty and back-up either properly secured or removed at safe place.			
5	All Shift Incharge of Individual Section are to be in coordination with emergency team to appraise the contracted labour supervisor at jetty and backup of the developments.			
6	Keep pictorial records of the sequence of events and preparedness (For Insurance Purpose)			
7	E&I Shift Incharge to ensure that all temporary connections have been removed and isolation of equipment/machineries wherever required.			
8	Admin Incharge and Individual Incharge to ensure that all vehicles are fully charged with fuel and have sufficient drivers.			

9	DC Incharge has to remain in touch with DC Head and Head- West Basin in case to hold the operation.			
10	Security Incharge to ensure that all the routes are free from traffic and to control the vehicular movement.			
11	DC Incharge to ensure that the approaches within the yards are free from cargo.			
12	DC Incharge to be in continuous with the Railway for rake operation control and with transporters for control of dumpers/trucks.			
13	ES & MHS Shift Incharge to be in touch with the supervisors of contract agencies working under Engineering Services for instructing and guiding them with respect to emergency. Also for evacuation.			
14	Safety Shift incharge will also intimate to the PMC Safety and officials for any information with respect to emergency and also for evacuation (if required).			
15	DC incharge must be touch with contract agencies (supervisors) and customers for giving information to them regarding emergency and to tak action with accordingly. Also for evacuation. all visitors will be stopped.			
16	Refer to the General DMP Checklist of West Basin [Departmentwise/Sectionwise]			

WEST BASIN - EMERGENCY PREPAREDNESS				
Level 2: When Cyclone is 500 KM Away From Mundra				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	HODs have a meeting above the impending emergency steps			
2	The operations squeezes to bare essential productivity with limited resources to ensure quick rap up.			
3	Emergency team to be in contact with Central Control Room for necessary preparedness.			
4	All jetty operations to stop if wind speed exceeds 16 meter/second or heavy rainfall occurs. This is with respect to the GSU and Stacker Reclaimer operations.			
5	Ensure all temporary things have been reomved.			
6	all visitors will be stopped.			
7	Drinking water (20 bottles of 20 litre) and dry non perishable food available for minimum 60 people (2 days). However the quantity shall be changed with respect to the staff to be deputed at West Basin during emergency after finalization with respective HODs and Head- West Basin.			
8	Steel cargo is properly stored and lashed. In case of rain or heavy storm sand to be reinforced with sand bags for securing of cargo from sliding.			
9	Minimum equipment (2 Pay loaders/2 excavators) to be parked near approach road of D - Yard (Receiving side). Rest Spare equipment (2 Pay loaders/2 excavators) to be parked at the open space near the entrance of F&G Yard (Discharge side). Rest of the equipment to be parked beyond ARD 8.			
10	All other spare equipment (trailer, hydra, boom-truck, bob-cat etc) to be parked in open space of Workshop.			

11	Minimum Numbers of Operators and Drivers to be Remain in a Shift; A) Crane Operators - 3 Nos B) Loader Operators - 4 Nos C) Excavator Operators - 4 Nos. D) Forklift Operators - 1 Nos E) Hydra Operator - 2 Nos F) Trailer Driver - 1 Nos G) Utility Drivers - 4 Nos H) Bus Drivers - 3 Nos I) JLG Operator - 1 Nos.			
12	Material & equipment that cannot be moved are covered.			
13	All loose items on jetty/backup are secured.			
14	Nomination of Emergency response vehicles [5 No's (ERT-1, 2 Adani Utilities-2, FLS Utility-2)]			
15	Vessels at Berth prepared for emergency cast off.			
16	All work permits revoked. Work at height is stopped and not permitted.			
17	Emergency team in continuous contact with other emergency services (such as Safety, Fire, Security, Other Services)			
18	All Individual Section Incharge have to get updated news frequently and the same to be communicated to contract agencies and other outsiders (i.e. surveyors, vendors, men-power providing agencies, transporters, coal customers etc).			
Central Control Room/Marine Control Room				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external customers.			
2	To inform all contracted and company staff about cyclone to evacuate their staff.			
3	To take feedback of evacuation process and highlight progress/ issues emergency team.			
4	To check all hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency in case of total power failure.			
Shift Incharge of Individual Sections				
1	All computers/peripherals in West Basin to be covered and protected against water ingress due to heavy rain.			
2	All hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency in case of total power failure.			
3	MHS Shift Incharge has to ensure that all the arrangement for securing Cranes, Staker Reclaimer and other Equipment is in order.			
4	DC Shift incharge has to ensure that all the equipment (i.e. payloader, excavator) inside the vessel or jetty has been removed.			
5	DC - MHS Shift incharge has to ensure that porta-cabins on jetty and back-up either properly secured or moved to a safe place.			
6	All Shift Incharge of Individual Section are to be in coordination with emergency team to appraise the contracted labour supervisor at jetty and backup of the developments.			
7	Keep pictorial records of the sequence of events and preparedness (For Insurance Purpose)			
8	E&I Shift Incharge to ensure that all temporary connections have been removed and isolation of equipment/machineries wherever required.			
9	Admin Incharge and Individual Incharge to ensure that all vehicles are fully charged with fuel and have sufficient drivers.			

10	DC Incharge has to remain in touch with DC Head and Head-West Basin in case to hold the operation.			
11	Security Incharge to ensure that all the routes are free from traffic and to control the vehicular movement.			
12	DC Incharge to ensure that the approaches within the yards are free from cargo.			
13	DC Incharge to be in continuous with the Railway for rake operation control and with transporters for control of dumpers/trucks.			
14	ES & MHS Shift Incharge to be in touch with the supervisors of contract agencies working under Engineering Services for instructing and guiding them with respect to emergency. Also for evacuation.			
15	Safety Shift Incharge will also intimate to the PMC Safety and officials for any information with respect to emergency and also for evacuation (if required).			
16	DC Incharge must be touch with contract agencies (supervisors) and customers for giving information to them regarding emergency and to tak action with accordingly. Also for evacuation.			
17	Refer to the General DMP Checklist of West Basin [Departmentwise/Sectionwise]			

WEST BASIN - EMERGENCY PREPAREDNESS				
Level - 3: A Day Before When the Cyclone is to Strike				
Cyclone - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	HODs have a meeting above the impending emergency steps			
2	All normal operations stopped. Only emergency operations (securing of GSU cranes, Security of Stacker & Reclaimers, Securing the mobile hoppers, Shifting of ground equipment i.e. payloader-excavator-skid loader-hydra-dumpers-trailer-sweeping machines-JLG-Boom truck etc, boom resting of MHCs) to be continued.			
3	Removal of staff from working on heighted structure or nearby seaside.			
4	Both the Control Rooms must have VHF sets with sufficient batteries, Emergency Torches, Rain Coat, Life Jackets, routine PPEs etc).			
5	Central control room (Adani House) issues Port closure notice			
6	All equipment (Pay loaders/excavators etc) to be parked at ARD 8.			
7	All pota-cabins to be secured with fixed heavy structures.			
8	Transportation arranged for evacuation of staff (employees and contractual staff)			
9	Emergency kit, food supplies and drinking water checked and tested.			
10	Communication mediums like VHF, mobile phones and PA systems checked and tested			
11	Only emergency team members and minimum staff to be remain in the port.			
12	Minimum equipment (2 pay loaders/2 excavators) to be parked near approach road of D - Yard (receiving side). Rest spare equipment (2 Pay loaders/2 excavators) to be parked at the open space near the entrance of F&G Yard (discharge side). Rest of the equipment to be parked nearby ARD 8.			

13	All other spare equipment (trailer, hydra, boom-truck, bob-cat etc) to be parked in open space of Workshop. In case of extreme situation, the equipment to be kept inside the workshop.			
14	Minimum Numbers of Operators and Drivers to be Remain in a Shift; A) Crane Operators - 3 Nos B) Loader Operators - 4 Nos C) Excavator Operators - 4 Nos D) Forklift Operators - 1 Nos E) Hydra Operator - 2 Nos F) Trailer Driver - 1 Nos G) Utility Drivers - 4 Nos H) Bus Drivers - 3 Nos I) JLG Operator - 1 Nos			
15	Emergency team in continuous contact with other emergency services (QHSE, Fire, Security, Marine and others)			
16	In case of extreme condition, only minimum staff will remain in port (upon seeing the condition). All the mobile equipment to be parked beyond ARD 8 (considering unmanned and open area).			
Central Control Room/Marine Control Room				
1	To circulate cyclone bulletins (issue by Martine Control) every 12 Hrs to all external customers .			
2	To ensure all contracted and company staff apart from emergency team is evacuated.			
3	To highlight any pending evacuation from port to emergency team.			
4	To be in continues touch with POC.			
During Effective Period				
1	All personnel notified against venturing out during effective period.			
2	Elevators to be electrically isolated.			
3	All personnel to remain indoor, observant and be alert.			
4	Emergency team members, Shift Incharge and coordination desk personnel take shelter in their respective control rooms with all hand held VHF, UHF, emergency light and mobile phones.			
5	People (Employees and Contractors) advised not to take shelter near old or damaged buildings or near tress.			
6	No personnel should be on open height structure as well as equipment (i.e. GSU, MHC, Stacker-Reclaimer).			
7	All doors and windows of buildings kept shut.			
8	Avoid top floor of buildings. Stay close to ground floor.			
9	Ensure the warden of the individual buildings are present.			
After Effective Period				
1	Take headcount of all the personnel. (FCC, Backup, Steel Yard, Jetty & Tug berth building)			
2	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
3	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured stating the type and extent of injury.			
4	Assess damage to equipment, resources and cargo.			
5	Initiate restart process.			
6	Photographs to be taken for assessing damages to cargo and property for insurance.			For insurance purpose
7	Communication to be sent to all clients regarding assessed and potential damage to cargo.			

Pre-Assessment Checklist [Preparedness in Early Stage]				
1	Ensure that all the important document are preserved at a proper place.			
2	Enusure that Emergency team has been prepared along with Roles & Responsibility.			
3	Ensure each representative of each department has a substitute (Dry Cargo, E&I, MHS SR, MHS Conv, MHS GSU, MHS WLS TLS, MHS Utility, ES CWS, ES Civil, Fire, Safety, Security, Marine, Railway, Admin, Store, IT etc).			
4	Ensure that list of Emergency Contact Numbers are displayed.			
5	Ensure that all employees, contractors/vendors/visitors/other customer are aware of emergencies and preparedness.			
6	Ensure that Emergency items contains following items; torches, ropes, wires, tarpaulins, plastic sheets, tool kit, duct tapes, assorted gears, first aid box, sand bags			
7	Ensure proper communication with the POC for further information/ updates/news of respective emergency from disaster authority/Govt agencies.			
8	Refer to the General DMP Checklist of West Basin [Departmentwise/Sectionwise]			

QHSE&F - Emergency Preparedness				
Emergency Response.				
Cyclone- Checklist				
Sr. No.	Activity	Yes	No	Remarks
Induction and Training Program.				
1	Arrange indduction /training program for all personnel on emergency preparedness & its awareness.			Part of Induction/ training program.
2	All concerned employees and contractual staff informed about the assembly point & evacuation locations.			
3	To arrange emergency drill for dealing with such emergency.			Part of Induction/ training program.
4	To arrange necessary training for emergency response team/ CMG/First Aid Team/Medical Team/Fire rescue team to deal with emergency. (Ensure availability of trained rescue team & necessary equipments all the time)			
5	Arrange training for all QHSE&F team member for emergency response & clear cut understanding of their cruisial roles & responsibility during emergency.			
6	To prepare & check effectiveness of Emergency Response Plan/ Disaster Management Plan.			
7	To do proper co-ordination with all concern department for maintaining necessary emergency response kit & necessary aids in required inventory or make identified supply of the same during declaration of such emergency.			
8	To maintain close co-rdination with mutual aid for dealing with emergency.			
During Effective Period				
1	Assist CEO/Executive Director (Corp. Affairs). as instructed.			
2	Co-ordination with respective HOD/HOS with respect to emergency actions.			

3	Ensure necessary action through CMG. Provide necessary assistance to CMG.			
4	Assist in evacuation of all personnel except key personnel.			
5	Provide HSE & F facilities (Assist for Rescue, Evacuation, and other Necessary Arrangement).			
6	Set up casualty collection centre and arrange first aid posts.			
7	Arrange enough stock medicines, antidotes, oxygen, stretchers,			
8	Keeping in mind that Road and Rail connectivity may be cut off for required period of time.			
9	Arranges additional medicine and equipment as required.			
10	Arrange a fully equipped Ambulance in ready state.			
11	Make arrangements for mobile casualty to reach at incident sites and transporting for further treatment.			
12	To do immediate co-ordination to mutual aids for necessary help/ support if required.			
After Effective Period				
1	Assist to CEO/Executive Director (Corp. Affairs).			
2	Assess damage (human) and send for further treatment.			
3	Assess the property damage and prepare report.			
4	Assist all HODs with restoration.			
5	Perform necessary rescue through rescue team where needed.			
6	Check each & every affected area & arrange for necessary HSE& F actions as require.			
7	After completion of all rescue, restoration work. check the effectiveness of executed emergency plan & take necessary require corrective action to update the plan & necessary facilities if required.			
8	To motivate the emergency rescue team, CMG & all concerns , who have perform well during emergency.			

Disaster Management Plan for
Earthquake





Earthquake

Introduction

It is fundamental to effective earthquake preparedness that maximum preventive measures be taken before an earthquake occurs. This includes building and facilities construction, storage planning and practices, and education of PORT personnel of appropriate actions when an earthquake occurs. This document deals with policies and procedures to be followed in the event of an earthquake.

Not all earthquakes are of the same magnitude. Further, the effects of an earthquake (including structural damage) may vary significantly from one area to another. This may be due to differences in distance from the earthquake's epicentre, differences in geology, differences in topography, or differences in building construction. For these reasons, at the occasion of an earthquake, it will be incumbent on responsible parties at each site to determine the level of response, which is appropriate for their site. For our Initial Assessment purposes earthquakes will be categorized at three levels:

Level I

A slight tremor is felt. Window shades swing and perhaps some small objects fall from desks, etc. It appears unlikely that there is significant damage.

Level II

The shaking is quite noticeable. Pictures are askew and things topple from desks and bookshelves. Some windows may crack. Damage, though noticeable, appears to be minor in nature

Note: A Level II earthquake calls for action. Even though there may appear to be little or no damage there may be problems about which you may not be immediately aware (such as broken gas lines, damaged wiring, structural damage, etc.). Therefore, a Level II earthquake calls for an orderly evacuation of the building until inspections indicate it is safe to re-enter. In this case the senior responsible person (one who would be the Site Incident Commander in the event of a Level III earthquake) should conduct an inspection of the building and its systems to confirm a safe environment.

Level III

This is the "big one." It may be difficult to walk. Items fall and some bookcases, etc. topple. Power lines sway violently. There is structural damage to buildings. Most earthquakes will fall in the Level I category. In the event of a Level I quake stay calm and communicate with those around you. The facility manager or supervisor should advise the Port Deputy Conservator of the event and the initial assessment. Please keep in mind, however, that this could be the precursor of a larger quake. The likelihood of this is not great but the possibility should not be dismissed. This would be a good time to search your work area for heavy or dangerous objects that could cause injury should they fall in a greater tremor.

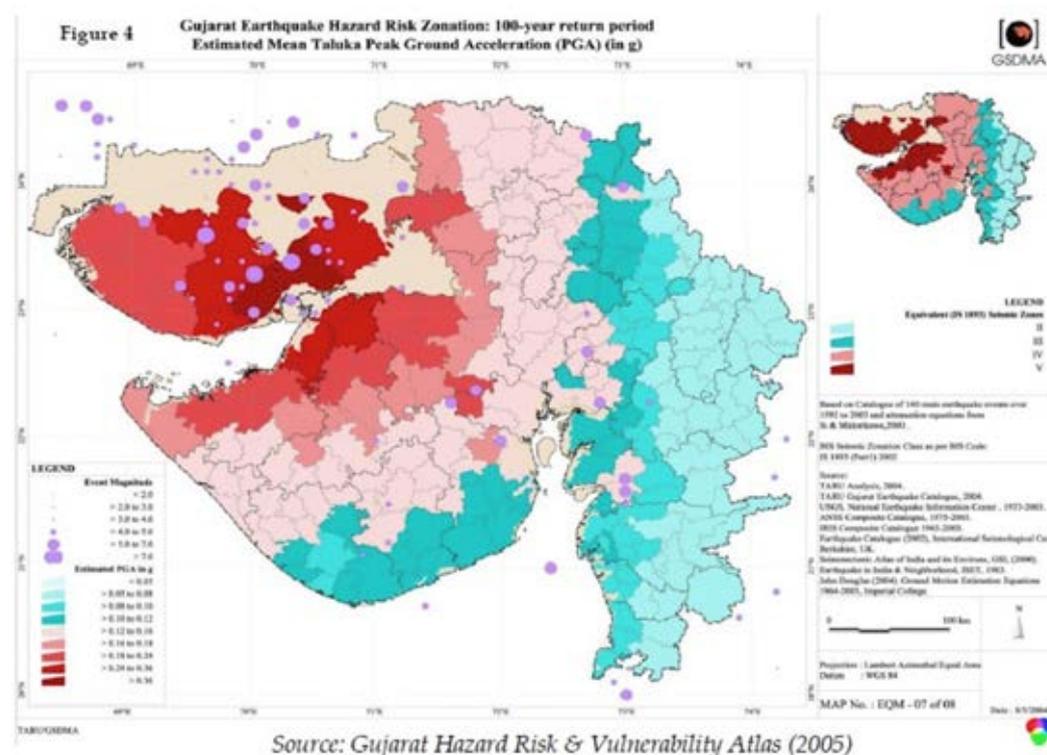
Important Information

Regular power supply may be cut off for a considerable time if the earthquake is severe, due to the failure of transmission line. Both road and railway connectivity may be cut off for some time. Local villagers may try to forcibly enter port and there may not be any local admin/police to help the port authorities. There may be unpredicted fall of buildings, structure, towers, transmission lines, heavy cranes, silos, go down, tanks, chimney etc. at unpredicted location. As Mundra is falling under seismic zone-v, all essential amenities and sustenance for port, like offices, emergency assembly points, etc... needs to be always in place.

Earthquake Zone Classification

The seismic zoning map of India the Gujarat region is divided into three zones. Kutchh region (about 300km x 300km) is assigned zone v where earthquakes of magnitude 8 can be expected. A belt of about 60-70km width around this zone covering areas of North Saurashtra and areas bordering eastern part of Kutchh are assigned zone-iv where intensity viii can be expected mainly due to earthquakes in Kutchh and some local earthquakes along north Kathiawar fault in northern Saurashtra. Rest of Gujarat lies in zone iii where intensity vii can be expected due to moderate local earthquakes or strong Kutchh earthquakes.

Earthquake Zone Classification Map



Useful web sites for earthquake information:

- www.imd.gov.in
- www.gsdma.org
- www.isgn.gov.in
- www.npmoc.navy.mil

Generally port installations & residential township are designed, based on the following criteria

All structures have been constructed as per IS 1893:1984 (Criteria for Earthquake Resistant Design of Structures), IS 13920:1993 Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces – Code of Practice , IS 4326:1993 Earthquake Resistant Design and Construction of Buildings - Code of Practice

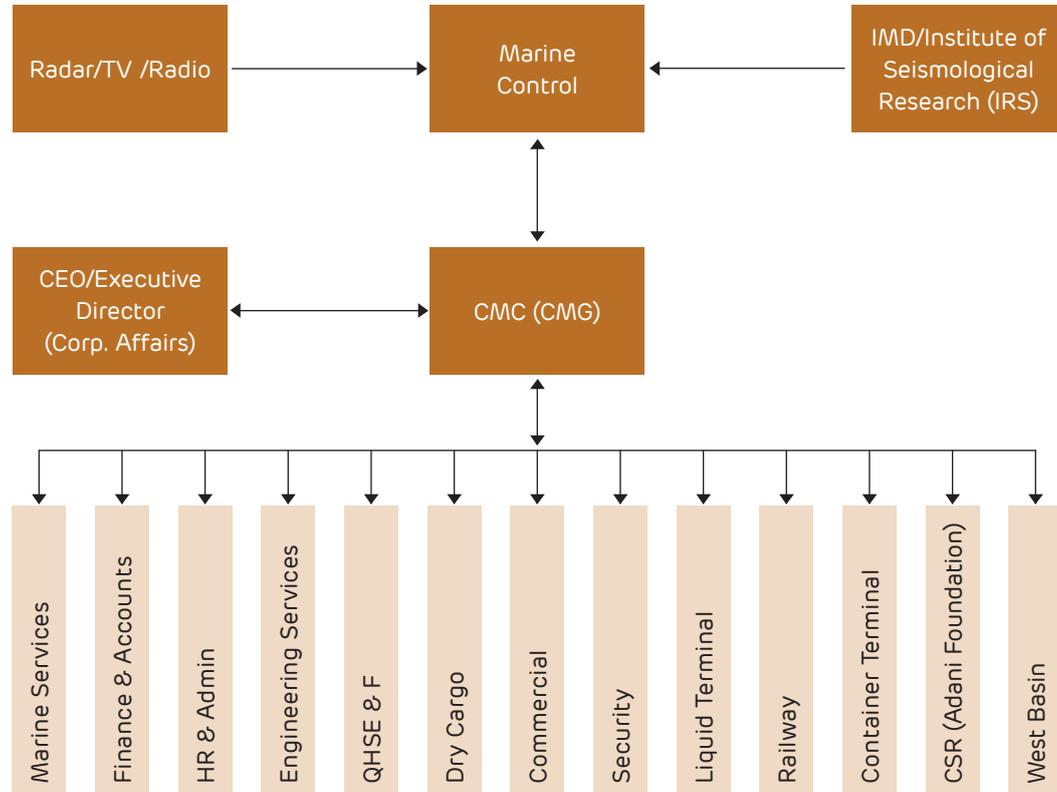
Crisis Management Group

- Crisis Management Group (CMG) will be a permanent body to deal with all crisis, will be formed by CEO.
- On feeling heavy tremors of an earthquake (high-richter scale), the Crisis Management Group (CMG) shall meet at the CMC or other convenient place as determined by the CEO.
- CEO Shall appoint departmental HOD/HOS as Coordinator and Convener of the CMG.
- All meetings of the Crisis Management Group (CMG) shall be conducted in the CMC.
- All HODs/HOS shall be members of CMG, in absence of the CEO, Executive Director (Corp. Affairs) shall be the Chairman of CMG and Coordinator shall be the convener.
- CEO may declare emergency so that all emergency staff and officers shall be at their duty stations and congregate at their designated stations for taking review of the situation and for implementing orders received from their respective HODs, who are CMG members.
- No emergency team member shall leave his station during the emergency period.
- CMC shall be manned round the clock and shall be headed by the CEO or someone nominated by CEO. He shall be at least of the rank of HOD.
- All situations of the earthquake and recovery shall be reviewed by the CEO/Executive Director at CMC, with the concerned CMG members.

Crisis Management Group – Responsibilities

All HODs and HOSs shall be members of crisis group for earthquake management and post restoration activities in addition to members nominated by CEO as per the situation.

The crisis management group shall be active till the full restoration of port activities.



Commands Structure/Designated Persons

- The following table shows the command structure for each department.
- In case the officer in the first column is not available, the second in command automatically takes over.
- Designation of the first column is the HOD and second column is the successor.
- In case of absence of both, the senior most officers of the dept. to assume charge.

Sr.No.	Head	Successor
1	CEO	Executive Director (Corp. Affairs) (Corporate Affairs)
2	HOD (Marine)	HOS (Marine)
3	HOD Finance	HOS Finance
4	HOD (HR & Admin)	HOS (HR & Admin)
5	HOD (ES)	HOS (ES)
6	HOD (QHSE & F)	HOS (QHSE & F)
7	HOD (Dry Cargo)	HOS (Dry Cargo)
8	HOD (Commercial)	HOS (Commercial)
9	HOD (Security)	HOS (Security)
10	HOD (Liquid)	HOS (Liquid)
11	HOD (Railway)	HOS (Railway)
12	HOD (Container Terminal)	HOS (Container Terminal)
13	HOD (West Basin)	HOS (West Basin)
14	HOD (CSR–Adani Foundation)	HOS (CSR – Adani Foundation)

* Roles of HODs [West basin (ES & DC)] and HODs [MPT (ES & DC)] are same. HODs [West Basin] will assist the Head – West Basin.

Action Plan

- A. Actions – During Earthquake
- B. Actions – Post-Earthquake: Recovery, Insurance, Restoration & Relief
- C. Checklists for Earthquake.

A Actions – During Earthquake

For an event demanding immediate evacuation:

A. Evacuate the vicinity through the nearest safe exit.

1. Use main fire exits if possible.
 - If exits are obstructed, use extreme caution when evacuating through any other means available.
 - Do not use elevators
2. Proceed at a walking pace. Do not run.
3. Those familiar with this evacuation plan are encouraged to see that visitors, vendors, tenants, etc. who may not be familiar with procedures are not left behind.
4. Assist those unable to use stairs (See below.)
5. Personnel are encouraged to take VHF with them as they evacuate.
6. All the people must be assembled at designated assembly points.
7. Follow the emergency exit signage.

B. Evacuation in anticipation of a potential hazard

1. Shut down computers, machinery, etc.
2. Move out in an orderly fashion.
3. Wnsure that everyone has vacated the building.

B Post-Earthquake: Recovery, Insurance, restoration & Relief

The purpose of post earthquake activity is to resume port operation as early as possible.

→ Site-main Controller
→ CEO/Executive Director (Corp. Affairs)

- a. Collect the details of damages if any from HODs immediately.
- b. Ask all members of the CMG to immediately inspect their area of responsibility, along with their subordinate staff and officers and report their finding within short period of time.
- c. Ask the HODs to submit preliminary estimate immediately, followed by detailed estimate.
- d. HOD - Marine to be asked to complete the survey of berth as quickly as possible, to resume shipping activity.
- e. All required activities to resumePort operations are to be discussed and finalized with HODs.
- f. A department wise detailed programme is to be drawn up to resume normal Port operations.
- g. Regular follow up to complete the work as provided in the checklist is to be done.
- h. Emergency powers for procurement and award of contract must be evoked.
- i. HODs are required to submit the details and programs immediately.
- j. Reports on condition of Tugs and other Port crafts, ship unloader, ship loaders, HMCs and other auxiliary equipment after thoroughly inspection by HOD.
- k. All other cargo handling equipment like container handling equipment if any shall be inspected by HOD and detailed report to be obtained..
- l. MCCs, Stacker Reclaimers, Wagon tippler and Wagon tippler tunnel, Conveyor belts, conveyor galleries, Locomotives, Rail load out system etc. shall also be inspected carefully by HOD and reports to be obtained.
- m. Condition of Liquid berth and equipment and SPM Condition of all civil structures, Roads and water supply system to be checked.
- n. Ask all HODs to submit details to HOD - Finance to process insurance claims.
- o. Coordinate the CSR activities.
- p. Keep contact with District Collector and local state Govt. official and offer all possible help for rehabilitation the same to corporate office.
- q. Inform all stakeholders regarding restoration of the port operation and inform the same to corporate office.

• Incident Controller:
HOD – Marine
(Marine & SPM)

- a. Marine – HOD shall immediately arrange for survey of berth and inform the condition to CEO/COO, Who in turn inform the corporate office and stake holders.
- b. Restoration work if any may be done in association with Head ES.
- c. Shall check the navigational aid system and take action or rectifications if required
- d. Mobilise diving personnel and equipment.

• Incident Controller:
HOD – ES (MPT & WB)

- a. Shall immediately depute the electrical engineer to get an update of power supply.
- b. In case of power outage, coordinate with Electrical supply authorities for restoration of power supply
- c. If power is available, and MCCs are O.K, charge MCCs one by one after thorough checking.
- d. Depute the same team which has parked the equipment to release the equipment for operation after removing all blockages.
- e. If any equipment is found to be damaged report the matter to higher ups and take action for early repair or decommissioning.
- f. Equipment can also can be charged one-by-one, after charging the MCCs, after obtaining written clearance from the engineer in charge.
- g. Ensure that the equipment electrical system is perfect before charging. Keep records of all measurements.
- h. Inspect all electrical and mechanical systems thoroughly before trial run.
- i. Damaged street lights and damaged internal lighting system to be repaired and re-commissioned.
- j. Take trial run of conveyors.
- k. Ensure all DG sets work till normal power supply is resumed.
- l. Inspect the water supply system and take all action to establish normal water supply immediately.
- m. In case of any difficulty bring it to the notice of CEO/Executive Director (Corp. Affairs).
- n. Drainage system if damaged should be repaired immediately.
- o. Inspect all roof tops and if any roof is broken, take action for replacement.
- p. Coordinate with Admin/HR for clean-up activities.
- q. HODs of West Basin will assist the Head – West Basin.
- r. Initiate restart processes.

• Primary Support Team:
HOD – HR & Admin

- a. Shall take up relief camp work for port colony if required.
- b. Take all actions necessary to shift the officers and staff of the port.
- c. Coordinate with civil department to clean up the colony and premises.
- d. Arrange for provisions till normalcy is established.
- e. Coordinate food and drinking water arrangements for people on resumption of work to be coordinated.
- f. Arrange to lift out all the damaged materials generated during earthquake from the site and dispose it at proper place with the help of HSE department.

• Primary Support Team:
HOD – QHSE & F

- a. Assist to CEO/Executive Director (Corp. Affairs).
- b. Assess the damage (human) and sent for further treatment.
- c. Assess the property damage and prepare report in consultation with concern department.
- d. Assist all HODs with restoration.
- e. Suggest optimal strategies for emergency isolation of damaged equipment, emergency transfer of material etc.

-
- f. Recommends appropriate procedure to isolate damaged units without introducing new hazard.
 - g. Arrange portable lighting arrangement to the accident site in consultation with Admin and Commercial.
 - h. Arrange for environmentally safe disposal of port emergency generated effluent/waste.
 - i. Updating DMP.

-
- | | |
|--|--|
| <ul style="list-style-type: none"> → Secondary Support Team: HOD – Commercial | <ul style="list-style-type: none"> a. Shall inspect all stores and estimate loss or damages if any and take immediate action for re-equipping the stores. b. Coordinate with all HODs for requirements of consumables and spares. c. Discuss with CEO/Executive Director (Corp. Affairs) to ease norms of procurement for immediate supply of stores. |
|--|--|

-
- | | |
|--|--|
| <ul style="list-style-type: none"> → Incident Controller: HOD – Railway | <ul style="list-style-type: none"> a. Shall depute teams of staff to check the condition of all railway track and track electrification and signalling system. b. Contractor shall be instructed to depute adequate numbers of teams to survey the entire railway line and system, and submit feedback within the shortest possible time (fix the time period for feedback) c. Condition shall be reported to CEO/Executive Director (Corp. Affairs) and take action to repair and resume operations. |
|--|--|
- d. Any help for repair and decommissioning may be taken from HOD - ES.
 - e. He shall also inspect the Locomotives of the Port, and arrange for trial runs before putting them into operation.

-
- | | |
|---|--|
| <ul style="list-style-type: none"> → Incident Controller: HOD – Operations [DC (MPT & WB), CT, LT] | <ul style="list-style-type: none"> a. Shall inspect all areas along with concern HODs for estimate loss and damages if any. Prepare report and submit to CEO. b. The condition of stored hazardous/toxic cargo to be inspected along with HSE and immediate action, as advised by HSE to be taken up. c. Discuss with CEO/Executive Director (Corp. Affairs) and HODs for resumption of partial or full operations. d. Take all actions for early resumption of Port activities. |
|---|--|
- e. Coordinate with HOD – Marine to resume shipping operations.
 - f. Coordinate with HOD - Finance for insurance claims.

-
- | | |
|--|--|
| <ul style="list-style-type: none"> → Secondary support team: HOD – Finance & Accounts | <p>Insurance Claims</p> <ul style="list-style-type: none"> a. All HODs to prepare loss and damage list and estimate the costs of rectification and submit the same to HOD - Finance, who is the nodal officer for claiming insurance, with copies to CEO/ Executive Director (Corp. Affairs). The details shall contain photograph also. b. Shall coordinate with insurance company to arrange the surveyor as quickly as possible, so that rectification work can start immediately. |
|--|--|
- c. May coordinate with all HODs to prepare additional documents if required.
 - d. May collect the details of claims with supporting documents from HODs in a time frame to be fixed by him for early settlement of all claims.
 - e. Timely submission of insurance claims necessary for claiming losses.

• **Primary Support Team:
HOD – Security**

The road and railway traffic from and to the port may be disrupted due to the earthquake.

- a. Shall be well versed with all road communication of the area.
- b. Shall coordinate with local administration/State administration to clear the roads in consultation with Corporate Affairs.
- c. Port may also be required to engage men and machine to clear the road blockages if any.

• **Secondary Support Team:
CSR HOD – Adani
Foundation [General
Responsibilities]**

The company has a social responsibly to save the life and property of the people living in the peripheral areas. This work involves the following activities. These activities may be done in association with local administration.

- a. Request them to move to safer places.
- b. Moving to earthquake relief centre is the best option. If the same is not available nearby, they may be asked to move to permanent structures available nearby. Provide them all assistance for evacuation.
- c. Provide the villagers adequate dry food (chuda, gudo, biscuits, baby food etc.) items and potable water in adequate quantity.
- d. Services of medical team may be extended to the peripheral villages with necessary medicines and first aids.
- e. Advise them to remain calm.
- f. After the earthquake there may be shortage of food and water. Water has to be provided for their basic needs till normalcy is established.
- g. Start community Kitchens to provide them with food.
- h. Help in rehabilitation and resettlement of all displaced people in coordination with local Govt. agencies and NGOs.

C Checklist:

- Checklist for CEO/Executive Director (Corp. Affairs).
- Following Checklists prepared which shall be used at the time of declaration of Earthquake.

Checklist – 1	CEO/Executive Director (Corp. Affairs)
Checklist – 2	Marine Services
Checklist – 3	Engineering Services
Checklist – 4	Dry Cargo
Checklist – 5	Liquid Terminal
Checklist – 6	Container Terminal
Checklist – 7	HR & Admin
Checklist – 8	Security
Checklist – 9	Railway Services
Checklist – 10	West Basin
Checklist – 11	QHSE

CEO - Emergency Preparedness				
Earthquake - Checklist				
Sr. No.	Activity	Yes	No	Remarks
During Effective Period				
1	Alarm to be sounded and announcement to be made on PA system. All operations to be stopped			
2	Personnel to be informed to vacate buildings, godowns, cranes, RTG's and RMQC's. Lifts not to be used for evacuation. Personnel assembled at nearest assembly point for Earthquake.			
3	All departments told to carry out a head count.			
4	People must be advised to maintain calm and reassure others.			
After Effective Period				
1	Announcement to be made declaring end of emergency on PA system and other means of communication.			
2	Advise emergency teams to carry out on-field assessment and head counts.			
3	Launch search and rescue operations for missing personal.			
4	Personnel to be advised not to enter damaged buildings/structures.			
5	Get reports on casualties and injuries to personnel. Attend to injured persons and give them first aid, if possible, inform the hospital if anyone is injured, stating the type and extent of injury.			
6	Carry out assessment of damage to property and all high value assets within the port including ships.			
7	Reports to be consolidated with photographs from all departments for insurance claims.			
8	Examine cargo pipelines, fire water lines, electrical underground cable & system, building & godown walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
9	Initiate Gradual resumption of port operation.			

Marine Services - Emergency Preparedness				
Earthquake - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Part of Regular Training and Inspections				
1	All on-roll staff and contractual employees to be given training on emergency response on earthquake, exit routes in various buildings, assembly points and location of Medical Station/Fire Station.			
2	Training to be given to employees on how to disconnect electric and water supply in their buildings.			
3	Heavy objects, glasses to be kept in lower levels. To be inspected during safety rounds every quarter.			
4	Heavy objects must not be kept on the parapet, window, balcony sills.			
During Effective Period				
1	Personnel to be informed to vacate buildings, godowns, cranes, RTG's and RMQC's. Lifts not to be used for evacuation.			
2	People to be advised to maintain calm and reassure others.			
3	During the earthquake, the safest places are open spaces, away from buildings, godowns and high rise equipments.			

4	If indoors, take cover under a desk, table, bed or doorways and against inside walls and staircase. Stay away from glass doors, glass panes, windows or outside doors. Do not cause a stampede while evacuating as the buildings in the Port are earthquake resistant.			
5	When outside, move away from buildings and utility wires.			
6	If in a moving vehicle, stop the vehicle and stay in the vehicle away from buildings, towers and trees.			
7	All operations must be stopped and personnel moved to a safe location from where they can be evacuated.			
8	DPC, MMPT Marine Control Officer and data entry operator to assemble near jetty barrier with all hand held VHF, UHF, emergency light and mobile phones.			
9	Announcements to be made instructing employees to avoid taking shelter near buildings, godowns, high rise equipments, stacked containers and trees.			
After Effective Period				
1	DPC, MMPT control officer & data entry operator to return back to Marine Control Room.			
2	Take headcount of all the personnel.			
3	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
4	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			
5	Assess damage to equipments, building and for any unsafe condition.			
6	Check water pipes, electric lines and fittings. If damaged, shut off the main valves. Do not touch live wires.			
7	Initiate restart process.			

Engineering Services of MPT - Emergency Preparedness				
Earthquake - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Part of Regular Training and Inspections				
1	All on duty staff and contractual employees are given training on emergency response on earthquake, exit routes in various buildings, assembly points and location of Medical Station/Fire Station.			Training program
2	People are made aware about evacuation plan in case of emergency.			Training program
3	People are made aware of do's and don'ts before, during and after earthquake.			Part of training. List of do's and don'ts enclosed
4	Heavy objects, glasses kept in lower levels. To be inspected during safety rounds every quarter.			
5	Heavy objects must not be kept on the parapet, window, balcony sills.			
During Effective Period				
1	Personnel to be informed to vacate buildings, godowns, cranes, RTG's and RMQC's. Lifts not to be used for evacuation.			To be made part of emergency drill.
2	Announcements to be made to avoid taking shelter near buildings, godowns, high rise equipment, stacked containers and trees.			To be made part of emergency drill.

3	People must be advised to maintain calm and reassure others.			
4	All operations to be stopped and personnel moved to a safe location from where they can be evacuated.			To be made part of emergency drill.
5	During the earthquake, the safest places are open spaces, away from buildings, godowns and high rise equipment, electrical lines and trees.			
6	If indoors, take cover under a desk, table, bed or doorways and against inside walls and staircase. Stay away from glass doors, glass panes, windows or outside doors. Do not cause a stampede while evacuating as the buildings in the Port are earthquake resistant.			
7	When outside, move away from buildings and utility wires.			
8	If in a moving vehicle, stop the vehicle and stay in the vehicle away from buildings, towers and trees.			
9	FCC control room, DG House/Substation & Workshop personal to assemble at the nearest assembly point or rescue point respectively with all hand held VHF, emergency lights and mobile phones.			To be made part of emergency drill.
After Effective Period				
1	FCC control and Coordination desk to return to their respective control rooms.			
2	Take headcount of all the personnel. (FCC, backup, steel yard, jetty & tug berth building)			
3	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
4	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			
5	Assess damage to equipment and building to ensure safe working conditions.			
6	Check water pipes, electric lines and fittings. If damaged, shut off the main valves. Do not touch live wires.			
7	Initiate restart process.			
8	Photographs to be taken for assessing damages to cargo and property for insurance.			For insurance purpose
9	Communication to be sent to all clients regarding assessed and potential damage to cargo.			

Dry Cargo - Emergency Preparedness				
Earthquake - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Part of Regular Training and Inspections				
1	All on duty staff and contractual employees are given training on emergency response on earthquake, exit routes in various buildings, assembly points and location of Medical Station/Fire Station.			Training program
2	People are made aware about evacuation plan in case of emergency.			Training program
3	People are made aware of do's and don'ts before, during and after earthquake.			Part of training. List of do's and don'ts enclosed
4	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc.			To be placed with dry cargo coordination desk and FCC control room
5	Training given to employees on how to disconnect electric supply in their buildings.			

6	Heavy objects, glasses kept in lower levels. To be inspected during safety rounds every quarter.			
7	Heavy objects must not be kept on the parapet, window, balcony sills.			
During Effective Period				
1	Personnel to be informed to vacate buildings, godowns, cranes, RTG's and RMQC's. Lifts not to be used for evacuation.			To be made part of emergency drill.
2	Announcements to be made to avoid taking shelter near buildings, godowns, high rise equipment, stacked containers and trees.			To be made part of emergency drill.
3	People must be advised to maintain calm and reassure others.			
4	All operations must be stopped and personnel moved to a safe location from where they can be evacuated.			To be made part of emergency drill.
5	During the earthquake, the safest places are open spaces, away from buildings, godowns and high rise equipment, electrical lines and trees.			
6	If indoors, take cover under a desk, table, bed or doorways and against inside walls and staircase. Stay away from glass doors, glass panes, windows or outside doors. Do not cause a stampede while evacuating as the buildings in the Port are earthquake resistant.			
7	When outside, move away from buildings and utility wires.			
8	If in a moving vehicle, stop the vehicle and stay in the vehicle away from buildings, towers and trees.			
9	FCC control and Coordination desk personal to assemble near line and jetty barrier respectively with all hand held VHF, emergency lights and mobile phones.			To be made part of emergency drill.
After Effective Period				
1	FCC control and Coordination desk to return to their respective control rooms.			
2	Take headcount of all the personnel. (FCC, backup, steel yard, jetty & tug berth building)			
3	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
4	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			
5	Assess damage to equipment and building to ensure safe working conditions.			
6	Check water pipes, electric lines and fittings. If damaged, shut off the main valves. Do not touch live wires.			
7	Initiate restart process.			
8	Photographs to be taken for assessing damages to cargo and property for insurance.			For insurance purpose
9	Communication to be sent to all clients regarding assessed and potential damage to cargo.			

Liquid Terminal - Emergency Preparedness				
Earthquake - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Part of Regular Training and Inspections				
1	All on-roll staff and contractual employees to be given training on emergency response on earthquake, exit routes in various buildings, assembly points and location of Medical Station/Fire Station.			
2	Training to be given to employees on how to disconnect electric and water supply in their buildings.			

3	Heavy objects, glasses to be kept in lower levels. To be inspected during safety rounds every quarter.			
4	Heavy objects must not be kept on the parapet, window, balcony sills.			
During Effective Period				
1	Personnel informed to vacate Liquid terminal buildings.			
2	People to be advised to maintain calm and reassure others.			
3	During the earthquake, the safest places are open spaces, away from buildings, godowns and high rise equipment.			
4	If indoors, take cover under a desk, table, bed or doorways and against inside walls and staircase. Stay away from glass doors, glass panes, windows or outside doors. Do not cause a stampede while evacuating as the buildings in the Port are earthquake resistant.			
5	When outside, move away from buildings and utility wires.			
6	If in a moving vehicle, stop the vehicle and stay in the vehicle away from buildings, towers and trees.			
7	All operations must be stopped and personnel moved to a safe location from where they can be evacuated.			
8	Liquid Control Officer and data entry operator to assemble near driver canteen with all hand held VHF, UHF, emergency light and mobile phones.			
9	Announcements to be made to avoid taking shelter near buildings, godowns, high rise equipment, stacked containers and trees.			
After Effective Period				
1	Control officer & data entry operator to return back to Liquid Control Room.			
2	Take headcount of all the personnel.			
3	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
4	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			
5	Assess damage to equipment, building and for any unsafe condition.			
6	Check water pipes, electric lines and fittings. If damaged, shut off the main valves. Do not touch live wires.			
7	Initiate restart process.			

Container Terminal - Emergency Preparedness				
Earthquake - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Part of Regular Training and Inspections				
1	All onroll staff and contractual employees to be given training on emergency response on earthquake, exit routes in various buildings, assembly points and location of Medical Station/Fire Station.			
2	Training to be given to employees on how to disconnect electric and water supply in their buildings.			
3	Heavy objects, glasses to be kept in lower levels. To be inspected during safety rounds every quarter.			
4	Heavy objects must not be kept on the parapet, window, balcony sills.			

During Effective Period				
1	Personnel informed to vacate buildings, workshops , godowns, cranes, RTG's and RMQC's. Lifts not to be used for evacuation.			
2	People to be advised to maintain calm and reassure others.			
3	During the earthquake, the safest places are open spaces, away from buildings, godowns and high rise equipments.			
4	If indoors, take cover under a desk, table, bed or doorways and against inside walls and staircase. Stay away from glass doors, glass panes, windows or outside doors. Do not cause a stampede while evacuating as the buildings in the Port are earthquake resistant.			
5	When outside, move away from buildings and utility wires.			
6	If in a moving vehicle, stop the vehicle and stay in the vehicle away from buildings, towers and trees.			
7	All operations must be stopped and personnel moved to a safe location from where they can be evacuated.			
8	Shift superintendent , tower controller, Planners , Operators , engineers, checkers and all ITV drivers to assemble away from operation building at emergency assembly point with all hand held VHF, UHF, emergency light and mobile phones.			
9	Announcements to be made instructing employees to avoid taking shelter near buildings, godowns, high rise equipments, stacked containers and trees.			
After Effective Period				
1	Shift superintendent , tower controller, Planners , Operators , engineers, checkers and all ITV drivers to return back at their respective work place.			
2	Take headcount of all the personnel.			
3	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
4	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			
5	Assess damage to equipments and building for any unsafe conditions.			
6	Check water pipes, electric lines and fittings. If damaged, shut off the main valves. Do not touch live wires.			
Administration - Emergency Preparedness				
Earthquake - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Part of Regular Training and Inspections				
1	All on-roll staff and contractual employees to be given training on emergency response on earthquake, exit routes in various buildings, assembly points and location of Medical Station/Fire Station.			
2	Training to be given to employees on how to disconnect electric and water supply in their buildings.			
3	Heavy objects, glasses to be kept in lower levels. To be inspected during safety rounds every quarter.			
4	Heavy objects must not be kept on the parapet, window, balcony sills.			
During Effective Period				
1	Personnel informed to vacate buildings. Lifts not to be used for evacuation.			
2	People to be advised to maintain calm and reassure others.			

3	During the earthquake, the safest places are open spaces, away from buildings, godowns and high rise equipments.			
4	If indoors, take cover under a desk, table, bed or doorways and against inside walls and staircase. Stay away from glass doors, glass panes, windows or outside doors. Do not cause a stampede while evacuating as the buildings in the Port are earthquake resistant.			
5	When outside, move away from buildings and utility wires.			
6	If in a moving vehicle, stop the vehicle and stay in the vehicle away from buildings, towers and trees.			
After Effective Period				
1	All Admin officer take charge to respective Control Rooms			
2	All the Buses, LMVs moved towards parking near all Assembly Points.			
3	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
4	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			

Security Services - Emergency Preparedness				
Earthquake - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Part of Regular Training and Inspections				
1	All on-roll staff and contractual employees to be given familirization on emergency response on earthquake, exit routes in various buildings, assembly points and location of Medical Station/Fire Station.			
2	Training to be given to employees on how to disconnect electric and water supply in their buildings.			
3	Heavy objects, glasses to be kept in lower levels. To be inspected during safety rounds every quarter.			
4	Heavy objects must not be kept on the parapet, window, balcony sills.			
During Effective Period				
1	Personnel to be informed to vacate buildings, godowns, cranes, RTG's and RMQC's. Lifts not to be used for evacuation.			
2	People to be advised to maintain calm and reassure others.			
3	During the earthquake, the safest places are open spaces, away from buildings, godowns and high rise equipments.			
4	If indoors, take cover under a desk, table, bed or doorways and against inside walls and staircase. Stay away from glass doors, glass panes, windows or outside doors. Do not cause a stampede while evacuating as the buildings in the Port are earthquake resistant.			
5	When outside, move away from buildings and utility wires.			
6	If in a moving vehicle, stop the vehicle and stay in the vehicle away from buildings, towers and trees.			
7	All operations must be stopped and personnel moved to a safe location from where they can be evacuated.			
8	DPC, MMPT Marine Control Officer and data entry operator to assemble near jetty barrier with all hand held VHF, UHF, emergency light and mobile phones.			
9	Announcements to be made instructing employees to avoid taking shelter near buildings, godowns, high rise equipments, stacked containers and trees.			

After Effective Period				
1	Security Control Room Officer along with Data Operators to return back to respective Security Control Room.			
2	Take headcount of all the personnel.			
3	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
4	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			
5	Assess damage to equipments, building and for any unsafe condition.			
6	Check water pipes, electric lines and fittings. If damaged, shut off the main valves. Do not touch live wires.			
7	Initiate restart process.			

Railway Services - Emergency Preparedness				
Earthquake - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Part of Regular Training and Inspe				
1	All on duty staff and contractual employees are given training on emergency response on earthquake, exit routes in various buildings, assembly points and location of Medical Station/Fire Station.			Training program
2	People are made aware about evacuation plan in case of emergency.			Training program
3	People are made aware of do's and don'ts before, during and after earthquake.			part of training. List of do's and don'ts enclosed
4	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc.			To be placed with dry cargo coordination desk and FCC control room
5	Training given to employees on how to disconnect electric supply in their buildings.			
6	Heavy objects, glasses kept in lower levels. To be inspected during safety rounds every quarter.			
7	Heavy objects must not be kept on the parapet, window, balcony sills.			
During Effective Period				
1	Personnel informed to vacate railway building control room, Railway Yard, Loco Shed, Railway stations and Railway Maintenance Office. Lifts not to be used for evacuation.			To be made part of emergency drill.
2	Announcements to be made to avoid taking shelter near buildings, godowns, high rise equipment, stacked containers and trees.			To be made part of emergency drill.
3	People must be advised to maintain calm and reassure others.			
4	All operations must be stopped and personnel moved to a safe location from where they can be evacuated.			To be made part of emergency drill.
5	During the earthquake, the safest places are open spaces, away from buildings, godowns and high rise equipment, electrical lines and trees.			

6	If indoors, take cover under a desk, table, bed or doorways and against inside walls and staircase. Stay away from glass doors, glass panes, windows or outside doors. Do not cause a stampede while evacuating as the buildings in the Port are earthquake resistant.			
7	When outside, move away from buildings and utility wires.			
8	If in a moving vehicle, stop the vehicle and stay in the vehicle away from buildings, towers and trees.			
9	FCC control and coordination desk personal to assemble near OO Line and Railway building respectively with all hand held VHF, emergency light and mobile phones..			To be made part of emergency drill.
After Effective Period				
1	Railway Emergency team to return to their control rooms.			
2	Take headcount of all the personnel. (Railway operation building, loco shed, railway stations and railway maintenance Office)			
3	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
4	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			
5	Assess damage to equipment and building to ensure safe working conditions.			
6	Check water pipes, electric lines and fittings. If damaged, shut off the main valves. Do not touch live wires.			
7	Initiate restart process.			
8	Photographs to be taken for assessing damages to cargo and property for insurance.			For insurance purpose
9	Communication to be sent to all clients regarding assessed and potential damage to cargo.			

WEST BASIN - EMERGENCY PREPAREDNESS				
Emergency Response				
Earthquake - Checklist				
Part of Regular Training and Inspections				
Sr. No.	Activity	Yes	No	Remarks
1	All on duty staff and contractual employees are given training on emergency response on earthquake, exit routes in various buildings, assembly points and location of Medical Station/Fire Station.			Training program
2	People are made aware about evacuation plan in case of emergency.			Training program
3	People are made aware of do's and don'ts before, during and after earthquake.			Part of training. List of do's and don'ts enclosed
4	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc.			To be placed at Central Control Room
5	Heavy objects, glasses kept in lower levels. To be inspected during safety rounds every quarter.			
6	Heavy objects must not be kept on the parapet, window, balcony sills.			
7	Wardens of the individual buildings are aware of their duties.			

8	Emergency team prepared for respective emergencies and their roles and responsibility.			
9	Emergency Contact Numbers displayed and circulated to all concern.			
10	Ensure that emergency siren is working.			
11	HODs have a meeting above the impending emergency steps			
During Effective Period				
1	Ensure proper communication with Security for traffic control of dumpers/trucks.			
2	Ensure proper communication with railway department (Govt) for rake movement.			
3	Ensure proper communication with transporters and agents for their role in case of emergency.			
4	Ensure that any information from CCR/higher authority must be passed on to the downstream.			
5	Personnel informed to vacate buildings, cranes, transfer towers, workshops etc. Lifts not to be used for evacuation.			To be made part of emergency drill.
6	Announcements to be made to avoid taking shelter near buildings, godowns, high rise equipment, stacked containers and trees.			To be made part of emergency drill.
7	People must be advised to maintain calm and reassure others.			
8	All operations must be stopped and personnel moved to a safe location from where they can be evacuated.			To be made part of emergency drill.
9	Ensure all the customers/surveyors have been informed regarding emergency and preparedness.			
10	Ensure electrical isolation of machines/equipment before leaving.			
11	During the earthquake, the safest places are open spaces. Stay away from buildings, godowns and high rise equipment, coal piles, electrical lines and trees.			
12	If indoors, take cover under a desk, table, bed or doorways and against inside walls and staircase. Stay away from glass doors, glass panes, windows or outside doors. Do not cause a stampede while evacuating as the buildings in the Port are earthquake resistant.			
13	When outside, move away from buildings and utility wires.			
14	If in a moving vehicle, stop the vehicle and stay in the vehicle away from buildings, towers and trees.			
15	Ensure all person should reach to the assembly point keeping away from the any structures.			
16	Warden has to perform his duty for evacuation of building.			Warden's Duty
After Effective Period				
Sr. No.	Activity	Yes	No	Remarks
1	Staff of Central Control Room and Marine Control will return back to their desk.			
2	Warden has to take head-count of all the personnel (sitting inside building). Individual Incharge has to ensure the head-count of all the workmen and the field staff.			
3	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
4	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			

5	Assess damage to equipment and building to ensure safe working conditions.			
6	Check water pipes, electric lines and fittings. If damaged, shut off the main valves. Do not touch live wires.			
7	Ensure that respective HOD/HOS have inspected areas.			
8	Initiate restart process.			
9	Photographs to be taken for assessing damages to cargo and property for insurance.			For insurance purpose
10	Ensure that site-round is taken, report prepared and submitted the observations to all concern for compliance.			
11	Communication to be sent to all clients regarding assessed and potential damage to cargo.			
Pre-Assessment Checklist [Preparedness in Early Stage]				
1	Ensure that all the important document are preserved at a proper place.			
2	Enusure that Emergency team has been prepared along with Roles & Responsibility.			
3	Ensure each representative of each department has a substitute (Dry Cargo, E&I, MHS SR, MHS Conv, MHS GSU, MHS WLS TLS, MHS Utility, ES CWS, ES Civil, Fire, Safety, Security, Marine, Railway, Admin, Store, IT etc).			
4	Ensure that list of Emergency Contact Numbers are displayed.			
5	Ensure that all employees, contractors/vendors/visitors/other customer are aware of emergencies and preparedness.			
6	Ensure that Emergency items contains following items; torches, ropes, wires, tarpaulins, plastic sheets, tool kit, duct tapes, assorted gears, first aid box, sand bags.			
7	Ensure proper communication with the POC for further information/ updates/news of respective emergency from disaster authority/ Govt agencies.			
8	Refer to the General DMP Checklist of West Basin [Departmentwise/Sectionwise]			Click Here

QHSE&F - Emergency Preparedness				
Emergency Response.				
Earthquake- Checklist				
Sr. No.	Activity	Yes	No	Remarks
Induction and Training Program.				
1	Arrange induction /training program for all personnel on emergency preparedness & its awareness.			Part of Induction/ training program.
2	All concerned employees and contractual staff informed about the assembly point & evacuation locations.			
3	To arrange emergency drill for dealing with such emergency.			To be made part of emergency drill.
4	To arrange necessary training for emergency response team/CMG/First Aid Team/Medical Team/Fire rescue team to deal with emergency. (Ensure availability of trained rescue team & necessary equipments all the time)			
5	Arrange training for all QHSE&F team member for emergency response & clear cut understanding of their cruisial roles & responsibility during emergency.			

6	To prepare & check effectiveness of Emergency Response Plan/ Disaster Management Plan.			
7	To do proper co-ordination with all concern department for maintaining necessary emergency response kit & necessary aids in required inventory or make identified supply of the same during declaration of such emergency.			
8	To maintain close co-rdination with mutual aid for dealing with emergency.			
During Effective Period				
1	Assist CEO/Executive Director (Corp. Affairs), as instructed.			
2	Co-ordination with respective HOD/HOS with respect to emergency actions.			
3	Ensure necessary action through CMG. Provide necessary assistance to CMG.			
4	Assist in evacuation of all personnel except key personnel.			
5	Provide HSE & F facilities (Assist for Rescue, Evacuation, and other Necessary Arrangement).			
6	Set up casualty collection centre and arrange first aid posts.			
7	Arrange enough stock medicines, antidotes, oxygen, stretchers,			
8	Keeping in mind that Road and Rail connectivity may be cut off for required period of time.			
9	Arranges additional medicine and equipment as required.			
10	Arrange a fully equipped Ambulance in ready state.			
11	Make arrangements for mobile casualty to reach at incident sites and transporting for further treatment.			
12	To do immediate co-ordination to mutual aids for necessary help/support if required.			
After Effective Period				
1	Assist to CEO/Executive Director (Corp. Affairs).			
2	Assess damage (human) and send for further treatment.			
3	Assess the property damage and prepare report.			
4	Assist all HODs with restoration.			
5	Perform necessary rescue through rescue team where needed.			
6	Check each & every effecetd area & arrange for necessary HSE& F actions as require.			
7	After completion of all rescue, restoration work. check the effectiveness of executed emergency plan & take necessary require corrective action to update the plan & necessaary facilities if required.			
8	To motivate the emergency rescue team, CMG & all concerns , who have perform well during emergency.			

Disaster Management Plan for
**Heavy Rain/
Flood**





Heavy Rain/Flood

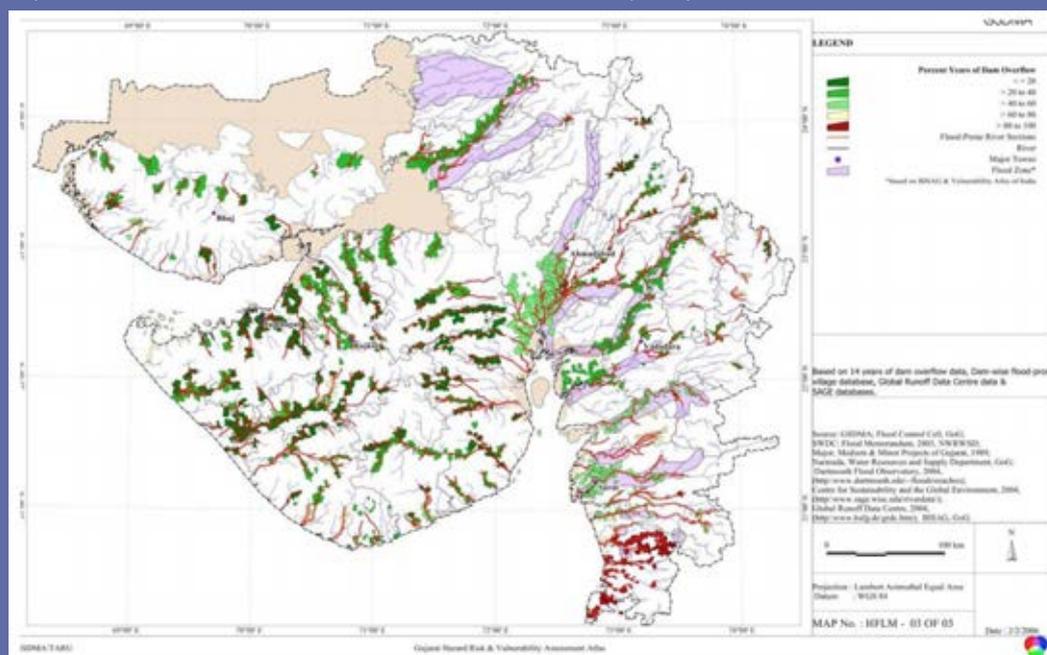
Introduction

During emergency, flood messages are conveyed by the Govt authorized Officer or Collector of the District to All India Radio/Doordarshan Kendra for necessary broadcast.

Heavy continuous rains for long period of time after which the dams are opened at Patri near Mundra.

Probability of damage to port assets is medium, chances of life loss are less as time is available and detailed mitigation procedures can be implemented. Emergency action will be based on preparedness levels achieved during emergency drills. Proper communication channel to be established for dissemination of warnings to the persons working on ground level.

Gujarat flood hazard risk zonation settlement wise flood frequency



Important information

- Power supply may be cut off for a considerable time (days) if the flood is severe.
- Both road and railway connectivity may be cut off for some time.
- There may be unpredicted inundation from unforeseen direction.
- All preparations to face such eventualities should be taken. Drinking water and adequate stock of essentials to be maintained.
- Adequate stock of essential medicines shall be maintained.
- If any other incident (i.e. fire, toxic release, oil spillage) occurs because of natural calamities, actions mentioned in the onsite emergency plan & Oil spill contingency plan needs to be taken.

Useful websites for tracking floods

- <http://www.gsdma.org/>
- www.imd.ernrt.in
- www.npmoc.navy.mil/products
- www.underground.com/tropical

Action plan

- A. Actions – Two days before heavy rain expected as per weather forecast.
- B. Actions – On the day when rainfall starts.
- C. Actions – Heavy Rain/ During Flood.
- D. Actions – Post Flood stage: recovery, insurance, Restoration & relief.
- E. Checklists to be used at different stage of Flood.

A 2 days before heavy rain expected as per weather forecast

Actions – Immediate after obtaining receiving information from concern authority:

This Activity starts on intimation of possible Flood hitting the Port. Normally before 3 to 4 days, and at least 48 hrs before the predicted cycle.

Marine Control (Signal Station)

- Prime duty of signal station is to collect the weather condition, give warning to all, by hoisting warning signals and control all marine activities.
- Marine Head of the Port is the controlling authority of Signal Station, who is assisted by 2 DGM Marine Operations.
- Marine Control is the eyes and ears of the port.
- Marine Control station is the Permanent Nodal Agency to gather information about low pressure forming, cyclone formation and all details of cyclone and marine control shall inform to CEO and all HODs.
- The Port's radar system is installed on top of the Marine Operation Building (MPT & WB) station, Vessel Traffic Management System (VTMS) is with the marine control.
- The information is to be collected from Indian Meteorological department, Local radar system/ Local TV networks news/Radio and Web-site.
- All information related to low pressure formation and flood shall be immediately sent to CEO and all HODs by mail, SMS, followed by telephone to ensure the authority has received the message. In case any recipient is out of headquarters, the information shall be passed on to the HOS.
- The Marine Control station shall maintain the contact details of CEO, all HODs and, HOSs, in addition to all installation. (HR department shall supply contact details of all concerned list is to be kept updated every 3 months).
- On confirmation of flood, Marine Head shall make arrangements for food, water and all facilities necessary for the smooth functioning of the marine control, as proposed for Flood Management Centre.

Flood Management Centre

- On receipt of information of approaching flood a Crisis Management Centre (FMC) at Adani house, First floor, Conference room shall be started at least 48hrs prior to the approach of flood.
- FMC formation shall be ordered by the CEO or the Executive Director.
- First and second floor of a permanent building is the ideal choice and hence the first floor of Adani House has been chosen for setting up of the FMC.
- CEO or the Executive Director shall be overall in charge of the FMC and shall take all necessary steps for proper functioning of the control room.
- All information shall be passed over to FMC by the Marine Control, when FMC starts functioning.
- All coordination and control shall be done by the CEO from the FMC.
- The FMC shall have stand-by power supply (Diesel powered Generator) which can last at least 48 hrs, in case of power failure. A diesel bowser shall be kept stand-by at a sheltered/ protected location near Adani House to supplement the existing 1800 ltrs of fuel which is available for the 320 KV Generator. The FMC shall be easily accessible and well connected with at least 3 modes of communication (Telephone, Walkie-talkie with charging facility, Mobile phone) in addition to functional public address system.
- The communication system between Marine control, FMC, CEO and HODs shall not fail at any cost.

Control room shall have the following facility

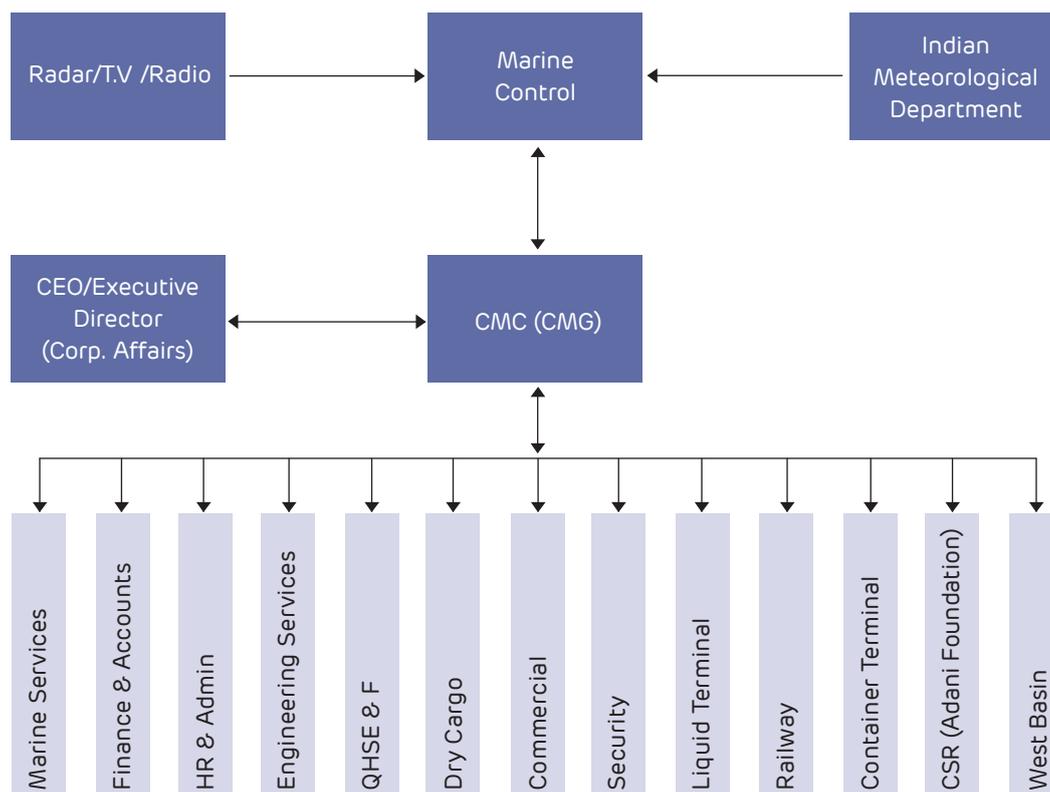
- Two numbers of laptop with internet link.
- Communication systems as described above.
- UPS and stand-by generator with fully charged battery and diesel for 4 days continuous running.
- Toilet facility with at least 2x1000 liters capacity overhead water tank.
- Dry food items and bottled water for 3 people for 4 days.
- One vehicle and one stand-by vehicle with adequate fuel and drivers.
- Adequate chairs, tables and sofas.
- Marine Head shall also arrange food and water for persons working at Marine Control round the clock during cyclone through HR & Admin.

Crisis Management Group

- Crisis Management Group (CMG) will be a permanent body to deal with all crisis and formed by CEO.
- On confirmation of possible flood attack on the port, the Crisis Management Group (CMG) shall meet at the FMC or other convenient place as determined by the CEO.
- CEO Shall appoint departmental HOD/HOS as Coordinator and Convener of the CMG.
- All meetings of the Crisis Management Group (CMG) shall be conducted in the FMC.
- All HODs/HOS shall be members of CMG, in absence of CEO, Executive director shall be the Chairman of CMG and Coordinator shall be the convener.
- CEO may declare emergency so that all staff and officers shall be at their duty stations and congregate at their designated stations for taking review of the situation and for implementing orders received from their respective HODs, who are CMG members.
- No officer shall leave his station during the emergency period.
- FMC shall be manned round the clock and shall be headed by CEO or someone nominated by CEO. He shall be at least of the rank of HOD.
- All advance preparations before the onset of flood, actions during flood and recovery shall be reviewed by CEO/Executive Director at FMC with the concerned CMG members.

Crisis Management Group – Responsibilities

All HOD's and HOS's shall be members of crisis group for flood management and post restoration activities in addition to members nominated by CEO as per the situation. The crisis management group shall be active till the full restoration of port activities.



.....

Commands structure/designated persons:

- The following table shows the command structure for each department.
- In case the officer in the first column is not available, the second in command automatically takes over.
- Designation of the first column is the HOD and second column is the successor.
- In case of absence of both, the senior most officers of the dept. to assume charge.

Sr.No.	Head	Successor
1	CEO	Executive Director (Corporate Affairs)
2	HOD (Marine)	HOS (Marine)
3	HOD Finance	HOS Finance
4	HOD (HR & Admin)	HOS (HR & Admin)
5	HOD (ES)	HOS (ES)
6	HOD (QHSE & F)	HOS (QHSE & F)
7	HOD (Dry Cargo)	HOS (Dry Cargo)
8	HOD (Commercial)	HOS (Commercial)
9	HOD (Security)	HOS (Security)
10	HOD (Liquid)	HOS (Liquid)
11	HOD (Railway)	HOS (Railway)
12	HOD (Container Terminal)	HOS (Container Terminal)
13	HOD (West Basin)	HOS (West Basin)
14	HOD (CSR – Adani Foundation)	HOS (CSR – Adani Foundation)

* Roles of HODs [West basin (ES & DC)] and HODs [MPT (ES & DC)] are same. HODs [West Basin] will assist to Head – West Basin.

Duties and responsibilities of CEO /Executive Director and HODs:

- On receipt of imminent flood, all HODs shall inform their subordinates to take all prescribed precautions as per the checklist and stand-by for further instruction.
- All HODs and officers shall have departmental walkie-talkie and mobile phones with them with fully charged batteries.
- All HODs shall collect sufficient cash from the CFO, with the approval of CEO for contingency expenditure.
- All the members of the crisis group are required to inspect their area of responsibility to make sure all necessary precautions have been taken.
- In addition to the following, if there are any additional requirements. It shall be promptly attended to. Detailed duty and responsibility of the CEO and HODs are listed below

- Group Position
- Port Position
- Alternative
- Site-Main Controller

CEO
Executive Director
(Corp. Affairs)

- Keep a close contact with marine control, CMG/ head marine and get latest update on the flood.
- Call for emergency meeting of the CMG for appraisal.
- Instruct all HOD's to be in readiness.
- Instruct HOD to form groups of officers and distribute the duties and responsibilities of all subordinate officers for their readiness (a group formed).
- Monitor flood management action plan. Check list is prepared.
- Declare and ensure state of emergency and preparedness is maintained all throughout till full recovery and restoration.
- Finalize the program for shutting down operations and evacuation and other operations as deemed necessary.
- CEO shall coordinate with CMG and flood related coordination work. such as :
 - Liaison with District Collector, Indian navy, Coast Guard and SP and local administration.
 - Instruct the SEZ corporate affairs/Adani foundation to inform local villages the danger arising from the imminent approach of flood and apprise them to move to safer areas and offer all possible assistance.
 - Review the condition of stack yard, stock of cargo inside transit shed, cargo safety action plan with all HODs.
 - Review safety of dangerous cargo if any on board the ship, shed or nearby.
 - Plan for casting off ships with dangerous cargo and dispatch of dangerous cargo from the port by road on priority basis.
 - Finalise roster for removal of cargo from ships to roads from the port with head marine and HOD's, marine operations
 - Review drainage, evacuation of surge/tidal water with ES-Civil dept. and instruct civil department to complete all related work within short period of time.
 - Review action plan for safety of port and port equipment with Marine, Dry Cargo, ES, railway and CT.
 - Review the plan for emergency power supply and water supply with MUPL.
 - Finalize with Admin/HR and HSE, the action plan for the safety of employees to colony including emergency evacuation in case of water logging at various places.
 - Instruct Admin/HR to coordinate all arrangements for food and water.
 - Ask all HOD's to be ready with resources to meet unpredicted emergencies
 - Issue order to declare HOD finance as the coordinating officer for all works related to insurance.
 - Review the insurance position and renew policies if lapsed.
 - Sanction cash for emergencies, to be maintained by HOD's.
 - Review the preventive arrangements made by HOD's as per checklist.
 - Keep the corporate head office informed of all incidence and activities.

- Group Position
 - Port Position
 - Alternative
 - Incident Controller
- Head – Marine
- HOS – Marine

- Have close coordination and supervision of the marine control to be fully alert day and night to monitor the flood condition and get the latest input.
- Pass on the latest message to CEO/Executive director and all CMG members for advance planning.
- Take active part in the formation of CMG with the approval of CEO.
- Take action to preserve all vital records and documents.
- Co-ordinate with HSE and take their advice for health, safety and environmental issues particularly if ships with dangerous or toxic cargoes are present in the port.
- Ensures that applicable implementation procedures are reviewed and are in position.
- Inform master of the ships about the flood and

ask them to be prepared to move out on short notice.

- Keep all the tugs and crafts stand-by for emergency evacuation of ships to roads on short notice.
- Prepare a roster for evacuation of ship, in consultation with HOD of various SBU's.
- Discuss and finalize with master of tugs and other officers necessary action to be taken for the protection and safety of tugs, port crafts and navigational aids, during flood.
- Keep all navigational survey equipment in good condition for use after passage of flood situation.
- Control of shipping.
- Obtain approval from CEO for taking all necessary action for the safety of the port and port crafts.
- Considering the condition of the channel depth, marine head shall prepare a chart for evacuation of the ships from the port.
- Marine head shall apprise CEO of all actions being undertaken.
- Action plan for such situation to be planned in advance.
- Increase nos. of mooring ropes etc. if required are to be planned.
- Keep enough wire ropes ready for use in case of emergency.
- Coordinate for proper functioning of FMC.
- Prepare duty roster for manning of Crisis Management Centre by officers of the Administration, Finance & Accounts and Commercial.
- Keep track of the flood and take all necessary action for cargo management with the help of various SBU's Head.
- Visit the Port and coordinate with various SBU's Head to ensure safety of cargo stacked in stack yard and cargo stored in covered areas.
- Management of Hazardous waste may be done with the guidance of HOD QHSE & F.
- Action plan to move Hazardous cargo to safe place to be finalized.
- Liaison with all stake holders to relieve their anxiety if any.
- The roster of all departments may be collected, combined and kept in the FMC for ready reference.
- Mobilizes and monitors vehicles as per the checklist.
- Coordinate with Coast-Guard for patrolling the seafront.
- Liaison with Marine Police and ensure proper patrolling.
- During the course of flood fishing boats may try to berth on the vacant spaces and damage the berth or sink there.

- Plan in advance to prevent this incidence.
- Arrange food and water for personnel on roster duty with the help of HOD Admin.
- Liaises with local administration and communicates inputs from and to the SEZ Corporate affairs/Adani foundation.
- Liaises with media as spokesman under guidelines of the CEO.
- Liaison with the District Collector/Tahasildar/Local Police/Marine police as and when directed by CEO.
- Advance planning to keep audio/video records of all events.
- Ensure proper storage of valuable documents and equipment.
- Weather forecast news to be circulated regularly to the industries inside SEZ and surrounding.

• Group Position
 • Port Position
 • Alternative
 • Secondary Support Team
 Head F & A
 HOS F & A

- Maintains cash/funds for disbursement to all the dept.
- Disburses cash/funds to different departments as per requirement.
- Take over the function as Nodal officer for all Insurance related activity.
- Keep all valuable records and data in safe custody.
- Provides Disbursement Statement for processing claims.
- Depute officer to each dept. to assess the requirement and needs of affected dept.
- Assist in procurement and process purchasing/leasing of equipments.
- Prepare to help Admin/HR for hiring of specialist services, food, and shelter and transport arrangements, as the situation demands.
- Prepare documents for all events, damages and claims.

• Position
 • Port Position
 • Alternative
 • Primary Support Team
 HOD HR & Admin
 HOS HR & Admin

- Keep close liaison with FMC/CMG and perform coordination with the concurrence of CEO.
- Attend CMG meetings, as directed by CEO/Executive Director (Corp. Affairs).
- Keep enough staff and vehicle to attend emergencies.
- Provide contact details of all officers and staff to Marine control and FMC.
- Discuss and finalize with HOD QHSE & F, action plan for the safety and shelter of all officers staff and Staff colony.
- Collect the duty roster of all dept. and their posting position to finalize arrangements for provisions, water and other essential for 4 to 5 days.
- Finalize arrangements for safety of colony.
- Advise colony occupants to store drinking water, cooking materials, cooking gas, candles etc. to meet emergencies.
- Ask the canteens to store adequate raw materials,

gas etc for at least a week.

- Coordinate evacuation with Transport in township areas if situation so warranted with the clearance from FMC.
- Finalize in coordination with HOS Admin & HOD Security the plan to ensure safety of Port properties and Colony.
- Coordinate with HSE and Medical officers for attending to emergencies.
- Coordinate with other field group (DC, Marine, ES, Container, CT, Liquid, Railway, Security, and QHSE & F) for food and drinking water for the persons engaged in flood duty and restoration work.
- Make a list of staff who can be evacuated from all departments (DC, Marine, ES, Container, CT, Liquid, Railway, QHSE&F)

- Position
- Port Position
- Alternative
- Incident Controller

HOD – ES (MPT & WB)

HOS – ES (MPT & WB)

- Keep up to date about the flood conditions.
- Make detailed inspection of all facilities and plan for preventive actions in case of flood conditions.
- Make responsibility chart for safe parking of all equipments and advice the implementation system to field groups for on site action.
- Plan for checking the condition of all stand-by equipments like DG sets, Diesel engine driven welding sets, De-watering pumps etc.
- Plan and advise the procedure for parking and anchoring of all equipments to the field group as detailed below.
 - > Plan with HOD Commercial for procurement of essential materials.
 - > Keep all valuable data's and records in proper safe custody.
- Finalize a team of engineers and staff for round the clock emergency duty.

- Plan for adequate dry food and water, with the assistance of HOD Admin for the people who may be required to be on emergency duty.
- Plan for emergency de-watering units, emergency lights etc.
- Draw available resource pool and keep a list of qualified contractors contacts and number. Keep stand-by at least one team for emergency Power transmission line repairs and reconditioning.
- Call the officers and personally apprise them the action to be taken in the next 24 hrs (24 hrs pre flood).
- The last pre-flood period may be curtailed due to unexpected sudden Increase of wind speed.
- The action team should be apprised of such a situation taking place in advance.
- Cargo operation to be stopped early for moving equipment to safety and taking out ships.
- Though the port operation shall continue till the time the wind speed permits, all preparatory arrange must be in place to complete all planned Safety work before the wind speed reaches the threshold limit.
- Plan for parking all non-working equipment prior to the last 24hrs.
- Attend the CMG meeting and apprise CEO/Executive director (Corp Affairs) the action plan to be taken to prevent damage to the port equipment and installation in case the flood hit the port.

Instruction to be given to the designated groups for anchoring the equipment :

- Stop operations in consultation with HOD Dry cargo & Container terminal when the wind speed increases.
- The Loading and unloading booms of Ship loader, Ship unloader and container cranes, HMCs shall be lifted and latched.
- If latching is not functioning, repair it or tie with wire ropes as additional Protection.
- Ship loader and ship unloader, HMC etc. shall be travelled to the designated parking position lower the anchoring pins into hole and lock.
- In case of hydraulic locking, lower the locking jaws and lock it with rails.
- Park and secure the boom of all stacker & reclaimers at the designated place.
- In addition, block all the wheels of all rail mounted equipment mechanically.
- Lock all control rooms and operators cabins.
- Switch off power supply of equipment, after they are parked and secured.
- Check all MCCs and tunnels and ensure there is no possibility of surface water entry inside.
- Inspect all roads, culverts, drainage system and water supply system.
- Take action to rectify defects on war footings to complete within 24/30 hrs.
- Inspect all buildings, roof of temporary buildings, and top of conveyor galleries.

- Take action for repair and strengthening.
- Inspect the seashore of the port and take action for protection if warranted.
- Plan action group to attend to emergencies, Co-ordinate with MUPL for maintaining water supply.
- Check all buildings, conveyor gallery and roofs tops and strengthen them to with stand the cyclonic wind.
- Coordinate with HOD Commercial to procure and store enough sand/cement and other construction material to tackle emergency.
- An experienced engineer may be attached with commercial to help in arranging civil construction materials.
- Impart all necessary to seal entry of surface water inside tunnel and MCCs and control rooms.
- Plan for a group of officers and staff for stand-by duty during flood.
- Plan to keep adequate diesel operated de-watering pumps.

- Position
- Port Position
- Alternative
- Primary Support Team

HOD – QHSE & F

HOS – QHSE & F

- Assist CEO as instructed.
- Co-ordination with respective HOD/HOS with respect to emergency actions.
- HOS of all sections of QHSE&F will assist to HOD – QHSE&F.
- Assist in evacuation of all personnel except key personnel.
- Provide HSE & F facilities (Assist for Rescue, Evacuation, and other Necessary Arrangement).
- Liaison with mutual-aid partners for assistance.
- Availability of Emergency Kit (torch, PPEs, rope, first-aid, whistle, VHF sets, PA System, Fire Extinguisher etc)
- All Emergency vehicles are to be ready to operate, completely filled with fuel, and stand-by drivers.
- Arrange necessary staff of Fire & Rescue with necessary arrangements.

- Assess the prone areas where there could be chance of major environmental pollution.
- Remove/Securing of Hazardous and toxic cargo.
- Providing necessary arrangement to prevent damage to the environment.
- Suggests optimal strategies for conducting emergency isolation of damaged equipment, the emergency transfer of materials etc.
- Renders assistance for trapped personnel.
- Recommends the appropriate procedures to isolate damaged units without introducing new hazards.
- Coordinate as per plan for all preparations to meet the emergencies.
- Set up casualty collection centre and arrange first aid posts.
- Arrange enough stock medicines, antidotes, oxygen, stretchers, keeping in mind that Road and Rail connectivity may be cut off for required period of time.
- Maintains a list of blood groups of each employee with special reference to rare blood groups.
- Arrange additional medicine and equipment as required.
- Arrange a fully equipped Ambulance in ready state.
- Ensure that the casualty section of Port hospital has specialists round the clock during flood.
- Arrange for extra beds and in emergency contact with the Adani Hospital and Bhuj Hospital for extra medical supplies.
- Make arrangements for mobile casualty unit to reach at incident sites and transportation for further treatment.
- Duty Doctor to be onsite with team who acts as liaison officer for all medical services.
- Advise regular medicine takers to keep adequate stock of medicine with them like BP patients, Diabetics etc.

- Position
- Port position
- Alternative
- Incident Controller

HOD–Dry Cargo
(MPT & WB)

HOS–Dry Cargo
(MPT & WB)

- As soon as getting the information about flood, personally visit all stack yards, plots and other cargo storage area, including transit shed if any and satisfy the condition of stacking.
- Inspect all drainages and if found not clear inform civil engineering to immediately clear the drainages to ensure free follow of drained water.
- Confirm that hazardous and toxic cargoes are properly protected to prevent environmental issues.
- Take action to evacuate all perishable cargo, and ask the owner to arrange for evacuation as quickly as possible.
- Take action to identify all expensive materials and take action to protect them to prevent losses during flood.
- Arrange to segregate and protect cargo in sheds.
- Co-ordinate with HOD Marine in de-berthing vessel to vacate the berth.

- As soon as the wind speed approaches 20mtrs/sec, issue instruction to stop all operation and move the equipment to parking position.
- Discuss with DC team and HOD Marine and operations may have to be stopped early, so that they get time to move out all ships.
- ES also need time to travel the equipment to parking position.
- Take all possible action in coordination with CMC and owners of cargo to ensure no or minimum loss of cargo during flood and possible tidal inundation.
- Have a final inspection of cargo before the onset of heavy wind.
- While inspecting if any drainage system inside the port is still chocked, immediately arrange to clean it with the assistance of (ES-Civil department).
- Coordinate with ship-owners/agents/C & F agents/stevedores and with HR/Admin Officer to arrange and evacuation and safety of all men.
- Liaison with HOD Security for safety of cargo.
- Preserve all records in safe place to save it from wind and possible inundation.
- All cargo handling equipment like, Pay loaders, Front end loaders, Bull dozers, Dumpers, Trailers, cranes, forklifts etc. shall be kept ready with adequate fuel to use them on emergency, during flood and later during restoration. This equipment is to be parked in a safe, protected area.
- Enough operators/workmen also shall be stand-by round the clock to operate these equipment during flood in emergencies and for restoration.
- Mobilization of additional manpower and cargo handling equipment
- Port, Stevedores and C & F agents to meet emergencies and later on to segregate unaffected cargo and make arrangements to protect such cargo, till evacuation.
- Officer of Dry Cargo will coordinate with Security about the local road network in case of road blockage, to clear the blockage in coordination by Corporate Affairs with state government and local administration.
- Corporate Affairs to also explore alternative mode of connectivity, so that some form of connectivity with the main stream is immediately established.

- Position
- Port Position
- Alternative
- Secondary Support Team

HOD – Commercial
HOS – Commercial

- Collect details of all materials in store and plan for procurement of adequate stock of consumables and construction materials.
- Discuss with all HODs about their possible requirements.
- Make physical verification of the stores for proper stocking to prevent damage during flood.
- Co-ordinate with ES-civil for repair of stores if required.
- During flood, keep sufficient stock of consumables like tarpaulins, gunny bags, ropes and wires for port crafts, diesel oil, kerosene oil, hurricane lantern, candles, petromax lamps, torch lights with batteries and bulbs, electrical items etc. are kept in stock.
- Stock adequate roofing materials and fixtures for emergencies.
- Few sealed packets of bleaching powder shall be available in stores for sanitation.

- Few gas Cutting sets may be kept in stores for emergency the quantity may be decided in consultation with ES.
- All the materials which are likely to get damaged with Rain/water inundation shall be protected by a tarpaulin cover and kept above ground level.
- All electrical and electronic items shall be shifted to safe place fully wrapped.
- Stores which needs to be kept in controlled temperature, like belt splicing materials etc. are to be moved to places where D/G set are available, or arrange one D/G set for emergency supply.
- Spares shall be sealed in polyethylene covers and kept to save it from flood damage.
- Electrical items should be kept in high raised rake to prevent water contamination.
- Cut edge of conveyor belts should be either covered or a coat of rubber solution shall be applied.
- Arrange to keep stand-by staff round the clock to issue these materials any time during the emergency and restoration period.
- All valuable records and computers shall be properly stored to save it.
- Informs HOD-Finance the approximate funds required.

- Position
- Port Position
- Alternative
- Primary Support Team

HOD – Security
HOS –Security

- Plan for effective traffic control and its regulation in port area during and after flood.
- Coordinate with QHSE&F for fire and safety issues.
- Inspect the circumference of the Port and in case of damages to compound wall get them repaired with the help of HOS civil Engg, immediately.
- Close all possible vulnerable points.
- Check the readiness of the fire and safety units.
- Keep clear all internal roads within port area for smooth traffic.
- Plan for posting extra watch and security guard team for intensifying patrolling of stores, substations, berths, transit sheds, warehouses, administrative building, loco sheds, workshops, Water supply installations, etc. in addition to all entry and exit points.
- Issue orders to all gates to effectively control the entry of unauthorized persons or vehicles inside the protected area.
- Plan to intensify the patrolling of periphery and inside

the port, including the Berth area.

- Plan for mobilizing additional manpower and keep to them at stand-by.
- Liaison with police and local aid agencies under intimation to CEO.
- During the flood, flood and recovery period no visitor shall be permitted inside the protected area.
- In case of authorized visitors, they shall be apprised of the flood and its effect. They may be escorted to safe place.
- Liaison with Admin for their accommodation and transport.



- Position
- Port Position
- Alternative
- Incident Controller

HOD – Liquid
HOS – Liquid

- Maintain close contact with Marine Control and CMG.
- Inform the masters of the ship about the progress of the flood, and ask them to be prepared to move out on short notice.
- Discuss with Marine HOD and finalize the ship movement program in advance.
- Keep all officers and staff for emergent action on intimation of flood (Notice of 24 hrs or less only may be given for evacuation)
- Plan for a well-prepared emergency group to stand-by during the flood to meet unforeseen emergencies.

- Position
- Port Position
- Alternative
- Incident Controller

HOD – Railway
HOS – Railway

- Maintain close contact with Marine control for the status of the flood.
- Ensure that the wagons and locomotives are parked in safe area in case the wind speed increases
- All normal operations stopped. Only emergency operations for evacuation of locomotives and wagons to safe places.
- Railway emergency team is equipped with VHF sets, emergency torches, rain coats.
- Liaison with Indian railway authority.
- Co-ordination with Dry Cargo for wagon loading.
- Railway team in continuous contact with other emergency services (such as QHSE & F, Security, other services)
- Inspect the locomotives of the port, and arrange for trial running to put them into operation.

- Position
- Port Position
- Alternative
- Incident Controller

HOD – CT
HOS – CT

- Maintain close contact with Marine control for the status of the flood.
- Arrange for evacuation of all personnel working in CT.
- All personnel remaining in the port to be cautioned against venturing out during effective period.
- All containers to be stacked only three high (as per possibility)
- All hand held UHF/batteries, emergency torch, mobile phone fully charged for use in emergency in case of total power failure.
- Wharf supervisor to ensure that no personnel are allowed on the jetty areas.
- Should be ready to stop activity in case increase in wind speed.

B On the day when rainfall starts:

- Position
 - Port Position
 - Alternative
 - Site-Main Controller
- CEO
Executive Director
(Corp. Affairs)

- Ensure from HODs that all precautionary measures are completed in advance and obtain written feedback.
- To ensure that all documents and Records are kept in safe places by HOD's.
- Hold review meeting of the CMG at regular interval, minimum 3 times daily till full recovery and resumption of port operations.
- Have frequent overall physical verification inside the port area.
- Advise all members of CMG to be present at CMC during flood.
- Authorize release of required funds.
- Appraise The Corporate office, the situation and action taken.
- Coordinate with District collector, Tahasildar, Indian Navy, Coast guard and Marine Police for advance precautionary actions.

- Take all necessary steps to help local authorities with evacuation and sheltering people of nearby villages who may be affected.
- Approve information to the media.
- In case of high tidal prediction, employees and families staying in the Colony needs to be relocated.
- Instruct Admin to look in to the possibility of shifting people of ground floor to first floor or above.
- Instruct Admin/HR department to arrange enough grocery items, dry food and drinking water for emergency requirements.
- Confirms the termination of the emergency after the threat is over.
- Lead the Crisis Management Group for early restoration of facilities and resume port activities.
- Provide timely status reports to the authorities.
- Take active role for corporate social responsibility, depute Adm/HR for Coordinating the activities described below responsibility.

- Group Position
 - Port Position
 - Alternative
 - Incident Controller
- HOD – Marine
HOS – Marine

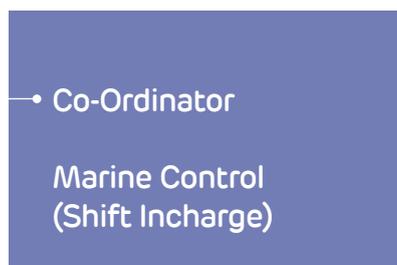
- Keep track of the course of flood/heavy rain and inform all pilots and staff and officers under him about the latest position.
- On information from Marine Control about increasing wind speed and heavy rain, ask HOD of Dry Cargo, Container Terminal and Liquid Terminal to stop all loading, unloading of cargoes, discharging and bunkering operations.
- Discuss with CEO, HOD Dry Cargo, Container, Liquid and Pilot to start evacuation of the ship to the roads as per the Roster finalized earlier.
- Ship on oil berth is to be given priority for evacuation.
- Coordinate with HSE to ensure ship with hazardous and toxic cargo are taken out first.
- Evacuation shall be completed before the wind speed reaches threshold value.
- To ensure this evacuation may have to be started earlier.

- Preserve all records and documents safely.
- Keep all the necessary officers and staff on stand-by for emergency duty.
- In coordination with HOD Security, ensures evacuation of all dock workers and private labour, visitors, shippers, consignees from the port area.

- Ensures implementation of the disaster response plan and coordinating with the Fire Fighting Authorities (Rescue).
- After evacuation of all ships, arranges to protect Tugs and Port crafts by proper docking and tie up to withstand simultaneous flood wind and destructive tides.
- Deploy craft- and mobilize resources to confine and clean up spill if any.
- Keep adequate provision of food and water for men on emergency duty.
- Inform possible time of return to normalcy to all cargo interests, shipping Agents, stevedores.
- If due to any reason a ship could not be taken out, this ship needs to be protected well against breakage of mooring ropes and possible drifting and banging on to the berth.
- Several tie ups, as situation demands, with bollards needs to be done.
- A team of staff along with DC/Pilot needs to be on stand-by duty for the period of flood/heavy rain to take spot decisions.
- Enough good quality ropes, shackles and other required materials necessary shall be kept with the group.
- This matter shall be brought to the notice of the CEO and Corporate Head.

Actions for SPM:

- Stop all pumping operations.
- Flush both floating and subsea hose strings with seawater.
- Disconnection both floating hose strings from SPM buoy, shift and secure at safe location.
- Blind both j-piping arm flanges.
- Disconnect both mooring hawser assemblies and transfer to a safe location or on board of Diving support vessel.
- **Secure all :**
 - > Loose and portable equipment & spares from SPM buoy.
 - > All hatches doors and replace seals if needed.
 - > Doors and latches for tightness.
 - > Deck & central chamber valves.
- Remove Hazardous and Toxic substances.



- The coordinator shall work as the convener of CMG.
- The duty of the coordinator is to coordinate with all CMG members and help to implement all decisions.
- All officers on duty must have walkie-talkie and mobile phone with them with fully charged batteries.
- Keep few extra walkie-talkies ready at CMC for emergency work.
- Keep a record of walkie-talkies to prevent loss.
- He shall work as a convener of the CMG and shall report directly to CEO.
- He shall help all CMG members for the pre-flood arrangements and post flood re-commissioning.
- The extra man power required for all departments shall be arranged by him, by lateral shifting or by hiring for specific purpose and period.
- He shall help HOD Commercial for procuring the items necessary for flood damage repairs.
- A salvage team with a salvage vehicle shall be maintained at the Marine control under the control of the senior pilot, who shall be on duty during flood.
- This salvage team is to be used for attending to emergencies during flood.
- For manning the same, staffs have to be provided in coordination with HOD Marine & ES.
- This vehicle shall be able to move around in port area and shall be provided with, a D/G set, Portable welding machine, Gas cutting sets, wire Ropes, shackles, first aid box, emergency light, necessary tools and tackles etc.
- Liaise with HOD Marine and is responsible for keeping the Fire and rescue Dept. in a state of alertness on a 24 hour basis.
- Keeps CMG, HOD Marine, HSE and HOD Security informed of any crisis & lead team directly to incident site.

- Initiates de-watering with the help of Fire and ES.
- Team reaches the incident location with the correct resources.
- The fire team also shall work as rescue /evacuation and other emergencies.
- Assists in the evacuation of workers to the assembly points in liaison with HR. Plan with the assistance of HSE, for adequate men to stand-by duty to be engaged in emergencies.
- Arranges safety equipment e.g. Life Jacket, protective gloves and goggles, breathing apparatus as required.
- The emergency set should be so arranged that it can start functioning immediately on reaching the emergency point (D/G set is ready with POL and battery, Emergency light sets ready, Gas Cutting set is connected and ready, Welding set ready, Enough welding rods are available.)
- Men on duty should contain at least, one welder, an electrician, riggers etc.
- Coordinate with Medical department for maintaining mobile first aid centre.

• Support Staff
Senior Pilot
Pilot

- Senior Pilot to be stationed at Marine Control.
- Assist Pilots to take out ships on to the roads.
- Assist Pilots to secure Port craft properly, taking into consideration of severity of the flood.
- Maintains 24 hour vigilance towards the channel / anchorage & port
- On receipt of any incidence inform CEO/HOD Marine refrains from exchanging any information with unauthorized persons unless authorized to do so by the CEO.

- Maintains contact with vessels on VHF.
- A salvage vehicle with tools and tackles, a portable welding set, portable DG sets, Gas cutting set, ropes of different size, portable lights should be maintained at the Disposal of the Marine control station under the senior Pilot.
- For manning the same persons from different department shall be arranged by the Coordinator.

• Group Position
• Port Position
• Alternative
• Incident Controller
HOD–Dry Cargo (MPT & WB)
HOS–Dry Cargo (MPT & WB)

- As soon as getting the information about flood/heavy rain, personally visit all stack yards, plots and other cargo storage area, including transit shed if any and satisfy the condition of stacking.
- Confirm that hazardous and toxic cargoes are properly protected to prevent environmental issues. Take HSE into confidence.
- Expensive materials identified and stored carefully to avoid losses due to wind or water inundation.
- Arranges to segregate and protect cargo in sheds.
- Co-ordinate with Marine control in unberthing vessel to vacate the berth.
- As soon as the wind speed approaches 20mtrs/sec, issue instruction to stop all operation and move the equipment to parking position.
- Discuss with ES and HOD Marine, and stop operations early so that they get time to move out all ships.
- Take all possible action in coordination with CEO and owners of cargo to ensure no or minimum loss of cargo during flood and possible tidal inundation.

- Have a final inspection of cargo before the onset of heavy Wind.
- Inspecting drainage system and immediately arrange to clear drainage system if choked with the assistance of ES-Civil.
- Coordinates with ship-owners/agents/C & F agents/stevedores and with HR/Adm Officer to arrange and evacuation and safety of all men.
- Liaison with HOD Security for safety of cargo.
- Preserve all records in safe place to save it from flood and possible inundation.
- All cargo handling equipment like, pay loaders, front end loaders, bull dozers, cranes, forklifts,

dumpers, trailers etc. shall be kept ready with adequate fuel to use them in an emergency, during flood/heavy rain and later during restoration. This equipment is to be parked in safe, protected area.

- Enough operators/workmen also shall be on stand-by round the clock to operate these equipment during flood and for restoration.
- Mobilization of additional manpower and cargo handling equipment from port, stevedores and C & F agents to meet emergencies and later on to segregate unaffected cargo and make arrangements to protect such cargo, till evacuation.
- A traffic team under an officer, who knows about the local road network shall be formed and be ready to act in case of road blockage, to clear the blockage in coordination by SEZ Corporate Affairs with state government and local administration.
- He shall also explore alternative mode of connectivity, so that some form of connectivity with the main stream is immediately established.
- All the stack yards visited to ensure that the cargo storage is safely done.
- It is programmed complete all the works immediately.
- Proper storage of all expensive cargo separately in safe manner.

- Position
- Port Position
- Alternative
- Primary Support Team

HOD – Security

HOS – Security

- Maintain adequate men for manning all exit and entry points and to make regular surveillance survey of the port, periphery and vulnerable points.
- Ensure security men on all points, during flood also.
- Maintain patrols and ensure unsafe practices are eliminated.
- Liaise with Site Incident controller (HOD Marine).
- Keeps CMG, HOD Marine, HSE and HOD Security informed of any crisis & lead team directly to incident site.
- Controls the entry of unauthorized persons and vehicles.
- Permits the entry of authorized personnel and outside agencies for
- Rescues operations without delay.
- Allows the entry of emergency vehicles such as ambulances without hindrances.

- Ensure that all people are aware of the assembly points, where the transportation vehicles are available.
- Ensure that the headcount matches the list of people available with the assembly point section of that area.
- Help Admin/HR for evacuation as and when asked for.
- Carry out reconnaissance of evacuated area before declaring the same as evacuated and report to HOD Security/CMG.
- Keep adequate fuel and vehicles for emergency duty, in Consultation with HOD Security/FMC.
- Disperses crowd-cordons off restricted areas- prevent looting.
- During heavy flood there may be instances of local villagers rushing inside the port area, HOD Security may be prepared to meet such emergencies.
- HOD Security and HOS Security shall frequently take rounds inside the port area to ensure that everything is in order and shall submit compliance to CMG.

- Position
 - Port Position
 - Alternative
 - Incident Controller
- HOD – ES (MPT & WB)
- HOS – ES (MPT & WB)

- Maintain roster of officers and staff for duty during flood and restoration period.
- As soon as the flood is confirmed to strike within 24 hrs start preventive Preparations.
- Apprise the team the modus of operandi of parking and securing each equipment.
- Form teams for safety and securing of all equipment and vital units.
- With coordination with all department HOD Like Dry Cargo, Container Terminal, Liquid Terminal and HSE etc. pull out equipment one by one from operation and move to safe, designated parking area.
- Instruct the leader of the team to be personally responsible and obtain feed back in writing, which may be submitted to CEO, after physical verification.
- Ship loader and ship unloader shall be parked at the designated area, lower the locking bar into the slot in

the jetty.

- In case of hydraulically operated rail clamp, lower them to hold on to the rail, and block all wheels mechanically.
- Securing of all equipment should be checked before submitting the clearance to higher ups.
- All equipment shall be stopped at the moment upon declaration of flood, raise the booms and latch them, tie up if latch is not reliable.
- Travel and position to the respective earmarked parking position and lock.
- Loading boom of Stacker Reclaimers should be lowered and latched at the parking position.
- In case of any difficulty to travel to the parking position lower the boom to the travelling rail, any one side and tie down with the rail.
- Block the travelling wheels and slew wheels mechanically.
- Additionally the rail mounted equipment may be tied to the rails by wire rope and clamps depending on the severity of the flood.
- Tie down all raised conveyor belt to prevent dismounting, especially belt on the tippers of stacker reclaimer, ship loaders and open conveyor belts at Berth.
- Do not use wire rope to tie down conveyor belt, also ensure to use gunny bags or old belt pieces between the belt and rope to prevent damage to the belts.
- Power supply to all points to be shut off after parking the equipment.
- There shall be 3 level of inspection after the parking of all equipment by the leader of the anchoring team, HOS –ES, HOD- ES.
- Personally inspect all equipment (Ship unloaders, HMCs, ship loaders, Stacker Reclaimers, portlines, transistors etc. and satisfy the safety of the parking done.
- Parking should be done as per the guide line of the manufactures.
- The hoppers at the berth shall be locked with the rails to prevent movements at high wind speed.
- Inspect the Tunnels and ensure the de-watering pumps are in working condition. The motors may be wrapped to ensure that water does not spoil the insulation in case of power failure and inundation. (Ensure to remove the wrappings before switching on)
- Ensure that no surface water make entry into the MCC, tunnels etc., in coordination with Civil.
- All DG sets to be made functional with adequate stock of fuel for at least 4 days of operation.
- The DG Sets should be installed on high pedestal to prevent it from getting submersed in water.
- DG in the guest house, water supply system, Signal station and CMC also need to be maintained.
- Provide all assistance to maintain power supply to colony and water pumping system. Keep adequate drinking water and dry food in the substation for all the staff on emergency duty.
- All important Sub stations have to be manned during flood.
- Monitors the rendering of assistance for rescue of personnel.
- Ensures the dept. group remains alert on duty for electrical isolation of equipment during an emergency.
- Render all assistance for upkeep and restoration of water supply system.
- Lead the group from the front to ensure prevention of damages.
- Inspect the workshops and ensure the equipment are covered properly to save them from

severe wind and water. (Temporary roof may be blown off, hence costly equipment may be wrapped with tarpaulin.)

- Have a personnel inspection of all ES auxiliary equipment.
- Render help to others who request for help, such as Civil and Railways.
- Ensure that all doors of transfer towers are closed and tied to prevent opening due to the gushing wind.

- Position
- Port Position
- Alternative
- Primary Support Team

HOD – QHSE & F

HOS – QHS E & F

- Maintain adequate men for manning all exit and entry points and to make regular surveillance survey of the port, periphery and vulnerable points.
- Maintain patrols and ensure unsafe practices are eliminated.
- Liaise with HOD Marine.
- Keep CMG informed of any crisis & lead team directly to incident site.
- Controls the entry of unauthorized persons and vehicles.
- Permits the entry of authorized personnel and outside agencies for Rescues operations without delay.
- Allows the entry of emergency vehicles such as ambulances without hindrances.
- Help Admin/HR for evacuation as and when asked for.

- Carry out reconnaissance of evacuated area before declaring the same as evacuated and report to CEO/CMG.
- Keep adequate fuel and vehicles for emergency duty, in consultation with HOS stores/CMC.
- HOD Security and HOS Security shall frequently take rounds inside the port are to ensure that everything is in order and shall submit compliance to CMG.

- Position
- Port position
- Alternative
- Secondary Support Team

HOD – Finance

HOS – Finance

- Action is initiated to keep cash as discussed with CEO.
- HODs are intimated the procedure of issuing of cash.
- As directed by CEO validity of all insurance verified.
- Circular issued to all HODs indicating the procedure to be followed for raising insurance claims.
- Separate teams are formed to handle the finance matters of each department so that all cash expenditure and accounts are properly maintained.

- Position
- Port Position
- Alternative
- Secondary Support Team

HOD – ES (MPT & WB)

HOS – ES (MPT & WB)

- Get updates from the all officers and workmen on duty.
- Ensure completion of cleaning of all roads culverts and drainages.
- If any work is left out take action to complete it within 24 hrs.
- Confirm that all rainwater entry points to the sub-stations and tunnels are sealed.
- Prepare to tackle inundation due to tidal water.
- When flood is confirmed keep contractors on stand-by, for emergency works during and immediately thereafter, men are not available.
- Keep a set of engineers and workmen on stand-by duty for such works.
- Help Admin co-ordinate evacuation of port areas and mobilize, collect and distribute relief material.
- In consultation with CMG keep adequate de-watering

pumps operated with diesel engines.

- Attend CMG meetings as & when require.

- Position
- Port Position
- Alternative
- Primary Support

HOD – HR & Admin

HOS – HR & Admin

- Maintain close contact with CMC/CMG/HSE and perform coordination with the concurrence of CEO.
- Make circulars/leaflets and circulate among all including colony.
- Coordinate evacuation of townships and people staying in low lying areas situation so warranted with the clearance from CEO.
- Make announcement to colony and nearby villages with SEZ Corporate Affairs about the severity of the imminent flood and advise local population to move to safer shelters.
- Collecting details of evacuated people. This will be necessary to settle claims, if any, at a later date.
- Consult Legal Advisor and obtain their advice for legalizing all the port's actions.
- Coordinate with other field group (All Departments) for food and drinking water for the persons engaged

in flood duty and restoration work.

- Document all events and actions in coordination with other HODs for future reference.
- Facilities for sanitation and other necessary arrangements.

- Position
- Port position
- Alternative
- Incident Controller

HOD – LT

HOS – LT

- Shifting of hazardous and toxic waste in consultation with QHSE & F.
- Maintain close contact with Marine Control and CMG.
- Make plan for shifting of equipment/vehicles.
- Inform the masters of the ship, the progress of Flood, and ask them to be prepared to move out on short notice.
- Discuss with Marine HOD and finalize the ship movement program in advance.
- Keep all officers and staff for emergent action on intimation of flood.
- Prepare Emergency group to stand-by during flood to meet unforeseen emergencies.
- All concerned employees and contractual staff informed.
- Contractor staff evacuated from the port and verified.

- All personnel remaining in the port cautioned against venturing out during effective period
- Transportation arranged for evacuation of emergency team if required. (Employees and contractual staff)
- Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)
- Liquid Control (CTF and VEG Oil) Co-ordinate with Marine Control for Flood status.
- Stop all activities, remove all tanker Lorries from liquid terminal and do not allow any tanker Lorries to enter the liquid terminal area.
- Vessels at berth are to be informed to keep Main Engine Standby at short notice for emergency castoff in coordination with marine.
- All equipment/computers in control to be covered and protected against water ingress due to heavy rain.
- All storage tanks' shell and roof manholes to be box up.
- Ensure flange joint connection to be tighten.
- Ensure roads and pathways are cleaned and not obstruct for any vehicle movement during emergency.
- Jetty supervisor to ensure that no personnel are allowed on the Jetty areas.
- Jetty supervisor to brief all workers/Labours to remain alert and nominated shelters. Only minimal mooring member to remain in the port and no Worker/Labour to be on the berth.
- All Hydra and jetty/technical vehicle to be parked at safe shelter.

- Position
- Port position
- Alternative
- Incident Controller

HOD – Railway

HOS – Railway

- Maintain close contact with Marine control regarding the status of the flood.
- Ensure that the wagons and locomotives are in a safe area.
- Railway emergency team to be equipped with VHF sets, emergency torches, rain coat.
- Liaison with Indian railway authority.
- Co-ordination with Dry Cargo for wagon loading.
- Railway team in continuous contact with other emergency services (such as QHSE & F, Security, other services)

- Position
- Port Position
- Alternative
- Incident Controller

HOD – CT

HOS – CT

- Maintain close contact with Marine control regarding the status of the flood.
- All concerned employees and contractual staff informed must be evacuated from the port and verified.
- All personnel remaining in the port cautioned against venturing out during effective period.
- All hand held UHF/batteries, Emergency torch, Mobile Phone fully charged for use in emergency in case of total power failure.
- Operation to be suspended based on information of marine control.
- Only emergency team to be available at site.
- Power supply to all points to be shut off after parking the equipment.
- There shall be 3 level of inspection after the parking of each equipment by the leader of the anchoring

team, HOS –ES, HOD- ES.

- Personally inspect all equipment (QC, RTG and other equipment and vehicles) and safe parking.

C During Flood

1	Ensure that all emergency teams and mobile first-aid centres are in action for meeting emergencies as planned.
2	Switch off the power supply and ensure all the DG sets are in working condition and enough fuel and operating personnel are working. The DG sets must be installed on high pedestal to prevent it getting submersed in water.
3	Evacuation of personnel who remain/trapped during flood.
4	No one venture out from the office or shelter if the speed of wind is more than 100kmph. Personnel in open may be thrown by force of wind.
5	During flood, no one should open doors or windows, force of wind will force open other doors and windows. Opened windows or doors cannot be closed and chances of roof lifting upwards are high.
6	An emergency team with adequate man power, tools and plants, portable welding sets and gas cutting sets with adequate ropes and other consumables shall be maintained during flood for rescue and salvage operation.
7	Switch of power supply to all installations from the main power supply source. All important and vital installation shall be manned.

D Post flood stage: Recovery, Insurance, Restoration & Relief

The purpose of post flood activity is to resume port operation as early as possible.

If the eye of the flood has passed the port, wait for complete passing of the rear anti clock wise rear flood before inspection. Confirm from the radar station/signal station.

Site-Main Controller – CEO/Executive Director (Corp. Affairs)

- a. Collect the details of damages if any from HODs immediately.
- b. Ask all members of the CMG to immediately inspect their area of responsibility, along with their subordinate staff and officers and report their finding within short period of time.
- c. Ask the HODs to submit preliminary estimate immediately, followed by detailed estimate.
- d. HOD - Marine to be asked to complete the survey of channel and berth as quickly as possible, to resume shipping activity.
- e. All required activities to resume Port operations are to be discussed and finalized with HODs.
- f. A department wise detailed programme is to be drawn up to resume normal Port operations.
- f. Regular follow up to complete the work as programmed is to be done.
- g. Emergency powers for procurement and award of contract are to be evoked.
- h. HODs are required to submit the details and programs immediately.
- i. Reports on condition of Tugs and other Port crafts, ship un loader, ship loaders, HMCs and other auxiliary equipments after thoroughly inspection by HOD.
- j. All other cargo handling equipments like container handling equipment if any shall be inspected by HOD and detailed report to be obtained.
- k. MCCs, Stacker Reclaimers, Wagon tippler and tunnel, Conveyor belts, conveyor galleries, Locomotives, Rail load out system etc shall also be inspected carefully by HOD and reports to be obtained.
- l. Check Condition of all civil structures, Roads, Culverts and drainages and water supply system by HOD and reports to be obtained.
- m. Ask all HODs to submit details to HOD - Finance to process insurance claims.
- n. Coordinate the CSR activities.
- o. Keep contact with District Collector and local state Govt. official and offer all possible help for rehabilitation of displaced villagers.
- p. Inform all stockholders regarding all clear & restoration of the port operation. Also inform the same to the corporate office.

Incident Controller: HOD – Marine [Marine & Spm]

- a. Marine – HOD shall immediately arrange for survey of channel and berth and inform the condition to CEO/Executive Director (Corporate affairs) who in turn informs the corporate office and stake holders.
- b. Restoration work if any may be done in association with head civil.
- c. Shall check the navigational aid system take action for rectifications if required
- d. Check all tugs and mooring crafts and they should be made fully functional as quickly as possible.

SPM

- a. Checking both mooring hawser assemblies and replace the components as required.
- b. Replacements of both 9" PP pick ropes of mooring hawsers.
- c. Inspection of each floating hoses on both floating hose strings.
- d. Underwater inspection of each individual hoses on both subsea hose string and subsea umbilical.
- e. Underwater inspection of all deep sea floats for its integrity.
- f. Checking subsea hose strings configuration at low and high tide.
- g. Verifying chain angle of all six anchor chains to be within limits, at low and high tide.
- h. SPM buoy body inspection – integrity of seal on all hatches and doors.
- i. Operational check of all navigational and safety equipment.
- j. Carryout "Free Span and Lateral displacement" survey of subsea pipeline and provide support wherever necessary i.e. if it is beyond recommended allowable span.

Incident Controller: HOD – ES (MPT & WB)

- a. Shall immediately depute the electrical engineer to have an update of power supply.
- b. In case of power outage, coordinate with Electrical supply authorities for restoration of power supply.
- c. If power is available, and MCCs are O.K, charge MCCs one by one after thorough checking.
- d. Depute the same team which has parked the equipments to release the equipment for operation after removing all blockages.
- e. If any equipment is found to be damaged report the matter to higher ups and take action for early repair or decommissioning.
- f. Do not start operating, until all parking locks & additional tie-ups are removed
- g. Equipments also can be charged one by one after charging the MCCs after obtaining written clearance from the engineer in charge.
- h. Ensure that the equipments electrical system is perfect before charging. Keep records of all measurements.
- i. Inspect the tunnel and dewater the accumulated water.
- j. Inspect all electrical and mechanical system thoroughly before Trial run.
- k. All lighting towers which were lowered to be raised up.
- l. Damaged street lights and damaged internal lighting system to be repaired and recommissioned.
- m. All belt clamping/tie-up must be removed before trial run of conveyors.
- n. Arrange for de watering of tunnel with diesel pump if power supply is not readily available.
- o. Ensure all DG sets works till normal power supply is resumed.
- p. Shall inspect the water supply system and take all action to establish normal water supply immediately.
- q. In case of any difficulty bring it to the notice of CEO/Executive Director (Corp. Affairs).
- r. Drainage system if damaged should be repaired immediately.
- s. Inspect all roof tops and if any roof is blown off, take action for replacement.
- t. Coordinate with Admin/HR for clean-up activities.
- u. HODs of West Basin will assist to Head – West Basin.

Primary Support Team: HOD – HR & Admin

- a. Take all actions necessary to rehabilitate for all personnel.
- b. Coordinate with civil department to clean up the drainage and premises.
- c. Arrange for provisions till normalcy is established.
- d. Food arrangements to people on resumption work to be coordinated.
- e. Shall take over the control of CSR activity with the approval of CEO.
- f. May provide additional hands to HOD Commercial for taking up massive procurement actions as pre-planned.

Primary Support Team: HOD – QHSE & F

- a. Assist the CEO/Executive Director (Corp. Affairs).
- b. Assess damage (human) and send for further treatment.
- c. Assess the property damage and prepare report.
- d. Assist all HODs with restoration.
- e. Arrange for environmentally safe disposal of post emergency generated effluents/waste.
- f. Updating DMP based on faced natural calamities.

Secondary Support Team: HOD – Commercial

- a. Shall inspect all stores and estimate loss or damages if any and take immediate action for reequipping the items.
- b. Coordinate with all HODs for requirements of consumables and spares.
- c. Request HR to post additional hands to take up massive procurement action.
- d. Discuss with CEO/Executive Director (Corp. Affairs) to ease norms of procurement for immediate supply of stores.

Incident Controller: HOD – Railway

- a. Shall depute teams of staff to check the condition of all railway track, Loco and signalling system.
- b. Condition shall be reported to CEO/Executive Director (Corp. Affairs) and take action to repair and resume operations.
- c. Coordinate with Indian Railway for resume the operation.
- d. Any help for repair and decommissioning may be taken from HOD - ES.
- e. He shall also inspect the Locomotives of the Port, and arrange for trial running to put them into operation.

Incident Controller: HOD – Operations [DC (MPT & WB), CT, LT]

- a. Shall inspect all stack yards and cargo sheds and estimate cargo loss and damages if any.
- b. The condition of stored hazardous/toxic cargo to be inspected along with HSE and immediate action as advised by HSE to be taken up.
- c. Deploy men and equipments to segregate and salvage all cargo.
- d. Coordinate with ES HOD, for assistance in de-watering and plot/shed repairs.
- e. Estimate the losses and damages along with BD and inform CEO/Executive Director (Corp. Affairs).
- f. Discuss with CEO/Executive Director (Corp. Affairs) and HODs for resumption of partial or full operations.
- g. Take all actions for early resumption of Port activities.
- h. Coordinate with HOD – Marine to resume shipping operations.
- i. Coordinate with HOD - Finance for insurance claims.
- j. All costly and critical materials are stacked properly to avoid loss due to Wind or water inundation.
- k. Inspect the loading and unloading arms and taken up repairs if any.
- l. Assess the damage, prepare report, and regularize equipment after trial.
- m. Assess damage of cargo and inform clients.
- n. Contaminated cargo to be disposed in consultation with the QHSE & F.

Secondary Support Team: HOD – Finance & Accounts

Insurance Claims

- a. All HODs to prepare loss and damage list and estimate the costs of rectification and submit the same to HOD - Finance, who is the nodal officer for claiming insurance, with copies to CEO/ Executive Director (Corp. Affairs). The details shall contain photographs also.
- b. Shall coordinate with insurance company to arrange the Surveyor as quickly as possible, so that rectification work can start immediately.
- c. May coordinate with all HODs to prepare additional documents if required.
- d. May collect the details of claims with supporting documents from HODs in a time frame to be fixed by him for early settlement of all claims.
- e. Timely submission of insurance claims necessary for claiming losses.

Primary Support Team: HOD – Security

- a. Restoration of road traffic & port entry system from and to the port disrupted due to the flood.
- b. Shall be well versed with all road communication of the area.
- c. Shall coordinate with local administration/State administration to clear the roads in consultation with Corporate Affairs.
- d. Port may also be required to engage men and machine to clear the road blockages.

Secondary Support Team: CSR HOD – Adani Foundation [General Responsibilities]

The company has a social responsibility to save the life and property of the people living in the peripheral areas. This work involves the following activities. These activities may be done in association with local administration.

- a. Inform the public by public announcement the danger level of the flood and its effects and consequences.
- b. Leaflets are to be circulated about the danger level.
- c. If Tidal inundation is expected the villagers may be informed of the consequences.
- d. Request them to move to safer places to escape from heavy wind and tidal actions.
- e. Moving to Flood shelter is the best option. If flood shelter is not nearby, they may be asked to move to permanent structures available nearby. Provide them all assistance for evacuation.
- f. Provide the villagers adequate dry food (Chuda, Gudo, biscuits, baby food etc.) items and potable water in adequate quantity.
- g. Water tankers with potable water may be kept stand-by.
- h. Services of medical team may be extended to the peripheral villages with necessary medicines and first aids.
- i. Advise them to remain indoors during flood.
- j. After the flood there may be shortage of food and water.
- k. Water has to be provided for their basic needs till normalcy is established.
- l. Start community kitchens to provide them with food.
- m. Help in rehabilitation of all displaced people in coordination with local Govt. Agencies and NGOs.

- Position
- Port position
- Alternative
- Secondary support team

In-charge -
Telecommunication

- Take charge of all communication systems - fixed and portable.
- Ensure availability of sufficient numbers of electronic communication equipment to the port control station, base control and anywhere else as necessary.

- Position
- Port position
- Alternative
- Secondary support team

In-charge - IT

- Take charge of all necessary communication system.
- Take all necessary back up of data.
- Assess damage of assets and restore.

E Checklist

- Checklist for CEO/Executive Director (Corp. Affairs).
- Following checklists prepared which shall be used at the time of declaration of flood.

Checklist – 1	CEO/Executive Director (Corp. Affairs) (Corp. Affairs)
Checklist – 2	Marine Services
Checklist – 3	Engineering Services
Checklist – 4	Dry Cargo
Checklist – 5	Liquid Terminal
Checklist – 6	Container Terminal
Checklist – 7	HR & Admin
Checklist – 8	Security
Checklist – 9	Railway Services
Checklist – 10	West Basin
Checklist – 11	QHSE & F

CEO - Emergency Preparedness				
On the day when rainfall starts				
Heavy Rain - Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency Control Room established at suitable location with communication facilities			
2	All teams have reported their readiness for dealing with emergencies.			
3	Testing of communication (PA System, Mega phones, VHF, UHF and Landline) with all on site Emergency Control Rooms.			
4	Assess the situation and declare emergency.			
5	Alarms sounded followed by verbal order by PA system.			
6	Evaluate transportation/evacuation/food arrangements.			
7	Confirm readiness of medical facilities.			
8	Liaise with government bodies, other stake holders and mutual aid, partners for providing support if necessary.			
9	Obtain status of situation from the government Emergency Control Room and disseminate information.			
10	Check level of high tide for the day and whether the drains in the port have been reported to be cleared for easy drainage of water.			
11	All vehicles topped up with fuel.			
12	Walkie Talkie sets fully charged along with spare charged batteries.			
13	Emergency numbers to be kept with all emergency vehicles			
14	List of emergency contacts & suppliers.			
15	All non-essential persons have been evacuated from the port.			
16	Roads and pathways are clear for emergency movement.			
17	All departments must maintain a diary to note down action taken.			
18	Readiness of de-watering pumps.			
During Effective Period				
1	All personnel notified against venturing out during effective period, All personnel to remain indoor, observant and be alert.			
2	Take frequent updates from departments for any damage to property or injury to personnel.			
3	Provide necessary support by on site emergency team.			
4	If required operations to be suspended.			
After Effective Period				
1	Announcement to be made declaring end of emergency or PA system and other means of communication.			
2	Advise emergency teams to carry out on-field assessment.			
3	Personnel to be advised not to enter damaged buildings/structures.			
4	Launch search and rescue operations for missing personal.			
5	Get reports on casualties and injuries to personnel. Arrange for medical assistance.			
6	Carry out assessment of damage to property and all high value assets within the port including ships.			
7	Reports to be consolidated with photographs from all departments for insurance claims.			
8	Gradual resumption of port operation.			

Marine Services - Emergency Preparedness				
Level - 1 :- Two Days before heavy rain expected as per weather forecast				
Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency team to be formed for dealing with the emergency			
2	Whether emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	All concerned employees and contractual staff informed. Contractor staff evacuated from the port and verified, Contractor informed to evacuate their staff. All personnel notified against venturing out during effective period.			
5	Electric equipment at jetty/tug berth is covered and protected against water ingress.			
6	Electric equipment at jetty/tug berth covered and protected against water ingress.			
7	Drinking water (10 bottles of 20 ltr) and dry non perishable food available at Marine Building.			
8	Raincoats, charged emergency torches, battery operated torches with spare batteries, life jackets, ropes , life buoys to be kept on stand-by for emergency use.			
9	Diving team and Marine Hydra to be on stand-by to provide assistant when required.			
10	Stop to all permits to work.			
11	Arrangement made for stand-by vehicle.			
12	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
13	List of emergency contacts & suppliers available.			
14	Kept appropriate PPE's.			
Marine Control (MMPT & WB)				
1	WB Marine Control to issue weather bulletins every 6 Hrs.			
2	All vessel at berth and at anchorage are to be informed about weather condition.			
3	All equipments/computers in MMPT control to be covered and protected against water ingress due to heavy rain.			
4	All hand held UHF/batteries, emergency torch, mobile phone to be fully charged for use in emergency incase of total power failure.			
Jetty Supervisor				
1	Jetty supervisor to check and ensure that all lines of vessels at berth are always kept taught. Vessel to be instructed to double up mooring lines, if required.			
2	Jetty Supervisor to brief all mooring crew to remain alert, careful and should move in pairs. No mooring crew to stand close to the berth.			

Marine Services - Emergency Preparedness				
Level - 2 :- On the day when rainfall starts				
Heavy Rain - Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency team formed for dealing with the emergency			
2	Whether emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	All concerned employees and contractual staff informed. Contractor staff evacuated from the port and verified, Contractor informed to evacuate their staff. All personnel notified against venturing out during effective period.			
5	All operations must be stopped and personnel moved to a safe location from where they can be evacuated Transportation arranged for evacuation of staff (employees and contractual staff)			
6	Electric equipment at jetty/Tug berth covered and protected against water ingress.			
7	All loose items on jetty are secured.			
8	Adequate drinking water and dry non perishable food at Marine Building.			
9	Adequate no of raincoats, charged emergency torches, battery operated torches with spare batteries, life jackets, ropes , life buoys to be kept on stand-by for emergency use.			
10	Diving team and Marine Hydra on stand-by to provide assistant when required.			
11	Stop all work permits.			
12	Arrangement made for stand by vehicle.			
13	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
14	List of emergency contacts & suppliers available.			
15	Raincoats- 6 nos, gumboots- 6 nos, helmets- 6 nos, gantline- 50 meter x 6 nos available.			
Marine Control (MMPT & WB)				
1	Weather bulletins issued by WB Marine Control every 6 Hrs.			
2	Vessel at berth and at anchorage are informed about weather condition.			
3	All equipments/computers in MMPT control covered and protected against water ingress due to heavy rain.			
4	Hand held UHF/batteries, emergency torch, mobile phone fully charged for use in emergency in case of total power failure.			
Jetty Supervisor				
1	Jetty supervisor checked and ensure that all lines of vessels at berth are always kept taught. Vessel to be instructed to double up mooring lines, if required.			
2	Jetty Supervisor to brief all mooring crew to remain alert, careful and should move in pairs. No Mooring Crew to stand close to the berth.			

During Effective Period				
1	All personnel to be notified against venturing out during effective period.			
2	Avoid taking shelter near old or damaged buildings or near tress.			
3	Avoid standing near sea side.			
4	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present.			

Engineering Services-MPT - Emergency Preparedness				
Level - 1 :- Two Days before heavy rain expected as per weather forecast				
Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	ES-MPT Emergency team formed for dealing with the emergency			
2	Emergency team is in contact with Central Control Room for necessary preparedness			
3	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	People are made aware of do's and don'ts before, during and after flood			part of training. List of do's and don'ts enclosed
5	Coordination with labour contractors for making necessary arrangements towards evacuation of labours (Approx. 400 No's) deployed at FCC, Conveyor, Jetty, Steel Yard & Liquid Terminal. Actual evacuation to be done only after port shutdown is declared from CEO office			List of average manpower in port on normal operation day is enclosed
6	All drains are cleared of blockades and sluice gates are kept open.			
7	Portcabins are secured properly and relocation of electronic equipment from various porta cabins to designated location			
8	All existing emergency equipment such de-watering pump , DG set should be properly maintained & ready to use condition as may be required by operation dept. Pump at south basin bund shall be in maintained condition			
9	Drinking water (10 bottles of 20 ltr) and dry non perishable food available for 30 people (2 days) at Tug berth building and FCC control room			
10	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc.			
11	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
12	List and contact details of customers, contractors and port emergency contacts is kept ready with FCC control room and DC coordination desk.			

ES -MPT Coordination desk				
1	To circulate weather bulletins (issue by Martine Control) every 12 Hrs to all external contractor .			
2	To appraise ES-MPT shift Incharges every 12 hrs who in turn will appraise their reportees & colleagues			
3	All hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency incase of total power failure. All existing emergency equipment such de-watering pump , DG set etc should be properly maintained & ready to use condition as may be required by operation dept .			
4	All clients are intimated against potential flood threat to proceed with their insurance formalities.			
5	Keep pictorial records of the sequence of events and preparedness(For Insurance Purpose)			For insurance purpose

Engineering Services-MPT - Emergency Preparedness				
Level - 2 :- On the day when rainfall starts				
Heavy Rain - Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	ES-MPT emergency team representatives deployed at Adani House,FCC Control room and ES-MPT coordination desk as per plan			
2	ES-MPT Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
3	ES-MPT emergency team representatives of FCC control room , DG House /substation , workshop & ES -MPT coordination desk is handy with VHF sets , Emergency Torches, Rain Coat			
4	Central control room (Adani House) issues port closure notice			
5	All normal operations stopped. Only emergency operations (securing of MHC/goliath/LMC/equipment/hoppers/dumpers/trailers) to be continued			
6	Transportation arranged for evacuation of non essential staff (employees and contractual staff)			
7	Only ES-MPT Emergency team members to remain in the port.			
8	2 pilot vehicles stand-by near tug berth building and FCC control room/ES-MPT coordination desk			
9	All existing emergency equipment such de-watering pump, DG set, excavator, hydra etc should be ready for deployment as per requirement			
10	Drinking water (10 bottles of 20 litre) and dry non perishable food available for 30 people (2 days) at Tug berth building and FCC control room			
11	Emergency Kit is ready and checked			
12	Communication mediums like VHF, Mobile phones and PA systems checked and tested			

13	Emergency team in continuous contact with other emergency services (such as QHSE & F, security, other services)			
14	List and contact details of contractors and port emergency contacts to be kept ready with FCC control room, DG houses, sub station, workshop and ES-MPT coordination desk			
ES-MPT Coordination desk				
1	To circulate weather bulletins (issue by Martine Control) every 12 Hrs to all external contractor			
2	To take feedback of evacuation process and highlight progress/ issues emergency team.			
3	All computers/peripherals in MPT control to be covered and protected against water ingress due to heavy rain			
During Effective Period				
1	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employees are present			
2	All personnel to be notified against venturing out during effective period			
3	Do not taking shelter in low lying areas, old or damaged buildings, near tress and temporary structures			
4	Shelter to be taken on higher ground			
5	Avoid standing near sea side			
After Effective Period				
1	Take headcount of all the personnel (FCC, backup, steel yard, jetty & tug berth building)			
2	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
3	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury			
4	Assess damage to equipment, resources and cargo			
5	Initiate restart process			
6	Photographs to be taken for assessing damages to cargo and property for insurance			

Dry Cargo - Emergency Preparedness				
Level - 1 :- Two Days before heavy rain expected as per weather forecast				
Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Dry Cargo Emergency team formed for dealing with the emergency			
2	Emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			

4	People are made aware of do's and don'ts before, during and after flood.			part of training. List of do's and don'ts enclosed
5	Coordination with labour contractors for making necessary arrangements towards evacuation of labours (approx. 650 No's) , drivers (150 no's) , surveyors (120 no's) and equipment operators (75 no's) deployed at fcc, maruti, steel yard, stevedoring and backup. Actual evacuation to be done only after port shutdown is declared from ceo office			List of average manpower in port on normal operation day is enclosed
6	All drains are cleared of blockades and sluice gates are kept open.			
7	Cargo is secured inside warehouses and Open Plots. Cargo is covered near gates inside warehouses and potential leakage points.			
8	All non operating godown gates are kept closed and secured with bentonite walls.			
9	Steel cargo is properly stored and lashed. In case of rain or heavy storm sand to be reinforced with sand bags for securing of cargo from sliding.			
10	Portacabins are secured properly and relocation of electronic equipment from various porta cabins to designated location			
11	De-watering pumps are placed at all low level areas (steel yard , CG-10 main road, old admin building)			
12	Arrangement of two mobile de-watering pumps to evacuate water from inside closed warehouses.			
13	Drinking water (10 bottles of 20 ltr) and dry non perishable food available for 30 people (2 days) at tug berth building and FCC control room			
14	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc.			
15	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
16	List and contact details of customers ,contractors and port emergency contacts is kept ready with FCC control room and DC Coordination desk..			
Dry Cargo Coordination desk				
1	To circulate Weather Bulletins (issue by Martine Control) every 12 Hrs to all external customers .			
2	To appraise Jetty /Backup and FCC shift Incharges every 12 hrs who in turn will appraise their reportees.			
3	All hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency incase of total power failure.			
4	All clients are intimated against potential flood threat to proceed with their insurance formalities.			
5	Keep pictorial records of the sequence of events and preparedness(For Insurance Purpose)			For insurance purpose

Dry Cargo - Emergency Preparedness				
Level - 2 :- On the day when rainfall starts				
Heavy Rain - Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Dry cargo emergency team representatives deployed at Adani House, Marine Control Room, FCC Control room and Dry Cargo coordination desk.			
2	Emergency team, at the direction of CEO, to carry out the following tasks: develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
3	FCC control room and DC coordination desk is handy with VHF sets , Emergency Torches, Rain Coat.			
4	Central control room (Adani House) issues Port closure notice			
5	All normal operations stopped. Only emergency operations (securing of MHC/Goliath/LMC/ equipment/Hoppers/dumpers/trailers) to be continued.			
6	Transportation arranged for evacuation of non essential staff (employees and contractual staff)			
7	All godown gates to be kept closed and secured with bentonite walls.			
8	Steel cargo is properly stored and lashed. In case of rain or heavy storm sand to be reinforced with sand bags for securing of cargo from sliding.			
9	Only Emergency team members to remain in the port.			
10	2 pilot vehicles stand-by near Tug berth building and FCC control room.			
11	De-watering pumps to be placed at all low level areas (Steel Yard , CG-10 main road, Old admin building)			
12	Arrangement of two mobile de-watering pumps to evacuate water from inside closed warehouses.			
13	Drinking water (10 bottles of 20 litre) and dry non perishable food available for 30 people (2 days) at Tug berth building and FCC control room			
14	Emergency Kit is ready and checked			
15	Communication mediums like VHF, Mobile phones and PA systems checked and tested			
16	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
17	List and contact details of customers ,contractors and port emergency contacts to be kept ready with FCC control room and DC Coordination desk..			
Dry Cargo Coordination desk				
1	To circulate weather bulletins (issue by Martine Control) every 12 hrs to all external customers			
2	To take feedback of evacuation process and highlight progress/ issues emergency team			
3	All computers/peripherals in MPT control to be covered and protected against water ingress due to heavy rain			

During Effective Period				
1	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present			
2	All personnel to be notified against venturing out during effective period			
3	Do not taking shelter in low lying areas, old or damaged buildings, near tress and temporary structures			
4	Shelter to be taken on higher ground			
5	Avoid standing near sea side			
After Effective Period				
1	Take headcount of all the personnel. (FCC, backup, steel yard, jetty & tug berth building)			
2	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
3	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury.			
4	Assess damage to equipment, resources and cargo.			
5	Initiate restart process.			
6	Photographs to be taken for assessing damages to cargo and property for insurance.			For insurance purpose
7	Communication to be sent to all clients regarding assessed and potential damage to cargo.			

Liquid Terminal - Emergency Preparedness				
Level - 1 :- Two Days before heavy rain expected as per weather forecast				
Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency team formed for dealing with the emergency			
2	Emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	All concerned employees and contractual staff informed. All personnel notified against venturing out during effective period.			
5	A team is formed to identify and removal of items from jetty which may fall into sea due to strong wind such as life buoy with stand, gangway etc.			
6	Electric equipment at jetty/Tug berth covered and protected against water ingress.			
7	Oil Spill Management Plan is activated.			
8	Drinking water (10 bottles of 20 ltr) and dry non perishable food available at Liquid Building.			

9	11 Nos of raincoats, charged emergency torches, 2 battery operated torches with spare batteries, 6 life jackets, ropes (50 meters x 6), life buoys available for emergency use.			
10	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
11	List of emergency contacts & suppliers available.			
12	Kept appropriate PPE's.			
Liquid Control (CTF and VEG Oil)				
1	Co-ordinate with Marine Control for weather bulletins every 6 hrs			
2	Inform all contractors to remove all their equipment from liquid terminal area and put proper location			
3	Vessel at berth and at anchorage informed about cyclone warning			
4	All hand held UHF/batteries, emergency torch, mobile phones are fully charged for use in emergency incase of total power failure			
5	Check & clean of dyke wall for all tanks. (Ensue valves of dyke wall are in open condition)			
6	Floating roof tank ensure the tank roof draining system valves must be in open condition			
7	All storage tanks shell and roof manholes to be box up			
8	Material (i.e. oil drums, sludge tanks etc.) & equipment that cannot be moved are to be covered			
9	Check earthing of pipelines & tanks with help of ESE & I			
10	Clean the spillage material to prevent slippery surface			
11	All storm water drainage system(sumps and clear passage of line) should be clean and cover properly			
12	Electric machinery is covered and protected against water ingress.			
Jetty Supervisor				
1	Jetty supervisor to ensure all lines of vessels at berth are always kept tight			
2	Jetty Supervisor briefed all workers/labors be alert, careful and to move in pairs. No one to stand close to the berth			
3	All hydra and jetty/technical vehicles parked at safe shelter			
4	Safe guard all loose material including Hose and drums and other loose material			

Liquid Terminal- Emergency Preparedness				
Level - 2 :- On the day when rainfall starts				
Heavy Rain - Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency team formed for dealing with the emergency			
2	Whether emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			

4	All concerned employees and contractual staff informed Contractor staff evacuated from the port and verified, Contractor informed to evacuate their staff All personnel notified against venturing out during effective period			
5	All operations must be stopped and personnel moved to a safe location from where they can be evacuated Transportation arranged for evacuation of staff (employees and contractual staff)			
6	Electric equipment at jetty/tug berth covered and protected against water ingress.			
7	All loose items on jetty are secured.			
8	Adequate drinking water and dry non perishable food at Liquid Building.			
9	Adequate no of raincoats, charged emergency torches, battery operated torches with spare batteries, life jackets, ropes , life buoys to be kept on stand-by for emergency use.			
10	Stop all work permits.			
11	Arrangement made for stand-by vehicle.			
12	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
13	List of emergency contacts & suppliers available.			
14	Raincoats-11 nos, gumboots- 11 nos, helmets- 11 nos			
15	List of emergency contacts & suppliers available.			
16	Kept appropriate PPE's.			
Liquid Control (CTF and VEG Oil)				
1	Co-ordinate with Marine Control for weather bulletins every 6 hrs.			
2	Stop all activities, remove all tanker Lorries from liquid terminal and do not allow any tanker Lorries to enter the liquid terminal area.			
3	All vessel at berth informed about weather warning in coordination with Marine.			
4	Vessels at berth are to be informed to keep Main Engine on stand-by for emergency castoff at short notice			
5	All equipment/computers in control to be covered and protected against water ingress due to heavy rain			
6	All hand held UHF/batteries, emergency torch, mobile phone to be fully charged for use in emergency incase of total power failure			
7	All storage tanks shell and roof manholes to be box up			
8	Ensure flange joint connections are tightened			
9	Check foundation of all tank & pumps			
10	Remove all employees from operational activities			
11	Ensure Oil Spill Management Plan is activated in case of flood			
12	Adequate drinking water and dry non perishable food at jetty area			
13	All electrical and diesel driven pumps should be ready in all respects for immediate use			
14	Ensure roads and pathways are cleaned and not obstruct for any vehicle movement during emergency			
15	Safe guard surface heat tracing system of pipeline			
Jetty Supervisor				
1	Jetty supervisor to ensure all lines of vessels at berth are always kept tight			
2	Jetty supervisor briefed all workers/labors be alert, careful and to move in pairs. No one to stand close to the berth			
3	All hydra and jetty/technical vehicles parked at safe shelter			
4	Safe guard all loose material including hose and drums and other loose material			

During Effective Period				
1	All personnel to be notified against venturing out during effective period			
2	Avoid taking shelter near old or damaged buildings or near tress			
3	Avoid standing near sea side			
4	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present			

Container Terminal - Emergency Preparedness				
Level - 1 :- Two Days before heavy rain expected as per weather forecast				
Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency team formed for dealing with the emergency			
2	Whether emergency team is in contact with Central Control Room for necessary preparedness			
3	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	All concerned employees and contractual staff to be informed Contractor staff to be evacuated from the port and verified All personnel to be notified against venturing out during effective period			
5	Electric equipment is covered and protected against water ingress			
6	adequate Drinking water and dry non perishable food available at CT operation buildings			
7	Raincoats, charged emergency torches, battery operated torches with spare batteries, life jackets, ropes, life buoys to be kept ready for emergency use.			
8	Stop all work.			
9	Arrange for stand-by vehicle.			
10	Emergency team to be in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
11	List of emergency contacts & suppliers available.			
12	Kept appropriate PPE's.			
CT2 and CT3 Control Room				
1	CT2 and CT3 Control communicate Weather Bulletins every 6 Hrs.			
2	All hand held UHF/batteries, emergency torch, mobile phone to be fully charged for use in emergency incase of total power failure.			
Wharf Supervisor				
1	Wharf supervisor to check and ensure that all lines of vessels at berth are always kept taught. Vessel to be instructed to double up mooring lines, if required.			
2	Jetty supervisor to brief all mooring crew to remain alert, careful and should move in pairs. No mooring crew to stand close to the berth.			

Container Terminals - Emergency Preparedness				
Level - 2 :- On the day when rainfall starts				
Heavy Rain - Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency team formed for dealing with the emergency			
2	Whether emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	All concerned employees and contractual staff to be informed Contractor staff to be evacuated from the port and verified All personnel to be notified against venturing out during effective period			
5	All operations must be stopped and personnel moved to a safe location from where they can be evacuated Transportation arranged for evacuation of staff (employees and contractual staff)			
6	Electric equipment covered and protected against water ingress.			
7	All loose items in terminals are secured.			
8	Adequate drinking water and dry non perishable food at CT Operation Buildings.			
9	Adequate no of raincoats, charged emergency torches, battery operated torches with spare batteries, life jackets, ropes, life buoys to be kept on stand-by for emergency use.			
10	Stop all work permits.			
11	Arrangement made for stand-by vehicle.			
12	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
13	List of emergency contacts & suppliers available.			
14	Raincoats- 6 Nos, Gumboots- 6 Nos, Helmets- 6 Nos, Gantline- 50 meter x 6 Nos available.			
CT2 and CT3 Tower Control				
1	Weather Bulletins Communicated by CT Control every 3 Hrs.			
2	All equipments/computers in CT control covered and protected against water ingress due to heavy rain.			
3	Hand held UHF/batteries, emergency torch, mobile phone fully charged for use in emergency in case of total power failure.			
Wharf Supervisor				
1	Wharf supervisor checked and ensure that all lines of vessels at berth are always kept taught. Vessel to be instructed to double up mooring lines, if required.			
2	Wharf Supervisor to brief all to remain alert, careful and should move in pairs. No Mooring Crew to stand close to the berth.			

During Effective Period				
1	All personnel to be notified against venturing out during effective period.			
2	Avoid taking shelter near old or damaged buildings or near tress.			
3	Avoid standing near sea side.			
4	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present.			

Administration - Emergency Preparedness				
Level - 1 :- Two Days before heavy rain expected as per weather forecast				
Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency team formed for dealing with the emergency			
2	Emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of Head Administration to carry out the following tasks: develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources;			
4	All concerned employees and contractual staff informed Contractor staff to be evacuated from the port and verified All personnel to be notified against venturing out during effective period			
5	Drinking water (50 bottles of 20 ltr) and dry non perishable food available at all Canteens			
6	10 Nos of raincoats, 06 nos. charged emergency torches, 06 battery operated torches with spare batteries in each control room, ropes (50 meters) in each buses available for emergency use			
7	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			

Administration - Emergency Preparedness				
Level - 2 :- On the day when rainfall starts				
Heavy Rain - Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Emergency team formed for dealing with the emergency			
2	Whether emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			

4	Drinking water (50 bottles of 20 ltr) and dry non perishable food available at all Canteens			
5	All concerned employees and contractual staff informed. Contractor staff evacuated from the port and verified, Contractor informed to evacuate their staff. All personnel notified against venturing out during effective period.			
6	All operations must be stopped and personnel moved to a safe location from where they can be evacuated Transportation arranged for evacuation of staff (employees and contractual staff)			

Security Services - Emergency Preparedness				
Level - 1 :- Two Days before heavy rain expected as per weather forecast				
Flood - Check List				
Sr. No.	Activity	Yes	No	Remarks
General Points				
1	Obtain status of flood at regular interval from Emergency Control Room and disseminate to others for their information and appropriate safety measures			
2	Establishment of Emergency Control Room at suitable location with communication facilities			
3	A team is to be formed for emergency.			
4	All vehicles to be topped up with fuel – prior to effective period and top up on daily basis.			
5	Walkie talkie sets to be fully charged along with stand-by batteries			
6	Keep mobiles (personal/official) fully charged			
7	Ensure emergency lights are functioning			
8	Ensure mega phones are functioning (change old batteries)			
9	Ensure public announcement (PA system) on ERT vehicle is functioning			
10	Ensure Digital Cameras and Handy Cam fully charged.(ERT, PSC, MSB, MWB)			
11	Ensure security guards in possession of all PPEs and whistle			
12	Ensure availability of rope (30 Mtr), life jacket & tarpaulin (If available), At respective gate & 01 at ISCR,			
13	Traffic Cone to be removed and kept in closed room, it may float and hit with some object			
14	Frontier from roads to be removed and kept in Covered Godown in stacking mode.			
15	Search lights to be kept ready dully functional.			
16	Hammer and cutting tools (available with Fire Dept).			
17	Bottled drinking water to kept in all emergency vehicles			
18	First Aid Box to be kept with all emergency vehicles dully updated from medical wing.			
19	Emergency numbers to be kept with all emergency vehicles			
20	Security Reinforcement to be kept ready at Guards colony with due provision of transport (whichever transport mode is available).			
21	Alternate route for Hospital and other locations to be checked and available with all emergency teams.			

22	Detailed briefing of security guards to be carried out			
23	Communication to be done as per requirement (to save battery of mobile & VHF)			
24	Removal of security guard from remote and isolated location as per instruction of ISCR.			
25	Ensure rain coat available with all Security personnel on duty			
26	List of emergency contacts & suppliers.			
27	Material & equipment that cannot be moved are to be covered.			
28	Hoist appropriate storm warning Signal.			
29	Remove all loose materials and equipment from jetty & other area.			
30	Ensure all workmen are sheltered at safe locations like canteens (concrete buildings).			
31	Stop all vehicle movement and ensure the vehicles are parked at safe location with blocked wheels			
32	Ensure roads and pathways are cleaned			
33	Air filled tubes, bamboos & air filled boats to be kept ready for evacuation.			To be kept centrally

Security Services - Emergency Preparedness				
Level - 2 :- On the day when rainfall starts				
Heavy Rain - Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
General Points				
1	Obtain status of flood at regular interval from Emergency Control Room and disseminate to others for their information and appropriate safety measures			
2	Establishment of Emergency Control Room at suitable location with communication facilities			
3	A team is to be formed for emergency.			
4	All vehicles to be topped up with fuel – prior to effective period and top up on daily basis.			
5	Walkie talkie sets to be fully charged along with stand-by batteries			
6	Keep mobiles (personal/official) fully charged			
7	Ensure emergency lights are functioning			
8	Ensure mega phones are functioning (change old batteries)			
9	Ensure public announcement (PA system) on ERT vehicle is functioning			
10	Ensure Digital Cameras and Handy Cam fully charged.(ERT, PSC, MSB, MWB)			
11	Ensure security guards in possession of all PPEs and whistle			
12	Ensure availability of rope (30 Mtr), life jacket & tarpaulin (if available), At respective gate & 01 at ISCR,			
13	Traffic Cone to be removed and kept in closed room, it may float and hit with some object			
14	Frontier from roads to be removed and kept in Covered Godown in stacking mode.			
15	Search lights to be kept ready dully functional.			
16	Hammer and cutting tools (available with Fire Dept).			
17	Bottled drinking water to kept in all emergency vehicles			

18	First Aid Box to be kept with all emergency vehicles dully updated from medical wing.			
19	Emergency numbers to be kept with all emergency vehicles			
20	Security Reinforcement to be kept ready at Guards colony with due provision of transport (whichever transport mode is available).			
21	Alternate route for Hospital and other locations to be checked and available with all emergency teams.			
22	Detailed briefing of security guards to be carried out			
23	Communication to be done as per requirement (to save battery of mobile & VHF)			
24	Removal of security guard from remote and isolated location as per instruction of ISCR.			
25	Ensure rain coat available with all Security personnel on duty			
26	List of emergency contacts & suppliers.			
27	Material & equipment that cannot be moved are to be covered.			
28	Hoist appropriate storm warning Signal.			
29	Remove all loose materials and equipment from jetty & other area.			
30	Ensure all workmen are sheltered at safe locations like canteens (concrete buildings).			
31	Stop all vehicle movement and ensure the vehicles are parked at safe location with blocked wheels			
32	Ensure roads and pathways are cleaned			
33	Air filled tubes, bamboos & air filled boats to be kept ready for evacuation			To be kept centrally
During Effective Period				
1	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present			
2	All personnel to be notified against venturing out during effective period			
3	All personnel to remain indoor, observant and be alert			
4	Avoid taking shelter near old or damaged buildings or near tress			
5	All doors and windows to be shut			
6	Avoid the top floor of buildings. Stay close to ground floor			
7	Close the visitors' gate			
8	Occupy pre-determined post for controlling security of installation			
9	Call up additional help from Barracks			
10	Ensure that unauthorized persons/vehicles do not enter the gate			
11	Provide security men for firefighting & rescue			
12	Arrange for transport of higher authorities to the terminal			
13	Transport vehicles would be provided near emergency control center			
14	Depute security guards for controlling traffic at scene of disaster			
15	Produce a list of port staff on duty in co-ordination with time office			
16	Ensure availability of security men at gates so that they can lead authorities to disaster site			
17	Ensure that non-essential persons do not crowd affected area			
18	Instruct all drivers to take shelter at canteens (concrete buildings)			
19	Ensure vehicles are parked at designated parking areas, with wheels blocked			
20	Close the gate and stop allowing visitors and transport trucks either inward or outward.			
21	If caught in open areas during flood find a safe shelter immediately			

After Effective Period				
1	Assess damage to equipment, building and unsafe condition.			
2	Do not enter in damaged buildings			
3	Use Mobile Phones only for emergency calls			
4	Start search operation for Living Things			
5	Do not use any damaged electronic goods			
6	Drink boiled water			
7	Confirm with concerned about situation of flood before you move out.			
8	Start restorative measures & repairs.			

Railway Services - Emergency Preparedness				
Level - 1 :- Two Days before heavy rain expected as per weather forecast				
Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
1	Railway Emergency team formed for dealing with the emergency			
2	Emergency team is in contact with Central Control Room for necessary preparedness.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
4	People are made aware of do's and don'ts before, during and after flood.			part of training. List of do's and don'ts enclosed
5	Coordination with labour contractors for making necessary arrangements towards evacuation of labours (Approx. 250 No's) , Employees and Indian Railway Personel . Actual evacuation to be done only after port shutdown is declared from CEO office			List of average manpower in port on normal operation day is enclosed
6	All drains are cleared of blockades and sluice gates are kept open			
7	Portacabins are secured properly and relocation of electronic equipment from various porta cabins to designated location			
8	De-watering pumps are placed at all low level areas (Railway yard of west Basin and MDCC MPT)			
9	Arrangement of two mobile de-watering pumps to evacuate water from inside closed warehouses.			
10	Drinking water (10 bottles of 20 ltr) and dry non perishable food available for 30 people (2 days) at Railway control Room at MDCC MPT and all Railway Stations are Likely to be affected			
11	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc.			
12	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
13	List and contact details of customers ,contractors and port emergency contacts is kept ready with Railway control Room			

Railway Services - Emergency team Coordinator				
1	To circulate weather bulletins (issue by Martine Control) every 12 hrs to all external customers			
2	To appraise Railway yard and Loco Shed every 12 hrs who in turn will appraise their reportees			
3	All hand held VHF/batteries, Emergency torch, Mobile Phones are fully charged for use in emergency incase of total power failure			
4	All clients are intimated against potential flood threat to proceed with their insurance formalities			
5	Keep pictorial records of the sequence of events and preparedness(For Insurance Purpose)			For insurance purpose

Railway Services - Emergency Preparedness				
Level - 2 :- On the day when rainfall starts				
Heavy Rain - Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	Railway emergency team representatives deployed at Adani House, Marine Control Room, FCC Control room			
2	Emergency team, at the direction of CEO, to carry out the following tasks: develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
3	Railway control Room at MDCC MPT is handy with VHF sets, emergency torches, rain coat			
4	Central control room (Adani House) must issue Port closure notice			
5	All normal operations stopped. Only emergency operations to evacuate Locomotive and wagons at safe places in Railway Yard.			
6	Transportation arranged for evacuation of non essential staff (employees and contractual staff)			
7	Only Emergency team members to remain in the port.			
8	2 Vehicles stand-by near railway building and FCC control room.			
9	De-watering pumps are placed at all low level areas (Railway yard of west Basin and MDCC MPT)			
10	Arrangement of two mobile de-watering pumps to evacuate water from inside rail track areas.			
11	Drinking water (10 bottles of 20 litre) and dry non perishable food available for 30 people (2 days) at Railway control room of MDCC MPT and West Basin.			
12	Emergency kit is ready and checked			
13	Communication mediums like VHF, mobile phones and PA systems checked and tested			
14	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services).			
15	List and contact details of customers, contractors and port emergency contacts to be kept ready with FCC control room and DC coordination desk.			

Railway Services - Emergency team Coordinator				
1	To circulate weather bulletins (issue by Martine Control) every 12 hrs to all external customers.			
2	To take feedback of evacuation process and highlight progress/ issues emergency team.			
3	All computers/peripherals in MPT and West Basin control Room to be covered and protected against water ingress due to heavy rain.			
During Effective Period				
1	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present.			
2	All personnel to be notified against venturing out during effective period.			
3	Do not taking shelter in low lying areas, old or damaged buildings, near tress and temporary structures.			
4	Shelter to be taken on higher ground			
5	Avoid standing near sea side.			
After Effective Period				
1	Take headcount of all the personnel (Railway Control Room of MDCC MPT and West Basin)			
2	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
3	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury			
4	Assess damage to equipment, resources and cargo			
5	Initiate restart process			
6	Photographs to be taken for assessing damages to cargo and property for insurance			For insurance purpose
7	Communication to be sent to all clients regarding assessed and potential damage to cargo			

WEST BASIN - EMERGENCY PREPAREDNESS				
Level 1: Two Days Before Heavy Rain Expected As Per Weather Forecast				
Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
General				
1	HODs have a meeting above the impending emergency steps			
2	Emergency team is in contact with Central Control Room. Also the team should assist to all concen department as per instructions from concern HODs and Head- West Basin.			
3	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations all visitors will be stopped.			

4	People are made aware of do's and don'ts before, during and after flood			part of training. List of do's and don'ts enclosed
5	Coordination with labour contractors for making necessary arrangements towards evacuation of labours, drivers, surveyors and equipment operators deployed at vessel, yard, back-up area, silo. Actual evacuation to be done only after port shutdown which will be declared from CEO office			
6	All drains are cleared and outlets are opened			part of training. List of do's and don'ts enclosed
7	Cargo is secured inside warehouses and open Plots. Cargo is covered near gates inside warehouses and potential leakage points			
8	All non operating godown gates are kept closed and secured with bentonite walls			
9	Steel cargo is properly stored and lashed. In case of rain or heavy storm sand to be reinforced with sand bags for securing of cargo from sliding			
10	Portacabins are secured properly and relocation of electronic equipment from various porta cabins to designated location			
11	De-watering pumps are placed at certain areas (Workshops, Fire pump-house etc)			
12	Minimum number of operators and drivers to be remain in a shift; A) Crane Operators - 3 Nos B) Loader Operators - 4 Nos C) Excavator Operators - 4 Nos D) Forklift Operators - 1 Nos E) Hydra Operator - 2 Nos F) Trailer Driver - 1 Nos G) Utility Drivers - 4 Nos H) Bus Drivers - 3 Nos I) JLG Operator - 1 Nos			
13	Drinking water (20 bottles of 20 litre) and dry non perishable food available for minimum 60 people (2 days). However the quantity shall be changed with respect to the staff to be deputed at West Basin during emergency after finalization with respective HODs and Head - West Basin.			
14	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc.			
15	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
16	List and contact details of customers, contractors and port emergency contacts is kept ready with with Central Control Room, Key staff of Operation and ES Department.			
Central Control Room/Marine Control Room				
1	To circulate weather bulletins (issue by Martine Control) every 12 hrs to all external customers .			
2	To appraise shift incharges operation, engineering and emergency services of (jetty/backup) every 12 hrs who in turn will appraise their reportees.			
3	All hand held UHF/batteries, emergency torch, mobile phones are fully charged for use in emergency incase of total power failure.			
4	All clients are intimated against potential flood threat to proceed with their insurance formalities.			
5	Keep pictorial records of the sequence of events and preparedness (For Insurance Purpose)			For insurance purpose

Pre-Assessment Checklist [Preparedness in Early Stage]				
1	Ensure that all the important document are preserved at a proper place.			
2	Enusure that emergency team has been prepared along with roles & responsibility.			
3	Ensure each representative of each department has a substitute (Dry Cargo, E&I, MHS SR, MHS Conv, MHS GSU, MHS WLS TLS, MHS Utility, ES CWS, ES Civil, Fire, Safety, Security, Marine, Railway, Admin, Store, IT etc).			
4	Ensure that the list of Emergency Contact Numbers are displayed.			
5	Ensure that all employees, contractors/vendors/visitors/other customer are aware of emergencies procedures.			For insurance purpose
6	Ensure that Emergency Items contains following items; torches, ropes, wires, tarpaulins, plastic sheets, tool kit, duct tapes, assorted gears, first aid box, sand bags			
7	Ensure proper communication with the POC for further information/ updates/news of respective emergency from disaster authority/ Govt agencies			
8	Refer to the General DMP Checklist of West Basin [Departmentwise/Sectionwise]			

WEST BASIN - EMERGENCY PREPAREDNESS				
Level 2: On the Day When Rainfall Starts				
Heavy Rain - Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	All Emergency Team members and Individual Shift Incharge to be on-site for actions as per instructions from Head - West Basin/CCR.			
2	Emergency team, at the direction of CEO, to carry out the following tasks: Develop an overview of the situation; identify tasks to be undertaken; identify resources available for tasking; determine gaps in information and resources; access expert advice as required; develop and implement tactical plans for response and recovery operations			
3	All the emergency team members and shift incharge must have VHF sets, emergency torches, rain coat, life-jackets and other required protective gears.			
4	Central control room (Adani House) issues Port closure notice			
5	All normal operations stopped. Only emergency operations (securing of MHC/goliath/LMC/ equipment/hoppers/dumpers/trailers) to be continued			
6	Transportation arranged for evacuation of non-essential staff (employees and contractual staff)			
7	All electrically powered equipment/machines are to be isolated			
8	Loose material/items to be properly stored and lashed. In case of rain or heavy storm sand to be reinforced with sand bags for securing of cargo from sliding			

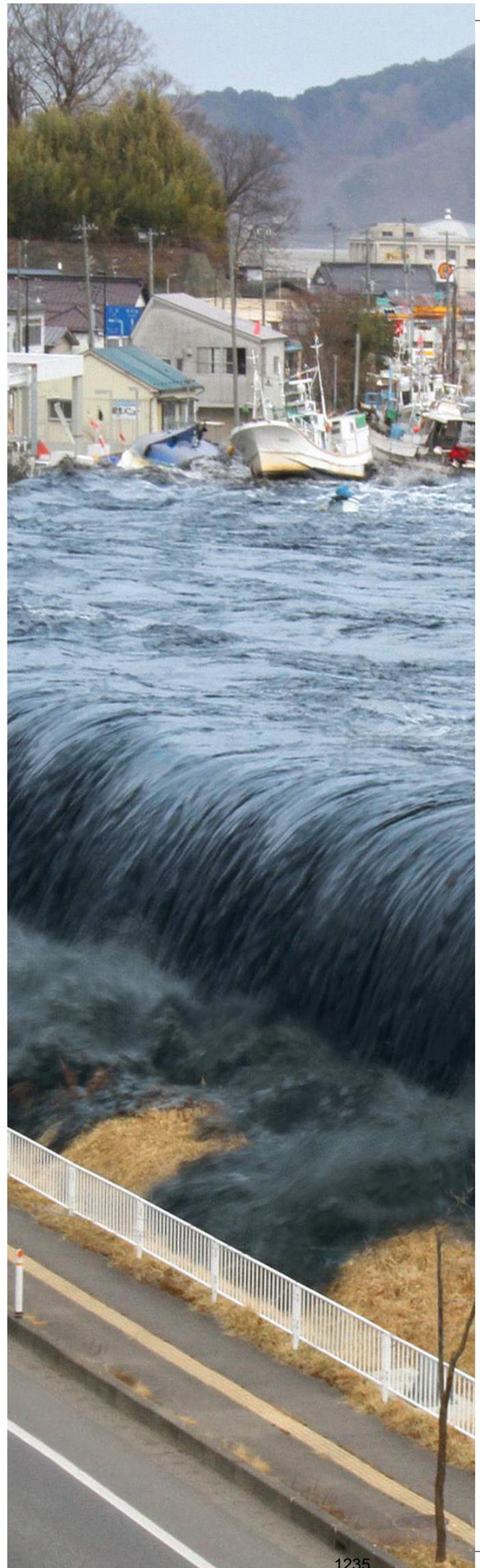
9	Only emergency team members to remain in the port			
10	Nomination of Emergency response vehicles [5 No's (ERT-1, 2 Adani Utilities-2, FLS Utility-2)]			
11	De-watering pumps to be placed at all low level areas (steel yard, CG-10 main road, old admin building)			
12	Arrangement of two mobile de-watering pumps to evacuate water from inside closed warehouses			
13	Drinking water (20 bottles of 20 litre) and dry non perishable food available for minimum 60 people (2 days). However the quantity shall be changed with respect to the staff to be deputed at West Basin during emergency after finalization with respective HODs and Head- West Basin			
14	Emergency kit is ready and checked			
15	Communication mediums like VHF, mobile phones and PA systems checked and tested			
16	Emergency team in continuous contact with other emergency services (such as QHSE & F, Security, other services)			
17	List and contact details of customers ,contractors and port emergency contacts is kept ready with with Central Control Room, Key staff of operation and ES department			
18	All visitors will be stopped			
Central Control Room & Marine Control Room				
1	To circulate weather bulletins (issue by Martine Control) every 12 hrs to all external customers			
2	To take feedback of evacuation process and highlight progress/ issues emergency team			
3	All computers/peripherals in MPT control to be covered and protected against water ingress due to heavy rain.			
During Effective Period				
1	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present.			
2	All personnel to be notified against venturing out during effective period.			
3	Do not taking shelter in low lying areas, old or damaged buildings, near tress and temporary structures.			
4	Shelter to be taken on higher ground			
5	Avoid standing near sea side.			
After Effective Period				
1	Take headcount of all the personnel. (Respective Incharge/ Contract Supervisor)			
2	Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing			
3	Attend to injured persons and give them first aid, if possible. Also inform the hospital if anyone is injured, stating the type and extent of injury			
4	Assess damage to equipment, resources and cargo			
5	Initiate restart process			
6	Photographs to be taken for assessing damages to cargo and property for insurance			For insurance purpose
7	Communication to be sent to all clients regarding assessed and potential damage to cargo			

Pre-Assessment Checklist [Preparedness in Early Stage]				
1	Ensure that emergency team has been prepared along with roles & responsibility			
2	Ensure each representative of each department has a substitute (Dry Cargo, E&I, MHS SR, MHS Conv, MHS GSU, MHS WLS TLS, MHS Utility, ES CWS, ES Civil, Fire, Safety, Security, Marine, Railway, Admin, Store, IT etc)			
3	Ensure that all employees, contractors/vendors/visitors/other customer are aware of emergencies and preparedness			
4	Ensure that emergency items contains following items; torches, ropes, wires, tarpaulins, plastic sheets, tool kit, duct tapes, assorted gears, first aid box, sand bags			
5	Ensure proper communication with the POC for further information/ updates/news of respective emergency from disaster authority/ Govt agencies			
6	Refer to the General DMP Checklist of West Basin [Departmentwise/Sectionwise]			For insurance purpose

QHSE&F - Emergency Preparedness				
Emergency Response.				
Flood - Checklist				
Sr. No.	Activity	Yes	No	Remarks
Induction and Training Program				
1	Arrange induction /training program for all personnel on emergency preparedness & its awareness			Part of Induction/training program.
2	All concerned employees and contractual staff informed about the assembly point & evacuation locations			
3	To arrange emergency drill for dealing with such emergency.			To be made part of emergency drill.
4	To arrange necessary training for emergency response team/ CMG/First Aid Team/Medical Team/Fire rescue team to deal with emergency. (Ensure availability of trained rescue team & necessary equipments all the time)			
5	Arrange training for all QHSE&F team member for emergency response & clear cut understanding of their crucial roles & responsibility during emergency			
6	To prepare & check effectiveness of Emergency Response Plan/ Disaster Management Plan			
7	To do proper co-ordination with all concern department for maintaining necessary emergency response kit & necessary aids in required inventory or make identified supply of the same during declaration of such emergency			
8	To maintain close co-ordination with mutual aid for dealing with emergency.			
During Effective Period				
1	Assist CEO/Executive Director (Corp. Affairs), as instructed.			
2	Co-ordination with respective HOD/HOS with respect to emergency actions.			
3	Ensure necessary action through CMG. Provide necessary assistance to CMG			

4	Assist in evacuation of all personnel except key personnel.			
5	Provide HSE & F facilities (Assist for Rescue, Evacuation, and other Necessary Arrangement).			
6	Set up casualty collection centre and arrange first aid posts.			
7	Arrange enough stock medicines, antidotes, oxygen, stretchers,			
8	Keeping in mind that Road and Rail connectivity may be cut off for required period of time.			
9	Arranges additional medicine and equipment as required.			
10	Arrange a fully equipped Ambulance in ready state.			
11	Make arrangements for mobile casualty to reach at incident sites and transporting for further treatment.			
12	To do immediate co-ordination to mutual aids for necessary help/ support if required.			
After Effective Period				
1	Assist to CEO/Executive Director (Corp. Affairs).			
2	Assess damage (human) and send for further treatment.			
3	Assess the property damage and prepare report.			
4	Assist all HODs with restoration.			
5	Perform necessary rescue through rescue team where needed.			
6	Check each & every affected area & arrange for necessary HSE& F actions as require.			
7	After completion of all rescue, restoration work. Check the effectiveness of executed emergency plan & take necessary require corrective action to update the plan & necessary facilities if required.			
8	To motivate the emergency rescue team, CMG & all concerns, who have perform well during emergency.			

Disaster Management Plan for
Tsunami

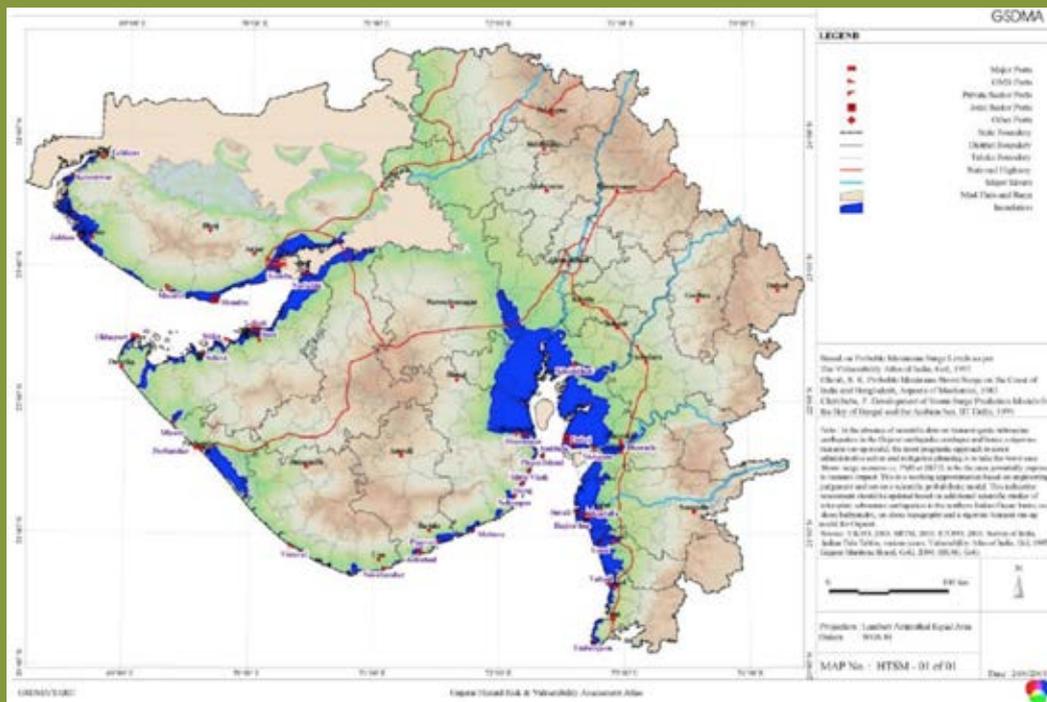




Tsunami

Important Information

Tsunami is Japanese word for “harbor wave which is a huge ocean wave that can travel at speeds up to 600 mi/hr (965 km/hr) can have heights of up to 30 m (98 ft), wavelengths of up to 200 km (124 mi) and long periods, usually between 10 and 60 minutes. Sometimes incorrectly called a tidal wave, a tsunami is usually caused by an underwater earthquake or volcanic eruption and often causes extreme destruction when it strikes land. It is a series of waves which travel outward on the ocean surface in all directions in a kind of ripple effect. Since the waves can start out hundreds of miles long and only a few feet high, they would not necessarily be noticeable to a passing ship or a plane flying overhead. The tsunami warning is issued on earthquake having intensity of more than 6.5 on richter scale.



Note: tsunamis are extremely rare events in Gujarat. However, Gujarat state in general is prone to tsunami risk due to its longest coastline and probability of occurrence of submarine earthquakes near the offshore in arabian sea. In past, kandla coast was hit by a tsunami of 12m height in 1945, due to an earthquake in makran fault line.

Tsunami can cause huge loss of life and damage to port assets due to minimum response time available for saving lives, property and environment. Both road and railway connectivity may be cut off for some time. There may be unpredicted rush-off of sea water, heavy current which may damage buildings, structures, towers, transmission lines, heavy cranes, silos, godowns, tanks, chimney etc. at unpredicted location. Adequate stock of essential medicine shall be maintained.

-
1. <http://www.incois.gov.in/>
 2. <http://www.nio.org/>
 3. <http://www.imd.gov.in/>
 4. <http://www.imdahm.gov.in/>

Action Plan

- A. Actions – Before tsunami (Maximum Before 30 Mins)
- B. Actions – During tsunami
- C. Actions – Post tsunami stage: recovery, insurance, restoration & relief
Looking to the scenario of tsunami (short-time span), actions – before tsunami (maximum 30 mins)/during tsunami has been merged.

Marine Control (Signal Station)

- Prime duty of signal station is to collect the weather condition and inform Control.
- Marine Head of the Port is the controlling authority of Signal Station, who is assisted by 2 DGM Marine Operations.
- Marine Control station is the Permanent Nodal Agency to gather information about Tsunami, and marine control shall inform the CEO and all HODs.
- The port radar system is installed on top of the Marine Operation Building (MPT & WB) station, Vessel Traffic Management System (VTMS) is with the marine control.
- The information is to be collected from Indian Meteorological department, Institute of Seismological Research (ISR) and Indian National Centre for Ocean Information Services (INCOIS).
- All information related to tsunami shall be instantly sent to CEO and all HODs by mail, SMS, followed by Telephone to ensure the authority has received the message. In case any recipient is out of headquarters, the information shall be passed on to the HOS.
- The Marine Control station shall maintain the contact details of CEO, all HODs and, HOSs, in addition to all installation (HR department shall supply contact details of all concerned list is to be kept updated every 3 months).

Tsunami Management Centre

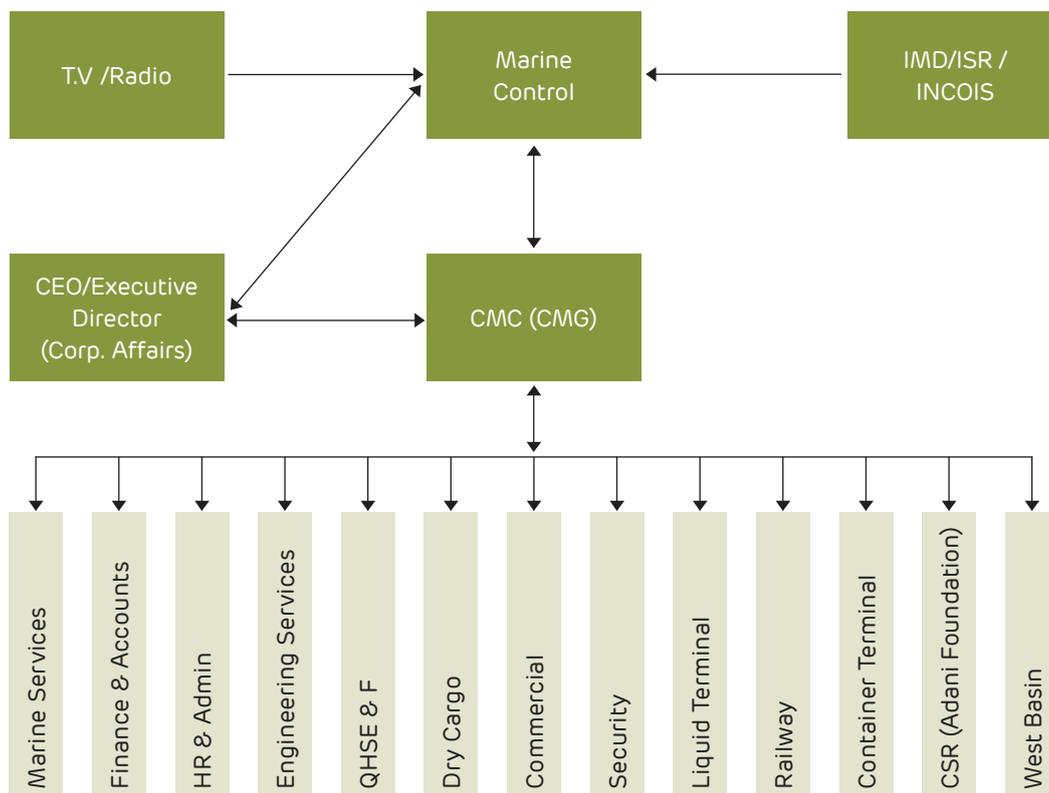
- On receipt of information of approaching tsunami a Crisis Management Centre (CMC) at Shantivan Colony.
- CMC formation shall be ordered by the CEO or the Executive Director (Corp. Affairs).
- CEO or the Executive Director (Corp. Affairs) shall be overall in charge of the CMC and shall take all necessary steps for proper functioning of the control room.
- All information shall be passed over to CMC by the Marine Control, when CMC starts functioning.
- All coordination and control shall be done by the CEO from the CMC.

Crisis Management Group

- Crisis Management Group (CMG) will be a permanent body to deal with all crisis and it is formed by CEO.
- On confirmation of possible tsunami attack on the port, the Crisis Management Group (CMG) shall meet at the CMC or other convenient place as determined by the CEO.
- CEO Shall appoint departmental HOD/HOS as Coordinator and Convener of the CMG.
- All meetings of the Crisis Management Group (CMG) shall be conducted in the CMC.
- All HODs/HOS shall be members of CMG, in absence of CEO, Executive Director (Corp. Affairs) shall be the Chairman of CMG and Coordinator shall be the convener.
- CEO may declare emergency so that all staff and officers shall be at their duty stations and congregate at their designated stations for taking review of the situation and for implementing orders received from their respective HODs, who are CMG members.
- CMC shall be manned round the clock and shall be headed by CEO or someone nominated by CEO. He shall be at least of the rank of HOD.

Crisis Management Group – Responsibilities

All HOD's and HOS's shall be members of crisis group for tsunami management and post restoration activities in addition to members nominated by CEO as per the situation. The crisis management group shall be active till the full restoration of port activities.



Commands Structure/Designated Persons

- The following table shows the command structure for each department.
- In case the officer in the first column is not available, the second in command automatically takes over.
- Designation of the first column is the HOD and second column is the successor.
- In case of absence of both, the senior most officers of the dept. to assume charge.

Sr.No.	Head	Successor
1	CEO	Executive Director (Corporate Affairs)
2	HOD (Marine)	HOS (Marine)
3	HOD Finance	HOS Finance
4	HOD (HR & Admin)	HOS (HR & Admin)
5	HOD (ES)	HOS (ES)
6	HOD (QHSE & F)	HOS (QHSE & F)
7	HOD (Dry Cargo)	HOS (Dry Cargo)
8	HOD (Commercial)	HOS (Commercial)
9	HOD (Security)	HOS (Security)
10	HOD (Liquid)	HOS (Liquid)
11	HOD (Railway)	HOS (Railway)
12	HOD (Container Terminal)	HOS (Container Terminal)
13	HOD (West Basin)	HOS (West Basin)
14	HOD (CSR – ADANI FOUNDATION)	HOS (CSR – ADANI FOUNDATION)

* Roles of HODs [West basin (ES & DC)] and HODs [MPT (ES & DC)] are same. HODs [West Basin] will assist to Head – West Basin.

A & B Actions – Before tsunami (Maximum before 30 Mins) and Actions – During tsunami:

Marine Control will receive the information from IMD/ISR/INCOIS. Thereafter they will inform to the CEO/Executive Director (Corp. Affairs).

• Group Position
• Port Position
• Alternative
• Site Main Controller
CEO
Exec. Director (Corp. Affairs)

- Stop all operations.
- Inform to all HODs of evacuation of personnel from the port.
- Continuous updates on tsunami.
- Inform to HR & Admin for providing facilities of transportation.
- To establish Emergency Control Centre.
- Contact Government authority for further more information about tsunami.
- Power supply is to be cut-off in consultation with MUPL and ES.



- Assist CEO as instructed.
- Marine Control will inform to all the Vessel Chiefs for evacuation as per direction of CEO

General Responsibilities

- Each individual coming out to speak with loud "PLEASE EVACUATE" and reach a safe place.
- Immediate evacuation with readily available vehicles.
- Upon getting information, Admin shall send the vehicles immediately for evacuation from port.
- Security is to maintain the traffic control for fast turn-around of vehicles.
- Security shall allow only to the vehicles (for evacuation) and rescue team.

C Actions – Post tsunami Stage (Recovery, Insurance, Restoration & Relief):

The purpose of post tsunami activity is to resume port operation as early as possible.

Site-main Controller – CEO/Executive Director (Corp. Affairs) Corp. Affairs)

- Collect the details of damages if any from HODs immediately.
- Ask all members of the CMG to immediately inspect their area of responsibility, along with their subordinate staff and officers and report their finding.
- Ask the HODs to submit preliminary estimate immediately, followed by detailed estimate.
- HOD - Marine to be asked to complete the survey of channel and berth as quickly as possible, to resume shipping activity.
- All required activities to resume port operations are to be discussed and finalized with HODs.
- A department wise detailed programme is to be drawn up to resume normal Port operations.
- After ensuring the situation, inform to MUPL to start the power in consultation with ES.
- Regular follow up to complete the work as programmed is to be done.
- Emergency powers for procurement and award of contract are to be evoked.
- HODs are required to submit the details and programs immediately.
- Reports on condition of tugs and other port crafts, ship unloader, ship loaders, HMCs and other auxiliary equipment after thoroughly inspection by HOD.
- All other cargo handling equipment like container handling equipment if any shall be inspected by HOD and detailed report to be obtained.
- MCCs, stacker reclaimers, wagon tippler and wagon tippler tunnel,
- Ask all HODs to submit details to HOD - Finance to process insurance claims.
- Coordinate the CSR activities.
- Keep contact with District Collector and local state Govt. official and offer all possible help for rehabilitation of displaced villagers.
- Inform all stockholders regarding all clear & restoration of the port operation. Also inform the same to the corporate office.
- Confirms the termination of the emergency after the threat is over.
- Lead the Crisis Management Group for early restoration of facilities and resume port activities.

Incident Controller: HOD – Marine [Marine & Spm]

- a. Marine – HOD shall immediately arrange for survey of channel and berth and inform the condition to CEO/COO, Who in turn inform to the corporate office and stake holders.
- b. Restoration work if any may be done in association with Head ES.
- c. Shall check the navigational aid system take action for rectifications if required
- d. Check all tugs and mooring crafts and they should be made fully functional as quickly as possible.

SPM

- a. Checking both mooring hawser assemblies and replace the components as required.
- b. Replacements of both 9" PP pick ropes of mooring hawsers.
- c. Inspection of each floating hoses on both floating hose strings.
- d. Underwater inspection of each individual hoses on both subsea hose string and subsea umbilical.
- e. Underwater inspection of all deep sea floats for its integrity.
- f. Checking subsea hose strings configuration at low and high tide.
- g. Verifying chain angle of all six anchor chains to be within limits, at low and high tide.
- h. SPM buoy body inspection – integrity of seal on all hatches and doors.
- i. Operational check of all navigational and safety equipment.
- j. Carry out the system pressure test from floating hose string end to PLEM valve upto 15 bars and hold for 03 hours. Visual check by divers for any abnormalities on floating hoses and subsea hoses.
- k. Carryout "Free Span and Lateral displacement" survey of subsea pipeline and provide support wherever necessary i.e. if it is beyond recommended allowable span.

Incident Controller: HOD – ES (MPT & WB)

- a. Shall immediately depute the electrical engineer to have an update of power supply.
- b. In case of power outage, coordinate with Electrical supply authorities for restoration of power supply
- c. If power is available, and MCCs are O.K, charge MCCs one by one after thorough checking.
- d. Depute the same team which has parked the equipment to release the equipment for operation after removing all blockages.
- e. If any equipment is found to be damaged report the matter to higher ups and take action for early repair or decommissioning.
- f. Do not start operating, until all parking locks & additional tie-ups are removed
- g. Equipment also can be charged one by one after charging the MCCs after obtaining written clearance from the engineer in charge.
- h. Ensure that the equipment electrical system is perfect before charging. Keep records of all measurements.
- i. Inspect the tunnel and dewater the accumulated water.
- j. Inspect all electrical and mechanical system thoroughly before Trial run.
- k. All lighting towers which were lowered to be raised up.
- l. Damaged street lights and damaged internal lighting system to be repaired and recommissioned.
- m. All belt clamping/tie-up must be removed before trial run of conveyors.
- n. Arrange for de watering of tunnel with diesel pump if power supply is not readily available.
- o. Ensure all DG sets works till normal power supply is resumed.
- p. Shall inspect the water supply system and take all action to establish normal water supply immediately.
- q. In case of any difficulty bring it to the notice of CEO/Executive Director (Corp. Affairs) (Corp. Affairs).
- r. In case of water logging, arrange diesel pumps and pump out water.
- s. Drainage system if damaged should be repaired immediately.
- t. Inspect all roof tops and if any roof is blown off, take action for replacement.
- u. Coordinate with Admin/HR for clean-up activities.
- v. HODs of West Basin will assist to Head – West Basin.

Primary Support Team: HOD – HR & Admin

- a. Shall take up rehabilitation work of port colony.
 - b. Take all actions necessary to rehabilitate the officers and staff of the port.
 - c. Coordinate with civil department to clean up the colony and premises.
 - d. Arrange for provisions till normalcy is established.
 - e. Food arrangements to people on resumption work to be coordinated.
-

Primary Support Team: HOD – QHSE&F

- a. Assist to CEO/Executive Director (Corp. Affairs)
 - b. Assess damage (human) and send for further treatment.
 - c. Assess the property damage and prepare report in consultation with concern department.
 - d. Assist all HODs with restoration.
 - e. Arrange for environmentally safe disposal of post emergency generated effluents/waste.
 - f. Updating DMP based on faced natural calamities.
-

Secondary Support Team: HOD – Commercial

- a. Shall inspect all stores and estimate loss or damages if any and take immediate action for reequipping the items.
 - b. Coordinate with all HODs for requirements of consumables and spares.
 - c. Discuss with CEO/Executive Director (Corp. Affairs) to ease norms of procurement for immediate supply of stores.
 - d. He shall help HOD Commercial for procuring the items necessary for tsunami damage repairs.
-

Incident Controller: HOD – Railway

- a. Shall depute teams of staff to check the condition of all railway track and track electrification and signalling system.
 - b. Contractor shall be instructed to depute adequate numbers of teams to survey the entire railway lines and system and submit feedback within the shortest possible time (fix the time period for feedback)
 - c. Condition shall be reported to CEO/Executive Director (Corp. Affairs) (Corp. Affairs) and take action to repair and resume operations.
 - d. If track electrification is damaged, coordinate with Indian Railways to press in Diesel locos till the electric line is repaired, and resume operation with conventional signalling.
 - e. Any help for repair and decommissioning may be taken from HOD - ES.
 - f. He shall also inspect the Locomotives of the Port, and arrange for trial running to put them into operation.
 - g. Inspect the locomotives of the port, and arrange for trial running to put them into operation.
-

Incident Controller: HOD – Operations [DC (MPT & WB), CT, LT]

- a. Shall inspect all areas along with concerned HODs for estimate loss and damages if any. prepare report and submit to CEO.
- b. The condition of stored hazardous/toxic cargo to be inspected along with HSE and immediate action, as advised by HSE, to be taken up.
- c. Deploy men and equipment to segregate and salvage all cargo.
- d. Coordinate with ES HOD, for assistance in de-watering and plot/shed repairs.
- e. Discuss with CEO/Executive Director (Corp. Affairs) and HODs for resumption of partial or full operations.
- f. Take all actions for early resumption of port activities.
- g. Coordinate with HOD – Marine to resume shipping operations.

-
- h. Coordinate with HOD - Finance for insurance claims.
 - i. All costly and critical materials are stacked properly to avoid loss due to wind or water inundation.
 - j. Estimate the losses and damages along with BD and inform CEO/Executive Director (Corp. Affairs).
-

Secondary Support Team: HOD – Finance & Accounts

Insurance Claims

- a. All HODs to prepare loss and damage list and estimate the costs of rectification and submit the same to HOD - Finance, who is the nodal officer for claiming insurance, with copies to CEO/Executive Director (Corp. Affairs) (Corp. Affairs). The details shall contain photograph also immediately
 - b. Shall coordinate with insurance company to arrange the surveyor as quickly as possible, so that rectification work can start immediately.
 - c. May coordinate with all HODs to prepare additional documents if required.
 - d. May collect the details of claims with supporting documents from HODs in a time frame to be fixed by him for early settlement of all claims.
 - e. Timely submission of insurance claims necessary for claiming losses.
-

Primary Support Team: HOD – Security

- a. Restoration of road traffic & port entry system from and to the port disrupted due to the Tsunami.
 - b. Shall be well versed with all road communication of the area.
 - c. Shall coordinate with local administration/State administration to clear the roads in consultation with Corporate Affairs.
 - d. Port may also be required to engage men and machine to clear the road blockages.
-

Secondary Support Team: CSR HOD – Adani Foundation [General Responsibilities]

The company has a social responsibility to save the life and property of the people living in the peripheral areas. This work involves the following activities. These activities may be done in association with local administration.

- a. Inform the public by public announcement the danger level of the tsunami and its effects and consequences.
- b. Leaflets are to be circulated about the danger level.
- c. If Tidal inundation is expected the villagers may be informed of the consequences.
- d. Request them to move to safer places to escape from heavy wind and tidal actions.
- e. Moving to tsunami shelter is the best option. If tsunami shelter is not nearby, they may be asked to move to permanent structures available nearby. Provide them all assistance for evacuation.
- f. Provide the villagers adequate dry food (chuda, gudo, biscuits, baby food etc.) items and potable water in adequate quantity.
- g. Water tankers with potable water may be kept stand-by.
- h. Services of medical team may be extended to the peripheral villages with necessary medicines and first aids.
- i. Advise them to remain indoors during tsunami.
- j. After the tsunami there may be shortage of food and water.
- k. Water has to be provided for their basic needs till normalcy is established.
- l. Start community Kitchens to provide them with food.
- m. Help in rehabilitation of all displaced people in coordination with local Govt. Agencies and NGOs.

- Position
 - Port position
 - Alternative
 - Secondary support team
- in-charge - telecommunication

- Take charge of all communication systems of fixed and portable.
- Ensure availability of sufficient numbers of electronic communication equipment to the port control station, Base Control and anywhere else as necessary.

- Position
 - Port position
 - Alternative
 - Secondary support team
- in-charge - IT

- Take charge of all necessary communication system.
- Take all necessary back up of data.
- Assess damage of assets and restore

A Checklist

- Checklist for CEO/Executive Director (Corp. Affairs) (Corp. Affairs).
- Following Checklists prepared which shall be used at the time of declaration of tsunami.

Checklist – 1	CEO/Executive Director (Corp. Affairs) (Corp. Affairs)
Checklist – 2	Marine Services
Checklist – 3	Engineering Services
Checklist – 4	Dry Cargo
Checklist – 5	Liquid Terminal
Checklist – 6	Container Terminal
Checklist – 7	HR & Admin
Checklist – 8	Security
Checklist – 9	Railway Services
Checklist – 10	West Basin
Checklist – 11	QHSE&F

CEO- Emergency Preparedness				
Tsunami - Check List				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
1	On receipt of tsunami warning, emergency Control Room to be established on the fourth floor of Adani house. (In the conference room).			
2	Alarms sounded followed by verbal order on PA system instructing personnel to stop all operations and initiate tsunami action plan.			
3	All teams have reported initiation of emergency action plan.			
4	Inform government agencies, other stake holders and mutual aid partners for initiating emergency action.			
5	Obtain status of situation from the government Emergency Control Room and disseminate information.			
6	Emergency numbers to be kept with all emergency vehicles (Provide copy of emergency numbers list in all vehicles)			
After Effective Period				
1	Announcement to be made declaring end of emergency or PA system and other means of communication.			
2	Head count to be taken to certain missing personnel.			
3	Get reports on casualties and injuries to personnel. Arrange for medical assistance.			
4	Launch search and rescue operations for missing personnel.			
5	Personnel to be advised not to enter damaged buildings/structures.			
6	Carry out assessment of damage to property and all high value assets within the port including ships.			
7	Reports to be consolidated with photographs from all departments for insurance claims.			
8	Gradual resumption of port operation.			

Marine Services - Emergency Preparedness				
Emergency Response.				
Tsunami- Checklist				
Sr. No.	Activity	Yes	No	Remarks
Induction and Training Program.				
1	Induction to employees about the emergency location of Medical Station, Fire Station.			Part of Induction program.
2	All concerned employees and contractual staff informed about the assembly points.			
3	All Crafts, Tugs, Fishing boats, and ships to be notified immediately and to move into deep waters away from shore line			To be made part of emergency drill.
4	Make arrangement of transportation of employees and contractors			
During Effective Period				
1	Avoid standing near sea side. Move as far away from the sea shore as is possible.			
2	During the event, the safest place is a terrace of structured building.			
3	If possible, evacuate the port and move as fast as possible away from the shore line			

4	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present			
5	Take head count of personnel			
After Effective Period				
1	Take head count of personnel			
2	Assess damage to equipments, building and unsafe condition			
3	Initiate restart/repair process			

Engineering Services of MPT - Emergency Preparedness				
Emergency Response.				
Tsunami- Checklist				
Sr. No.	Activity	Yes	No	Remarks
Induction and Training Program.				
1	Induction to employees about the emergency location of Medical Station and Fire Station			Part of Induction program.
2	All concerned employees and contractual staff informed about the assembly points			Part of safety tool talk
3	People made aware about tsunami warning signals(earthquake, sudden rise and fall in coastal water level)			Training program
4	People are made aware about evacuation plan in case of emergency			Training program
5	People are made aware of do's and don'ts before, during and after tsunami			part of training. List of do's and don'ts enclosed
6	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc. to be placed at FCC control room , DG houses & substation & workshop			Emergency Kit as per annexure
During Warning Period (appx 30 Min)				
1	Cargo operations stopped and all prerequisite for vessel to cast off undertaken.			To be made part of emergency drill.
2	Mobile Harbour Cranes in boom down position & properly lashed as per SOP & crane to be parked at designated area. 2.1 Mobile harbour cranes at jetty 2.2 Steel yards crane e.g goliath cranes & LMC			To be made part of emergency drill.
3	Dumpers and mobile equipment moved away from berth (designated open plots)			
4	Arrangements to be made for transportation of employees and contractors and labourers			
5	Emergency Kit, Food supplies and drinking water checked and tested.			
6	Communication mediums like VHF, Mobile phones and PA systems checked			Numbers mentioned in Annexure
7	Visitors' evacuation is ensured Note: At the time of cyclone & tsunami warning, priority to be given to worker, technician working on jetty or below jetty			
During Effective Period				
1	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present			
2	If possible, evacuate the port and move as fast as possible away from the shore line. Follow the evacuation plan			

3	During the event, the safest place is a terrace of structured building. Backup and ES team to rush to new CT building, Steel yard and jetty staff to tug berth building terrace			
After Effective Period				
1	Assess damage to equipment and buildings, and record the conditions.			
2	Take head count of personnel			
3	Initiate restart/repair process			
4	Photographs to be taken for assessing damages to cargo and property for insurance			
5	Communication to be sent to all clients regarding assessed and potential damage to cargo			For insurance purpose

Dry Cargo - Emergency Preparedness				
Emergency Response.				
Tsunami- Checklist				
Sr. No.	Activity	Yes	No	Remarks
Induction and Training Program.				
1	Induction to employees about the emergency location of Medical Station and Fire Station.			Part of Induction program.
2	All concerned employees and contractual staff informed about the assembly points.			Part of safety tool talk
3	People made aware about tsunami warning signals(earthquake, sudden rise and fall in coastal water level)			Training program
4	People are made aware about evacuation plan in case of emergency.			Training program
5	People are made aware of do's and don'ts before, during and after tsunami.			part of training. List of do's and don'ts enclosed
6	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc. to be placed at FCC control room, DG houses & substation & workshop			Emergency Kit as per annexure
During Warning Period (appx 30 Min)				
1	Cargo operations stopped and all prerequisite for vessel to cast off undertaken			To be made part of emergency drill.
2	Mobile Harbour Cranes in boom down position & properly lashed as per SOP & crane to be parked at designated area. 2.1 Mobile Harbour Cranes at jetty 2.2. Steel yards crane e.g Goliath Cranes & LMC			To be made part of emergency drill.
3	Dumpers and mobile equipment moved away from berth (designated open plots)			
4	Arrangements made for transportation of employees and contractors and labour			
5	Emergency kit, food supplies and drinking water checked and tested.			
6	Communication mediums like VHF, mobile phones and PA systems checked			Numbers mentioned in Annexure
7	Visitors' evacuation is ensured. Note : At the time of cyclone & tsunami warning , priority to be given to worker, technician working on jetty or below jetty.			

During Effective Period				
1	During the event, the safest place is a terrace of structured building. Backup and FCC team to rush to new CT building, Steel yard and jetty staff to tug berth building terrace.			
2	If possible, evacuate the port and move as fast as possible away from the shore line. Follow the evacuation plan.			
3	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present.			
After Effective Period				
1	Assess damage to equipment and buildings, and record the conditions.			
2	Take head count of personnel.			
3	Initiate restart/repair process			
4	Photographs to be taken for assessing damages to cargo and property for insurance.			For insurance purpose
5	Communication to be sent to all clients regarding assessed and potential damage to cargo.			

Liquid Terminal - Emergency Preparedness				
Emergency Response.				
Tsunami Check List				
Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
Induction and Training Program.				
1	Induction to employees about the emergency location of Medical Station, Fire Station.			
2	All concerned employees and contractual staff informed about the assembly points.			
3	All crafts, tugs, fishing boats, and ships to be notified immediately and to move into deep waters away from shore line			
4	Make arrangement of transportation of employees and contractors			
During Effective Period				
1	Avoid standing near sea side. Move as far away from the sea shore as is possible			
2	During the event, the safest place is a terrace of structured building			
3	If possible, evacuate the port and move as fast as possible away from the shore line			
4	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present			
5	Take head count of personnel			
After Effective Period				
1	Take head count of personnel			
2	Assess damage to equipment, building and unsafe condition			
3	Initiate restart process			

Container Terminal - Emergency Preparedness				
Emergency Response.				
Tsunami- Checklist				
Sr. No.	Activity	Yes	No	Remarks
Induction and Training Program.				
1	Induction to employees about the emergency location of Medical Station, Fire Station			Part of Induction program.
2	All employees concerned and contractual staff informed about the assembly points			
3	Park all machines/cranes and secure them as appropriate			To be made part of emergency drill.
4	Make arrangement of transportation of employees and contractors			
During Effective Period				
1	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present			
2	Take head count of personnel			
3	Avoid standing near sea side. Move as far away from the sea shore as possible			
4	During the event, the safest place is a terrace of structured building.			
5	If possible, evacuate the port and move as fast as possible away from the shore line			
After Effective Period				
1	Take head count of personnel			Numbers mentioned in Annexure
2	Assess damage to equipments, building and unsafe condition			
3	Initiate restart/repair process			

Administration - Emergency Preparedness				
Emergency Response.				
Tsunami- Checklist				
Sr. No.	Activity	Yes	No	Remarks
Induction and Training Program.				
1	Induction to employees about the emergency location of Medical Station, Fire Station			Part of Induction program.
2	All concerned employees and contractual staff informed about the assembly points			
3	Evacuation route to be intimated to all drivers			
During Effective Period				
1	All buses and LMVs immediately moved towards parking near each Assembly points			
2	Evacuation route to be cleared with the help of security			
3	All Controll rooms will be manned			
After Effective Period				
1	Assess damage to equipments, building and unsafe condition			
2	Initiate restart/repair process			

Security Services - Emergency Preparedness

Tsunami - Check List

Sr. No.	Activity	Yes	No	Remarks
Before Effective Period				
General Points				
1	Obtain status of tsunami at regular interval from Emergency Control Room and disseminate to others for their information and appropriate safety measures			
2	Establishment of Emergency Control Room at suitable location with communication facilities			
3	A team is to be formed for emergency.			
4	All vehicles to be topped up with fuel – prior to effective period, and topped up on daily basis.			
5	Walkie talkie sets to be fully charged along with stand-by batteries			
6	Keep mobiles (personal/official) fully charged			
7	Ensure emergency lights are functioning			
8	Ensure mega phones are functioning (change old batteries)			
9	Ensure public announcement (PA system) on ERT vehicle is functioning			
10	Ensure digital cameras and handy cam are fully charged.(ERT, PSC, MSB, MWB)			
11	Ensure security guards in possession of all PPEs and whistle			
12	Ensure availability of rope (30 Mtr), life jacket & tarpaulin (If available), at respective gate & 01 at ISCR,			
13	Traffic cone to be removed and kept in closed room (may be affected by high wind)			
14	Frontier from roads to be removed and kept in covered godown in stacking mode.			
15	Search lights to be kept ready dully functional.			
16	Hammer and cutting tools (available with Fire Dept).			
17	Bottled drinking water to kept in all emergency vehicles			
18	First Aid Box to be kept with all emergency vehicles duly updated from medical wing.			
19	Emergency numbers to be kept with all emergency vehicles			
20	Security reinforcement to be kept ready at guards colony with due provision of transport (whichever transport mode is available).			
21	Alternate route for hospital and other locations to be checked and available with all emergency teams.			
22	Detailed briefing of security guards to be carried out			
23	Communication to be done as per requirement (to save battery of mobile & VHF)			
24	Remove security guards from remote and isolated location as per instruction of ISCR.			
25	Ensure rain coat available with all Security personnel on duty			
26	List of emergency contacts & suppliers.			
27	Material & equipment that cannot be moved are to be covered.			
28	Hoist appropriate storm warning Signal.			
29	A team is to be formed for emergency.			
30	Remove all loose materials and equipment from jetty & other areas			
31	Ensure all workmen are sheltered at safe locations like canteens (concrete buildings)			

32	Stop all vehicle movement and ensure the vehicles are parked at safe location with blocked wheels			
33	Ensure roads and pathways are cleaned			
34	Air filled tubes, bamboos & air filled boats to be kept ready for evacuation			
During Effective Period				
1	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employee are present			
2	All personnel to be notified against venturing out during effective period			
3	All personnel to remain indoor, observant and be alert			
4	Avoid taking shelter near old or damaged buildings or near tress			
5	All doors and windows to be shut			
6	Avoid the top floor of buildings. Stay close to ground floor			
7	Close the visitors' gate			
8	Occupy pre-determined post for controlling security of installation			
9	Call up additional help from barracks			
10	Ensure that unauthorized persons/vehicles do not enter the gate			
11	Provide security men for firefighting & rescue			
12	Arrange for transport of higher authorities to the terminal			
13	Transport vehicles would be provided near emergency control center			
14	Depute security guards for controlling traffic at scene of disaster			
15	Produce a list of port staff on duty in co-ordination with time office			
16	Ensure availability of security men at gates so that they can lead authorities to disaster site			
17	Ensure that non-essential persons do not crowd affected area			
18	Instruct all drivers to take shelter at canteens (concrete buildings)			
19	Ensure vehicles are parked at designed parking areas, with wheels are blocked			
20	Close the gate ant stop allowing visitors and transport trucks either inward or out ward			
21	If caught in open areas during tsunami find a safe shelter immediately			
After Effective Period				
1	Assess damage to equipment, building and unsafe condition.			
2	Do not enter in damaged buildings			
3	Use mobile phones only for emergency calls			
4	Start search operation for living things			
5	Do not use any damaged electronic goods			
6	Drink boiled water			
7	Confirm with concerned about situation of tsunami before you move out			
8	Start restorative measures & repairs			

Railway Services - Emergency Preparedness				
Emergency Response.				
Tsunami- Checklist				
Sr. No.	Activity	Yes	No	Remarks
Induction and Training Program.				
1	Induction to employees about the emergency location of Medical Station and Fire Station			Part of Induction program.
2	All concerned employees and contractual staff informed about the assembly points			Part of safety tool talk
3	People made aware about tsunami warning signals(earthquake, sudden rise and fall in coastal water level)			Training program
4	People are made aware about evacuation plan in case of emergency			Training program
5	People are made aware of do's and don'ts before, during and after tsunami			Part of training. List of do's and don'ts enclosed
6	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc. to be placed at FCC control room, DG houses & substation & workshop			Emergency Kit as per annexure
During Warning Period (appx 30 Min)				
1	Railway operations stopped			To be made part of emergency drill.
2	Locomotive to be sent at safe places			To be made part of emergency drill.
3	Electrical supply to the signalling panel to be switched off			
4	Arrangements to be made for transportation of employees and contractors and labourers			Numbers mentioned in Annexure
5	Emergency kit, food supplies and drinking water checked and tested			
6	Communication mediums like VHF, mobile phones and PA systems checked			
7	Visitors' evacuation is ensured			
During Effective Period				
1	During the event, the safest place is a terrace of structured building. Railway Operation team to rush to new CT building, Railway control room MDCC MPT. MICT Building			
2	If possible, evacuate the port and move as fast as possible away from the shore line. Follow the evacuation plan			
3	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employees are present			
After Effective Period				
1	Assess damage to equipment and buildings, and record the conditions			
2	Take head count of personnel			
3	Initiate restart/repair process			
4	Photographs to be taken for assessing damages to cargo and property for insurance			For insurance purpose
5	Communication to be sent to all clients regarding assessed and potential damage to cargo			

WEST BASIN - EMERGENCY PREPAREDNESS

Emergency Response

Tsunami- Checklist

Sr. No.	Activity	Yes	No	Remarks
Induction and Training Program				
1	Induction to employees about the emergency location of medical station and fire station			Part of Induction program.
2	All concerned employees and contractual staff informed about the assembly points			Part of safety tool talk
3	People to be made aware about tsunami warning signals(earthquake, sudden rise and fall in coastal water level)			Training program
4	People to be made aware about evacuation plan in case of emergency			Training program
5	People to be made aware of do's and don'ts before, during and after tsunami			part of training. List of do's and don'ts enclosed
6	Emergency kit is prepared beforehand. The emergency kit contains flashlight and extra batteries, battery-operated radio and extra batteries, first aid kit emergency food and water, essential medicines, whistle, etc. to be placed at Central Control Room			Emergency Kit as per annexure
7	Ensure that no elevator or lift to be used in case of emergency			
8	Wardens of the individual buildings must be aware of their duties			Duties of Warden
9	Ensure all personnel working inside port are aware of the various siren codes (emergency, evacuation, all clear)			
During Warning Period (Approx. 30 Min)				
1	Cargo operations stopped and all prerequisite for vessel to cast off undertaken			To be made part of emergency drill.
2	All GSU cranes are secured with storm storm-lock pin			To be made part of emergency drill.
3	All stackers and reclaimer machines are locked and kept at the end			To be made part of emergency drill.
4	Dumpers and mobile equipment moved away from berth (to be kept in yards without obstruction)			
5	Arrangements to be made for transportation of employees and contractors and labourers			Numbers mentioned in Annexure
6	Emergency kit, food supplies and drinking water checked and tested.			
7	Communication mediums like UHF, mobile phones and PA systems checked			
8	All the personnel working on jetty or nearby seaside are to be moved.			
9	Ensure emergency teams [Fire, Safety, Security, Marine, Operation, Engineering, Stores, Admin, Railway] are ready.			
10	Residential area of labors inside the port needs to be shifted until the situation gets controlled			
11	Visitors' evacuation is ensured			
12	Ensure that no personnel should be inside the hatch and hatches are to be closed			
13	Ensure that details of contract workforce [head-count] at the time of evacuation or shifting			

During Effective Period				
1	During the event, the safest place is a terrace of structured building. Move away from seaside as far as much you can			
2	If possible, evacuate the port and move as fast as possible away from the shore line. Follow the evacuation plan			
3	Assemble at emergency assembly point and evacuate the area, when announced. Ensure all company and contract employees are present			
4	Emergency team to coordinate and act as per the guidance			
After Effective Period				
1	Assess damage to equipment and buildings, and record the conditions			
2	Take head count of personnel			
3	Initiate restart/repair process			
4	Photographs to be taken for assessing damages to cargo and property for insurance			For insurance purpose
5	Ensure that site-round is taken, report prepared and submitted the observations to all concern for compliance			
6	Communication to be sent to all clients regarding assessed and potential damage to cargo			
Pre-Assessment Checklist [Preparedness in Early Stage]				
1	Ensure that emergency team has been prepared along with roles & responsibility			
2	HODs have a meeting above the impending emergency steps			
3	Ensure each representative of each department has a substitute (Dry Cargo, E&I, MHS SR, MHS Conv, MHS GSU, MHS WLS TLS, MHS Utility, ES CWS, ES Civil, Fire, Safety, Security, Marine, Railway, Admin, Store, IT etc)			
4	Ensure that emergency siren is working			
5	Ensure that PA System/VHF/Base station are working			
6	Ensure that list of Emergency Contact Numbers are displayed			
7	Ensure that all employees, contractors/vendors/visitors/other customer are aware of emergencies and preparedness			
8	Ensure that site-round is taken, report prepared and submitted the observations to all concern for compliance			
9	Ensure all jobs carrying out on height work (or jobs which require scaffolding) to be monitored and controlled			
10	Ensure that Emergency kit contains following items; torches, ropes, wires, tarpaulins, plastic sheets, tool kit, duct tapes, assorted gears, first aid box, sand bags			
11	Ensure that respective HOD/HOS have inspected areas			
12	Ensure that all the important document are preserved at a proper place			
13	Ensure all the customers/surveyors have been informed regarding emergency situation and preparedness			
14	Ensure proper communication with Security for traffic control of dumpers/trucks			
15	Ensure proper communication with railway department (Govt) for rake movement with respect to emergency			
16	Ensure proper communication with transporters and agents for their role in case of emergency			
17	Ensure electrical isolation of machines/equipment			
18	Ensure that wind anemometer is working in all equipment (i.e. stacker-reclaimer, GSU)			

19	Ensure that any information from CCR/higher authority must be passed on to the downstream			
20	Ensure that all drains, sock-pits etc are cleaned off			
21	Ensure proper communication with the vessels and tugs for actions required			
22	Ensure proper communication with the emergency boats			
23	Ensure proper communication with the POC for further information/ updates/news of respective emergency from disaster authority/ Govt agencies			
24	Refer to the General DMP Checklist of West Basin [Departmentwise/Sectionwise]			

QHSE&F - Emergency Preparedness				
Emergency Response.				
Tsunami- Checklist				
Sr. No.	Activity	Yes	No	Remarks
Induction and Training Program.				
1	Arrange induction /training program for all personnel on emergency preparedness & its awareness			Part of Induction/ training program.
2	All concerned employees and contractual staff informed about the assembly point & evacuation locations			
3	To arrange emergency drill for dealing with such emergency			To be made part of emergency drill.
4	To arrange necessary training for emergency response team/ CMG/First Aid Team/Medical Team/Fire rescue team to deal with emergency. (Ensure availability of trained rescue team & necessary equipments all the time)			
5	Arrange training for all QHSE&F team member for emergency response & clear cut understanding of their crucial roles & responsibility during emergency			
6	To prepare & check effectiveness of Emergency Response Plan/ Disaster Management Plan			
7	To do proper co-ordination with all concern department for maintaining necessary emergency response kit & necessary aids in required inventory or make identified supply of the same during declaration of such emergency			
8	To maintain close co-rdination with mutual aid for dealing with emergency			
During Effective Period				
1	Assist CEO/Executive Director (Corp. Affairs). as instructed			
2	Co-ordination with respective HOD/HOS with respect to emergency actions			
3	Ensure necessary action through CMG. Provide necessary assistance to CMG			
4	Assist in evacuation of all personnel except key personnel			
5	Provide HSE & F facilities (Assist for rescue, evacuation, and other necessary arrangement)			
6	Set up casualty collection centre and arrange first aid posts			

7	Arrange enough stock medicines, antidotes, oxygen and stretchers			
8	Arranges additional medicine and equipment as required			
9	Arrange a fully equipped Ambulance in ready state			
10	Make arrangements for mobile casualty to reach at incident sites and transporting for further treatment			
12	To do immediate co-ordination to mutual aids for necessary help/ support if required			
After Effective Period				
1	Assist to CEO/Executive Director (Corp. Affairs)			
2	Assess damage (human) and send for further treatment			
3	Assess the property damage and prepare report			
4	Assist all HODs with restoration			
5	Perform necessary rescue through rescue team where needed			
6	Check each & every affected area & arrange for necessary HSE& F actions as require			
7	After completion of all rescue, restoration work. Check the effectiveness of executed emergency plan & take necessary require corrective action to update the plan & necessary facilities if required			
8	To motivate the emergency rescue team, CMG & all concerned, who have perform well during emergency			



Resources Logistics Energy

www.adaniports.com

Follow us on:



[/AdaniOnline](#)

adani™

Annexure – 19

❖ Roof Top Rain Water Harvesting System



Location: Tug Berth Building (Mundra Port Terminal)

Annexure - 20

Cost of Environmental Protection Measures

Sr. No.	Activity	Cost incurred (INR in Lacs)			Budgeted Cost (INR in Lacs)
		2022 - 23	2023 - 24	2024 - 25 (till Sep'24)	2024 - 25
1.	Environmental Study / Audit and Consultancy	7.32	22.67	1.88	27
2.	Legal & Statutory Expenses	12.32	8.60	5.00	13
3.	Environmental Monitoring Services	15.32	13.37	6.11	19.20
4.	Hazardous / Non-Hazardous Waste Management & Disposal	104.035	130.11	19.10	172.40
5.	Environment Days Celebration and Advertisement / Business development	2.53	3.42	2.80	4.00
6.	Treatment and Disposal of Bio-Medical Waste	2.29	2.28	1.20	2.28
7.	Mangrove Plantation, Monitoring & Conservation	35.0	15	0	0
8.	Other Horticulture Expenses	956	904	253	831
9.	O&M of Sewage Treatment Plant and Effluent Treatment Plant (including STP, ETP of Port & SEZ & Common Effluent Treatment Plant)	141.33	186.94	74.69	195.41
10.	Expenditure of Environment Dept. (Apart from above head)	90.136	80.39	2.19	75.92
Total		1366.28	1366.78	365.97	1340.21

Annexure - 21

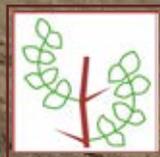
Final Report

Shoreline Change Assessment Studies Using Satellite Imageries at Adani Ports and SEZ Limited, Mundra

Submitted to: -

Adani Ports and Special Economic Zone Ltd (APSEZL),
Mundra, Kachchh District, Gujarat

Submitted by: -



Gujarat Institute of Desert Ecology
P.O.Box # 83, Opp.Changleshwar Temple,
Mundra Road, Bhuj,
Kachchh-370001, Gujarat

August 2022

Project Personnel

Project Coordinator

Dr. V. Vijay Kumar, Director

Principal Investigator

Mr. Dayesh Parmar, Project Officer

Team Member

Mr. Chetanbhai Pandya & Team (DGPS Survey)

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1. Gujarat.....	1
1.1.1. Gulf of Kachchh	2
1.2. About Adani Ports and Special Economic Zone Ltd. (APSEZL).....	3
1.3. Origin of the Study	3
1.4. Objectives of the Study.....	4
2. STUDY AREA	5
2.1. Location.....	5
2.2. Climate.....	5
2.2.1. Tidal Regime.....	6
2.2.2. Currents.....	6
2.2.3. Salinity	7
3. METHODOLOGY AND DATA USED	8
3.1. Short Term Shoreline Change Analysis	9
3.2. Long Term Shoreline Change Analysis	9
3.3. Data Used.....	10
3.3.1. Pre-processing.....	10
3.4. Field Work.....	12
4. RESULTS AND ANALYSIS.....	14
4.1. Results For Shoreline Change Analysis From Satellite Images.....	14
4.1.1. Results for Overall Shoreline Change From 2015 to 2022.....	15
4.1.2. Zones of High Erosion and High Accretion	16
4.1.3. Beach Profile	20
5. CONCLUSION	26
5.1. Shoreline Changes.....	26
5.2. Recommendations	27

LIST OF FIGURES

Figure 2.1: Location Map of The Study Area.....	6
Figure 3.1: Flowchart of the Methodology Adopted	8
Figure 3.2: Calculation of Short-Term Shoreline change analysis	9
Figure 3.3: Calculation of Long Term (LRR) Shoreline Change Analysis	10
Figure 3.4: Shoreline Digitization for Different Years Using Multi Date Satellite Imageries.....	12
Figure 3.5: Establishing DGPS Base Station (A) And Collecting Survey and Ground Truthing Data(B), (C), (D) Using Rover.....	13
Figure 4.1: Study area in two blocks.....	15
Figure 4.2: Shoreline Changes During March 2015 to April 2022.....	16
Figure 4.3: Zones of High Erosion and High Accretion	17
Figure 4.4: Shoreline Data of the Study Sites Using DGPS	18
Figure 4.5: Approved CZMP in line with CRZ Notification, 2011 prepared by National Centre for Coastal Management (NCSCM)	19
Figure 4.6: Beach Profile of the study area.....	21
Figure 4.7: Beach Profile at Different Locations	22
Figure 4.8: Satellite image of the Study area during May 2015.....	23
Figure 4.9: Satellite image of the Study area during May 2022.....	24
Figure 4.10: :(a) Modhava Coast, (b) and (c) and (d) Western Coast (e) & (f) Eastern Coast of Adani Port.	25

LIST OF TABLES

Table 3.1: High-resolution Satellite Data for Shoreline Procured From NRSC 10

Table 4.1: Details of Average and Maximum Short term Shoreline Changes 16

1. INTRODUCTION

The shoreline is the zone where large bodies like an ocean or lake meet the land. The coastal shoreline is a dynamic interface between the land and the sea water which gets altered due to various coastal processes that govern it such as wave characteristics, near-shore circulation, sediment characteristics, beach forms, etc. Shoreline changes are the result of a process called littoral transport, which is responsible for moving eroded materials along the coasts utilizing waves and currents in the nearshore zone (Misra and Ramakrishnan, 2015). The developmental and maintenance activities such as the construction of the port, mining of beach sand, industrialization, garbage dump, urbanization, recreational activities, discharge of domestic sewage and industrial effluent, and reduction in sediment supply from rivers have amplified the processes of modifications, including changes in the shoreline (Kannan and Malarvannan, 2016).

An important aspect of the shoreline is the sustainable development and protection of the coastal environment. Therefore, monitoring coastline areas is a crucial subject since shorelines are the most important and dynamic natural phenomenon (Tamassoki *et al.*, 2014), where changes in one part subsequently affect the other parts, which will be a chain of reactions.

1.1. Gujarat

Gujarat is situated on the western coast of India, in the Arabian Sea. Among the maritime states of India, Gujarat has the longest coastline of around 1650 km, which supports a wide diversity of marine flora and fauna. The state has two gulfs, the Gulf of Khambhat and the Gulf of Kachchh, and the coast is differentiated between high rainfall area (2500 mm in south Gujarat) and low rainfall area (250 mm in the northwest part of Kachchh). The coast experiences a different range of tides, waves, cyclones, and currents in the sea, affecting the physical as well as the biological conditions of the whole marine ecosystem.



1.1.1. Gulf of Kachchh

The Gulf of Kachchh is situated along the west coast of Gujarat in India. It is about 170 Km in length. The coastal stretch of Kachchh district constitutes the entire northern coast of the Gulf of Kachchh (GoK) which is one of the three major Gulf systems of India endowed with very high biological richness and physical and chemical peculiarities. Despite its high aridity (4 on a scale of 1- 4) and poor mean rainfall (340 mm), the Kachchh coast has diverse ecological habitats and ecosystems like mangroves, sandy coasts, mudflats, creeks, and other tidal incursions which enhance manifold its coastal landscape diversity and natural resources.

In the late 1990s, industrial development was promoted aggressively because of its very rich mineral deposits, the short sea routes to Gulf countries, and easy availability of land which were considered best than the other coastal regions of the state. The announcement of tax holidays during the post-earthquake in 2001 by the state government provided further impetus for coastal industrial development. Many of these developments are beginning to have implications for ecological, social, and economic spheres. Kachchh coast faces threats from climate change, pollution, and habitat changes which are crucial for understanding the impacts on the shoreline.

Morphological change is responsible for the change in coastal structure or shape. Morphological change occurs due to tidal patterns. It can be estimated by different methods like Aerial photography, Field survey using GPS, Satellite remote sensing, LIDAR, etc.

The shoreline changes occurring due to processes like accumulation and erosion of substratum can be analysed in a Geographic Information System (GIS) by examining differences between the shoreline of different years. Shoreline proxies include the high-water line, vegetation line and dunes among many others. (Jodhani *et al.*, 2020)



1.2. About Adani Ports and Special Economic Zone Ltd. (APSEZL)

The former Gujarat Adani Port Ltd., now named as Adani Ports and Special Economic Zone Ltd. (APSEZL) started its operations in Mundra in 1998 with an all-weather, open-sea jetty and port backup at Navinal Island. The Port has since then undergone four expansions, namely a railway line and container terminal in 2000, Single Point Mooring and Pipeline for crude oil terminal in 2004, a Multipurpose wharf Terminal-II in 2007, and a Waterfront development project in 2009 which includes the development of North Port, South Port, East Port & West Port. In addition to these, port-based special economic zone and two thermal power plants exist which form a major industrial cluster of this coast.

1.3. Origin of the Study

APSEZ has obtained Environmental and CRZ Clearance for a waterfront development project at Mundra District, Kachchh, Gujarat, and as a part of EC/CRZ Clearance condition, APSEZ shall undertake “The shoreline changes in the area shall be monitored periodically and the reports to be submitted every 6 months to RO, Bhopal”.

Also, APSEZ had undertaken a Cumulative Impact Assessment (CIA) through NABET accredited consultant namely M/s. Chola MS Risk Services Limited, Chennai in the year 2015-16 in line with the MoEF&CC Order dated 18th September, 2015 for the projects already granted Environmental Clearance and CRZ Clearance in the region so that future developments can be assessed for providing necessary approvals at a later stage. As a part of the Environmental Management Plan (EMP) compliance with the CIA study, APSEZ shall undertake a study “To map the coastal morphology (Shoreline) at least once in three years”. Therefore, Adani Ports and Special Economic Zone Ltd. (APSEZL) has approached M/s. Gujarat Institute of Desert Ecology (GUIDE) to study the intensive monitoring of shoreline changes through high-resolution satellite imageries (LISS-IV). The present report compiles the results of shoreline change analysis by using satellite imageries and beach profile analysis of a 55 km coastline stretch of Adani Ports and Special Economic



Zone Ltd. (APSEZL). Due to the dynamic nature of shoreline boundary, it is essential to understand the long and short-term rate of shoreline changes from a coastal vulnerabilities point of view.

1.4. Objectives of the Study

1. To map and monitor shoreline behavior (changes) of 13 km (16 km on west side and 27 km on east side of Adani main port) coastline stretch of Adani Ports and Special Economic Zone Ltd. (APSEZL) using LISS-IV high-resolution satellite imageries during the years 2015 and 2022 after construction of port activities.
2. To identify the zones of high erosion and accretion using LISS-IV, high-resolution satellite imageries.
3. Collection of shoreline information and cross-sectional profiles using DGPS, at 20.00-meter interval along the route & offset between high tide line to low tide line, along the 10km stretch around the project site.
4. Shoreline change analysis by superimposing DGPS Survey data with satellite data.
5. Superimposing current shoreline changes data on approved CZMP in line with CRZ Notification, 2011 prepared by National Centre for Coastal Management (NCSCM).



2. STUDY AREA

2.1. Location

Kachchh coast constitutes the entire northern shore of the Gulf of Kachchh marked by narrow beaches and wide mudflats. The coastal stretch of the Mundra is dissected by extensive mudflats and creek systems. Major creek systems in the area are Navinal, Bocha, Baradi mata, and Kotadi creek. These creeks are again divided into minor creek complexes. The present study is about the shoreline changes on the coastal stretch of Mundra between the western side of Modhva to the eastern side of Luni which forms the study area (Fig.1.1) earmarked on the map.

The study site is 43 km long coastline stretch (16 km on the western side and 27 km on the eastern of Adani main port) of Adani Ports and Special Economic Zone Ltd. (APSEZL), located on the western coordinates of site 22°47'37.289"N, 69°25'18.078"E to eastern coordinates of site 22°50'56.604"N, 69°54'8.115"E, which is given in Figure 2.1.

2.2. Climate

As per the Indian Meteorological Department, Govt. of India, the highest monthly mean of daily maximum temperature of the study area is 36°C. The dry bulb temperature goes up to 47.8°C, considering max Humidity of 95%. The wind is predominantly from the south-west as well as from the west to some extent. The wind velocity is 65 km/hr.

Due to its arid nature, annual rainfall in Kachchh is poor, ranging from 250-350 mm which is often irregular. However, the mean annual rainfall during 1932 to 2021 was higher at Mundra (478 mm) comparing to other coastal talukas of Kachchh district. Rain during monsoon is confined to only 12-16 days and occurs as an instant downpour. Freshwater input into the near coastal waters is quite meagre and appears to influence the coastal erosion. Annual temperature fluctuation in the district is extreme, ranging from 7- 47 °C with a yearly average humidity of 60% which increases to 80% during the southwest monsoon and decreases to 50%



during November-December. The phenomenon of drought is common, with 2 drought years in a cycle of 5 years(Thivakaran *et al.*, 2015).

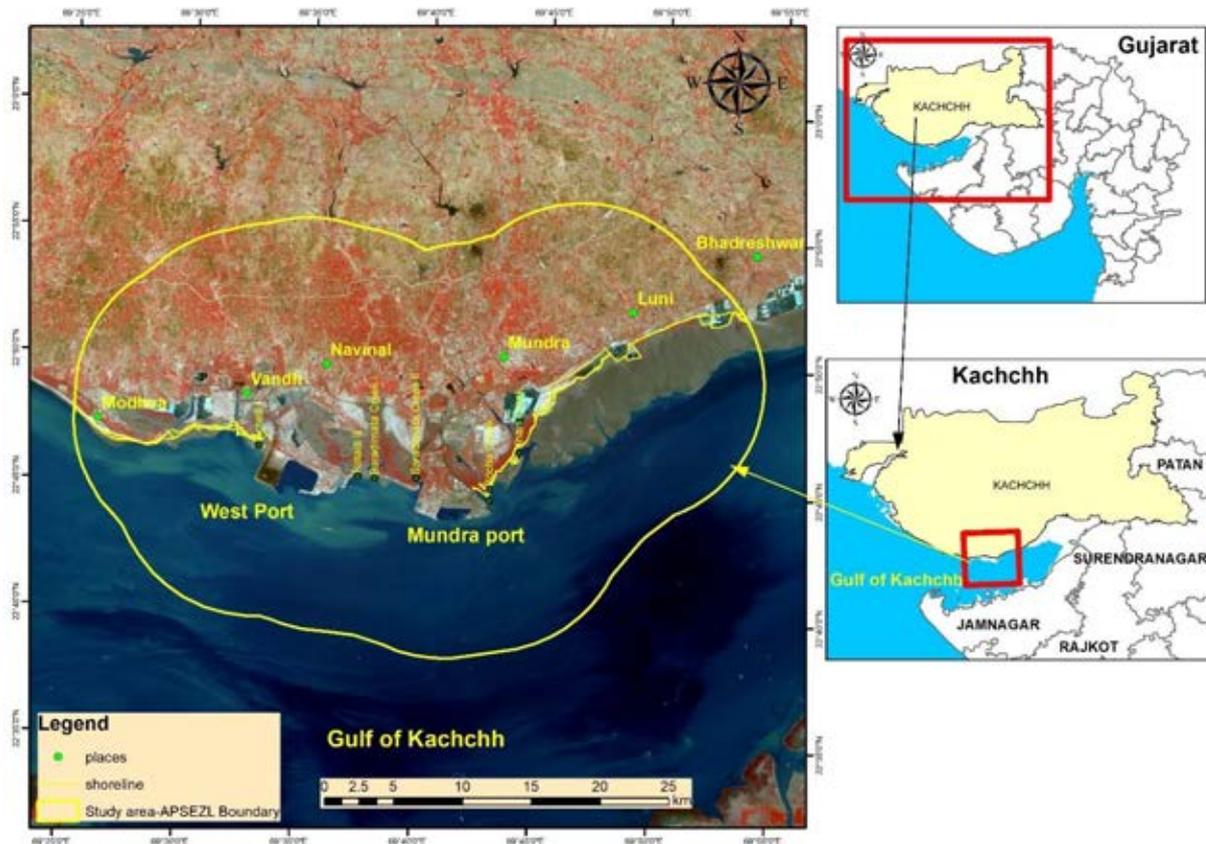


Figure 2.1: Location Map of The Study Area

2.2.1. Tidal Regime

Tides at Mundra are the mixed type, predominantly semidiurnal type with a Mean High-Water Spring (MHWS) of 6.66 m and Mean High water Neap (MHWN) of 5.17 m. The phase difference is not uniform for successive tides in the Gulf and it varies as per tidal conditions ((ICMAM 2004).

2.2.2. Currents

The currents in the Gulf and associated creeks are largely tide induced and oscillations are mostly bimodal reversing in direction with the change in the tidal phase. The influence of wind on variations in current is minor. The current reversals are quite sharp occurring within 30 - 60 min. The maximum current

speed varied from 0.5 to 1.2 m/s. The predominant direction of the current is 45° during flood and 220° during ebb.

The circulation is generally elliptical with the major axis in the east-west direction. These trajectories suggest that the excursion lengths are in the range of 10 to 15 km depending on the tidal phase (neap or spring)(NIO, 2009).

2.2.3. Salinity

Salinity is an indicator of freshwater intrusion in nearshore coastal waters as well as the excursion of salinity in inland water bodies such as estuaries, creeks, and bays. Normally seawater salinity is 35.5 ppt but may vary depending on evaporation, precipitation, and freshwater addition. Salinity largely influences several processes such as dissolution, dispersion, dilution, etc in seawater due to high dissolved salt content and high density. In the absence of freshwater inflow, the salinity varies from 35.9 to 38.0 ppt.



3. METHODOLOGY AND DATA USED

The shoreline change analysis has been carried out using multi-date satellite images to estimate the rate of change in terms of distance of the shore eroded or accreted using a cross-shore profile in terms of area and volume. From the satellite images, the shoreline has been extracted after rectification and co-registration. The rate of shoreline changes from 2015 to 2022 has been analysed and compared with the DGPS survey and ground truthing data for which Digital shoreline change analysis system (DSAS) software that works within the Geographic Information System (ArcGIS) software was applied. DSAS computes rate-of-change statistics for a time series of shoreline vector data. It is also useful for computing rates of change for other boundary change conditions that incorporate a clearly-identified feature position at discrete times (Himmelstoss *et al.*, 2018). The methodology flowchart of the present study on the shoreline change is shown in (Figure 3.1)

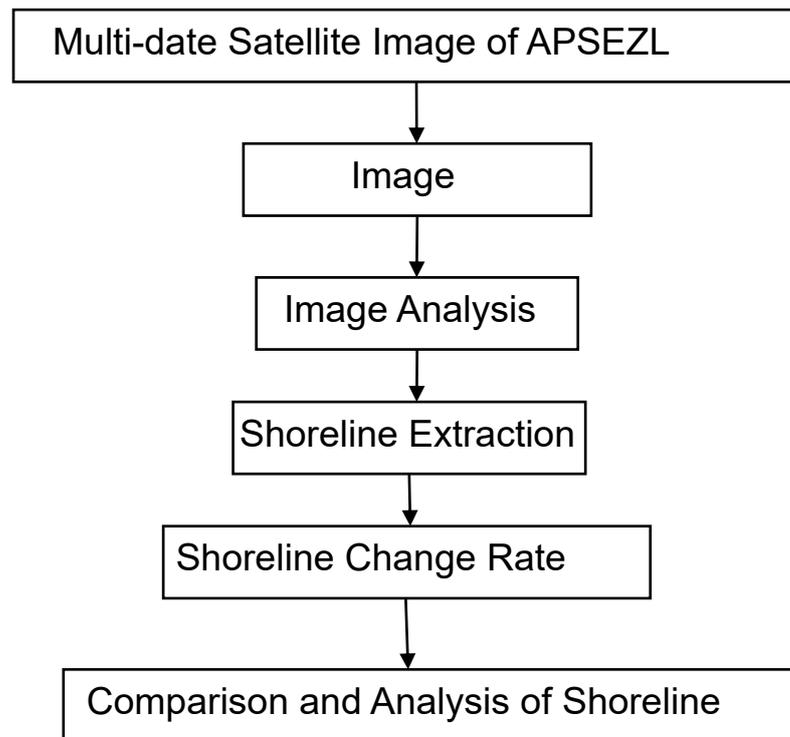


Figure 3.1: Flowchart of the Methodology Adopted



3.1. Short Term Shoreline Change Analysis

The end point rate (EPR) is calculated by dividing the distance of shoreline movement by the time elapsed between the oldest and the most recent shoreline (Figure 3.2). The major advantages of the EPR are the ease of computation and the minimal requirement of only two shoreline dates. The major disadvantage is that in cases where more data are available, the additional information is ignored.

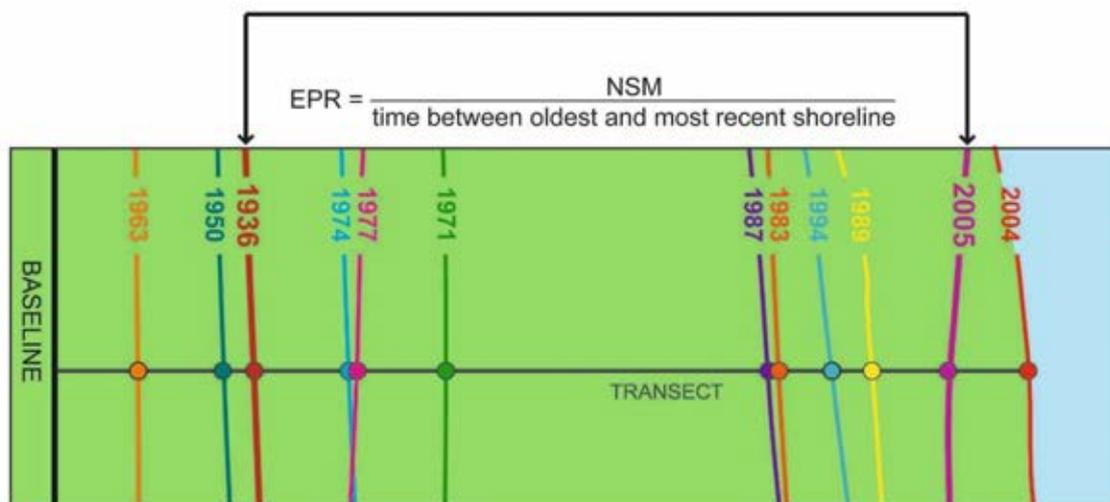


Figure 3.2: Calculation of Short-Term Shoreline change analysis

(Sample image source: (Sweet *et al.* 2017))

3.2. Long Term Shoreline Change Analysis

A linear regression rate-of-change (LRR) statistic is determined by fitting a least-squares regression line to all shoreline points for a particular transect (Figure 3.3). The regression line is placed so that the sum of the squared residuals (determined by squaring the offset distance of each data point from the regression line and adding the squared residuals together) is minimized. The linear regression rate is the slope of the line. However, the linear regression method is susceptible to outlier effects and also tends to underestimate the rate of change relative to other statistics (Sutikno *et al.*, 2017).



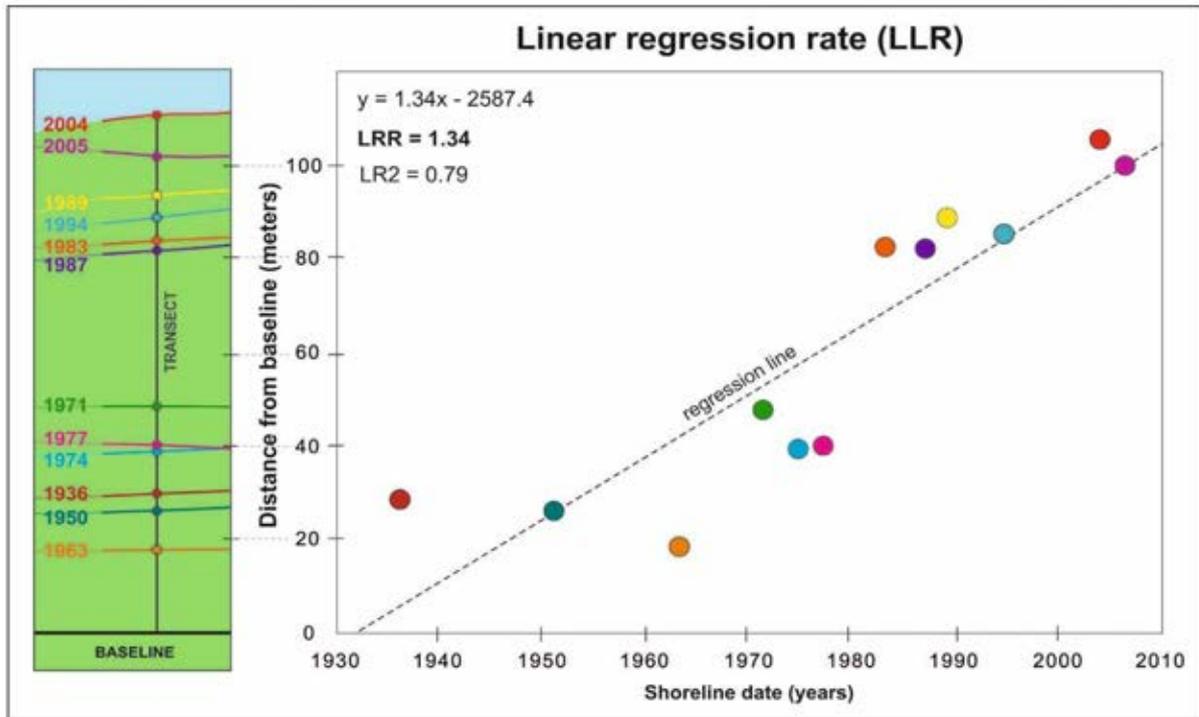


Figure 3.3: Calculation of Long Term (LRR) Shoreline Change Analysis

(Sample image source:(Sweet *et al.* 2017))

3.3. Data Used

The Multi-date satellite imageries, LISS-III and LISS-IV were procured from NRSC, Hyderabad was used for the analysis of the present study. The details of the satellite imagery used for the present study are given below (Figure 4.8, Figure 4.9 and Table 3.1).

Table 3.1: High-resolution Satellite Data for Shoreline Procured From NRSC

Satellite	Date	Sensor	Resolution (m)
IRS-R2	03 th March 2015	LISS-III	23.5
IRS-R2	12 th April 2022 and 24 th April 2022	LISS -IV	5.8

3.3.1. Pre-processing

Pre-processing of satellite data includes correction of geometric, atmospheric, and radiometric aspects and clipping of the area to obtain the exact imagery of the project sites. The rectification operation aims to correct distorted images to create



a more faithful representation of the original scene. It typically involves the initial processing of raw image data to correct geometric distortions.

Radiometric Correction: Radiometric correction addresses variations in the pixel intensities (DNs) that have not been caused by the object or scene scanned. These variations include differing sensitivities or malfunctioning of the detectors, topographic effects and atmospheric effects.

Geometric Correction: Geometric correction addresses errors in the relative positions of pixels. These errors are induced by sensor viewing geometry or terrain variations. A geometric correction was done based on Ground Control Points (GCPs) and the image was re-sampled using the nearest neighbourhood interpolation method.

Shoreline Extraction: Continuous shoreline positions were extracted automatically and digitized manually for two different periods i.e., 2015 and 2022. Digital Shoreline Analysis System (DSAS) version 5.1, an extension of ESRI ArcGIS software was used to calculate shoreline rate of change statistics from a time series of multiple shoreline positions. The shoreline positions were compiled in ArcGIS with 5 attribute fields that included Object ID (a unique number assigned to each transect), shape, shape length, ID, date (original survey year), and uncertainty values. All different shoreline features were then merged within a single line on the attribute table, which enabled the multiple coastline files to be appended together into a single shape file. The Shoreline change rate was calculated by Endpoint rate (EPR) for the short term and Linear Regression Rate (LRR) for the long-term period. DSAS is purely a statistical approach. A baseline was digitized onshore by closely digitizing the direction and shape of the outer shoreline, which was used as the starting point for all transects.



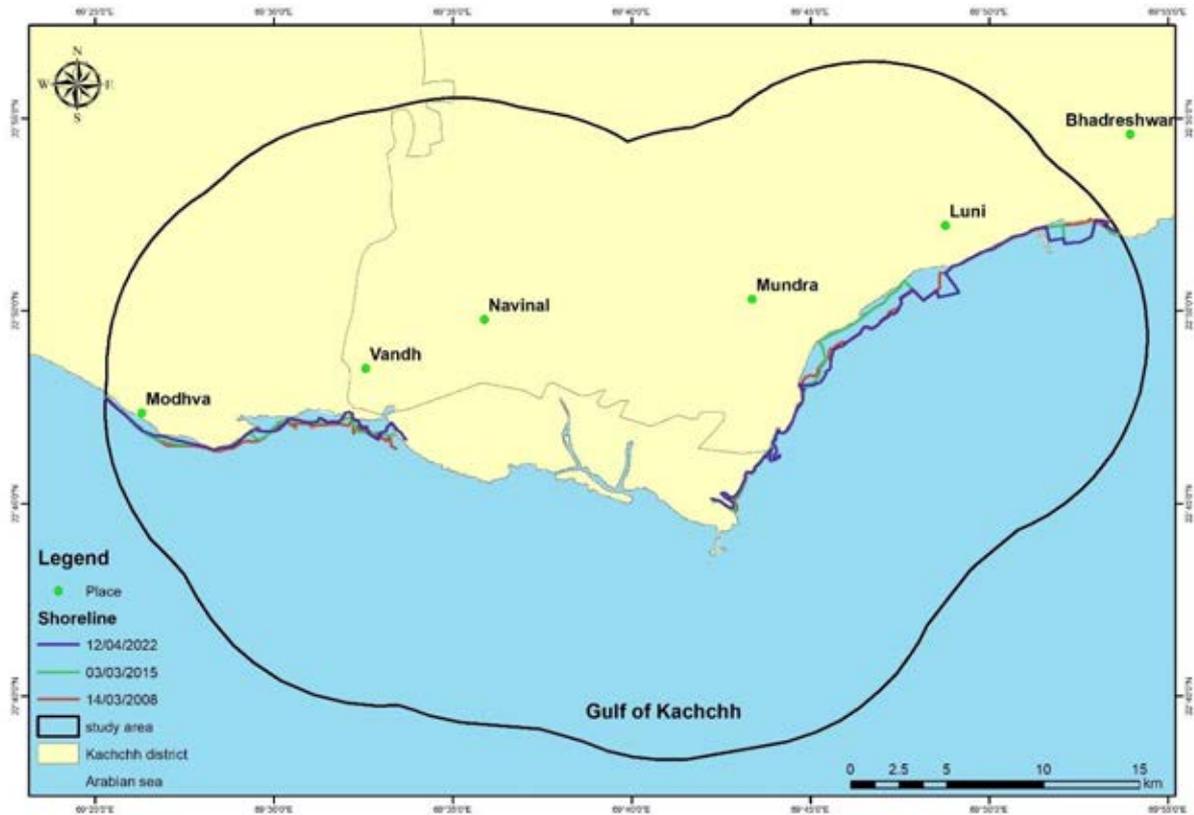


Figure 3.4: Shoreline Digitization for Different Years Using Multi Date Satellite Imageries.

3.4. Field Work

Field investigation is a vital part of the project. Fieldwork helps to check and collect most of the ground information required for shoreline mapping. The fieldwork was conducted during the period between 26th to 30th April 2022 and 21st to 23rd June 2022 for the DGPS survey and collecting ground truthing data.





Figure 3.5: Establishing DGPS Base Station (A) And Collecting Survey and Ground Truthing Data(B), (C), (D) Using Rover.

4. RESULTS AND ANALYSIS

In the present study, the rate of shoreline changes statistics on a time series of multiple shoreline positions of a totally 43 km coastline stretches (16 km on the west side and 27 km on the east side of Adani main port) on either side of Adani Ports and Special Economic Zone Ltd (APSEZL) has been taken in to account for the calculation by using satellite images. A total of 4254 transects were generated with 10m spacing along the shoreline. The length of each transect (Cross shore) was between 500 to 3000m. The variations in the rate of shoreline change were recorded as N – S coast configuration. The shoreline change analysis was carried out for 2015-2022, the short-term shoreline change analysis method EPR was carried out using medium resolution (LISS III) and high-resolution images such as LISS-IV.

As a part of the NGT direction, the shoreline change analysis has been carried out for the years 2015-2022 to study the immediate changes after the commissioning of the port and initiation of the activities (September 2015) for short-term variation for the year 2015-2022 using EPR method has been carried out.

Based on the rate of change over the period, shoreline change has been categorized into seven classes National shoreline Assessment system (N-SAS, 2022). They are; high accretion (>5m/year), moderate accretion (3.0 to 5.0 m/year), low accretion (0.5 to 3.0 m/year), stable coast (0.5 to -0.5m/year), low accretion (-3.0 to -0.5 m/year), moderate erosion (-3.0 to -5 m/year) and high erosion (>-5m/year).

4.1. Results For Shoreline Change Analysis From Satellite Images

The erosion and accretion are highlighted with red and green colour respectively for better understanding. The study area is divided into two major blocks (1) West port and (2) Eastern side block for accurate analysis as shown in Figure 4.1.





Figure 4.1: Study area in two blocks.

4.1.1. Results for Overall Shoreline Change From 2015 to 2022

The results of the imagery data analysed before the port activity using medium to high resolution of (LISS-III (23.5m) and LISS-IV (5.8m)) satellite images, processed for the period 2015 to 2022 have shown a high rate of accretion (5 to 191 m/year) to stable coast along the eastern side block except for a few pockets where there was low to moderate erosion on the shore has seen. In contrast on the western side of the port, most of the area are highly eroded (Figure 4.2) at has been observed. The details of the instantaneous rate of shoreline changes (Short interval time) recorded from 2015 to 2022 are summarised in Table 4.1. The data indicated that shoreline changes were very much dynamic and no regular pattern was evident at all in the study sites. However, the rate of change was comparatively high on the eastern side of the port during the last 7 years.



Table 4.1: Details of Average and Maximum Short term Shoreline Changes

Period	Name of the block	Average Shoreline Change(M/Year)	Shoreline Change(M)	
			Maximum Accretion	Maximum Erosion
2015-2022	West Port	-11.43	39.86	-78.68
	Eastern	-26.60	191.32	-165.19

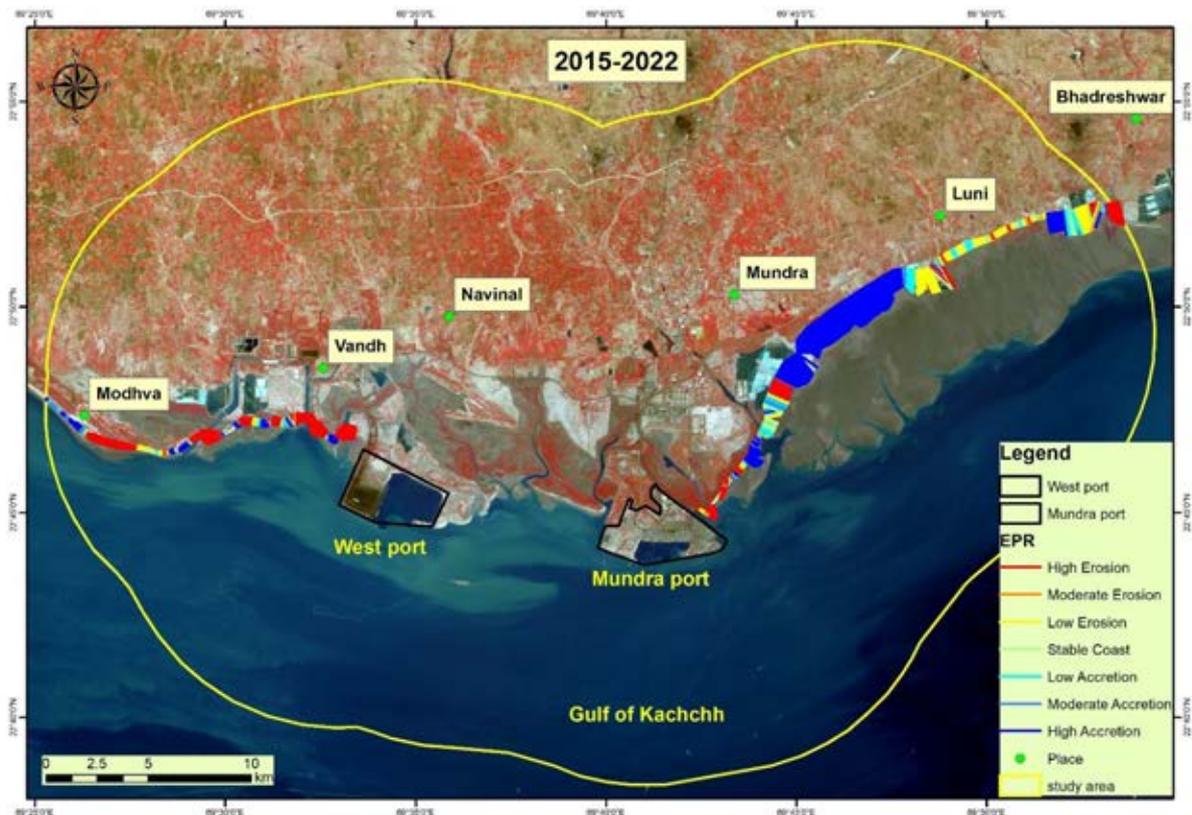


Figure 4.2: Shoreline Changes During March 2015 to April 2022

4.1.2. Zones of High Erosion and High Accretion

For the present study on shoreline changes evaluation, one sets of data were considered. They are the moderate to high resolution (23.5m and 5.8m) images for 2015-2022 and overall shoreline changes delineate in high erosion and high accretion zone, and the results are presented in Figure 4.3.

Based on the analysis of the imageries it is possible to delineate the study areas into zones for the ease of classification into high erosion and high accretion within the study limits. The images have indicated that a total distance of 23.6 km showed



high accretion zone, around 1.9 km high erosion zone near Bocha island on the eastern side of Mundra port, however on the western side of west port 11 km identified as a zone of high erosion whereas approximately 5 km patches between west port to Modhva comes under the high accretion zones (Figure 4.3).

Shoreline change analysis for the present study has been carried out over 7 years ranging from 2015 to 2022. Change detection analysis of the study area indicated that the shoreline has undergone both accretion and erosion processes in the last 7 years. Transects demarcated for accretion and erosion rates indicate that almost 51.4% of the area has undergone accretion for the entire study period (2015 to 2022). Even though it was observed that 48.6% of the area had experienced erosion, the rate of removal of the substratum was relatively lower than the rate of accretion.

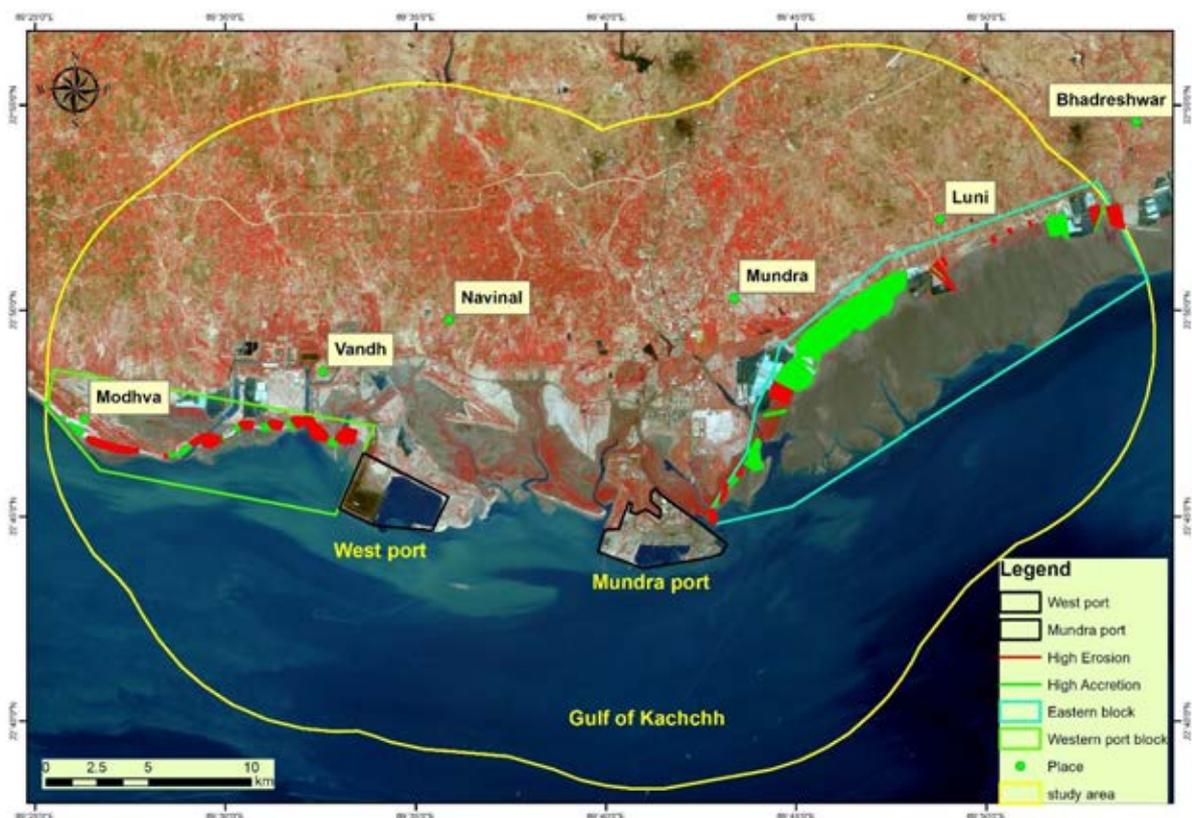


Figure 4.3: Zones of High Erosion and High Accretion

Validation of the shoreline data of the 43 km (16 km on west side and 27 km on east side of Adani main port) stretch of Adani Ports and Special Economic Zone Ltd



(APSEZL), using Differential GPS (DGPS) has been carried out for the period 26th to 30th April 2022 and 21st to 23rd June 2022 (Figure 4.4). The results obtained with the higher resolution satellite images of the field match the shoreline details derived from the satellite images.

The shoreline data derived from high-resolution satellite imagery obtained during 2018 has been compared with NCSCM (National Centre for Coastal Management) approved CRZ map (Figure 4.5) is quite similar to the shoreline configuration derived from the NCSCM (National Centre for Coastal Management) approved CRZ map of 2017-18.



Figure 4.4: Shoreline Data of the Study Sites Using DGPS



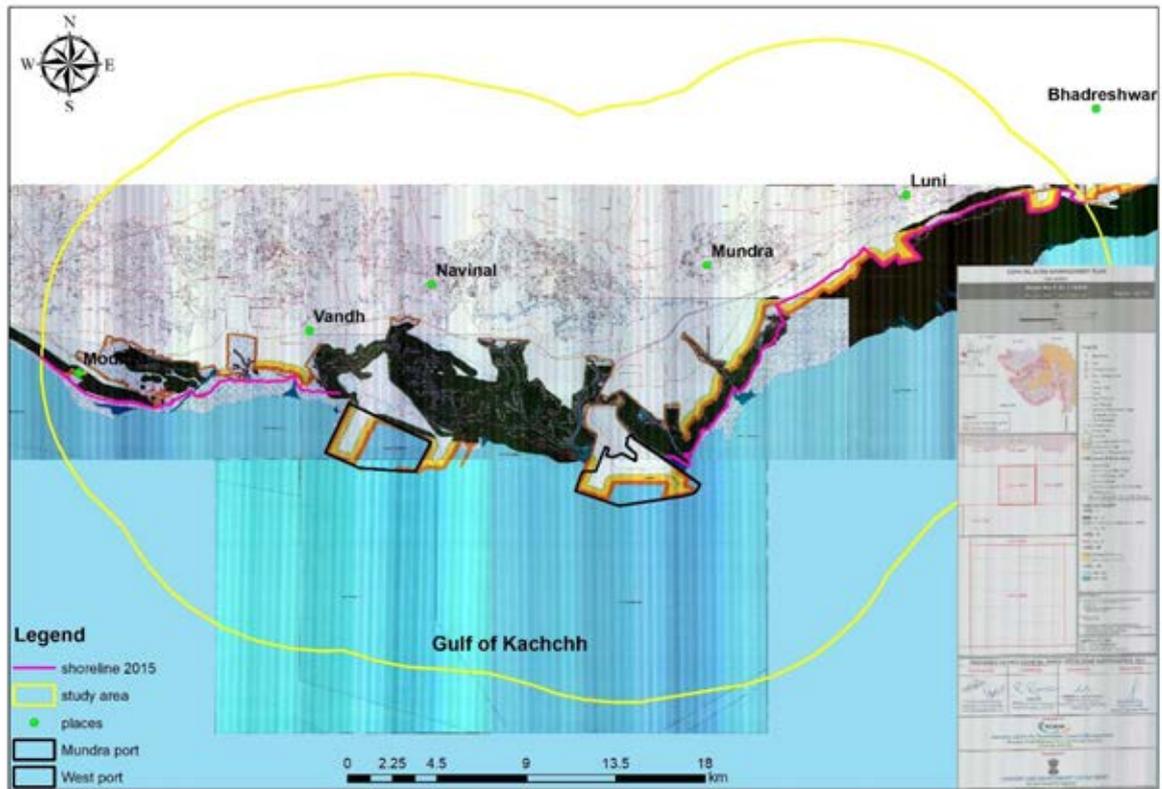


Figure 4.5: Approved CZMP in line with CRZ Notification, 2011 prepared by National Centre for Coastal Management (NCSCM)



4.1.3. Beach Profile

Shoreline Change analysis using Cross Section Profile (CSP) has been carried out using DGPS Survey. CSP data has been collected from 20 different locations along the Mundra Coast. The total profile line stretches of 50 km covering the area of approximately 30 km west and 25 km east of the existing port site was conducted during the period 26th to 30th April 2022 and 21st to 23rd June 2022 (Figure 4.6).

This analysis was done to create a baseline data for comparison in the future with beach profile data from the same location for different seasons. Beach profiles were plotted location-wise. The trends of beach profiles were assessed qualitatively (Figure 4.6). The difference, if any, shall be investigated further to understand the impact due to port activities on the shoreline evolution.

A beach profile is defined as a set of beach levels taken at a uniform distance in a straight line (Figure 4.7). Beach profiles can only be meaningful if surveys are undertaken over a stipulated period at the same place and the same directions.

Further, the beach profile also suggests that there are regions of high-rate accretion and erosion on an average of 3.05 m (Figure 4.7), and also there are vertical changes as seen along the eastern of Mundra coast which could be the reason for the high rate of sediment deposition along the Luni and Bhadreswar coast in the recent times. The rate of shoreline changes may be also depended on the inflow of fresh water into the estuarine.



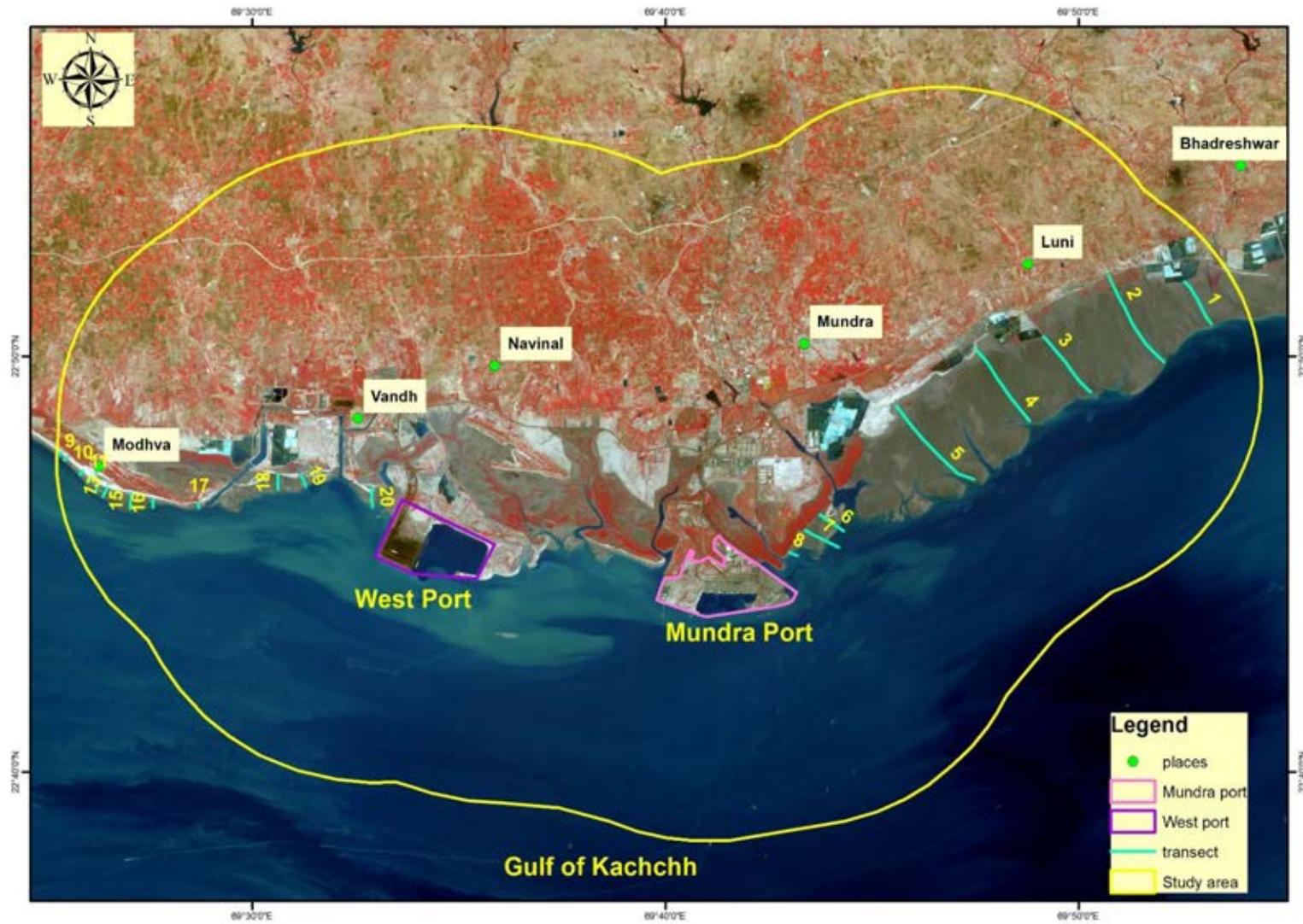


Figure 4.6: Beach Profile of the study area



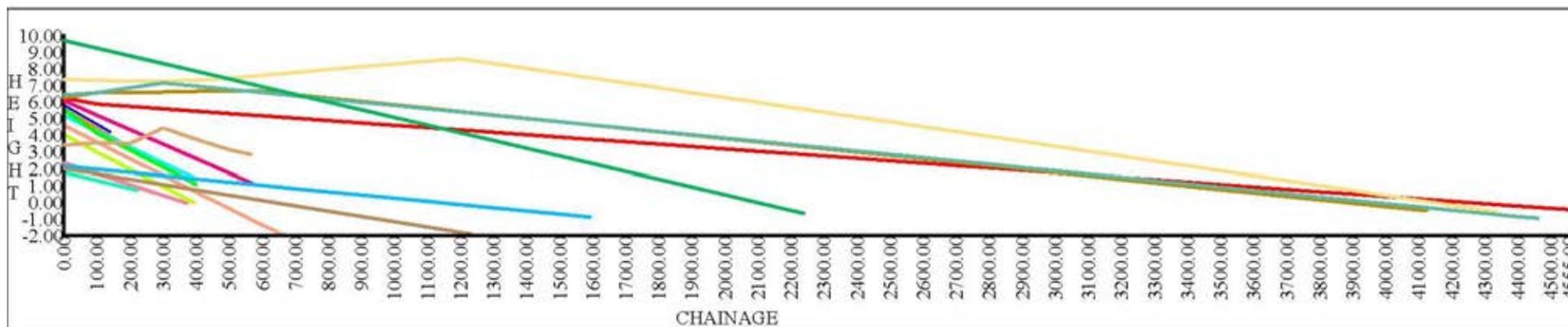


Figure 4.7: Beach Profile at Different Locations



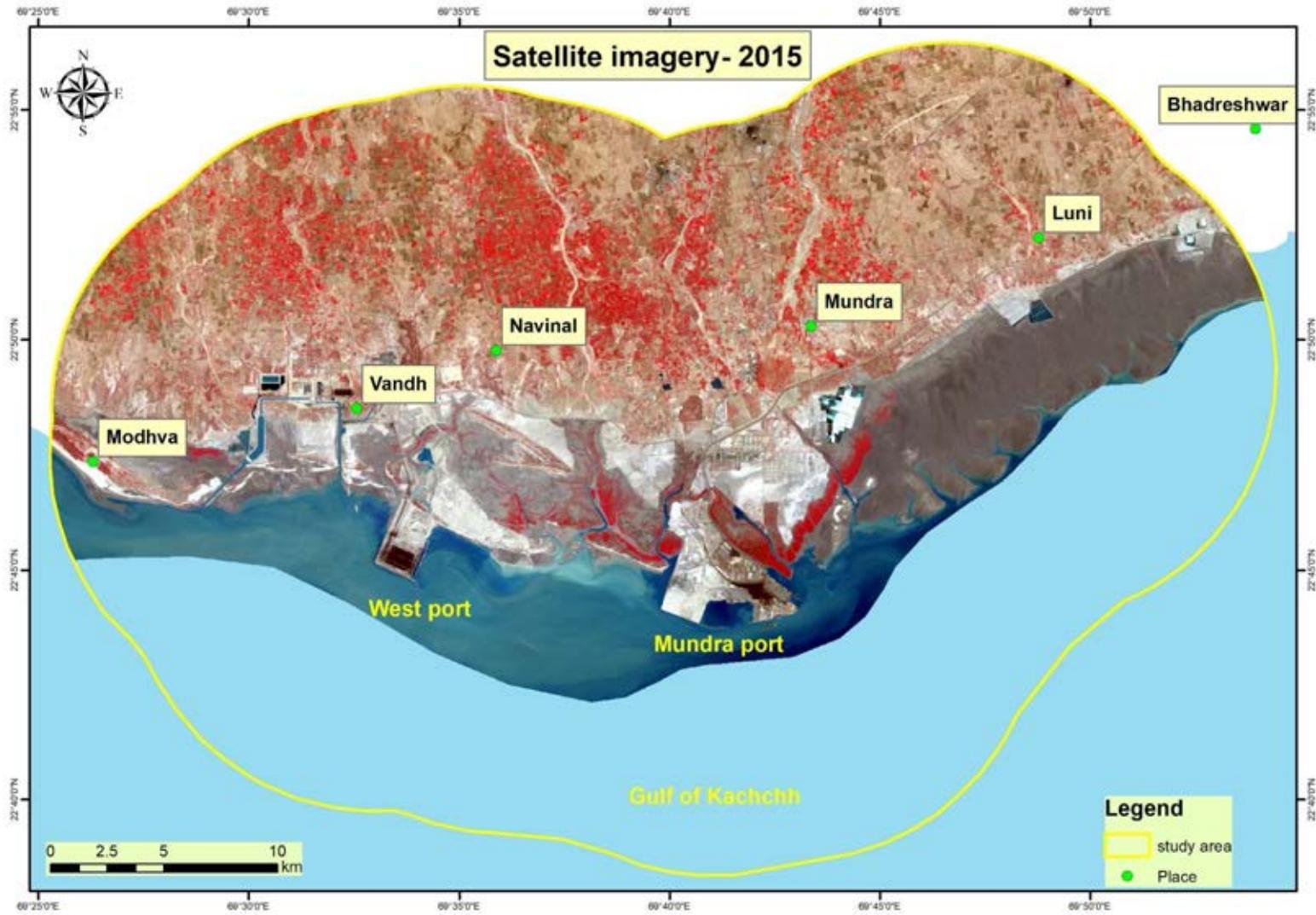


Figure 4.8: Satellite image of the Study area during May 2015



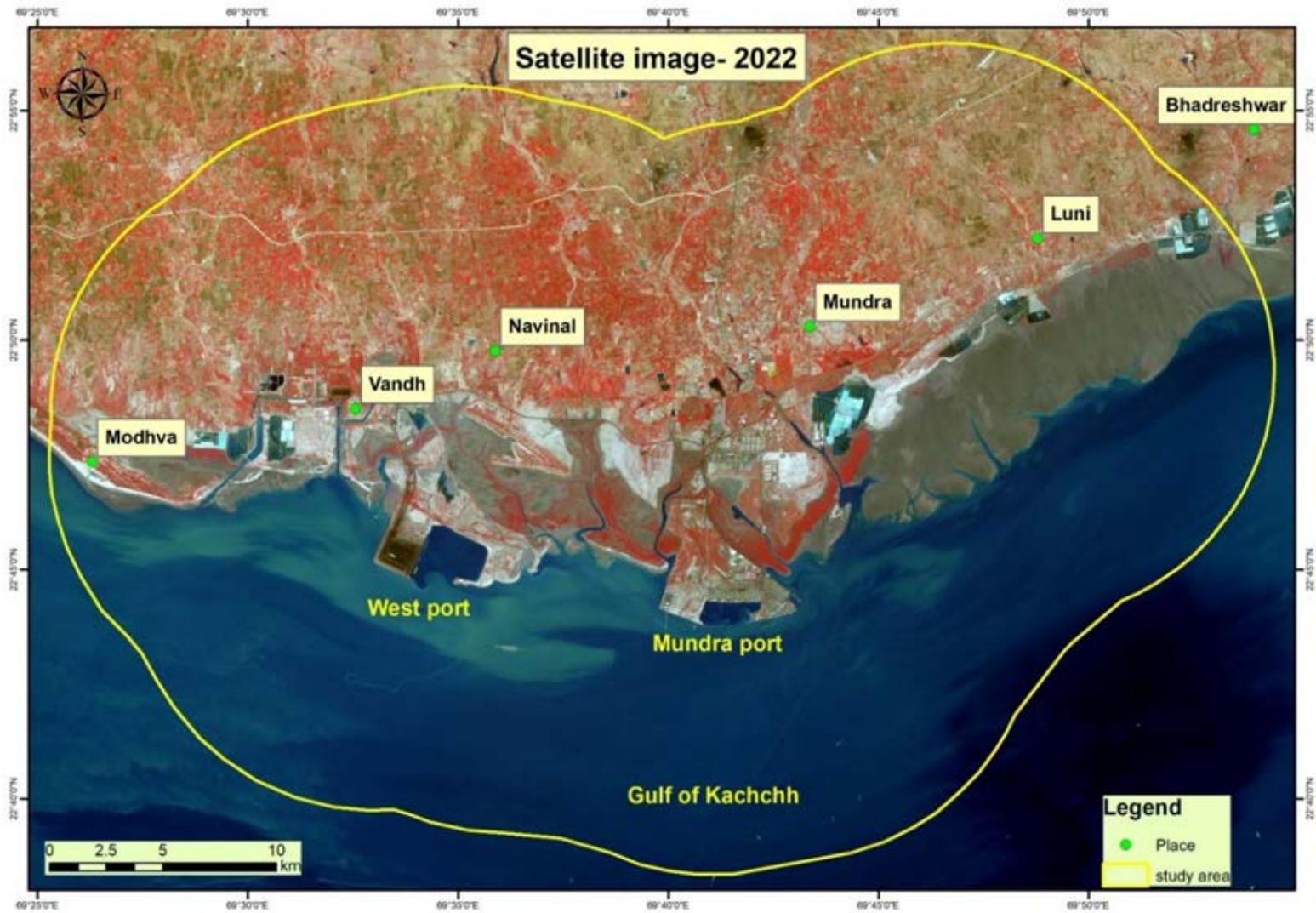


Figure 4.9: Satelliteimage of the Study area during May 2022



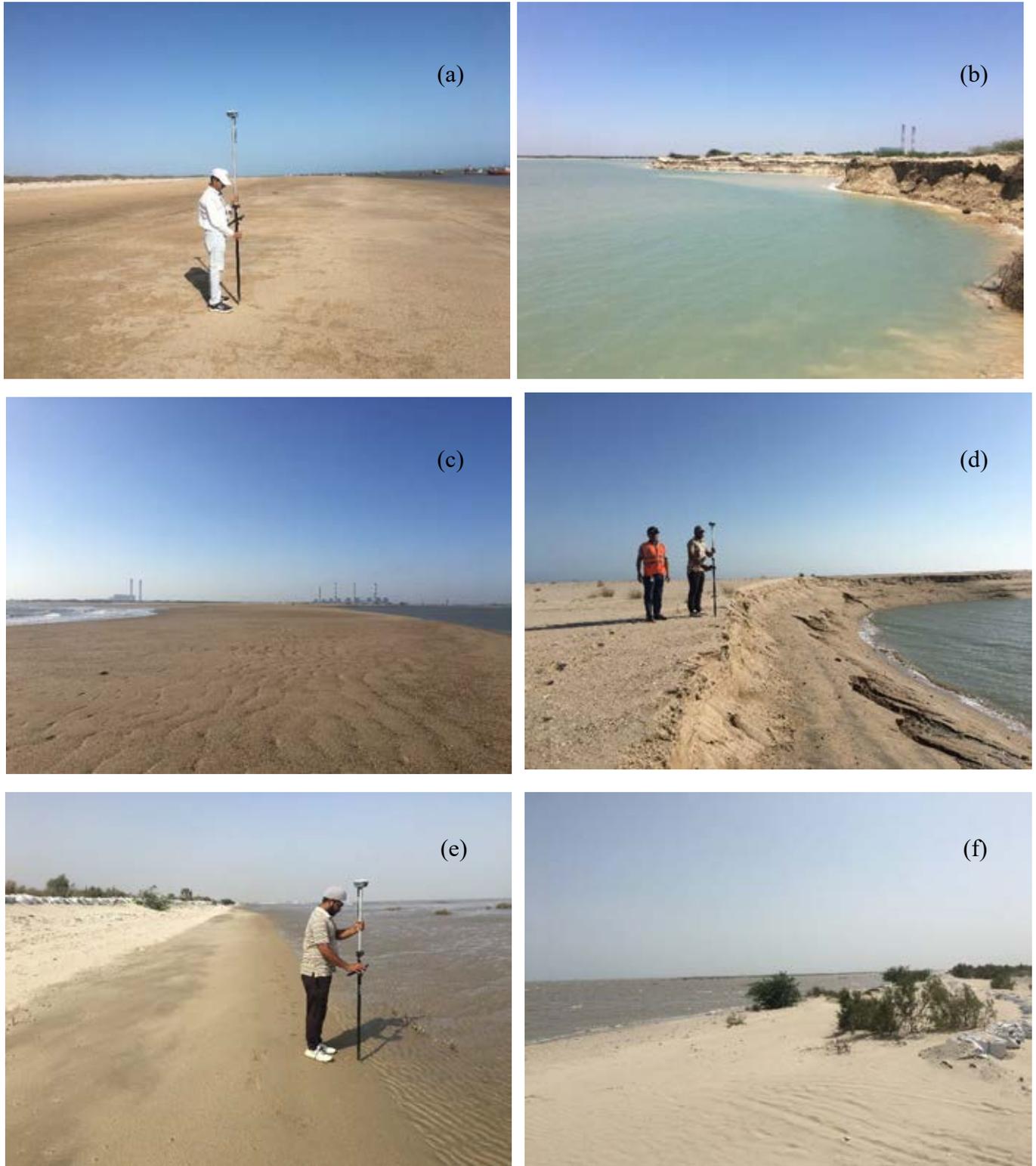


Figure 4.10: (a) Modhava Coast, (b) and (c) and (d) Western Coast (e) & (f) Eastern Coast of Adani Port.

5. CONCLUSION

5.1. Shoreline Changes

The present study confirms the expediency of the image processing techniques and GIS tools applied on multi-temporal and multi-spectral images of different satellite sensors for assessment of the changes along the shoreline. As deduced from the results of both short-term and long-term shoreline assessment that the results are in conformity with that of the data obtained through in-situ measurements, DGPS survey and ground truthing for the shore profile along the Mundra coast. The Mundra coast has been subjected to several significant changes during the last one and half decades (2015–2022) within this 43-km coastal strip particularly from Modhva (west) to Luni (east), ranging from high accretion of 191.32 m/year to severe erosion of up to -165.19 m/year, at few parts of the coast, however, remained stable. Above value for both erosion and accretion may vary ± 5 m depending upon the time of the satellite imageries taken during high tide and low tide time.

The present study concludes that the shoreline at Mundra coastal region is under the impact of shoreline change with processes of accretion and erosion varying from time to time (Hitesh Patel, 2018). Process of erosion increased which includes some patches at Modhva coastal stretches, near the west port and some patches near mouth of Bocha Island on eastern side of Mundra port area whereas rest of the area observed accretion.

The predominant causes of shoreline changes are both natural as well as anthropogenic. Natural processes include wind and wave forces whereas man-made effects or artificial processes include the construction of marine structures and water control structures. It is revealed from the study that the setting of shorelines and the supply of sediments determines how the shoreline changes at a particular location (Jodhani *et. al.*, 2020). The conservation and management plan is indicated below:



5.2. Recommendations

- The process of erosion is highest along the edges (close to the waterfront) it could be controlled only by physical means by constructing appropriate civil engineering structures. Erosion control structures or constructing embankments of stones or any suitable material along the erosion site is strongly recommended if the problem is too heavy. The proposed embankment should be an eco-engineering design with a gentle slope of appropriate angle to the tidal action that will allow natural flushing while controlling erosion.
- Erosion, either man-made or natural is a major threat to intertidal habitats in the Gulf environment due to altered hydrological regimes and other natural causes. Observations carried out during the field surveys revealed those estuarine environments as well as many coastal stretches are facing erosion mainly due to high tidal amplitude. Hence, extensive surveys should be carried out to recommend suitable mitigation measures and to update the status of the biodiversity as well in order to estimate the level of physiographical impacts on the shoreline.
- Artificial coastal structures help in controlling coastal erosion and thereby enhance intertidal and sub-tidal biodiversity as they accelerate the reef-building process. Artificial reefs tend to last for decades supporting faunal components. Since such structures are built using natural materials (for example dead gastropods and bivalves) they are environment-friendly and in due course become natural. They attract diverse marine fauna within a short period with a high potential to enhance biodiversity. The same could be implemented in Adani Ports and Special Economic Zone Ltd (APSEZL) jurisdiction in consultation with the experts.
- Plantation of suitable saline tolerant plant species (shrubs and trees) also helps in controlling the soil erosion along the coastal area.
- The establishment of facilities and the expansion of infrastructure over the coming years will bring about notable changes in the landscape and seascape in and around the Adani Ports and Special Economic Zone Ltd (APSEZL). Long-



term human-centred/induced activity of this magnitude in any coastal belt will have repercussions on its natural resources and ecosystems. As mangroves, mudflats and tidal creeks are the major ecological entities within the Adani Ports and Special Economic Zone Ltd (APSEZL), their conservation and management warrants priority and calls for a holistic approach. Thus, measures should be taken to conserve and preserve the mudflats and mangroves within the Adani Ports and Special Economic Zone Ltd (APSEZL) to retain their tangible and intangible ecological benefits. The conservation and management plan presented in the proceeding section has the following broad aspects and different activities under each aspect are dealt with.

- The creation of baseline information to track subsequent changes in natural shoreline formation within the Adani Ports and Special Economic Zone Ltd (APSEZL) observations through GIS and RS tools have to be adopted. The GIS maps may be utilized for the purpose and could serve as a base map. Changes in creek systems, shoreline configuration and other land use categories could be monitored through this exercise once in two or three years.
- Periodical monitoring, preferably once in 3 years, and comparison of results with baseline data to underline changes will pave way for the formulation of mitigation and conservation efforts. Periodical monitoring of shoreline configuration and mudflats will help to assess their health and detect shoreline changes. Assessment and earlier generated data could be used to check shoreline configuration in terms of short and long-term changes and its succession patterns.
- Mudflats and mangrove conservation and restoration measures could subsequently be undertaken based on the results of the monitoring programs.
- Research needs to be undertaken to assess the economic and ecological benefits of sustainable development of shoreline configuration.
- Awareness should be generated among local people about the shoreline configuration changes in the surrounding areas and the consequences, particularly to the fishermen community.



References:

- G.A.Thivakaran, Pranav J. Pandya, G.Thirumaran, and Devi Velusamy. 2015. "CONSERVATION AND MONITORING FOR NATURAL MANGROVE STANDS AT MUNDRA."
- Himmelstoss, Emily A., Rachel E. Henderson, Meredith G. Kratzmann, and Amy S. Farris. 2018. "Digital Shoreline Analysis System (DSAS) Version 5.0 User Guide." Report 2018-1179. Open-File Report. Reston, VA. USGS Publications Warehouse. <https://doi.org/10.3133/ofr20181179>.
- Hitesh B Patel, Subhash Bhandari. 2018. "Shoreline Change Analysis along Eastern Part of Kachchh Coast, Western India." *International Journal of Creative Research Thoughts(IJCRT)* 6 (1). <https://doi.org/January 2018>.
- ICMAM. 2004. "Model Integrated Coastal and Marine Area Management Plan for Gulf of Kachchh." Department of Ocean Development, Ministry of Earth Sciences, ICMAM Project Directorate, Chennai, Government of India.
- Jodhani, Keval, Pulkit Bansal, and Priyadarshna Jain. 2020. "Shoreline Change Observations in Gulf of Khambhat Using Satellite Images." *Available at SSRN 3552461*.
- Kannan, Jayakumar, and S. Malarvannan. 2016. "Assessment of Shoreline Changes over the Northern Tamil Nadu Coast, South India Using WebGIS Techniques." *Journal of Coastal Conservation* 20 (December). <https://doi.org/10.1007/s11852-016-0461-9>.
- Misra, Ankita, and Balaji Ramakrishnan. 2015. "A Study on the Shoreline Changes and LAND-Use/ Land-Cover along the South Gujarat Coastline." *Procedia Engineering* 116 (December): 381-89. <https://doi.org/10.1016/j.proeng.2015.08.311>.
- NIO. 2009. "Marine Environmental Impact Assessment for Discharge Channel of 4000 MW Ultra Mega Power Project Near Mundra, Gulf of Kachchh." National Institute of Oceanography.
- Sutikno, Sigit, Ari Sandhyavitri, Muhammad Haidar, and Koichi Yamamoto. 2017. "Shoreline Change Analysis of Peat Soil Beach in Bengkalis Island Based on GIS and RS." *International Journal of Engineering and Technology* 9 (January): 233-38. <https://doi.org/10.7763/IJET.2017.V9.976>.
- Sweet, William (William VanderVeer), Robert Kopp E., Christopher P. Weaver, J. T. B. Obeysekera, Radley M. Horton, E. Robert (Edward Robert) Thieler 1965-, and Chris Eugene Zervas 1957-. 2017. "Global and Regional Sea Level Rise Scenarios for the United States." Edited by Center for Operational Oceanographic Products and Services (U.S.), NOAA technical report NOS CO-OPS ; 83, . <https://doi.org/10.7289/v5/tr-nos-coops-083>.
- Tamassoki, E, H Amiri, and Z Soleymani. 2014. "Monitoring of Shoreline Changes Using Remote Sensing (Case Study: Coastal City of Bandar Abbas)." *IOP Conference Series: Earth and Environmental Science* 20 (June): 012023. <https://doi.org/10.1088/1755-1315/20/1/012023>.



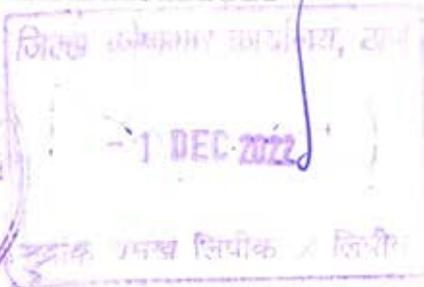
Annexure - 22



महाराष्ट्र MAHARASHTRA

© 2022 ©

28AA 598394



THIS ADDENDUM TO THE SERVICE AGREEMENT is made on this 31st December 2022

BETWEEN

Adani Ports And Special Economic Zone Limited, a Company incorporated under the Indian Companies Act, 1956 and having its Registered Office at having CIN No. **L63090GJ1998PLC034182** and its Registered Office at **Adani Corporate House Shantigram S G Highway P.O. Ahmedabad-382421** and its port office situated at **Adani Port, Navinal Island Mundra -370421 District Kutch, Gujarat** (here in after referred to as "**First party/APSEZL**", which expression shall, unless repugnant to the context or meaning thereof, mean and include its legal representatives, administrators, executors, successors & permitted assigns) represented herein by its duly constituted attorney **Mr. Paresh Gohil (GM - APSEZ Mundra & Tuna Ports)** who is authorized to do so by position he holds at/of the First Part.

AND

Ambuja Cements Limited, a Company incorporated under the Indian Companies Act, 1956, having CIN No. **L26942GJ1981PLC004717** its Registered Office at **Adani Corporate House, Shantigram, Near Vaishnav Devi Circle, S. G. Highway Khodiyar, Ahmedabad - 382421,**



Gujarat, having its division as "**geoclean**" that provides specialized services for thermal destruction or recovery of energy from hazardous/ non Hazardous waste material in cement kilns (hereinafter referred to as the "**Second Party/ACL**" which expression shall, unless repugnant to the context, mean and include its successors and assigns) represented herein by its duly constituted attorney **Moumita Chakraborty** (Head - Geoclean) who is authorized to do so by position she holds at/of the Other Part.

APSEZL and ACL shall be collectively addressed as "**the parties**" and individually as "**Party**" hereinafter in this Addendum.

WHEREAS, a Service Agreement (herein after known as "**Agreement**"), was entered into between **APSEZL & ACL** on 20th May 2020 for co-processing of **(i) Contaminated Cotton Waste, (ii) Pig Waste, (iii) ETP sludge, all Hazardous and (iv) Sorted MSW – Non hazardous**, in nature as per HOWM Rules 2016 (herein after referred as "**Waste materials**") as mentioned in Annexure A of the Agreement, to ACL's Ambuja Nagar Cement Plant valid till **31st December 2022** from the date of signing and execution;

AND WHEREAS, upon expiry of the validity of the Agreement, both Parties discussed and agreed to extend the validity of the agreement for next **Five years**;

AND WHEREAS, to record and give effect to their mutual understanding, **APSEZL and ACL**, have decided to execute this Addendum (**Addendum No. 1**) to the Agreement;

NOW IT IS HEREBY MUTUALLY AGREED BY AND BETWEEN APSEZL AND ACL AS FOLLOWS:

1. Definitions and Effective Date

1.1 Definitions

Unless otherwise defined in this Addendum (No. 1), capitalized words and expressions used in this Addendum shall have the meaning specified in the Agreement.

1.2 Effective Date

This Addendum to the Agreement shall become effective from **31st December 2022** after **signing and execution** and will be valid **for next Five years, i.e. till 31st December 2027**.

2. Annexure D – Quantity & Delivery Schedule and K – Health & safety Policy of ACL attached herewith this Addendum No. 1 shall replace the same from the Agreement.

3. Except as expressly modified and mentioned above in this Addendum No. 1, all other terms and conditions of the Agreement remain unchanged and are hereby ratified and confirmed.

4. On execution hereof, this **Addendum (No. 1)** shall form an integral part of the Agreement.



ANNEXURE D

Quantity & Delivery Schedule

First Party, during the term of the agreement, shall deliver the following quantities of Waste Material to ACL's Cement Plant on yearly basis.

Contaminated Cotton Waste: 250 MTPA

Pig Waste: 25 MTPA

ETP Sludge: 20 MTPA

Sorted MSW: 550 MTPA

First Party, during the term of the agreement, shall deliver the Waste Material to the Second Party's Cement Plant on monthly basis as per the mutually agreed delivery schedule. The delivery schedule of the month will be prepared by the party's through mutual consent and will be finalized before 20th of the earlier month.

In case of any change or modification required in the agreed monthly delivery schedule of a particular month by either party, the same shall be brought to the notice of other party at least seven days in advance or as mutually agreed.



Ambuja Cements Limited
Occupational Health and Safety Policy

*The Ambuja Cements Limited's OHS policy is in alignment
with Adani Group's OHS policy



We at Ambuja Cements Limited (Ambuja), firmly believe that Occupational Health & Safety (OHS) is an integral part of our activities, policies, processes, and business operations and are committed to provide safe and healthy workplace across our operating locations, to our employees, relevant stakeholders, and nearby communities to achieve our OHS vision "To be Globally admired OH&S Leader in the Infrastructure space".

Ambuja recognizes that OH&S and the overall wellbeing of its people is vital to its success and growth aspirations. It is our conviction to promote "Culture of Care" so that every activity is performed in a safe manner which facilitates continual growth and sustainability of our businesses. This is envisioned in our business theme "Growth with Goodness".

To meet our commitment, we shall endeavour to:

- Integrate Occupational Health & Safety aspects in every business decision we make and in every activity we perform. Leaders at all levels, demonstrate their personal commitment to OH&S to promote Principle of Prevention of unsafe situations by integrating requirements from design & engineering stage to operation and maintenance.
- Work with fundamental belief that all injuries and Occupational illness can and must be prevented. Working safely is a condition of employment to meet our goal of "Zero Harm".
- Comply and exceed applicable legal and regulatory OH&S requirements and set highest standards for positive safety compliance, wherever we operate.
- Develop skills, knowledge, competence and build capability by engaging employees, business partners and service providers through appropriate education and training to help them work safely. Influence our business partners in enhancing their OH&S standards.
- Ensure safe place to work by identifying, assessing and reducing risks & vulnerabilities to as low as reasonably practicable by applying hierarchy of controls for process, machinery, infrastructure and human behaviour and prevent any potential emergency situations.
- Conduct regular audits and facilitate assurance of OH&S programs and take timely action on findings to integrate learnings ensuring continued compliance to safety management system requirements.
- Proactively report all incidents, investigate root causes and ensure lessons learnt are shared and deployed across the company.
- Set OH&S objectives and targets, metrics as indicators of excellence, monitor progress and continually improve performance. Provide adequate resources to ensure continual improvement of OH&S management and performance.

We shall communicate this policy to all our employees, business partners and customers to emphasize their responsibilities and accountabilities for safe performance and thereby establish a renewed commitment towards consultative and participative processes.

Any violation or breach of this policy shall be dealt with procedures framed by the company from time to time. The policy shall be reviewed periodically for its suitability & relevance to our operations and updated as deemed necessary.



IN WITNESS WHEREOF the Parties hereto have hereunto set and subscribed their respective hands and seals on the day, month and year first above-written.

Adani Ports And Special Economic Zone Limited, by the hand of its authorized signatory,

in the presence of:

1. _____ (Name of Witness 1)
Signature of Witness 1,

2. _____ (Name of Witness 2)
Signature of Witness 2,

SIGNED AND DELIVERED for and on behalf of
Ambuja Cements Limited, by the hand of its authorized signatory,

Moumita Chakraborty

in the presence of:

MOUMITA CHAKRABORTY

1. *Gaurav*
Signature of Witness 1,

GAURAV KUSHWAHA
(Name of Witness 1)

2. *M. M. Muley*
Signature of Witness 2,

MANJUSHA MULEY
(Name of Witness 2)



Regional Office – Kutch (East)
Gujarat Pollution Control Board
Room No. 215-216-217, 2nd Floor,
Kandla Port Trust Administrative Building,
Gandhidham – 370201, Kutch.
Email:- ro-gpcb-kute@gujarat.gov.in

In exercise of the power conferred under section-25 of the Waster (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution) Act-1981 and Authorization under rule 6(2) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 framed under the E (P) Act-1986.

And whereas Board has received consolidated application no: 176383, dated 28/06/2020 for the fresh consolidated consent and authorization (CC & A) of this Board under the provision / rules of the aforesaid acts-rules. Consent & Authorization is hereby granted as under.

CONSOLIDATED CONSENT AND AUTHORISATION:

(Under the provision / rules of the aforesaid environmental acts)

To,
Aviation Corporation (PCB ID -63724),
PLOT NO: S. No. 67/2/P1,
Shikarpur- 370150
TAL: Bhachau, DIST: Kutch.

1. Consent Order No: AWH -43501; Date of Issue: 21/10/2020.

2. The consent shall be valid up to 27/06/2025 for the use of outlet for the discharge of trade effluent and emission due to operation of industrial plant for manufacture of following items/products at an above-mentioned address.

Sr No	Product	Quantity
1	Used Oil/ Waste Oil Reprocessing	300 MT/Month (Used Oil- 150 MT/Month & Waste Oil- 150 MT/Month)
2	Sodium Silicate	1500 MT/Month

Specific Condition

1. No ground water shall be withdrawn without prior approval from competent authority.
2. You shall not carry out any activity which may attract the applicability of EIA notification-2006 and its amendments.
3. Management of Solid Waste generated from industrial activities shall be as per Solid Waste Management Rules-2016 (solid waste as defined in Rule-3(46)).
4. As per provision of Rule-18 of Solid Waste Management Rules-2016 all industrial units using fuel and located within 100 km from the refused derived fuel (ROF) plant shall made an arrangement to replace at least five percent of their fuel requirement by refused derived fuel so produced.
5. Industry shall manage Solid Waste generated from industrial activities as per Solid Waste Management Rules- 2016 (Solid Waste as defined in Rule- 3(46)).
6. Industry shall comply with Plastic Waste Management Rules- 2018 & amended therefore. (if applicable)
7. You shall have to comply with Coal Handling guideline.



Regional Office – Kutch (East)
Gujarat Pollution Control Board
Room No. 215-216-217, 2nd Floor,
Kandla Port Trust Administrative Building,
Gandhidham – 370201, Kutch.
Email:- ro-gpcb-kute@gujarat.gov.in

8. You shall have to comply with Fly Ash Notification- 1999 and its amendments.						
3	Condition under the Water Act					
3.1	Source of Water: Tankers					
3.2	The quantity of industrial water consumption shall not exceed 07 KL/Day.					
3.3	The quantity of Domestic water consumption shall not exceed 02 KL/Day.					
3.4	The quantity of industrial waste water generated from manufacturing process & other ancillary operation shall not exceed 2.2 KL/Day.					
3.5	The quantity the Domestic waste water (sewage) shall not exceed 1.2 KL/Day.					
3.6	Industrial effluent from process plant, washing etc. shall be collected separately & treated into ETP adequately so that treated industrial effluent shall comply with following norms:					
	PARAMETER		PERMISSIBLE LIMIT			
	pH		6.5 to 8.5			
	Temperature		40°C			
	Color		100 Units			
	Suspended Solids		100 mg/l			
	Oil & Grease		10 mg/l			
	Phenolic Compound		01 mg/l			
	Amonical Nitrogen		50 mg/l			
	BOD (03 days At 27° C)		30 mg/l			
	COD		100 mg/l			
	Chloride		600 mg/l			
	Sulphates		1000 mg/l			
	Total Dissolved Solids		2100 mg/l			
	Sulphides		02 mg/l			
	Percent Sodium		60%			
	Sodium Adsorption Ratio		26			
	Treated effluent confirming to the above standards shall be reuse in within plant only.					
3.7	Industry shall provide fixed pipeline with flow meter for reuse of treated effluent to achieve Zero Liquid Discharge.					
3.5	Sewage shall be disposed of through septic tank / soak pit system.					
4	Conditions under the Air Act					
4.1	The following shall be used as fuel.					
	Sr No	Fuel	Quantity			
	1	HSD	20 Lit/Hr.			
	2	LDQ	290 Lit/Day			
	3	Fire Wood	08 MT/Day			
	4	Coal	05 MT/Day			
4.2	The flue gas emission through stack shall confirm to the following standards.					
	Stack No	Stack attached to	Stack height in meter	APCM	Parameter	Permissible Limit
	1	Boiler (01 TPE)	12	Water Scrubber	PM	150 mg/Nm3



Regional Office – Kutch (East)
Gujarat Pollution Control Board
Room No. 215-216-217, 2nd Floor,
Kandla Port Trust Administrative Building,
Gandhidham – 370201, Kutch.
Email:- ro-gpcb-kute@gujarat.gov.in

	2	Vessel (12 TPD)	11	with Cyclone Separator	SO2 NOx	100 PPM 50 PPM
	3	Furnace	30	Alkali Scrubber		
	4	DG Set (80 kVA) Stand by	11	--		
4.3	There shall be no process gas emission from manufacturing activities and other ancillary operations.					
4.4	The concentration of the following 11 parameters in the ambient air within the premises of the industry shall not exceed the limits specified hereunder as per National Ambient Air Quality Standards issued by MoEF & CC dated 16th November-2009.					
	Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient air in microgram/cum		
	1	Sulphur Dioxide (SO ₂)	Annual 24 Hours	50 80		
	2	Nitrogen Dioxide (NO ₂)	Annual 24 Hours	40 80		
	3	Particulate Matter (PM ₁₀)	Annual 24 Hours	60 100		
	4	Particulate Matter (PM _{2.5})	Annual 24 Hours	40 60		
4.5	The applicant shall provide portholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection to/and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/ displayed to facilitate identification.					
4.6	The industry shall make adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75dB(a) during day time and 70 dB(A) during night time. Daytime is reckoned in between 6 AM to 10 PM and nighttime is reckoned between 10 PM to 6 AM.					
4.7	<p><u>DG Sets Conditions:</u> The D.G. Set shall have acoustic enclosure and shall comply with the standards specified at Sr. no. 95 of Schedule-I of the rule-3 of E.P. Rules -1986 and Noise pollution level as per the Air Act-1981.</p> <p><u>D.G. Sets standards:</u> The flue gas emission through stack attached to D.G. Sets shall conform to the following standards.</p> <ol style="list-style-type: none"> The minimum height of stack to be provided with each of the generator set shall be $H=h + 0.2(KVA)^{1/2}$, where H=Total stack height in meter, h=height of the building in meters where or by the side of which the generator set is installed. Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the user's end The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/ acoustic treatment. Such circumstances the performance may be checked for noise reduction up to actual ambient noise level, 					



Regional Office – Kutch (East)
Gujarat Pollution Control Board
Room No. 215-216-217, 2nd Floor,
Kandla Port Trust Administrative Building,
Gandhidham – 370201, Kutch.
Email:- ro-gpcb-kute@gujarat.gov.in

	preferably, in the night time). The measurement for insertion loss may be done at different points at 0.5 m from the acoustic enclosure/room, and the averaged. d) The D.G. Set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A). e) All efforts shall be made to bring down the noise level due to the D.G. Set, outside the premises, within the ambient noise requirements by proper siting and control measures. f) Installation of a D.G. Sets must be strictly in compliance with the recommendations of the D.G. Set manufacturer. g) A proper routine and preventive maintenance procedure for the D G. Set should be set and followed in consultation with the DG Set manufacture which would help prevent noise levels of the DG Set from deteriorating with use.																														
5	Authorization under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 & amended.																														
5.1	Authorization Number: AWH -43501 Date of Issue: 21/10/2020 and shall valid up to 27/06/2025.																														
5.2	M/s. Aviation Corporation (PCB ID –63724), is hereby granted an authorization to operate facility for following hazardous wastes on the premises situated PLOT NO: S. No. 67/2/P1, Shikarpur– 370150, TAL: Bhachau, DIST: Kutch. <table border="1"> <thead> <tr> <th>Sr. No</th> <th>Waste</th> <th>Quantity</th> <th>Schedule-I</th> <th>Facility</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Used or spent Oil</td> <td>1800 MT/yr.</td> <td>5.1</td> <td>Receipt, Collection, Storage, Transportation & reused in process.</td> </tr> <tr> <td>2</td> <td>Oily waste</td> <td>1800 MT/yr.</td> <td>5.2</td> <td>Receipt, Collection, Storage, Transportation & reused in process.</td> </tr> <tr> <td>2</td> <td>Sludge from Wet Scrubber</td> <td>05.0 MT/yr.</td> <td>37.1</td> <td>Collection, Storage, Transportation & Disposed to TSDF site.</td> </tr> <tr> <td>3</td> <td>Sludge and filter contaminated with Oil</td> <td>20.0 MT/yr.</td> <td>3.3</td> <td>Collection, Storage, Transportation & Disposed to TSDF site.</td> </tr> <tr> <td>4</td> <td>Empty barrels/ containers/ liners contaminated with hazardous chemicals / wastes</td> <td>04.00 M/yr.</td> <td>33.1</td> <td>Collection, Storage, Transportation & disposed by selling it to registered recycler.</td> </tr> </tbody> </table>	Sr. No	Waste	Quantity	Schedule-I	Facility	1	Used or spent Oil	1800 MT/yr.	5.1	Receipt, Collection, Storage, Transportation & reused in process.	2	Oily waste	1800 MT/yr.	5.2	Receipt, Collection, Storage, Transportation & reused in process.	2	Sludge from Wet Scrubber	05.0 MT/yr.	37.1	Collection, Storage, Transportation & Disposed to TSDF site.	3	Sludge and filter contaminated with Oil	20.0 MT/yr.	3.3	Collection, Storage, Transportation & Disposed to TSDF site.	4	Empty barrels/ containers/ liners contaminated with hazardous chemicals / wastes	04.00 M/yr.	33.1	Collection, Storage, Transportation & disposed by selling it to registered recycler.
Sr. No	Waste	Quantity	Schedule-I	Facility																											
1	Used or spent Oil	1800 MT/yr.	5.1	Receipt, Collection, Storage, Transportation & reused in process.																											
2	Oily waste	1800 MT/yr.	5.2	Receipt, Collection, Storage, Transportation & reused in process.																											
2	Sludge from Wet Scrubber	05.0 MT/yr.	37.1	Collection, Storage, Transportation & Disposed to TSDF site.																											
3	Sludge and filter contaminated with Oil	20.0 MT/yr.	3.3	Collection, Storage, Transportation & Disposed to TSDF site.																											
4	Empty barrels/ containers/ liners contaminated with hazardous chemicals / wastes	04.00 M/yr.	33.1	Collection, Storage, Transportation & disposed by selling it to registered recycler.																											
5.3	The authorization is granted to operate a facility for collection, storage within factory premises, transportation and ultimate disposal of Hazardous waste by selling it to registered recyclers.																														
5.4	Unit shall apply for authorization for other types of hazardous waste referring to the amended Rules.																														
5.5	The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.																														
5.6	Terms and conditions of authorization:-																														
1.	The authorized person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.																														



Regional Office – Kutch (East)
Gujarat Pollution Control Board
Room No. 215-216-217, 2nd Floor,
Kandla Port Trust Administrative Building,
Gandhidham – 370201, Kutch.
Email:- ro-gpcb-kute@gujarat.gov.in

2.	The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the State Pollution Control Board.
3.	The person authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorization.
4.	Any unauthorized change in personnel, equipment or working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorization.
5.	The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time.
6.	The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on “Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty”.
7.	It is the duty of the authorized person to take prior permission of the State Pollution Control Board to close down the facility.
8.	The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
9.	The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
10.	The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.
11.	The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
12.	An application for the renewal of an authorization shall be made as laid down under these Rules.
13.	Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
14.	Annual return shall be filed by June 30th for the period ensuring 31st March of the year.
5.7	General Conditions
1	Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.
2	Applicant shall also comply with the general conditions given in annexure I.
3	The waste generator shall be totally responsible for (I.E. Collection, storage, transportation and ultimate disposal) of the wastes generated.
4	Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form - 4 by 31st January of every year.
5	In case of any accident, details of the same shall be submitted in Form - 5 to Gujarat Pollution Control Board.
6	As per "Public liability Insurance Act - 91" company shall get Insurance policy, if applicable.
7	Empty drums and containers of toxic and hazards material shall be treated as per guideline published for management & handling of discarded containers". Records of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.
8	In no case any kind of hazardous waste shall be imported without prior approval of appropriate authority.
9	In case of transport of hazardous waste to a facility for (I.E. Treatment, Storage and disposal) existing in a state other than the state where hazardous waste are generated, the occupier shall obtain "No Objection certificate" from the state pollution Control Board, the Committee of the



Regional Office – Kutch (East)
Gujarat Pollution Control Board
Room No. 215-216-217, 2nd Floor,
Kandla Port Trust Administrative Building,
Gandhidham – 370201, Kutch.
Email:- ro-gpcb-kute@gujarat.gov.in

	concerned state or Union territory Administration where the facility exists.
10	Unit shall take a)) concrete measures to show tangible results in waste generation reduction, avoidance, reuse and recycle. Action taken in this regards shall be submitted within 03 months and also along with Form 4.
11	Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon Supreme Court's order in W.P. NO.65 of 1995 dated 14th October 2003.
12	Industry shall have to display online data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including wastewater and air emissions and solid hazardous waste generated within the factory premises.

For and behalf of
Gujarat Pollution Control Board

Regional Officer, Kutch(East)

Outward No: 15655, 30/10/2020



GUJARAT POLLUTION CONTROL BOARD REGIONAL OFFICE

Swastik Complex, First Floor, Plot No. 1616/1617,
Near Vir Mokhdaji Circle, Ghogha Road, Bhavnagar - 364 001.

Phone (0278) 2566108 E-mail : ro-gpcb-bhav@gujarat.gov.in XGN site : www.gpcb.gujarat.gov.in

By R.P.A.D.

In exercise of the power conferred under Section - 25 of the Water (Prevention and Control of Pollution) Act - 1974, under Section - 21 of the Air (Prevention and Control of Pollution) Act - 1981 and Authorization under Rule - 6(2) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 framed under the Environment (Protection) Act, 1986.

And whereas Board has received consolidated consent application vide Inward ID : 264937, Dated : 13/10/2022 for the Renewal of consolidated consent and authorization (CC&A) of this Board under the Provisions / Rules of the aforesaid Acts. Consent & Authorization is hereby granted as under.

CONSENT AND AUTHORISATION:

(Under the provisions / rules of the aforesaid environmental acts)

To,

M/s. Western India Petro Chem Ind. (ID:16250),

Plot No. 62, 63, GIDC - Vartej,

Tal & Dist. : Bhavnagar.

1. Consent Order No. AWH-59633, Date of issue : 14/12/2022.
2. The consent shall be valid up to 31/12/2032 for the use of outlet for the discharge of treated effluent & air emission and to operate industrial plant for manufacture of the following items / products :

Sr. No.	Name of Product	Quantity
1.	Recycled Waste Oil	562.50 KL/ Month
2.	Re-refined used oil	189.86 KL/Month

SPECIFIC CONDITIONS :

- Unit shall obtain CCA Amendment for Plot No. 39 & 61.
- Unit shall use Incinerator, Hot Water Boiler & additional Furnace only after obtaining CCA Amendment of the Board.
- Unit shall not carry out any activities, which may attract the provision of the EIA Notification - 2006.
- Unit shall regularly renew the PLI policy & submit copy there of regularly.
- Unit shall submit hazardous waste annual return regularly.
- Unit shall adopt and regularly use the online manifest system for procurement & disposal of hazardous waste.

3. CONDITION UNDER THE WATER ACT :

- 3.1 The quantity of the Trade Effluent generation shall not exceed to 3.3 KL/Day & same shall be evaporated after primary treatment & maintain Zero Discharge. The records regarding the generation of trade effluent, evaporation data etc. shall be maintained in the form of log book and made available to the monitoring staff.
- 3.2 The quantity the domestic waste water (sewage) shall not exceed 0.16 KL/day.
- 3.3 The sewage shall be disposed off through septic tank/soak pit system.

4. **CONDITIONS UNDER AIR ACT - 1981 :**

4.1 The following shall be used as fuel:

Sr. No.	Name of Fuel	Quantity
1.	Light Diesel Oil / L. C.	30 Lit/Hrs

4.2 The applicant shall install & operate Air Pollution Control Systems in order to achieve norms prescribed below :

4.3 The flue gas emission through stack attached to Furnace shall conform to the following standards:

Sr. No.	Stack attached to	Stack height in Meter From G.L.	Air Pollution Control Measures	Parameter	Permissible limit
1.	Boiler	30	---	Particulate Matter SO ₂ NO _x	150 mg/NM ³ 100 ppm 50 ppm
2.	Thermic Fluid Heater	30	---		
3.	Furnace (2 No's)	30	Scrubber		

4.4 There shall be no generation of process emission from the manufacturing process and other ancillary Industrial operations.

4.5 The concentration of the following parameters in the ambient air within the premises of the industry and a distance of 10 meters from the source (other than the stack/vent) shall not exceed the following levels:

PARAMETER	PERMISSIBLE LIMIT ANNUAL	PERMISSIBLE LIMIT 24 HRS. AVERAGE
Particulate matter - 10 [PM ₁₀]	60 µg/M ³	100 µg/M ³
Particulate matter - 2.5 [PM _{2.5}]	40 µg/M ³	60 µg/M ³
Sulphur Dioxide	50 µg/M ³	80 µg/M ³
Nitrogen Dioxide	40 µg/M ³	80 µg/M ³

4.6 The applicant shall operate industrial plant / air pollution control equipment very efficiently and continuously so that the gaseous emission always conforms to the standards specified in above conditions.

4.7 The consent to operate the industrial plant shall lapse if at any time the parameters of the gaseous emission are not within the tolerance limits specified in above conditions.

4.8 The applicant shall provide Portholes, Ladder, Platform etc. at Chimney(s) for monitoring the Air Emissions and the same shall be open for inspection to/and for use of Board's Staff. The Chimney(s)/Vents attached to various sources of emission shall be designed by Number such as S-1, S-2 etc. and these shall be Painted / displayed to facilitate identification.

4.9 The Industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75 dB(A) during day time and 70 dB(A) during night time. Daytime is reckoned in between 6 A.M. and 10 P.M. and nighttime is reckoned between 10 P.M. and 6 A.M.

5. **AUTHORISATION FOR THE MANAGEMENT & HANDLING OF HAZARDOUS WASTES Form-2 {See Rule 6 (2)}.**

Number of authorization and date of issue : AWH-59633, Date of issue : 14/12/2022.

M/s. **Western India Petro Chem Ind.** hereby granted an authorization to operate facility for following hazardous wastes on the premises situated at **Plot No. 62, 63, GIDC - Vartej, Tal & Dist. : Bhavnagar**

Sr. No.	Waste	Category & Schedule	Quantity	Facility
1.	Used or spent oil	1 - 5.1	2745 KL/Yr.	Transportation, Collection, Storage, & Re-Refining.
2.	Wastes or residues containing oil	1 - 5.2	8325 MT/Yr.	
3.	Chemical sludge from waste water treatment	1 - 35.3	4.52 MT/Yr.	Generation, Collection, Storage, Transportation & disposed off by TSDF Site.
4.	Any process or distillation residue	1 - 36.1	358.46 KL/Yr.	
5.	Spent clay containing oil	1 - 4.5	59.80 MT/Yr.	Generation, Collection, Storage, Transportation & Disposal by Incineration at Common Hazardous Waste Incineration Facility
6.	Filters & Filters Medium	1-35.1	2.26MT/Yr.	
7.	Empty Barrels / Container / Liner Contaminated With Hazardous Chemical / Waste	1 - 33.1	57.25 MT/Yr.	Generation, Collection, Storage, Transportation & disposed off by Registered Recyclers.

5.1 The authorization is granted to operate a facility for Recycling, Generation, Collection, Storage, Transportation & ultimate disposal of Hazardous waste by selling to registered recyclers, TSDF Site & Incineration.

5.2 The authorization shall be in force for a period up to 31/03/2027.

5.3 TERMS AND CONDITIONS OF AUTHORIZATION :

5.3.1 The authorized person shall comply with the provisions of the Environment (Protection) Act - 1986 and the Rules made there under.

5.3.2 The authorization or its renewal shall be produced for inspection at the request of an officer authorized by this Board.

5.3.3 The persons authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.

5.3.4 Any unauthorized change in personnel, equipment or working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorization.

5.3.5 It is the duty of the authorized person to take prior permission of the State Pollution Control Board to close down the facility.

5.3.6 An application for the renewal of an authorization shall be made as laid down in Rule 6.

5.3.7 Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Court's order in W.P. No.657 of 1995 dated 14th October 2003.

5.3.8 Industry shall have to display online data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including waste water and air emissions and solid hazardous waste generated within the factory premises.

5.3.9 The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time.

5.3.10 The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty".

5.3.11 The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.

5.3.12 The importer or exporter shall bear the cost of import or export and mitigation of damages if any.

5.3.13 Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.

5.3.14 The occupier handling hazardous or other wastes and operator of disposal facility shall maintain records of such operations in Form 3.

- 5.3.15 The occupier handling hazardous and other wastes and operator of disposal facility shall send annual returns to the State Pollution Control Board in Form 4 by June 30th for the period ensuring 31st March of the year.
- 5.3.16 Where an accident occurs at the facility of the occupier handling hazardous or other wastes and operator of the disposal facility or during transportation, the occupier or the operator or the transporter shall immediately intimate the State Pollution Control Board through telephone, e-mail about the accident and subsequently send a report in Form 11.

6. GENERAL CONDITIONS :

- 6.1 Adequate plantation shall be carried out all along the periphery of the industrial premises in such a way that the density of plantation is at least 1,000 trees per acre of land and a green belt of 10 meters width is developed.
- 6.2 In case of any change either in products, its capacity or manufacturing process, the applicant shall have to obtain prior permission of this Board.
- 6.3 If the products/process falls in SCHEDULE-I or II of the Environmental Audit Scheme, as specified in the order dated 13/3/97 of Hon. High Court in MCA NO.326/97 in SCA No.770/95, the applicant shall also abide by the said scheme.
- 6.4 The applicant shall have to obtain P.L.I. Policy as per P.L.I. Act, 1991 and submit the copy of the same to the G.P.C.B.
- 6.5 The unit shall have and operate all the requisite equipments/facilities for prevention and control of efficiently all its effluent treatment plant/air pollution control equipments/ facilities for management and handling of hazardous wastes. Whenever the effluent treatment plant/air pollution control equipments/ facilities for hazardous waste or any part thereof are fully or partly non-operational for any reason whatsoever (whether for maintenance/repairs/electricity failure or otherwise) unit shall closedown its manufacturing/ processing activities and shall not restart it unless and until all it's the effluent treatment plants/air pollution protection and control equipments and facilities including stack monitoring/ facilities for hazardous waste management and handling are fully operational.
- 6.6 The unit shall have and use only one outlet for the discharge of its effluent and no effluent shall be discharged without requisite treatment and without meeting with the GPCB norms. Such outlet shall be near the front gate/entrance of the unit. The unit shall not keep any bypass line or system, or loose or flexible pipe for discharging effluent outside or even for transporting treated or untreated effluent within the factory premises, within effluent treatment plants or in the compound of the unit.
- 6.7 The unit shall, within one week from the date of issue of this order. Put up at the entrance the electricity consumer number and the name of the electricity consumers as on the record of the GEB/AEC.
- 6.8 Make adequate lighting arrangements all around the Effluent Treatment Plants/ Air Pollution Control measures/ incinerator / facilities for hazardous management and handling also above the Boards mentioned in the above clause.
- 6.9 The unit shall maintain the records of production and consumption of electricity and water for each day during the period of production. The unit shall maintain separate figures for consumption of electricity for running the Air pollution control measures / incineration system by having a separate meter/sub- meter for each Air Pollution Control measures. The number of units consumed by operating the diesel generating sets, if any, shall also be maintained. In case of plants involving 'Bio-mass' treatment, for each addition of bio-mass time and quantity, should be recorded. The uptake rate of Oxygen of the bio-mass in the aeration basin and other parameters of biological system should be recorded, every day.
- 6.10 When electricity supply or water supply is disconnected in future on account of noncompliance with the GPCB norms or on account of the closure order, which may be passed by the court or by the Govt., /GPCB under any statutory provisions relating to environmental protection and prevention and control of pollution. The unit shall not use any diesel generating set or any other alternative source of energy or water tankers from outside for continuing the production activities.
- 6.11 "Flow Meters" should be installed at inlet and outlet of Effluent Treatment Plant (ETP thereafter).
- 6.12 All the chemicals and nutrients, which are required to be added/dosed any where in the ETP, should be so added by using "Metering Pumps" only.
- 6.13 The printed log-books shall be maintained and get them certified for :
- a) Energy/Fuel Consumption/Raw material consumption and quantity of products manufactured.
 - b) Waste water/gaseous/ hazardous waste flow at inlet & outlet of E.T.P. & air pollution control measures/ incinerator.
 - c) Quantity of sludge generated/ treated/ stored/ reused/ disposed off separately for each type of hazardous waste.

- d) Laboratory analysis/reports for each of the specified parameters of liquid effluents, gaseous discharge and hazardous waste sample.
- 6.14 Low NO_x burners may be provided to avoid excessive formulation of NO_x. Only LSHS will be used as fuel during the critical months to ensure that SO₂ levels in the ambient air is within the norm specified.
- 6.15 A copy of approved On-site Emergency Plan as required under the Rules 13 and 14 of the Handling, Manufacture, Storage and Import of the Hazardous Chemicals Rules, 1989 should be submitted to the Board.
- 6.16 The funds earmarked for the Environmental protection measures should not be diverted for any other purpose and year wise expenditure should be reported to this Board and to the Government.
- 6.17 Storm water shall not be mixed with the industrial effluent. Disposal system for storm water shall be provided separately.
- 6.18 Good housekeeping shall be maintained within the factory and industrial premises. All pipes, vents, joints valves and drains shall be leak proof. They should be checked periodically and arrangements thereof shall be indicated in the On-site Emergency Plan. Floor washing shall be admitted in to the effluent collection system for subsequent treatment and disposal.
- 6.19 The directives issued by the Board from time to time in view of direction issued by the Honorable High Court of Gujarat in the matter of S.C.A.770/95 shall have to be complied with.
- 6.20 The applicant shall make an application for renewal of the consent at least 60 days before the date of expiry of the consent.
- 6.21 In case of change of ownership/management the name and address of the new owners / partners / directors / proprietor should immediately be intimated to the Board.
- 6.22 The applicant shall however, not without the prior consent to operate of the Board bring into use any new or altered outlet for the discharge of effluent or gaseous emission or sewage waste from the proposed industrial plant. The applicant is required to make applications to this Board for this purpose in the prescribed forms under the provisions of the Water Act-1974, the Air Act-1981 and the Environment (Protection) Act-1986.
- 6.23 Applicant is required to comply with the Manufacturing, Storage and Import of Hazardous Chemicals Rules-1989 framed under the Environment (Protection) Act-1986.
- 6.24 If it is established by any competent authority that the damage is caused due to their industrial activities to any person or his property in that case they are obliged to pay the compensation as determined by the competent authority.

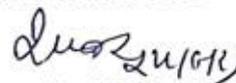
PENALTY PROVISIONS :

If the applicant fails to comply with the conditions and other directives issued by this Board as laid down in this order, the applicant is liable for the action under section 5 of the E(P) Act and also prosecution under Section 43 & 44 and other penal provisions of the Water Act and under section 37, 38, 39 and other penal provisions of the Air Act & under section 15 of the E(P) Act and shall on conviction, be liable for punishment and imprisonment as provided in the said Acts.

NOTE:

The Board reserves the right to review and/or revoke the consent/ authorization and/or make variations in the conditions that the Board deems fit in accordance with provisions of the Acts/Rules.

For and on behalf of
Gujarat Pollution Control Board



(A. J. Rathod)

Regional Officer

Date : 25/09/2023

No. GPCB/RO-BHV/BHV-548 /ID-16250/ 17711

ISSUED TO:

M/s. Western India Petro Chem Ind. (ID:16250),
Plot No. 62, 63, GIDC - Vartej,
Tal & Dist. : Bhavnagar.

Annexure - 23

Details of Greenbelt Development at APSEZ, Mundra

Total Green Zone Detail till Up to September 2024					
LOCATION	Area (In Ha.)	Trees (Nos.)	Palm (Nos.)	Shrubs (SQM)	Lawn (SQM)
SV COLONY	72.29	34920.00	7962.00	69696.00	100646.00
PORT & NON SEZ	81.61	149359.00	19220.00	75061.78	62966.38
SEZ	115.70	226120.00	20489.00	220583.60	28162.03
MITAP	2.47	8113.00	33.00	3340.00	4036.00
WEST PORT	104.29	248074.00	66816.00	24112.00	16369.00
AGRI PARK	8.94	17244.00	1332.00	5400.00	2121.44
SOUTH PORT	14.45	27530.00	3470.00	3882.00	3327.26
Samundra Township	58.26	63722.00	11834.00	23908.89	47520.07
Productive Farming (Vadala Farm)	0.00	0.00	0.00	0.00	0.00
TOTAL (APSEZL)	457.99	775082	131156	425984.27	265148.18
		906238.00			

Details of Mangrove Afforestation done by APSEZ

Sl. no.	Location	District	Area (Ha)	Duration	Species	Implementation agency
1	Mundra Port	Kutch	24	-	Avicennia marina	Dr. Maity, Mangrove consultant of India
2	Mundra Port	Kutch	25	-	Avicennia marina	Dr. Maity, Mangrove consultant of India
3	Luni/Hamirmora (Mundra)	Kutch	160.8	2007 - 2015	Avicennia marina, Rhizophora mucronata, Ceriops tagal	GUIDE, Bhuj
4	Kukadsar (Mundra)	Kutch	66.5	2012 - 2014	Avicennia marina	GUIDE, Bhuj
5	Forest Area (Mundra)	Kutch	298	2011 - 2013	Avicennia marina	Forest Dept, Bhuj
6	Jangi Village (Bhachau)	Kutch	50	2012 - 2014	Avicennia marina	GUIDE, Bhuj
7	Jakhau Village (Abdasa)	Kutch	310.6	2007-08 & 2011-13	Avicennia marina, Rhizophora mucronata, Ceriops tagal	GUIDE, Bhuj
8	Sat Saida Bet	Kutch	255	2014-15 & 2016-17	Avicennia marina & Biodiversity	GUIDE, Bhuj
9	Dandi Village	Navsari	800	2006 - 2011	Avicennia marina, Rhizophora mucronata, Ceriops tagal	GEC, Gandhinagar
10	Talaja Village	Bhavnagar	50	2011-12	Avicennia marina	Forest Dept, Talaja
11	Narmada Village	Bhavnagar	250	2014 - 2015	Avicennia marina	GEC, Gandhinagar
12	Malpur Village	Bharuch	200	2012-14	Avicennia marina	SAVE, Ahmedabad
13	Kantiyajal Village	Bharuch	50	2014-15	Avicennia marina	SAVE, Ahmedabad
14	Devla Village	Bharuch	150	210-16	Avicennia marina	SAVE, Ahmedabad
15	Village Tala Talav (Khambhat)	Anand	100	2015 - 2016	Avicennia marina	SAVE, Ahmedabad
16	Village Tala Talav (Khambhat)	Anand	38	2015 - 2016	Avicennia marina	GEC, Gandhinagar
17	Aliya Bet, Village Katpor (Hansot)	Bharuch	62	2017-18	Avicennia marina & Rhizophora spp.	GEC, Gandhinagar
18	Kukadsar- (Bhadeswar- Mundra)	Kutch	250	2021-22	Avicennia marina	Shreeji Enterprise, Amreli
19	Kukadsar- (Bhadeswar- Mundra)	Kutch	750	2022-23	Avicennia marina	Shreeji Enterprise, Amreli
20	Kukadsar- (Bhadeswar- Mundra)	Kutch	250	2023-24	Avicennia marina	Shreeji Enterprise, Amreli
Total			4140			

Annexure - 24

CERTIFICATE OF APPROVAL

Issued by Indian Register Quality Systems
(A Division of IRCLASS Systems and Solutions Private Limited)
This is to certify that the Occupational Health & Safety Management Systems of

Organisation: Adani Ports and Special Economic Zone Limited

Address: Adani House, P.O. Box No. 1,
Mundra, Kutch - 370 421,
Gujarat, India

has been assessed and found conforming to the following requirement

Standard: ISO 45001:2018

Scope: Providing Port Facilities for Import & Export of Bulk, Break Bulk, Liquid and Containerized Cargo, its Storage and Transportation by Road, Rail, Pipeline and Single Point Mooring (SPM) and RORO Operation for Export of Vehicles

Certificate No.: IRQS/220400397

Original Certification Date : 02/03/2010

Previous Expiry Date : 28/02/2022

Continuation Date of Granting : 21/02/2022

Current Date of Granting : 12/04/2022

Expiry Date : 27/02/2025



Shashi Nath Mishra
Head IRQS

This approval is subject to continued satisfactory maintenance of the Occupational Health and Safety Management Systems of the organization to the above standard which will be monitored by IRQS. The use of the Accreditation Mark indicates accreditation with respect to activities covered by the certificate with accreditation no. OH 007. Condition Overleaf COA/IRQS/NABCB/OHSMS/Rev 01

Head Office: 52A, Adi Shankaracharya Marg, Opp. Powai Lake, Powai, Mumbai - 400 072, India.

Annexure - 25



TEST REPORT

01-NS-CH8

Name : Mr. Bhagwat Swaroop Sharma 30048983	Reg. No : 4020101057
Age/Sex : 44 Years / Male PN:	Patient ID : 397083
Mobile No : 6357231713	Reg. Date Time : 08-Feb-2024 09:49 PM
	Coll. Date Time : 09-Feb-2024 07:43 AM
ADANI HOSPITALS MUNDRA PRIVATE LIMITED @ MUNDRA	Report Date Time : 12-Feb-2024 03:43 PM
	Sample Type : EDTA Whole Blood

Parameter	Result	Unit	Biological Ref. Interval
-----------	--------	------	--------------------------

COMPLETE BLOOD COUNT (CBC)

HB & Indices

Hemoglobin <i>Electrical Impedance</i>	14.3	g/dL	12.0 - 16.0
Hematocrit <i>Electrical Impedance</i>	47.5	%	40.0 - 54.0
RBC Count <i>Electrical Impedance</i>	5.10	million/cmm	4.0 - 5.5
MCV <i>Calculated</i>	93.2	fL	80 - 100
MCH <i>Calculated</i>	28.1	pg	27 - 34
MCHC <i>Calculated</i>	L 30.1	%	32 - 36
RDW <i>Calculated</i>	13.6	%	11.0 - 16.0

Total WBC

WBC Count <i>Electrical Impedance</i>	7740	/cmm	4000 - 10000
---	------	------	--------------

Platelet Count

Platelet Count <i>Electrical Impedance</i>	256000	/cmm	150000 - 450000
--	--------	------	-----------------

MPV <i>Calculated</i>	H 12.9	fL	6.5 - 12.0
---------------------------------	--------	----	------------

PDW <i>Calculated</i>	15.8	%	9.0 - 17.0
---------------------------------	------	---	------------

Differential Count

Neutrophils (%) <i>Flowcytometry</i>	L 45	%	50 - 70
--	------	---	---------

Lymphocytes (%) <i>Flowcytometry</i>	H 43	%	20 - 40
--	------	---	---------

Eosinophils (%) <i>Flowcytometry</i>	H 06	%	1 - 5
--	------	---	-------

This is an Electronically Authenticated Report.



Dr. Urvesh Kalaria
M.D (PATHOLOGY)

Page 1 of 14

NORTHSTAR DIAGNOSTICS PVT. LTD.

Diagnostics Centre & Pathology Lab : CH-8, Inspire Business Park, Adani Shantigram, Vaishnodevi Circle, S.G. Highway, Ahmedabad-382421

Registered office : 12-C, Gyankuj Society, Opp. St.Xaviers College, Navrangpura, Ahmedabad - 380009

delightme@northstarlabs.in northstarlabs.in 079 47514141 +91 84880 14015

northstar

PATHOLOGY LABS

Know Your Health

CIN NO. U33125GJ2021PTC119879



MC-5916



TEST REPORT

01-NS-CH8

Name : Mr. Bhagwat Swaroop Sharma 30048983	Reg. No : 4020101057
Age/Sex : 44 Years / Male PN:	Patient ID : 397083
Mobile No : 6357231713	Reg. Date Time : 08-Feb-2024 09:49 PM
	Coll. Date Time : 09-Feb-2024 07:43 AM
ADANI HOSPITALS MUNDRA PRIVATE LIMITED @ MUNDRA	Report Date Time : 20-Feb-2024 03:46 PM
	Sample Type : EDTA Whole Blood

Parameter	Result	Unit	Biological Ref. Interval
-----------	--------	------	--------------------------

ERYTHROCYTE SEDIMENTATION RATE [ESR]

ESR (After 1 hour) <i>Westergren method</i>	08	mm/hr	<10
---	----	-------	-----

This is an Electronically Authenticated Report.

@

Dr.Urvesh Kalaria
M.D (PATHOLOGY)

Page 3 of 14

NORTHSTAR DIAGNOSTICS PVT. LTD.

Diagnostics Centre & Pathology Lab : CH-B, Inspire Business Park, Adani Shantigram, Vaishnodevi Circle, S.G. Highway, Ahmedabad-382421

Registered office : 12-C, Gyankuj Society, Opp. St.Xaviers College, Navrangpura, Ahmedabad - 380009

© delightme@northstarlabs.in © northstarlabs.in ☎ 079 47514141 ☎ +91 84880 14015

northstar

PATHOLOGY LABS

Know Your Health

CIN NO. U33125GJ2021PTG119879



MC-5916



TEST REPORT

01-NS-CH8

Name : Mr. Bhagwat Swaroop Sharma 30048983	Reg. No : 4020101057
Age/Sex : 44 Years / Male PN;	Patient ID : 397083
Mobile No : 6357231713	Reg. Date Time : 08-Feb-2024 09:49 PM
	Coll. Date Time : 09-Feb-2024 07:43 AM
ADANI HOSPITALS MUNDRA PRIVATE LIMITED @ MUNDRA	Report Date Time : 10-Feb-2024 07:02 PM
	Sample Type : Fluoride

Parameter	Result	Unit	Biological Ref. Interval
-----------	--------	------	--------------------------

FASTING BLOOD SUGAR (FBS)

Fasting Blood Sugar (FBS) <i>Glucose Oxidase-Peroxidase</i>	H 103.92	mg/dL	70 - 100
---	----------	-------	----------

This is an Electronically Authenticated Report.

@

Dr.Urvesh Kalaria
M.D (PATHOLOGY)

Page 5 of 14

NORTHSTAR DIAGNOSTICS PVT. LTD.

Diagnostics Centre & Pathology Lab : CH-8, Inspire Business Park, Adani Shantigram, Vaishnodevi Circle, S.G. Highway, Ahmedabad-382421

Registered office : 12-C, Gyankuj Society, Opp. St.Xaviers College, Navrangpura, Ahmedabad - 380009

©delightme@northstarlabs.in ©northstarlabs.in ☎079 47514141 📞+91 84880 14015

northstar

PATHOLOGY LABS

Know Your Health

CIN NO. U33125GJ2021PTC119879

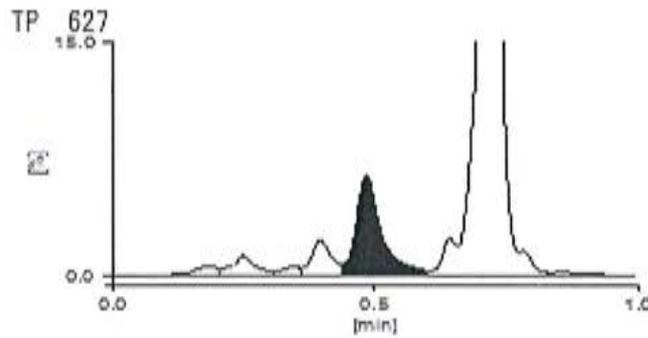
I V3.09 1 2024/02/12 11:28:41
 ID 34020101057
 Sample No. 2024021211240075 SL 0003 - 10
 Patient ID -
 Name
 Comment

CALIB (N)	Y = 1.1480X + 0.5492		
Name	%	Time	Area
FP			
A1A	0.5	0.19	5.07
A1B	1.0	0.25	10.39
F	0.3	0.34	3.53
LA1C+	1.5	0.40	15.22
SA1C	6.5	0.48	54.58
A0	91.7	0.71	945.86
H-VAR			

Total Area 1034.65

HbA1c 6.5 %

HbF 0.3 %





MC-5916

TEST REPORT

01-NS-CH8

Name	: Mr. Bhagwat Swaroop Sharma 30048983	Reg. No	: 4020101057
Age/Sex	: 44 Years / Male PN:	Patient ID	: 397083
Mobile No	: 6357231713	Reg. Date Time	: 08-Feb-2024 09:49 PM
		Coll. Date Time	: 09-Feb-2024 07:43 AM
		Report Date Time	: 12-Feb-2024 03:54 PM
		Sample Type	: Serum

ADANI HOSPITALS MUNDRA PRIVATE LIMITED @
MUNDRA

Parameter	Result	Unit	Biological Ref. Interval
Uric Acid <i>Uricase-Peroxidase Method</i>	5.20	mg/dL	3.6 - 8.2

This is an Electronically Authenticated Report.

@

Dr.Urvesh Kalaria
M.D (PATHOLOGY)

Page 9 of 14

NORTHSTAR DIAGNOSTICS PVT. LTD.

Diagnostics Centre & Pathology Lab : CH-8, Inspire Business Park, Adani Shantigram, Vaishnodevi Circle, S.G. Highway, Ahmedabad-382421

Registered office : 12-C, Cyankuj Society, Opp. St.Xaviers College, Navrangpura, Ahmedabad - 380009

delighimo@northstarlabs.in northstarlabs.in 079 47514141 +91 84800 14015

northstar

PATHOLOGY LABS
Know Your Health

CIN NO. U33125GJ2021PTC110879



TEST REPORT

01-NS-CH8

Name : Mr. Bhagwat Swaroop Sharma 30048983	Reg. No : 4020101057
Age/Sex : 44 Years / Male PN:	Patient ID : 397083
Mobile No : 6357231713	Reg. Date Time : 08-Feb-2024 09:49 PM
	Coll. Date Time : 09-Feb-2024 07:43 AM
ADANI HOSPITALS MUNDRA PRIVATE LIMITED @ MUNDRA	Report Date Time : 13-Feb-2024 09:35 AM
	Sample Type : Serum

Parameter	Result	Unit	Biological Ref. Interval
-----------	--------	------	--------------------------

LIPID PROFILE

Cholesterol <i>CHOD-POD Method</i>	H 223.01	mg/dL	0 - 200.8
Triglyceride <i>GPO-POD Method</i>	171.33	mg/dL	0 - 203.5
HDL Cholesterol <i>Direct Method</i>	40.83	mg/dL	>34.0
LDL Cholesterol <i>Direct Method</i>	H 147.91	mg/dL	0 - 100.0
VLDL <i>Calculated</i>	34.27	mg/dL	15 - 35
LDL/HDL Ratio <i>Calculated</i>	H 3.62		0 - 3.5
CHOL/HDL Ratio <i>Calculated</i>	H 5.46		0 - 5.0

This is an Electronically Authenticated Report.

Dr. Urvesh Kalaria
M.D (PATHOLOGY)

Page 11 of 14

NORTHSTAR DIAGNOSTICS PVT. LTD.

Diagnostics Centre & Pathology Lab : CH-8, Inspire Business Park, Adani Shantigram, Vaishnodevi Circle, S.G. Highway, Ahmedabad-382421

Registered office : 12-C, Gyankuj Society, Opp. St. Xaviers College, Navrangpura, Ahmedabad - 380009

delightme@northstarlabs.in northstarlabs.in 079 47514141 +91 84880 14015

northstar
PATHOLOGY LABS
Know Your Health

CIN NO. U33125GJ2021PTC119879



TEST REPORT

01-NS-CH8

Name : Mr. Bhagwat Swaroop Sharma 30048983	Reg. No : 4020101057
Age/Sex : 44 Years / Male PN:	Patient ID : 397083
Mobile No : 6357231713	Reg. Date Time : 08-Feb-2024 09:49 PM
ADANI HOSPITALS MUNDRA PRIVATE LIMITED @ MUNDRA	Coll. Date Time : 09-Feb-2024 07:43 AM
	Report Date Time : 20-Feb-2024 10:06 PM
	Sample Type : Serum

Parameter	Result	Unit	Biological Ref. Interval
25 OH VITAMIN D TOTAL <i>Chemiluminescence Immunoassay (CLIA)</i>	L 10.35	ng/mL	Deficiency : <20 Insufficiency : 20 - 30 Sufficiency : >30

Definition:

A steroid hormone that has long been known for its important role in regulating body levels of calcium and phosphorus and in the mineralization of bone. The term "vitamin D" specifically refers to two biologically inert precursors, vitamin D3 (cholecalciferol) or D2 (ergocalciferol). Neither vitamin D3 nor vitamin D2 has significant biologic activity; rather they must be metabolized within the body to the hormonally active form. Vitamin D3 is generated in the skin when light energy is absorbed (UV radiation in the UVB spectrum 290-320 nm) by a precursor molecule 7-dehydrocholesterol (7-DHC; provitamin D3). However, cutaneous vitamin D3 production after single prolonged UVB exposure is capped at approximately 10-20% of the original epidermal 7-DHC concentration, a limit achieved with suberythemogenic UV exposures. Vitamin D2 is plant derived, produced exogenously by irradiation of ergosterol, and enters the circulation through diet. Vitamin D3 from the skin and vitamin D3 and D2 from the diet enter the blood and are metabolized to their 25-hydroxy counterparts. Once formed, 25-hydroxyvitamin D (25-OHD) is metabolized in the kidney to 1,25-dihydroxyvitamin D (1,25-OHD).

Interpretation:

Increased In

- Vitamin D intoxication
- Excessive exposure to sunlight

Decreased In

- Malabsorption
- Steatorrhea
- Dietary osteomalacia, anticonvulsant osteomalacia
- Biliary and portal cirrhosis
- Thyrotoxicosis
- Pancreatic insufficiency
- Celiac disease
- Rickets

This is an Electronically Authenticated Report.

Dr. Urvesh Kalaria
M.D (PATHOLOGY)

Page 13 of 14

NORTHSTAR DIAGNOSTICS PVT. LTD.

Diagnostics Centre & Pathology Lab : CH-8, Inspire Business Park, Adani Shantigram, Vaishnodevi Circle, S.C. Highway, Ahmedabad-382421

Registered office : 12-C, Cyankuj Society, Opp. St. Xaviers College, Navrangpura, Ahmedabad - 380009

delightme@northstarlabs.in northstarlabs.in 079 47514141 +91 84880 14015

northstar

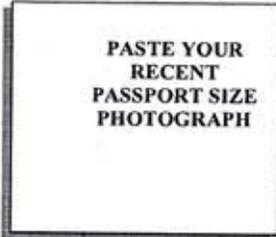
PATHOLOGY LABS

Know Your Health

CIN NO. U33125GJ2021PTC119879

adani	HR Policy Procedures	Document:	HRP
		Issue Date:	08-Apr-2022
		Effective from	08-Apr-2022
		Version:	Ver 6
Guidelines on Pre-Employment Medical Assessment			

**Annexure-2
Self-Declaration**



1 PERSONAL DETAILS:

(First Name) (Middle Name) (Surname/ Last Name)
Hitvesha Pradipbhai Modha

Gender (male / female): female Age (Years): 21

Post Applied for: _____

Height (cm): 167 Weight (Kg): 55 Blood Pressure: 120/80

2 PREVIOUS EMPLOYMENT: Yes / No (If yes specify)

SN	Company Name	Nature of Work	Duration (in years)

3 PERSONAL HABITS:

	Yes	No
Smoking		✓
Tobacco Chewing		✓
Alcohol		✓

adani	HR Policy Procedures	Document:	HRP
		Issue Date:	08-Apr-2022
		Effective from	08-Apr-2022
		Version:	Ver 6
Guidelines on Pre-Employment Medical Assessment			

Any Other: If yes specify _____ **No** _____

4 MEDICAL HISTORY:

i) **DISABILITY:** Yes / No **No**
 (If yes specify the details and disability % if certified)

.....

ii) **VISION:**

a) **Acuity of Vision:**

Are you using Spectacles / Glasses: Yes / No **No** (If yes specify power below)

Right Eye: _____

Left Eye: _____

b) **Colour Vision:**

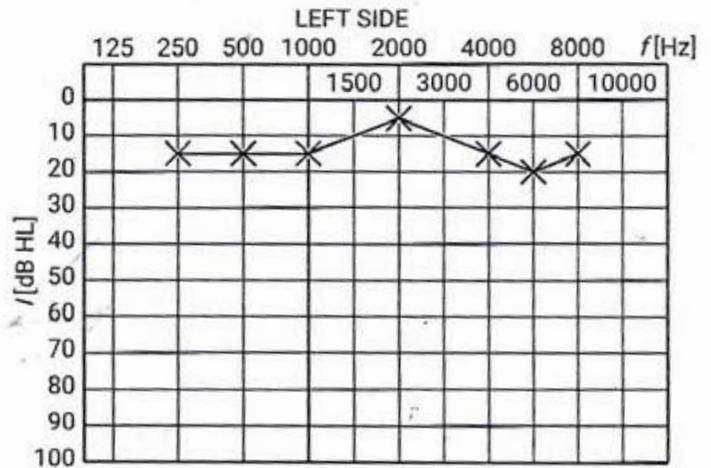
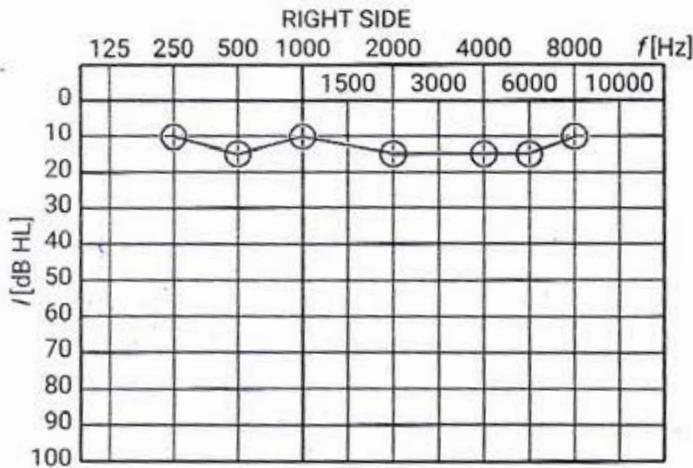
Color Blindness: Yes / No **No** (If yes pls mention details below)

iii) **PAST HISTORY:**

a) Any illness / injury / accidents / hospitalization after your last Annual Health
 Checkup: Yes / No **No** (If yes specify) _____

b) Any illness / injury / accidents in past: Yes / No **No** (If yes specify)

PURE-TONE AUDIOMETRY
(Air conduction)



Average hearing threshold at 500, 1000, 2000 and 4000 Hz

Right ear: 14 dB HL (Normal hearing)

Left ear: 13 dB HL (Normal hearing)

Normal hearing ≤ 20 dB HL

Mild impairment 21-40 dB HL

Moderate impairment 41-60 dB HL

Severe impairment 61-80 dB HL

Profound impairment including deafness > 80 dB HL

World Health Organization (WHO) grade of hearing loss

Better ear: 13 dB HL (Normal hearing)

Performance: No or very slight hearing problems. Able to hear whispers.

Recommendations: No recommendations.

HITVESHA MODHA 21 YEARS

Rt) Tympanic membrane: Normal

Lt) Tympanic membrane: Normal

Hearing of Whispered voice at 2 feet: Normal



adani	HR Policy Procedures	Document:	HRP
		Issue Date:	08-Apr-2022
		Effective from	08-Apr-2022
		Version:	Ver 6
Guidelines on Pre-Employment Medical Assessment			

c) Any job-related disease and / or injury: Yes / No (If yes specify) _____

d) Terminated or Rejected on medical grounds: Yes / No (If yes specify)

iv) **RECENT HISTORY:**

On medication for following (Answer Yes or No.)

High Blood Pressure (Hypertension)	N
High Blood Sugar (Diabetes)	N
Heart Disease	N
Kidney Disease	N
Tuberculosis	N
Chronic Lung Disease	N
Ear Disease	N

Hearing Problem	N
Fainting, Fits, Epilepsy, Dizziness	N
Any mental disorder	N
Hepatitis B	N
Any liver disorder	N
Cancer	N
Stroke or Brain problem	N

Any Other: NO

v) **IMMUNIZATIONS:**

Yes No

adani	• HR Policy Procedures	Document:	HRP
		Issue Date:	08-Apr-2022
		Effective from	08-Apr-2022
		Version:	Ver 6
Guidelines on Pre-Employment Medical Assessment			

COVID 1st Dose
 COVID 2nd Dose

Yes	
Yes	

Covishield.

5 I declare that the above statements are true and complete to the best of my knowledge and belief. In case this information is found to be false by the company, then the **company reserves the right to terminate my services without giving any notice.** I agree that the results of this medical examination in general terms may be revealed to the company if required. I also fully understand that in case I am declared medically unfit due to any reason, I shall not be entitled for the employment in the company. However, the decision taken by recruitment committee about my medical fitness will be final and binding to me.

Pradeep
 (Signature of Candidate)

Date: 22/06/2024

Name:

Mitvesha Modha

Age / Gender

21/F

Date:

22/06/24

Annexure-3

Pre-Employment Medical Assessment

(All details given below will be filled by examine physician & treated as confidential)
(Please ✓ Mark Where Applicable)

1 Personal Habits:

- i) Smoking
- ii) Tobacco chewing
- iii) Alcohol
- iv) Any other

2 Medical History:

i) **Any Disability:** Yes / No If yes specify with disability %

ii) **Personal History:**

NO

iii) **Known case of or past history of**

NO

iv) **Immunization:**

Yes No

Tetanus Toxoid

<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>

Hepatitis B

Others

Considered

Family History:

Has anyone of parents suffered from

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>

Hypertension

Heart Disease

Cancer

<input checked="" type="checkbox"/>

Diabetes

Tuberculosis

Epilepsy

Any other Disease

adani	Name:	Kitvesha Modha	Date:	22/06/24
	Age / Gender	21/F		

3 Physical Examination:

i) Build: Poor / Average / Strong Skin:
 ii) Throat: Tonsils: Thyroid: Lymph nodes:
 iii) Teeth & Gums: Tongue:
 iv) Height cms Weight kg BMI

v) Identification marks:
Mole on (Lt) Cheek

1 Vision (To be checked by eye specialist):

General Eye examination: _____

		Rt	Lt	Colour Vision (Pls \checkmark Mark Applicable)
Visual Acuity	Distance	<input type="text" value="6/6"/>	<input type="text" value="6/6"/>	Normal Colour vision <input checked="" type="checkbox"/> Total colour deficiency <input type="checkbox"/> Partial Colour Deficiency <input type="checkbox"/> If partial - pl. mention _____ <u>no</u>
	Near	<input type="text" value="N/6"/>	<input type="text" value="N/6"/>	
Corrected Vision	Distance	<input type="text"/>	<input type="text"/>	
	Near	<input type="text"/>	<input type="text"/>	
Power of lens	Spherical	<input type="text"/>	<input type="text"/>	
	Cylindrical	<input type="text"/>	<input type="text"/>	
	Axis	<input type="text"/>	<input type="text"/>	

	Yes	No
Squint	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Nystagmus	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Night Blindness	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Any other eye disease	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If yes pl. give details NO

A.
Dr. Tejal P. Kotecha
 (M.D.)
 Reg. No. G-8498

Signature & Seal of Ophthalmologist



adani

Name:

Mitvesha Modha

Age / Gender

21/F

Date:

22/06/24

5 **Hearing:**

External Examination: Rt Lt

Rinne's Test: Weber's Test:

Conversational Hearing/ Whispering:

Audiometry (Comment): 2 feet

dB Right Ear 14 dBHL dB Left Ear 13 dBHL

6 **Cardio-vascular System:**

Pulse-Rate 78 /min

Blood Pressure 120/80 mm hg
Sys Dia

Heart Sounds Murmur Present Absent Details if present

Character: Regular / Irregular Regular

7 **Respiratory System:**

Shape of Chest: Breath Sounds:

8 **Abdomen:**

Liver: Spleen: Any Abdominal Lump:

9 **Genito Urinary System:**

Hernia: Hydrocele/Varicocele:

10 **Venereal Disease:**

11 **Special Conditions:** Flat feet Varicose Veins

12 **Nervous System:**

Pupillary Reaction: Planter Reflex:

Knee Jerk Reflex: Romberg Sign: +ve -ve

13 **Investigations:**

i) Urine: Sp. Gr. 1.015 Reaction Acidic Albumin Acidic Sugar Absent

Microscopic: NAD

Blood: Haemoglobin 11.7 g% / HbA1c 5.30 Bl. Gr. B⁺ +ve -ve

ii) Chest X-ray: Reports Attached

iii) E.C.G: Reports Attached

iv) USG Whole Abdomen: Reports Attached

adani

Name:

Hitvesha Madha

Age / Gender

21 F

Date:

22/06/24

v) 2D Echo/TMT:

Reports Attached

vi) PFT: FVC

80

FEV1

98

FEV1/FVC %

122

PEFR

61

vii) Any other Investigations / clinical finding:

No / Normal

14 COMMENTS AND RECOMMENDATIONS:

(Pls Mark Applicable)

Fit Unfit

Remarks:

No

Details of Examining Physician:

Name:

Registration No.:

Address:

Contact No.:

Dr. Tejal P. Kotecha
(M.D.)
Reg. No. G-8498

Signature with Seal of Examining Physician

For office use only:

Date of receipt of original documents:

PEM No.:

MDMS No:

Medically

Fit

Temp. Unfit

Unfit

Special Remarks:

No



Annexure - 26



Ports and
Logistics

Environmental Policy

Adani Ports and Special Economic Zone Limited's (APSEZ) environmental responsibilities are driven by its commitment to preserve the environment and are integral to the way we do business. We shall strive to integrate best environmental practices across APSEZ's management and governance systems to minimize environmental impacts and attain a leadership position in environmental stewardship.

APSEZ, its subsidiaries, joint ventures, suppliers, service providers and contractors shall keep its commitment to:

- Build and operate the facilities in compliance with all applicable environmental laws, regulations, obligations and endeavor to go beyond compliances.
- Identify and evaluate environmental and climate impacts and their associated risks for all activities including distribution & logistics and formulate a mitigation strategy.
- Define roles and responsibilities for implementing environmental management policy.
- Conduct training for employees to understand the impacts of business activities on the environment.
- Continually improve the environmental performance by setting objectives, targets and processes for efficient use of natural resources, waste management and minimization, emission reduction, noise level control and pollution prevention.
- Conserve and protect environment in and around of our operational sites in consultation with stakeholders.
- Conduct environmental due diligence for new and expansion of existing projects, mergers and acquisitions by set procedures.
- Create environmental awareness through continuous engagement and training with stakeholders including employees, customers, suppliers, service providers, contractors and local communities.
- Measure, monitor, review and report the environmental performance and issues of the organization in accordance with this policy at regular intervals and audit (internal/ external) before communicating to relevant stakeholders.

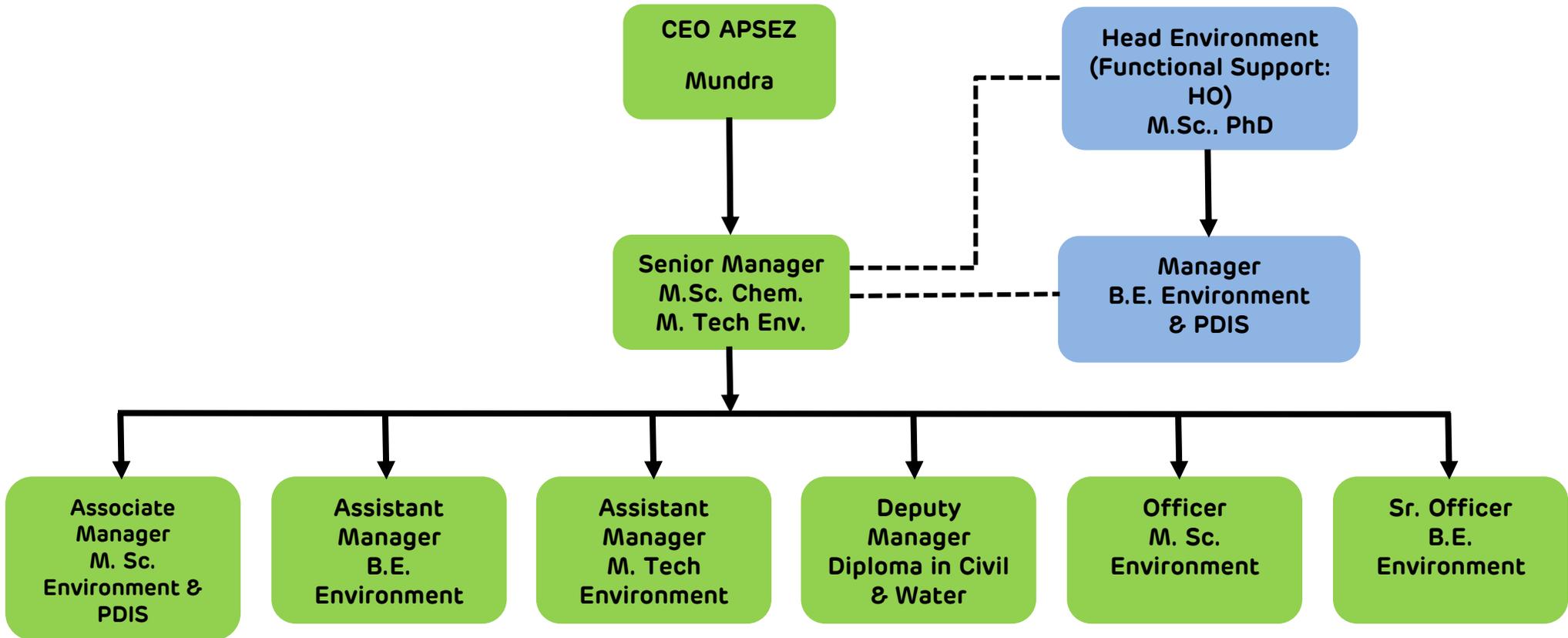
Date: August 09, 2023

Karan Adani

Whole-Time Director & CEO

Annexure - 27

Updated Organogram of Environment Management Cell, APSEZ, Mundra



Annexure - 28

Adani Ports and SEZ Ltd.

Regarding Environmental & CRZ Clearance for Proposed Expansion of Waterfront Development Plan of Mundra Port

PUBLIC NOTICE

This is to bring to the public notice that, Adani Ports and Special Economic Zone Limited (APSEZ) Regd. office at Adani Corporate House, Shantigram, Near Vaishno Devi Circle, S.G. Highway, Khodiyar, Ahmedabad – 382421, Gujarat has been accorded Environmental & CRZ Clearance for "Proposed Expansion of Waterfront Development Plan of Mundra Port in an area of 3335 ha for handling of additional 289 MMTPA of multi-purpose cargo in addition to the existing approved capacity of 225 MMTPA" located at Mundra, Kachchh District vide file no. 10-24/2019-1A-III, dated 13th August, 2024 by the Ministry of Environment, Forest & Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi – 110003. A copy of the above mentioned clearance letter along with the environmental conditions and safeguards is published here and is also available with Gujarat Pollution Control Board. This may also be seen on the website of Ministry of Environment, Forest & Climate Change at <https://parivesh.nic.in/> and on website of Adani Ports and Special Economic Zone Ltd. at <https://www.adaniports.com/Downloads>.

This is in reference to your application submitted to MoEF&CC vide proposal number IA/GJ/INFRA/469553/2024 dated 21/04/2024 for grant of prior Environmental Clearance (EC) to the proposed project under the provision of the EIA Notification 2006 and as amended thereof.

2. The particulars of the proposal are as below:

(i) EC Identification No.	EC24A3501GJ5976060N
(ii) File No.	10-24/2019-1A-III
(iii) Clearance Type	Fresh EC
(iv) Category	A
(v) Project/Activity Included Schedule No.	7(e) Ports, harbors, breakwaters, dredging
(vi) Sector	INFRA-1
(vii) Name of Project	Expansion of Waterfront Development Plan for Mundra Port by APSEZ, Mundra, Gujarat
(viii) Name of Company/Organization	ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED
(ix) Location of Project (District, State)	KACHCHH, GUJARAT
(x) Issuing Authority	MoEF&CC
(xi) Applicability of General Conditions as per EIA Notification, 2006	No

3. The aforementioned proposal was placed before the EAC during its 364th meeting of the Expert Appraisal Committee held on 15th May, 2024.

4. The proposal is for the expansion of the Waterfront Development Plan of Mundra Port in an area of 3335 ha for handling an additional 289 MMTPA of multi-purpose cargo in addition to the existing approved capacity of 225 MMTPA, located at Mundra, Kachchh District, Gujarat by M/s Adani Ports & Sez Ltd. The proposed project is located between longitude 69°31'6.14"E to 69°47'36.75"E and between latitude 22°43'39.75"N to 22°50'55.34"N.

5. Initially, the waterfront development has been accorded Environmental and CRZ clearance vide letter No: 10-47/2008- IA.III dated 12th January 2009 and addendum F.No:10-47/2008-IA.III dated 19th January 2009. The extension of validity for Environmental and CRZ clearance has been given vide letter no: 10-47/2008-IA.III dated 7th October 2015 with validity up to 11th January 2019 excluding all the clearance for all developmental activities at North port vide letter of even no dated 07th October, 2015.

6. The proposed project falls under 7(e), Ports, harbours, breakwaters, dredging, Category A. Total project cost is Rs. 4,901,400 lakhs.

7. Terms of Reference (ToR) details: The ToR proposal was considered in the 40th EAC (Infra-2) meeting held on 23rd April, 2019, the committee recommended for grant of the ToR, Ministry granted the ToR vide letter No. 10-24/2019-1A-III dated 17th May, 2019. Subsequently amendment in Terms of Reference was obtained on 27th September, 2019 and 10th April, 2020 for exemption of Public Hearing. Further, amendment in ToR w.r.t. excluding the East port from the master plan was applied in Ministry vide proposal no. IA/GJ/INFRA/457274/2024 dated 31/12/2023 and the proposal was appraised in the 353rd meeting of Expert Appraisal Committee held on 10th and 12th January, 2024 and the committee recommended for excluding the east port and Ministry granted the amendment in ToR on 26th February, 2024 excluding the East port from the master plan.

8. The proposed expansion of west port and south port along with supporting utilities/infrastructure facilities will be undertaken over an area of 3335 ha. For handling of additional 289 MMTPA of multi-purpose/Liquid/gas/cryogenic cargo will be handled in addition to the existing approved capacity of 225 MMTPA. Cargo handling for the FY 2023-24 is 165 MMT. The entire existing and proposed quay length will be used for handling Multipurpose/Liquid/Gas/Cryogenic cargo.

9. The details of the existing and proposed expansion development details are as following:

Sl. No.	Description	Approved till 2009	Already developed	Proposed Expansion	Cumulative after Expansion	Remarks
1	Quay Length (m)	22000	7870	8890	16760	The proposed quay length is envisaged due to optimization of layout for Multi-purpose cargo handling. (Existing 7870m quay length will also be optimized for multipurpose cargo handling)
2	Dredging (MCuM)	210 (Including East Port)	123 (South Port & West Port)	120	120	Due to optimization of layout within the existing approved waterfront area additional dredging quantity is envisaged
3	Effluent Treatment Plant (KLD)	265	265	800	1065	Based on the future requirement, ~800 KLD is proposed to be developed on Modular basis.
4	Sewage Treatment Plant (KLD)	50000	55	50000	50055	Based on the future requirement 50 MLD will be developed in Modular basis
5	Desalination Plant (MLD)	300	47	400 (in addition to already developed 47 MLD)	447	Additional units will be developed in Modular basis. Existing Intake and Outfall channel is suitable for 300 MLD Desalination capacity. For additional desalination plant capacity will have intake & outfall with pipeline system.
6	Sea Island Jetty	-	-	1	1	Off-shore berth for handling of Petroleum cargo
7	Single Point Mooring (SPM)/ Single buoy Mooring (SBM)	2	2	1	3	For handling of Petroleum cargo through VLCC

10. The details of existing Cargo handling:

Sl. No.	Type of Cargo	Capacity per Annum	Cargo Handling Capacity	Remarks
1	Container	MTEUs	9.5	1 TEU = 10 MT
2	Coal, Iron Ore	MMT	70.0	--
3	Steel & Scrap	MMT	10.5	--
4	Dry Bulk, Project and Heavy Engineering	MMT	11.0	--
5	Crude Oil (SPM)	MMT	20.0	--
6	POL, Chemicals and Vegetable Oils	MMT	7.5	--
7	Automobiles	Lac Nos.	8.5	1 Car = 1 MT
8	LNG	MMT	10.0	--
Total		MMTPA	225	--

11. Details of Cargo handling after expansion of Waterfront Development Plan (Proposed).

S. No	Cargo type	Cargo Mix	Cargo Handling Capacity (MMTPA)
1	Dry Bulk & Break Bulk Cargo	Multipurpose Cargoes including Coal/Iron ore/ limestone/Mines & Minerals & other dry bulk/Fertilizers and raw materials for manufacture of fertilizer/food grains/sugar/ clinker/cement/Project cargo/timber & wood/ machines/Iron steel products/Bulk/Break Bulk etc.	140
2	Containers	Container, Ro-Ro & Automobiles and any other non-hazardous cargo	250
3	Liquid Cargo	All Class A, B, C petroleum products, excluded petroleum products Including Petrochemical products, Hazardous, Toxic and Non-Hazardous chemicals/Liquids and other Liquid cargos. Tentative list of hazardous liquid cargo but not limited to are as follows: Ethylene, Propylene(Propene), Butadiene, Pentane, Ethyl Mercaptan Motor Spirit, Propylene Oxide, Hexane, Naphtha, Acetone, Methyl Chloride/Chloro Methane, Cyclohexane, Benzene, Ethyl Acetate, Acrylonitrile Acetonitrile, Methyl Methacrylate, Methacrylonitrile, Methanol (Methy Alcohol), Isopropyl Alcohol, Ethyl Alcohol (Ethanol), Ethylene di chloride, Methyl Isobutyl Ketone, Ethyl Benzene, N-Butyl Acetate, Isobutyl Alcohol (Iso Butanol), N-Butyl Alcohol (N-Butanol), Epichlorohydrine, Styrene, O- Xylene, Acetic Acid, Acetic Anhydride, Nonedible/ Mentha Oil Low Sulphur Heavy Stock/ Furnace oil, Aniline, Methyl Ethyl Ketone Peroxide, Ethyl Hexanol-2, Vinyl Chloride, Phenol, Naphthalene, Ethylene Glycol, Mono Ethylene Glycol, Toluene 2,4-di isocyanate, Diphenyl Methane Di-isocyanate, Edible oil/Palm Oil, Paraffin, Bitumen, Sulphur, Coal, CNG, NG, Ammonia (NH3), Diammonium Phosphate, Muriate of Potash (MOP), Soda Ash (Sodium Carbonate), Urea, Limestone, Caustic Soda, Sulphuric acid, Phosphoric acid, Piperine/Piperidine, Chloroform, Hydrochloric Acid (HCL), Ethylene diamine (EDA), CMDI etc. POL such as Motor Spirit, Naptha, HSD, Crude Oil, Aviation Fuel, Kerosene, Low Sulphur Heavy stock/Furnace Oil, Carbon Black Feedstock, Paraffin, Bitumen, Lube Oil, Asphalt etc.	84
4	Gas/Cryogenics/ Liquid	LNG, Propane, Butane, n-Butane, Ethane, LPG, CNG, NG and All Class A, B, C petroleum products, excluded petroleum products Including Petrochemical products, Hazardous, Toxic and Non- Hazardous chemicals/ Liquids and other Liquid cargos.	40
Total			514

12. Land use/Land cover of project site:

Sl.No	Land use/Landcover	Area (ha)	Percentage (%)
1.	Built up Land-Industry	63.97	1.9
2.	Built-up Land (Rural/Urban)	-	-
3.	Built-up Land-Port development	895.82	26.9
4.	Built up/Level Raised	2228.12	66.8
5.	Coastal Sand	6.07	0.2
6.	Cultivable Land	-	-
7.	Fallow Land	-	-
8.	Gulf	53.68	1.6
9.	Land with/without Scrub	24.73	0.7
10.	Land with Scrub - Sand Flat	-	-

Sl.No	Land use/Landcover	Area (ha)	Percentage (%)
11.	Mangroves	-	-
12.	Tidal Flat	44.37	1.3
13.	Plantation	-	-
14.	Reserve Forest	-	-
15.	Salt Pan	18.24	0.5
16.	Streams	-	-
17.	Tanks	-	-
Total		3335	100

13. Terrain and Topographical Features: The proposed development of west port and south port is on reclaimed land and has an average level of (+) 6.0 m CD to (+) 7.0 m CD. The proposed port area is on land which is required to be reclaimed/level raised in future, the average level at the proposed reclamation site is (+) 5.0 m CD to (-) 2.0 m CD.

14. Details of water bodies, impact on drainage: Baradimata Creek is located at the distance of - 0 km, West of South Port Kotdi Creek is located at the distance of - 0 km at North of West Port, Navinal Creek is located at the distance of - 0 km at North East of South Port, Bocha Creek is located at the distance of - 0.7 km at North East of South Port, Creek near Vandh is located at the distance of - 5.3 km at North West direction, Phot Nadi is located at the distance of - 3 km at North East of South Port, Khari Nadi is located at the distance of - 2.15 km at Northwest of West Port, Danesri Nadi is located at the distance of -1.85 km at North of West Port, Nagavanti Nadi is located at the distance of - 5.5 km at North West of South Port, River near Nana Bhadiya is located at the distance of - 6.2 km at North West of West Port, River near Gudiyali is located at the distance of - 13.2 km at North West of West Port, Proper drainage facility is provided in the existing WFDP facility. In addition to this, an adequate drainage system will be provided at the site with separate collection streams to segregate the storm run-off from roads, open areas, material storage areas, vehicle wash water and other wastewater streams.

15. Water requirement: Water requirement for the proposed project during construction phase is 2 MLD which will be met through existing water supply system and Narmada canal water supplied by GWIL. Water demand for the operational phase will be met by the seawater based desalination plant of capacity 400 MLD. No ground water extraction envisaged.

16. Diversion of forestland: No additional land area involved in the proposed expansion. Existing developed area in 2009 involved diversion of forestland over an area of 899 Ha, for which necessary Stage-II approvals were obtained, vide letter F.No.8-2/1999-FC (pt) 30th September 2009.

17. The project is not located within 10 km of Protected Areas (PA) including National Parks, Sanctuaries and Tiger Reserves etc. The project is not located within the Eco-Sensitive Zone (ESZ) or Eco-Sensitive Area (ESA) notified by the MoEF&CC. Nearest bird sanctuary to project site is Khijadiya Bird Sanctuary at 48 km SE located on the opposite bank of Gulf of Kutch followed by Kutch Desert Wildlife at 78 km NE and Narayan Sarovar Wildlife Sanctuary at 105 km NW.

18. Waste Management Plan: The existing facility has 55 KLD STP and 265 KLD ETP. The entire treated wastewater is being reused within the facility for green belt and dust suppression. In addition to the existing facility, STP of capacity 50000 KLD and ETP of capacity 800 KLD is proposed to be developed to treat the wastewater generated due to the proposed expansion. Treated wastewater generated from STP will be reused within the facility for greenbelt development and dust suppression. Treated wastewater from ETP will also be reused within the facility for greenbelt and Dust suppression as much as possible and the excess water will be discharged as combined discharge along with the desalination plant reject. Brine reject from desalination plant and cooling water reject from re-gasification unit of LNG will be discharged at the offshore location as identified through scientific study.

19. CETP details: Existing ETP Capacity-265 KLD, Proposed incremental - 800 KLD. Treated wastewater from ETP will also be reused within the facility for greenbelt and Dust suppression as much as possible and the excess water will be discharged as combined discharge along with the desalination plant reject. STP/ETP Aerobic Digestion Technology will be used.

20. STP details: The existing facility has a STP of capacity 55 KLD. Development of 50 MLD Sewage Treatment Plant (STP) is proposed as part of the current proposal in modular phases as per requirement. The entire treated wastewater is being reused within the facility for green belt and dust suppression.

21. Details of tree cutting and green belt development: The proposed land is a reclaimed land, Shrubs that are present in the site will be cleared during construction phase of the project. APSEZ has 450 Ha of green belt developed with 8.7 Lac saplings in the existing port & SEZ. Out of 450 Ha of green belt in APSEZ, 199 Ha is developed in the west port & south port area. The existing green belt has the native species of such as Date palm, Ficus Religiosa, Terminalia Arjuna, Cocos Nucifera, Washingtonia Filifera, Casuarina Spp., Azadirachta Indica, Eucalyptus Spp., Jatropha Curcas, Ficus Bengalensis, Subabool Spp., Casia Fistula, Delobix Regia, etc., It has been proposed to develop an additional 50 Ha of green belt area as part of the proposed expansion with an average tree density of 2490 trees per hectare.

22. Energy efficiency measures with estimated saving: The energy conservation measures implemented by Adani Ports and Special Economic Zone (APSEZ) at Mundra Port include: (i) LED Lighting Installation: By replacing traditional lighting with LED lights, APSEZ reduced annual electricity consumption by approximately 4.22 million units. This resulted in significant energy savings due to the higher efficiency and longer lifespan of LED lights compared to traditional lighting systems. (ii) Energy-Efficient Fans: Installation of energy-efficient fans at various locations helped in reducing annual electricity consumption by approximately 25 Kilo units. Energy-efficient fans consume less electricity while providing the same level of ventilation, contributing to energy conservation. (iii) Air Conditioner Timer Installation: By installing timers for controlling air conditioners in office areas, APSEZ saved approximately Rs. 1.22 Lakhs per annum. This measure ensures that air conditioners are only operational when needed, reducing unnecessary energy consumption during non-working hours or when areas are unoccupied. (iv) Optimization of Boom Flood Lights: APSEZ implemented PLC programming to optimize the use of boom flood lights, ensuring they automatically turn off when the boom is up. This measure prevents unnecessary energy consumption by ensuring that lights are only operational when required for operational safety.

23. Details of Rainwater Harvesting: As a wise use of natural resource, APSEZ has set up rainwater harvesting system where the rainwater from the roof top are collected in an underground tank for irrigation of greenbelt within the port. As part of the proposed expansion based on the rooftop area available approx. 38500 m³ of rainwater can be harvested annually.

24. Details of CRZ area: The study for demarcation of High tide Line (HTL), Low Tide Line (LTL) and Coastal Regulation Zone (CRZ) for the proposed project has been undertaken by National Centre for Sustainable Coastal Management (NCSCM). The details of the components covered under the CRZ area is as following:

Sl. No	Proposed Facilities	CRZ Classification
1	Multipurpose Storage/Liquid/Gas/Cryogenic Storage areas (with all operation facilities)/Shipbuilding Activity Area/Dry Dock	CRZ I(A) Diverted forest land, CRZ I(B) & CRZ III, CRZ IV(B) (Only permissible activities). No activity is permissible in the existing mangrove area.
2	Multipurpose Storage/ Liquid/Gas/Cryogenic-Berths	CRZ IV(A), & CRZ I (B) Only permissible activities)
3	Breakwater/Off-Shore Island Jetty/SBM/SPM and its associated facilities	CRZ IV (A)
4	Common Operational Building and Other facilities	CRZ I(B) & CRZIII Only permissible activities)
5	Utility Corridor (As defined)	CRZ I(A), CRZ I(B), CRZ IV(B), CRZ III
6	Marine Intake and Outfall structure (as defined) and its associated facilities	CRZ IV(A)
7	Desalination Plant	CRZ I(A) diverted reserve forest, CRZ I(B) & CRZ III
8	Seawater Intake & Outfall pipeline, Offshore pipeline from SBM/SPM/Sea Island Jetty and its associated facilities	CRZ IV(A) & CRZ IB
9	Dredging/Dumping/Reclamation	CRZ IV(A), CRZ I(B) & CRZ III
10	FSRU/FSO and Floating Dry Dock	CRZ IV(A) & CRZ I(B)

25. The Details of CRZ Zones & components of the project as per approved CZMP- 2011.

Sl. no	Development	CRZ-1A	CRZ- IB	CRZ-III NDZ	CRZ-III (200 to 500 m)		
					CRZ- IVA	CRZ- IVB	Area (Ha)
1	Desalination plant, Utility Corridor Non-Hazardous Cargo Storage Other as per CRZ	72.3	47.3	25	0	0	0
2	Dredge Disposal Location	0.0	0.0	0.0	0.0	4.6	0.0
3	Flare Area	0.0	0.0	0.0	0.0	0.2	0.0
4	GSPC LNG Berth 2	0.0	0.0	0.1	0.0	0.0	0.0
5	Intake for Desal	0.0	0.0	0.0	0.0	1.8	0.0
6	LNG Outfall Point	0.0	0.0	0.9	0.0	6.0	0.0
7	Multipurpose Backup Area	147.77	2.8	134.4	114.7	31.6	3.6
8	Multipurpose Backup Area Ship Building Activity	0.0	126.4	0.6	0.9	180.0	10.8

26. Area Breakup of only Utility Corridor proposed in CRZ Area.

S. no.	Corridor	Corridor-1	Corridor -2	Corridor -3	Corridor -4	Corridor -5	Corridor -6	Total
1	Total Area (Ha)	49.79	54.93	0.77	13.16	1.26	4.39	124.3
2	CRZ-IA (Mangrove Area) (Ha)	13.47	6.42	0.28	0.69	-	1.49	22.35
3	CRZ-IA (Mangrove Buffer) (Ha)	10.99	8.26	0.29	0.4	-	2.74	22.68
4	CRZ-IA (Diverted R.F) (Ha)	25.33	29.35	-	1.44	-	-	56.12
5	CRZ-IB (Intertidal Area)	-	3.69	-	5.67	0.44	-	9.8
6	CRZ-III (up to 200 m)	-	3.47	-	4.96	0.35	0.16	8.94
7	CRZ - III (200 m to 500 m)	-	-	-	-	0.47	-	0.47
8	Non CRZ Area	-	-	0.2	-	-	-	0.2

27. Multipurpose back up area.

S. no	Development	CRZ-IA	CRZ-IB	CRZ-III (up to 200m)	CRZ-III (200m to 500 m)	CRZ- IVA	CRZ- IVB	Non CRZ Area
Area (Ha)								
1	Multipurpose Backup Area	147.7*	2.8	134.4	114.7	31.6	3.6	1510.5
2	Multipurpose Backup Area/ Ship Building Yard	0.0	126.4	0.6	0.9	180.0	10.8	0
3	Multipurpose Liquid/ Gas/ Cryogenic Cargo Storage Area	252.3*	0.3	111.6	118.6	29.9	0	558.3

(Continue on Next Page)

(Continue from earlier Page)

- Gujarat Coastal Zone Management Authority (GCZMA) vide letter no. ENV/10/2024/37/T dated 20th April, 2024 recommended the proposal.
- The IRO, MoEF&CC has visited the site and issued the Certified Compliance report to Waterfront Development Project of M/S Adani Ports and Logistics at Mundra, District Kutchh, Gujarat vide letter dated 27th February, 2024.
 - Details of shoreline change: Historical change in the shoreline reveals that the shoreline in the region has a seasonal fluctuation falling under low erosion condition due to various natural and manmade activities. The predicted shoreline change due to the fully developed APSEZ facility indicates erosion in the study area will be less than 0.08m/year due to the proposed development. In 2023, APSEZ, through the Gujarat Institute of Desert Ecology (GUIDE), initiated shoreline monitoring along the Mundra coast. The study revealed a mix of erosion and accretion processes. Erosion was observed in certain patches near Modhva coastal stretches, the western port, and near the mouth of Bocha Island on the eastern side of Mundra port. The rest of the area showed accretion. Ground transect surveys, including beach profiling, were conducted to establish baselines and validate theoretical analyses using satellite imagery. Future shoreline changes will be monitored through repeated beach profiling and satellite imagery analysis at regular intervals.
 - Hydrodynamic study assessing the impacts of the proposed waterfront development plan expansion has been carried out using scientific models. It has been inferred from the study that the variation in the flow regime (circulation pattern) is local and restricted within the development area.
 - Flooding and related impacts due to cyclonic storm in the region has been studied in detail. The frequency of occurrence of cyclonic storm in the region is once in four years based on 100 years data. Maximum surge of 2m with a return period of 1 in 100 years was predicted, which will inundate the low lying area below 2m contours along the coast.
 - Dredging Disposal and Reclamation: The WFDP expansion involves optimizing the existing layout, adjusting the approach channel, basin, and berthing area to -21m CD to accommodate capsized vessels. Due to optimization of layout within the existing approved waterfront, area additional dredging quantity is envisaged. The envisaged dredging at South Port as per the current proposal accounts to 20 MCM. The envisaged dredging at West Port as per the current proposal is 100 MCM. Capital dredged material will be utilized for area levelling within approved area. The envisaged maintenance dredging as per the current proposal is 12 MCM/Annum, which will be disposed off in off-shore at identified locations.
 - Detailed analysis of impacts due to dredging and disposal on marine ecology along with other impacts are assessed both qualitatively and quantitatively was conducted by the Centre of Advanced Study (CAS) in Marine Biology, Annamalai University and to ensure the credibility and robustness of the findings, the EIA Report underwent a thorough validation process by the Gujarat Institute of Desert Ecology (GUIDE) an institute renowned for its expertise in environmental research and assessment.
 - Details of cargo handling with dust control measures: Full-fledged Dust Control System: The project implements a robust dust control system that encompasses various measures to minimize dust emissions. This system may include techniques such as: (i) Installation of dust suppression equipment such as misting systems, dust collectors, and water sprayers, Wind Breaking Wall/Wind Shield, Implementation of enclosed conveyor systems to contain cargo and prevent dust dispersion, Application of dust suppressants or binding agents on cargo stockpiles to mitigate dust generation.
 - Details of Oil Spill Contingency Plan: APSEZ has developed an effective Oil Spill Contingency Plan as per the stipulation of NOSDCP guidelines to combat the oil spill of 700 T (Tier-I). In order to ascertain the impacts associated with the oil spill during the operation phase, oil spill modelling study was undertaken considering an oil spill of maximum 700 tons at 2 hypothetical locations and the results have shown the oil slick would reach shore within 18 hours and 24 hours during the spring tide and neap tide condition (worst case).
 - Land acquisition and R&R issues involved: Since the proposed project expansion occur within the boundary limits as defined in the master plan for the Waterfront Development Plan, as approved by MoEF&CC in 2009. Thereby no land acquisition and R&R studies are envisaged.
 - Employment potential, No. of people to be employed: During construction phase, approximately 200 workers will be employed. During operation, direct employment of 1200 persons and indirect employment of 3600 persons is envisaged. The proposed project is likely to have positive impact on socioeconomic condition of the region.
 - Benefits of the project: Financially, the proposed expansion of port project will help in increasing the economy at the regional and national level.
 - Details of Court cases: There are two ongoing matters pending (Two at high court and one at Supreme Court). Details are as following:
 - Case No: CA9124 of 2011 Case Name: Kheti Vikas Seva Trust Vs Uol & others. Name of the court: Gujarat High Court.
 - Case No: SLP28788 of 2016 Case Name: Pravinshin Bhurabhai Chauhan Vs State of Gujarat & others. Name of the court: Supreme Court.
 - The EAC, taking into account the submission made by the project proponent had a detailed deliberation in its 364th meeting held on 15th May, 2024 and recommended the project for grant of environment and CRZ clearance for subject to all specific and standard conditions applicable for such projects.
 - The Ministry of Environment, Forest and Climate Change has considered the proposal based on the recommendations of the Expert Appraisal Committee (Infrastructure, CRZ and other miscellaneous projects) and hereby decided to grant of environmental and CRZ Clearance for 'Proposed Expansion of Waterfront Development Plan of Mundra Port in an area of 3335 ha for handling of additional 289 MMTPA of multi-purpose cargo in addition to the existing approved capacity of 225 MMTPA, located at Mundra, Kachchh District, Gujarat by M/S Adani Ports & Sez Ltd' under the EIA notification, 2006 as amended and CRZ Notification, 2011 subject to strict compliance of the following specific conditions, in addition to all standard conditions applicable for such projects.
 - This issues with the approval of the Competent Authority.

Copy To

- The Secretary, Forest & Environment Department, 8th Floor, Block-14, New Sachivalaya, Gandhinagar- 382010.
- The Deputy Director General of Forests (C), Ministry of Environment, Forest and Climate Change, Integrated Regional Office, Gandhi Nagar, A-Wing - 407 & 409, Aranya Bhawan, Near CH-3 Circle, Sector-10A, Gandhi Nagar - 382010.
- The Member Secretary, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi - 32.
- The Member Secretary, Gujarat Pollution Control Board, Paryavaran Bhawan, Sector-10A, Gandhinagar (Gujarat)- 382010.
- Parivesh Portal.
- Guard File/Monitoring File/Website/Record File.

Specific EC Conditions for (Ports, Harbors, Breakwaters, Dredging)

Annexure 1

S. No	EC Conditions
1. Specific Conditions	
1.1	Construction activity shall be carried out strictly according to the provisions of the CRZ Notification, 2011. No construction work/activity other than those permitted in Coastal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.
1.2	All the recommendations and conditions specified by the Gujarat Coastal Zone Management Authority vide letter no. ENV/10/2024/37/T dated 20th April, 2024 shall be implemented.
1.3	All the storage proposed in the CRZ area shall be in line with the CRZ notification, 2011. No storage is allowed other than the products mentioned in the CRZ notification, 2011 in the CRZ area.
1.4	Multipurpose Backup Area of 252.3 ha proposed in the CRZ-IA area only permissible activities shall be taken up. And in no case mangroves falling in proposed backup area shall be disturbed and 50 meter buffer should be kept around mangroves
1.5	In no case mangrove area falling within proposed Multipurpose Backup Area shall be disturbed and a buffer of 50 meters shall be provided all around the mangroves area.
1.6	Compensatory Mangrove Afforestation over 100 ha, as also stipulated in GCZMA conditions and agreed by the PP, shall be carried out at the Project cost. Accordingly, plan shall be prepared in consultation with state Forest Department or any other agency authorized by the government. The plan shall be submitted to the IRO of MoEF&CC within 3 months of the issue of EC/CRZ clearance and implementation of the plan shall be submitted in 6 monthly monitoring report.
1.7	No mangrove shall be cut or affected due to port construction.
1.8	Brine reject from desalination plant and cooling water reject from re-gasification unit of LNG will be discharged at the offshore location as identified through scientific study. No Objection Certificate from the concern Gujarat State Pollution Control Board need to be obtained.
1.9	Construction of Utility corridor on stilts is proposed through Gantry Girder Launching technology which does not require construction of road for transporting heavy machineries and therefore ensure minimal/zero footprint on land /mangrove areas. As per CRZ mapping by NCSCM actual damage to mangroves will be limited to only 0.92 ha. PP will carry out 100 ha Compensatory Mangrove afforestation.
1.10	The Environmental Clearance to the project is primarily under provisions of EIA Notification, 2006. It does not tantamount to approvals/consent/permissions etc required to be obtained under any other Act/Rule/regulation The Project Proponent is under obligation to obtain approvals /clearances under any other Acts/Regulations or Statutes as applicable to the project.
1.11	All the recommendations mentioned in the Marine Biology study conducted and validation process by the Gujarat Institute of Desert Ecology (GUIDE) shall be implemented. The compliance to the recommendations shall be submitted along with 6 monthly compliance report to the regional office of MoEF&CC.
1.12	Continuous monitoring of the ecological characteristics of the habitat during and after the construction, to assess the changes in the water quality, coastal hydrology, bottom contamination and diversity & abundance of marine organisms. The report of the monitoring report shall be submitted to the concern IRO, MoEF&CC along with six monthly report.
1.13	The Project Proponent shall ensure that no creeks or rivers are blocked due to any activities at the project site and free flow of water is maintained.
1.14	No underwater blasting is permitted.
1.15	The closed conveyor gallery along with the junction/transfer towers shall be provided with dust suppression systems (DSS). Dust suppression systems with water sprinklers/fogging system shall be provided to prevent the fugitive dust emissions during handling, transfer and storage. Further, the Greenbelts prevent/arrest/controls the fugitive emissions.
1.16	Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.
1.16	Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.
1.17	Spillage of fuel/engine oil and lubricants from the construction site are a source of organic pollution which impacts marine life, particularly benthos. This shall be prevented by suitable precautions and also by providing necessary mechanisms to trap the spillage.
1.18	Oil spillage prevention and mitigation scheme shall be prepared. In case of oil spillage/contamination, action plan shall be prepared to clean the site by adopting proven technology. The recyclable waste (oily sludge) and spent oil shall be disposed of to the authorized recyclers.
1.19	Emergency response system for oil spillage and oil spill contingency plan, any other hazardous material spillages shall be in place at the site level. The mock drill in this regard shall be conducted regularly and the same shall be documented and made available during inspections of local pollution control board, port authorities and MoEF&CC.
1.20	Since liquid/gaseous product handling is involved, complete risk safety assessment including 'BLEVE' study and mitigation measures and safety precautions shall be drawn and implemented along with the Robust safety standards and latest fire detection and prevention techniques. The report shall be submitted along with the 6 monthly compliance report.
1.21	The risk assessment and management plan being drawn up with regards to the environmental impacts of natural disasters, oil spills and other waste, dredging and dumping on marine ecology shall scrupulously implemented. It shall be ensured that the marine ecology in the area of influence shall not affect. The monitoring and compliance status of the marine ecology management plan shall be submitted along with the six monthly EC compliance reports.
1.22	All the recommendations mentioned in the risk assessment report, disaster management plan and safety guidelines shall be implemented.
1.23	The project proponent shall install a system to carryout Ambient Air Quality monitoring for common/criterion parameters relevant to the main pollutants released (e.g. PM10 and PM2.5 in reference to PM emission, and SO2 and NOx in reference to SO2 and NOx emissions) within and outside the port area at least at four locations (one within and three outside the port area at an angle of 120° each), covering upwind and downwind directions.
1.24	Appropriate Air Pollution Control (APC) system shall be provided for all the dust generating points including fugitive dust from all vulnerable sources, so as to comply prescribed fugitive emission standards.
1.25	Emission and air quality monitoring and results of manual stack monitoring and manual monitoring of air quality /fugitive emissions to Regional Office of MoEF&CC, Zonal office of CPCB and Regional Office of SPCB along with six monthly monitoring report.

S. No	EC Conditions
1.26	Rain water harvesting for roof run-off and surface run-off, should be implemented. Before recharging the surface run off, pre-treatment must be done to remove suspended matter, oil and grease.
1.27	Ensure minimum 5% of total electricity requirement be met through installation of solar energy/ green/ non-conventional in the proposed activity area.
1.28	All the commitments made as part of EMP with the budget provisions shall be implemented. The compliance to the recommendations shall be submitted along with 6 monthly compliance report to the regional office of MoEF&CC.
1.29	As per the Ministry's Office Memorandum F.No.22-65/2017-IA.III dated 30th September, 2020, the project proponent shall abide by all the commitments made by them to address the concerns raised during the public consultation. The project proponent shall initiate the activities proposed by them, based on the commitment made in the public hearing, and incorporate in the Environmental Management Plan and submit to the Ministry. All other activities including pollution control, environmental protection and conservation, R&R, wildlife and forest conservation/protection measures including the NPV, Compensatory Afforestation etc. either proposed by the project proponent based on the social impact assessment and R&R action plan carried out during the preparation of EIA report or prescribed by EAC, shall also be implemented and become part of EMP.
1.30	Environmental Clearance is granted subject to final outcome of Hon'ble Supreme Court of India, Hon'ble High Court of Gujarat, and any other court of law, if any, as May be applicable to this project.

Standard EC Conditions for (Ports, harbors, breakwaters, dredging)

S. No	EC Conditions
1. Statutory Compliance:	
1.1	Construction activity shall be carried out strictly according to the provisions of CRZ Notification, 2011 and the State Coastal Zone Management Plan as drawn up by the State Government. No construction work other than those permitted in Coastal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.
1.2	A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project should be obtained.
1.3	All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Coast Guard, Civil Aviation Department shall be obtained, as applicable by project proponents from the respective competent authorities.
2. Air Quality Monitoring and Preservation:	
2.1	The project proponent shall install system to carryout Ambient Air Quality monitoring for common/criterion parameters relevant to the main pollutants released (e.g. PM10 and PM2.5 in reference to PM emission, and SO2 and NOx in reference to SO2 and NOx emissions) within and outside the project area at least at four locations, covering upwind and downwind directions.
2.2	Appropriate Air Pollution Control (APC) system shall be provided for all the dust generating points including fugitive dust from all vulnerable sources, so as to comply prescribed emission standards.
2.3	Shrouding shall be carried out in the work site enclosing the dock/proposed facility area. This will act as dust curtain as well achieving zero dust discharge from the site. These curtain or shroud will be immensely effective in restricting disturbance from wind in affecting the dry dock operations, preventing waste dispersion, improving working conditions through provision of shade for the workers.
2.4	Dust collectors shall be deployed in all areas where blasting (surface cleaning) and painting operations are to be carried out, supplemented by stacks for effective dispersion.
2.5	The Vessels shall comply the emission norms prescribed from time to time.
2.6	Diesel power generating sets proposed as source of backup power should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. Use of low sulphur diesel. The location of the DG sets may be decided with in consultation with State Pollution Control Board.
2.7	A detailed traffic management and traffic decongestion plan shall be drawn up to ensure that the current level of service of the roads within a 05 kms radius of the project is maintained and improved upon after the implementation of the project. This plan should be based on cumulative impact of all development and increased habitation being carried out or proposed to be carried out by the project or other agencies in this 05 Kms radius of the site in different scenarios of space and time and the traffic management plan shall be duly validated and certified by the State Urban Development department and the P.W.D./ competent authority for road augmentation and shall also have their consent to the implementation of components of the plan which involve the participation of these departments.
3. Water Quality Monitoring and Preservation:	
3.1	The Project proponent shall ensure that no creeks or rivers are blocked due to any activities at the project site and free flow of water is maintained.
3.2	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality. Silt curtains shall be used to contain the spreading of suspended sediment during dredging within the dredging area.
3.3	No ships docking at the proposed project site will discharge its on-board waste water untreated in to the estuary/ channel. All such wastewater load will be diverted to the proposed Effluent Treatment Plant of the project site.
3.4	Measures should be taken to contain, control and recover the accidental spills of fuel and cargo handle.
3.5	The project proponents will draw up and implement a plan for the management of temperature differences between intake waters and discharge waters.
3.6	Spillage of fuel / engine oil and lubricants from the construction site are a source of organic pollution which impacts marine life. This shall be prevented by suitable precautions and also by providing necessary mechanisms to trap the spillage.
3.7	Total fresh water use shall not exceed the proposed requirement as provided in the project details. Prior permission from competent authority shall be obtained for use of fresh water.
3.8	Sewage Treatment Plant shall be provided to treat the wastewater generated from the project. Treated water shall be reused for horticulture, flushing, backwash, HVAC purposes and dust suppression.
3.9	A certificate from the competent authority for discharging treated effluent/ untreated effluents into the Public sewer/ disposal/drainage systems along with the final disposal point should be obtained.
3.10	No diversion of the natural course of the river shall be made without prior permission from the Ministry of Water resources.
3.11	All the erosion control measures shall be taken at water front facilities. Earth protection work shall be carried out to avoid erosion of soil from the shoreline/boundary line from the land area into the marine water body.
4. Noise Monitoring and Prevention:	
4.1	Noise level survey shall be carried as per the prescribed guidelines and report in this regard shall be submitted to Regional Officer of the Ministry as a part of six-monthly compliance report.
4.2	Noise from vehicles, power machinery and equipment on-site should not exceed the prescribed limit. Equipment should be regularly serviced. Attention should also be given to muffler maintenance and enclosure of noisy equipments.
4.3	Acoustic enclosures for DG sets, noise barriers for ground-run bays, ear plugs for operating personnel shall be implemented as mitigation measures for noise impact due to ground sources.
4.4	The ambient noise levels should conform to the standards prescribed under E(P)A Rules, 1986 viz. 75 dB(A) during day time and 70 dB(A) during night time.
5. Energy Conservation Measures:	
5.1	Provide solar power generation on roof tops of buildings, for solar light system for all common areas, street lights, parking around project area and maintain the same regularly;
5.2	Provide LED lights in offices and project areas.
6. Waste Management:	
6.1	Dredged material shall be disposed safely in the designated areas.
6.2	Shoreline should not be disturbed due to dumping. Periodical study on shore line changes shall be conducted and mitigation carried out, if necessary. The details shall be submitted along with the six monthly monitoring reports.
6.3	Necessary arrangements for the treatment of the effluents and solid wastes must be made and it must be ensured that they conform to the standards laid down by the competent authorities including the Central or State Pollution Control Board and under the Environment (Protection) Act, 1986.
6.4	The solid wastes shall be managed and disposed as per the norms of the Solid Waste Management Rules, 2016.
6.5	Any wastes from construction and demolition activities related thereto shall be managed so as to strictly conform to the Construction and Demolition Waste Management Rules, 2016.
6.6	A certificate from the competent authority handling municipal solid wastes should be obtained, indicating the existing civic capacities of handling and their adequacy to cater to the M.S.W. generated from project.
6.7	Used CFLs and TFLs should be properly collected and disposed off/sent for recycling as per the prevailing guidelines/ rules of the regulatory authority to avoid mercury contamination.
6.8	Oil spill contingency plan shall be prepared and part of DMP to tackle emergencies. The equipment and recovery of oil from a spill would be assessed. Guidelines given in MARPOL and Shipping Acts for oil spill management would be followed. Mechanism for integration of terminals oil contingency plan with the overall area contingency plan under the co-ordination of Coast should be covered.
7. Green Belt:	
7.1	Green belt shall be developed in area as provided in project details with a native tree species in accordance with CPCB guidelines.
7.2	Top soil shall be separately stored and used in the development of green belt.
8. Marine Ecology:	
8.1	Dredging shall not be carried out during the fish breeding and spawning seasons.
8.2	Dredging, etc shall be carried out in the confined manner to reduce the impacts on marine environment.
8.3	The dredging schedule shall be so planned that the turbidity developed is dispersed soon enough to prevent any stress on the fish population.
8.4	While carrying out dredging, an independent monitoring shall be carried out through a Government Agency/Institute to assess the impact and necessary measures shall be taken on priority basis if any adverse impact is observed.
8.5	A detailed marine biodiversity management plan shall be prepared through the NIO or any other institute of repute on marine, brackish water and fresh water ecology and biodiversity and submitted to and implemented to the satisfaction of the State Biodiversity Board and the CRZ authority. The report shall be based on a study of the impact of the project activities on the intertidal biotopes, corals and coral communities, molluscs, sea grasses, sea weeds, sub-tidal habitats, fishes, other marine and aquatic micro, macro and mega flora and fauna including benthos, plankton, turtles, birds etc. as also the productivity. The data collection and impact assessment shall be as per standards survey methods and include underwater photography.
8.6	Marine ecology shall be monitored regularly also in terms of sea weeds, sea grasses, mudflats, sand dunes, fisheries, echinoderms, shrimps, turtles, corals, coastal vegetation, mangroves and other marine biodiversity components including all micro, macro and mega floral and faunal components of marine biodiversity.
8.7	The project proponent shall ensure that water traffic does not impact the aquatic wildlife sanctuaries that fall along the stretch of the river.
9. Public Hearing and Human Health Issues:	
9.1	The work space shall be maintained as per international standards for occupational health and safety with provision of fresh air respirators, blowers, and fans to prevent any accumulation and inhalation of undesirable levels of pollutants including VOCs.
9.2	Workers shall be strictly enforced to wear personal protective equipments like dust mask, ear muffs or ear plugs, whenever and wherever necessary/ required. Special visco-elastic gloves will be used by labour exposed to hazards from vibration.
9.3	In case of repair of any old vessels, excessive care shall be taken while handling Asbestos & Freon gas. Besides, fully enclosed covering should be provided for the temporary storage of asbestos materials at site before disposal to CTSDF.
9.4	Safety training shall be given to all workers specific to their work area and every worker and employee will be engaged in fire hazard awareness training and mock drills which will be conducted regularly. All standard safety and occupational hazard measures shall be implemented and monitored by the concerned officials to prevent the occurrence of untoward incidents/ accidents.
9.5	Emergency preparedness plan based on the Hazard identification and Risk Assessment (HIRA) and Disaster Management Plan shall be implemented.

(Continue on Next Page)

(Continue from earlier Page)

Table with 2 columns: S. No and EC Conditions. Contains environmental clearance conditions for Muthoot Fincorp Ltd.

Table with 2 columns: S. No and EC Conditions. Contains environmental clearance conditions for AMARAVATI SMART AND SUSTAINABLE CITY CORPORATION LIMITED.

Digitally Signed by: Dr Amardeep Raju Member Secretary, MoEF&CC (EC)

Date: 13/08/2024

*This is a copy of Environment clearance issued in English and the original copy of the same is available on MoEF&CC website.

MUTHOOT FINCORP LTD. GOLD AUCTION NOTICE

Regd. Office: Muthoot Centre, TC No 27/ 3022, Punnen Road, Thiruvananthapuram, Kerala, India-695001, CIN : U65929KL1997PLC011518, Ph: +91 471 4911400, 2331427

Classifieds

PERSONAL section containing 'CHANGE OF NAME' and 'GAZETTE NOTIFICATION OF INDIA' notices.

AMARAVATI SMART AND SUSTAINABLE CITY CORPORATION LIMITED (ASSCCL) E-Procurement Tender-cum-reverse Auctioning (Reverse Tendering)

PUNJAB STATE POWER CORPORATION LIMITED E-Tender Enquiry No. 553/P-23/MPW-12774

Indian Institute of Engineering Science and Technology, Shibpur

Notification for Expression of Interest (EOI) for Empanelment of Legal Counsel: Advt. No. RO/AU/24/09

GOVERNMENT OF ODISHA e-procurement Notice OFFICE OF THE ADDITIONAL CHIEF ENGINEER CENTRAL MINOR IRRIGATION

Rajkot Nagrik Sahakari Bank Ltd. Notice for Sale (Multistate Scheduled Bank)

H. & G. H. MANSUKHANI INSTITUTE OF MANAGEMENT MMS (Masters in Management Studies) IN CHM CAMPUS, ULHASNAGAR

Indian Express advertisement: I choose substance over sensation. Inform your opinion with credible journalism.

ગદશાસના કડવા પાટાદાર સમાજ દ્વારા નાકગલા શાળાયાત્રાનું દરજી. (તસવાર / જીવન આચાર્ય)

આવતા વર્ષે ૭૫મા વાર્ષિક મહોત્સવની ઉજવણીની પણ તૈયારીઓ આદરવામાં આવી છે. ૭૪મા પાટોત્સવ પ્રસંગે સવારના ભાગમાં શોભાયાત્રા ઉમિયાનગર લક્ષ્મીનારાયણ મંદિર સુધી વાજતે-ગાજતે નીકળી હતી જેમાં સ્થાનિક પાટીદાર સમાજ તથા બહાર વસતા સમાજના આગેવાનો જોડાયા હતા. વિવિધ ચડાવામાં માતૃશ્રી કાંતાબેન બાબુલાલ શિવજી રંગાણી (બોટાદ), કસ્તુરબેન કાનજીભાઈ વાલજી ઉકાણી રંગાણી પરિવાર તથા વનિતાબેન સુરેશભાઈ કરશન પરવાડિયા, પ્રભાબેન હરેશભાઈ નારાણ પરવાડિયા અને મંજુલાબેન કાંતિલાલ કરશન પરિવાર, હેમલતાબેન ધીરજભાઈ રતનશી લીંબાણી તથા ચંપાબેન શાંતિલાલ કરશન રૂડાણી પરિવારે લીધો હતો. હાલમાં ભગવાન લક્ષ્મીનારાયણ મંદિરના જીર્ણોદ્ધારનું કાર્ય પણ ચાલી રહ્યું છે અને આગામી સમયમાં જેનો મહોત્સવ યોજાશે. કાર્યક્રમમાં મોહનભાઈ પરવાડિયા,

રંગાણી, ચંદુભાઈ ઉકાણી, દેવજીભાઈ ઉકાણી, ભરતભાઈ રંગાણી, હાર્દિકભાઈ પોકર વિગેરે જોડાયા હતા. પૂજનવિધિ મિતેશભાઈ જોશીએ કરાવી હતી.

વાયોરમાં જાગેશ્વર મહાદેવ મંદિરે ધાર્મિક કાર્યક્રમો યોજાયા
વાયોર, તા. ૧૯ : અબડાસાના ગરડા પંથક વિસ્તારના આ ગામમાં જાગેશ્વર મહાદેવ મંદિરે સંતવાણી રાખવામાં આવી હતી. વાયોર દરબારગઢ સ્થિત જાગેશ્વર મહાદેવ મંદિરે શ્રાવણ માસના બીજા સોમવારે આ સંતવાણી યોજાઈ હતી જેમાં આસપાસના વિસ્તાર જેઠમલપરના હરેશભાઈ ભટ્ટ, રાજુરામ, ફુલાયના યુવા આગેવાન સુરૂભા જટુભા જાડેજા-જ્યોતિષ, વાગાપદરના પઢિયાર કરશનજી ખારઈ, સિદ્ધેશ્વર મહાદેવના પૂજારી જંગમ સુભાષ ડેરૂ, ઉકીરના કલ્પેશ જોષી ઉપસ્થિત રહ્યા હતા. માજી જિલ્લા પંચાયત સદસ્ય અનિરુદ્ધ પી. જાડેજા, વાયોર બાપાદયાળુ નગર ક્ષત્રિય સમાજ, વેપારી એસોસિયેશન વિગેરે જોડાયા હતા. મહેમાનોનું સ્વાગત વાયોર જાગેશ્વર મહાદેવ મંદિરના પૂજારી ગુંસાઈ નથુગર મંગલગર દ્વારા કરાયું હતું.

વાવવ્ય પર્યાવરણમાં છેલ્લા ૫૦ વર્ષોમાં જોવા મળતી નવજીવન શ્રેણી



આપની હોસ્પિટલના નવપ્રસ્થાનના સોનેરી અવસરને અમે આવકારીએ છીએ. આપની લોકપ્રિયતા અને શ્રેષ્ઠ સેવાઓનો લાભ આ પંચકને મળતો રહે તેવી ઉમ્મીદ સાથે અભિનંદન-આવકારો.

- નારાણભાઈ પી. મહેશ્વરી : સભ્ય, જિલ્લા પંચાયત-૬૨૭. વિશ્વાસ બોહર, કોટડા (ચકાર)
- જીતુભા વનાજી જાડેજા : મોમાય આશિષ સવાલસર, કોટડા (ચકાર)
- પ્રકાશભાઈ દીરજી વાગડીયા : શ્રી માટુતિનંદન, રેતી, કાંઠરી, સિલિહાના સવાલસર કોટડા (ચકાર)
- આર. બી. ચાહી : પુણી જનરલ સ્ટોર્સ : કોટડા (ચકાર)
- ભરતકુમાર એચ. મહેશ્વરી : ટીનકવાલ રાણ સ્ટોર્સ, કોટડા (ચકાર)
- ફહીરમામદ હાફેઝ ચાહી : પ્રતિનિધિ કચ્છમિત્ર, કોટડા (ચકાર) પંચક

અદાણી પોર્ટ્સ એન્ડ એસઇટેડ લિમિટેડ
મુન્દ્રા પોર્ટના યોદરફુન્ડ ડેવલોપમેન્ટ પ્લાનના સુચિત વિસ્તરણ માટે પર્યાવરણીય અને સીઆરટોડ મંજૂરી સંબંધી

જાહેર સૂચના

આથી જાહેર જનતાને સુચિત કરવામાં આવે છે કે અદાણી પોર્ટ્સ એન્ડ એસઇટેડ સ્પેશિયલ ઇકોનોમિક ઝોન લિમિટેડ (એપીએસજીઝ) રજિ. એફિસ અદાણી કોર્પોરેટ ટાઉન, શાંતિગ્રામ, વેપારીવેલી સર્કલ નજીક, એસ.જી. ટાઇપે, અમદાવાદ-૩૮૨૪૨૧ (ગુજરાત)ને ગુજરાતના ૬૨૪ જિલ્લાના મુન્દ્રા તાલુકા ખાતે મુન્દ્રા પોર્ટના ૩૩૩૫ હેક્ટર વિસ્તારમાં ૨૨૫ MMTPAની ક્ષમતી મંજૂર ક્ષમતા ઉપરાંત ઠાકુરેતુક ડાગોના વધારાના ૨૮૯ MMTPA ટેન્કલિંગ માટે યોદરફુન્ડ ડેવલોપમેન્ટ પ્લાનના સુચિત વિસ્તરણ માટે ભારત સરકારના પર્યાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલય (MoEF&CC) દ્વારા EC ઓગળ નંબર EC24A3501GJ59760610N, પત્ર ક્રમાંક નં. 10-24/2019-1A-III, તા. ૧૩મી ઓગસ્ટ, ૨૦૨૪ના રોજ પર્યાવરણીય અને સીઆરટોડ મંજૂરી (EC & CRZ Clearance) આપવામાં આવેલ છે. આ પર્યાવરણીય અને સીઆરટોડ મંજૂરીપત્રની નકલ ભારત સરકારના પર્યાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલય (MoEF&CC) તથા ગુજરાત પ્રદુષણ નિયંત્રણ બોર્ડ (GPCB) ખાતે ઉપલબ્ધ છે. આ ઉપરાંત ભારત સરકારના પર્યાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલયની વેબસાઈટ <https://parlvesh.nic.in/> તથા અદાણી પોર્ટ્સ એન્ડ એસઇટેડ લિમિટેડની વેબસાઈટ <https://www.adaniports.com/Downloads> પર પણ ઉપલબ્ધ છે.

|| શ્રી ચામુંડા માતાવ નમઃ || || શ્રી મહોશય નમઃ || || શ્રી રામદેવાય નમઃ ||

આમંત્રણ

મોટા બંદરા, કોટડા, ચકારના ગૌરવને અભિનંદન

આપના નિતાંત સાથે-સહકારથી સફળતાની વધુ એક ટેકી કંડારીને... નવા સરનામે, નવા રચાયેલા સુલ્કવસ્થિત સંકુલમાં નવપ્રસ્થાન વેળાના અમારા આનંદમાં અને ઉત્સાહમાં આપની ઉપસ્થિતિ વિશેષ પ્રેરણારૂપ બનશે.

ડો. રાજેશ એચ. ખરેટ - એમ.બી.બી.એસ.,
જનરલ ફિઝિશિયન અને સર્જન - Reg. No. G-54671

+ નવજીવન હોસ્પિટલ એન્ડ મેડિકલ
નામે હવે નવી જગ્યાએ પણ અમારી શ્રેષ્ઠ સેવાઓથી આપને નવાજીવ્યુ શુભારંભના અતિથિવિશેષ અલગત આપ જ છો. આપને સહકારવા તત્પર..

મધુર ક્ષણ : આવણ વહ બીજ, બુધવાર, તા. ૨૧/૦૮/૨૦૨૪, સવારે ૧૦.૦૦ કલાકથી આપના આગમન સુધી.

શુભ સ્થળ : 'નવજીવન હોસ્પિટલ' કોટડા ઉ. ગ્રામ પંચાયતની ઠાણમાં, કોટડા ઉ. (ચકાર), તા. ભુજ-૬૨૭. ☎ ૯૯૨૫૫૭૦૭૧૫

નિમંત્રક

- ગં. સ્વ. હેસરોન માલશીભાઈ ખરેટ • ડો. રાજેશ એચ. ખરેટ
- ખરેટ હરીશકુમાર માલશીભાઈ • ખરેટ પૂજાબેન રાજેશભાઈ
- ખરેટ રમીલાબેન હરીશભાઈ • અમારા લાકડવાયા વિવાન અને રીવા

નોંધ : રૂબરૂ આમંત્રણ કે આમંત્રણ પત્રિકા ન મળ્યા હોય, આ રૂબરૂ આમંત્રણ સમગ્ર અમારા આનંદ, ઉત્સાહ વધારવા જરૂર આવશે.

૧૫૪ - ૩૦૬૧૦, ૨૧-૦૪-૨૦૨૪

૬	સી આઈલેન્ડ વેસ્ટી	-	-	૧	૧	પેટ્રોલિયમ કાર્ગોના હેન્ડલિંગ માટે ઓફ-શોર બર્થ
૭	કિંગલ પોઈન્ટ મૂવિંગ (એસપીએમ)/કિંગલ બુલો મૂવિંગ (એસપીએમ)	૨	૨	૧	૩	વીએવટીસી ઢાસા પેટ્રોલિયમ કાર્ગોના હેન્ડલિંગ માટે

૧૦. ક્ષયાત કાર્ગો હેન્ડલિંગની વિગતો:

ક્ર.નં.	કાર્ગોનો પ્રકાર	વાર્ષિક ક્ષમતા	કાર્ગો હેન્ડલિંગ ક્ષમતા	નોંધ
૧	કન્ટેનર	MTEUs	૮.૫	૧ TEU = ૧૦ MT
૨	કોલસા, આયર્ન ઓર	MMT	૭૦.૦	--
૩	ટીલ અને બંગાર	MMT	૧૦.૫	--
૪	ડ્રાઇ બલ્ક, પ્રોવેક્ટ અને ઢેવી એન્જિનિયરિંગ	MMT	૧૧.૦	--
૫	કુડ ઓઈલ (એસપીએમ)	MMT	૨૦.૦	--
૬	પીઓએલ, કેમિકલ અને વેલ્યુટેબલ ઓઈલ	MMT	૭.૫	--
૭	ઓટોમોબાઈલ	લાખ વાગ	૮.૫	૧ કાર = ૧ MT
૮	એલએનજી	MMT	૧૦.૦	--
કુલ		MMTPA	૨૨૫	--

૧૧. ગ્રેટરકન્ટ ડેવલપમેન્ટ યોજના (સૂચિત) ના વિસ્તરણ પછી કાર્ગો હેન્ડલિંગની વિગતો.

ક્ર.નં.	કાર્ગોનો પ્રકાર	કાર્ગો મિલકત	કાર્ગો હેન્ડલિંગની ક્ષમતા (વાર્ષિક મિલિયન મેટ્રિક ટનના - MMTPA)
૧	ડ્રાઇ બલ્ક અને બ્રેક બલ્ક કાર્ગો	મલ્ટીપર્પઝ કાર્ગોમાં કોલસા/આયર્ન ઓર/ચુનાના પલ્કર/ખાસ અને ખનીજ તથા અન્ય ડ્રાઇ બલ્ક/ખાસ અને ખાતરો/અનાજ/ખાંડના ઉત્પાદન માટેના કાચા માલ/કિલોગ્રામ/સિમેન્ટ/પ્રોવેક્ટ કાર્ગો/ટીબર તથા લાકડાં/મશીનો/લોખંડરોટીના ઉત્પાદનો/બલ્ક બ્રેક બલ્ક વગેરેનો સમાવેશ થાય છે.	૧૪૦
૨	કન્ટેનર	કન્ટેનર, ટો-ટો અને ઓટોમોબાઈલ તથા અન્ય કોઈપણ યિન યિન-એમ્બી કાર્ગો	૨૫૦
૩	મવાહી કાર્ગો	તમામ વર્ગ એ, બી, સીના પેટ્રોલિયમ પ્રોડક્ટ્સ, પેટ્રોકેમિકલ પ્રોડક્ટ્સ સહિતના બાકાત કરાયેલા પેટ્રોલિયમ પ્રોડક્ટ્સ, જોખમી અને ટોક્સિક તથા યિન-એમ્બી કેમિકલ/મવાહીઓ તથા અન્ય મવાહી કાર્ગો. જોખમી મવાહી કાર્ગોની કામચલાઉ ઘાટી (મથાદિત નથી): એથીલીન, પ્રોપીલિન (પ્રોપેન), બુટાડીન, પેન્ટેન, એથીલ મેર્કેટન મોટર સિલિન્ટ, પ્રોપીલિન ઓક્સાઈડ, ઢેક્રોન, નાથા, એસીટોન, મીથાઈલ ક્લોરાઈડ, મીથાઈલ ક્લોરાઈડ/કલોરો મીથેન, સાયકલોહેક્સેન, બેન્ઝીન, એથીલ એસીટેટ, એક્રીલોનાઈટ્રાઈલ, એસીટોનાઈટ્રાઈલ, મીથાઈલ મેથાક્રાઈલેટ, મેથાક્રાઈલોનાઈટ્રાઈલ, મેથાનોલ (મીથાઈલ આલ્કોહોલ), આઈસોપ્રોપીલ આલ્કોહોલ, એથીલ આલ્કોહોલ (એથાનોલ), એથીલીનડાયકલોરાઈડ, મેથીલઆઈસોબુટીલ કેટોન, એથીલ બેન્ઝીન, એન-બુટીલ એસીટેટ, આઈસોબુટીલ આલ્કોહોલ (આઈસો બુટાનોલ), એન-બુટીલ આલ્કોહોલ (એન-બુટાનોલ), એપિક્લોરોહાઈડ્રોઈન, સ્ટાયરીન, ઓ-ગ્રામલીન, એસિટિક એસિડ, એસિટિક એનહાઈડ્રાઈડ, આમાઇ/મેન્થા ટેલ, લો સલ્ફર ઢેવી સ્ટોક/ફરનેસ ઓઈલ, એનિલીન, મીથાઈલ ઈથાઈલ કેટોન પેરોક્સાઈડ, ઈથાઈલ ઢેક્રાનોલ-૨, વિનાઈલ ક્લોરાઈડ, ફેનોલ, નેપ્થાલીન, એથીલીન ગ્લાયકોલ, ટોલ્યુએન ૨-ડાઈ આઈસોપ્રોપાઈલ, ખાદ્ય તેલ/ખામ તેલ, પેરાફિન, પિટુએન, સલ્ફર, કોલ્સો, સીએનજી, એનજી, એમોનિયા (NH3), ડાસ્એમોનિયમ ફોસ્ફેટ, મ્યુરીએટ ઓફ પોટાશ (MOP), સોડા એશ (સોડિયમ કાર્બોનેટ), લુટીઆ, ચુનાના પલ્કર, કોસ્ટીક સોડા, સલ્ફ્યુરિક એસિડ, ફોસ્ફોરિક એસિડ, પીપેટીન/પીપેટાઈન, કલોરોફોર્મ, ક્લોરોફોસ્ફોરિક એસિડ (HCL), એથીલીન ડાયોક્સાઈડ (EDA), સીએમડીઆઈ વગેરે. મોટર સિલિન્ટ, નેથા, એચએસડી, કુડ ઓઈલ, એવીએશન ફ્યુઅલ, કેરોસીન, લો સલ્ફર ઢેવી સ્ટોક/ફરનેસ ઓઈલ, કાર્બન બ્લેક ફ્રીડ સ્ટોક, પેરાફિન, પિટુએન, લ્યુબ ઓઈલ, આરફાલ્ટ વગેરે જેવા પીઓએલ.	૮૪
૪	ગેસ/ કાર્બોનિકસ/ મવાહી	એલએનજી, પ્રોપેન, બુટેન, એન-બુટેન, ઈથેન, એલપીજી, સીએનજી, એનજી તથા તમામ વર્ગ એ, બી, સી ના પેટ્રોલિયમ ઉત્પાદનો, પેટ્રોકેમિકલ ઉત્પાદનો, જોખમી, ટોક્સિક અને યિન-એમ્બી કેમિકલ/મવાહીઓ તથા અન્ય મવાહી સહિતના બાકાત કરાયેલા પેટ્રોલિયમ ઉત્પાદન કાર્ગોસ.	૪૦
કુલ			૫૧૪

૧૨. પ્રોવેક્ટ ટાઈટની જમીનનો ઉપયોગ/જમીનનું સ્થાવરક:

ક્ર. નં.	જમીનનો ઉપયોગ/જમીનનું સ્થાવરક	ક્ષેત્રફળ (હેક્ટર)	ટકાવારી (%)
૧	બાંધકામ ધરાવતી જમીન-ઉદ્યોગ	૬૩.૮૭	૧.૬
૨	બાંધકામ ધરાવતી જમીન (ગ્રામ્ય/શહેરી)	-	-
૩	બાંધકામ ધરાવતી જમીન-બંદર વિકાસ	૮૬૫.૮૨	૨૬.૬
૪	બાંધકામ/સાઈટ ઉચી લવાયેલી જમીન	૨૨૨૮.૧૨	૬૬.૮
૫	કાંડાની ટેલી	૬.૦૭	૦.૨
૬	ખેડી શકાય તેવી જમીન	-	-
૭	ખેડાત કરેલી પણ વાવણી વિનાની જમીન	-	-
૮	અખાત	૫૩.૬૮	૧.૬
૯	સાફ કરેલી/સાફ નહીં કરેલી જમીન	૨૪.૭૩	૦.૭
૧૦	સાફ કરેલી - સપાટ રેલાજા જમીન	-	-

કરાયો છે, જેના પગલે એની ખાતરી રહે છે કે, બૂમ અપ હોય ત્યારે ફલ્ડ લાઈટ્સ ઓટોમેટિકલી બંધ થઈ જાય. આ પગલાંથી વીવર્ગીનો યિનવટ્ટી વપરાશ મિલકાત છે, લાઈટ્સનો ઉપયોગ ફક્ત કામકાજ સલામતી માટે જરૂરી હોય ત્યારે જ કરાય તેની ખાતરી રહે છે.

૨૩. વરસાદી પાણીનો સંગ્રહ (રેઈન વોટર હાર્વેસ્ટિંગ): કુદરતી સંસાધનના શાસ્ત્રપાલનમાં ઉપયોગના એક પગલાંરૂપે, એવીએસઈએડ ઢાસા વરસાદી પાણીના સંગ્રહની સીસ્ટમની સ્થાપના કરાઈ છે, જેમાં ઘાબા-છત ઉપરથી વહેતા વરસાદી પાણીનો સંગ્રહ ભૂગર્ભ ટાંકામાં કરાય છે અને તેનો ઉપયોગ પોર્ટની અંદરના વિસ્તારમાં ગ્રીનહેલ્થની સિંચાઈ માટે કરાય છે. સૂચિત વિસ્તરણના એક ભાગરૂપે પ્રાય થનારા ઘાબા-છતના વિસ્તારના આધારે, અંદાજે વાર્ષિક ૩૮૫૦૦ ઇન મીટર પાણીનો સંગ્રહ કરી શકાય તેવી સંભાવના છે.

૨૪. સીઆરટોડ વિસ્તારની વિગતો: સૂચિત પ્રોવેક્ટ માટેની હાઈ ટાઈડ લાઈન (એચટીએલ), લો ટાઈડ લાઈન (એલટીએલ) તથા કોસ્ટલ રેગ્યુલેશન ઝોન (સીઆરટોડ) વિસ્તારના ડીમાર્કેશન માટેનો અભ્યાસ નેશનલ સેન્ટર ફોર સ્ટેઈબલ કોસ્ટલ મેનેજમેન્ટ (એનસીએસટીએમ) ઢાસા હાથ ધરાયો છે. સીઆરટોડ વિસ્તાર હેઠળ આવતી હેવાયેલા હિસ્સાની વિગતો આ મુજબ છે:

ક્ર. નં.	સૂચિત સુવિધાઓ	સીઆરટોડ વર્ગીકરણ
૧	મલ્ટીપર્પઝ સ્ટોરેજ/મવાહી/ગેસ/કાર્બોનેલિક સ્ટોરેજ એરિયા (તમામ ઓપરેશનલ સુવિધાઓ સાથે) જ/જાણ નિર્માણ કામગીરી એરિયા/ડ્રાઇ ડોક	સીઆરટોડ ૧(એ) વનની ડાયવર્ટ્સ જમીન, સીઆરટોડ ૧(બી) અને સીઆરટોડ ૩, સીઆરટોડ ૪(બી) (ફક્ત મંજૂરીને પાત્ર કામગીરી). ક્ષયાત મેન્યુવ વિસ્તારમાં કોઈ કામગીરી મંજૂરીને પાત્ર નથી.
૨	મલ્ટીપર્પઝ સ્ટોરેજ/મવાહી/ગેસ/કાર્બોનેલિક-બર્થ	સીઆરટોડ ૪(એ) અને સીઆરટોડ ૪(બી) ફક્ત મંજૂરીને પાત્ર કામગીરી
૩	બ્રેકવોટર/ઓફશોર આઈલેન્ડ વેસ્ટી/એસપીએમ/એસપીએમ અને તેની સંબંધ સુવિધાઓ	સીઆરટોડ ૪(એ)
૪	કોમન ઓપરેશનલ ઓરિજિન તથા અન્ય સુવિધાઓ	સીઆરટોડ ૧(બી) અને સીઆરટોડ ૩ ફક્ત મંજૂરીને પાત્ર કામગીરી
૫	યુટિલિટી કોન્ટ્રોલ (નિયત કરાયેલ મુજબ)	સીઆરટોડ ૧(એ), સીઆરટોડ ૧(બી), સીઆરટોડ ૪(બી), સીઆરટોડ ૩
૬	મટીન ઈન્ટેક અને આઈટફોલ માળખું (નિયત કરાયેલ મુજબ) તથા તેની સંબંધ સુવિધાઓ	સીઆરટોડ ૪(એ)
૭	ડીસેલિનેશન પ્લાન્ટ	સીઆરટોડ ૧(એ) ડાયવર્ટ કરાયેલો આરક્ષિત વન વિસ્તાર, સીઆરટોડ ૧(બી) અને સીઆરટોડ ૩
૮	સમુદ્રના પાણીની ઈન્ટેક અને આઈટફોલ પાર્શ્વવાઈન, એસપીએમ/એસપીએમ/સમુદ્રી આઈલેન્ડ વેસ્ટી અને તેની સંબંધ સુવિધાઓનો ઓફશોર પાર્શ્વવાઈન	સીઆરટોડ ૪(એ) અને સીઆરટોડ ૪(બી)
૯	ડ્રેજિંગ/ડમિંગ/રિકલેમેશન	સીઆરટોડ ૪(એ), સીઆરટોડ ૪(બી) અને સીઆરટોડ ૩
૧૦	એક્સ્ટેન્ડેડ/સ્ટુડીઓ/એક્સ્ટેન્ડેડ અને ફ્લોટિંગ ડ્રાઇ ડોક	સીઆરટોડ ૪(એ) અને સીઆરટોડ ૧(બી)

૨૫. મંજૂર કરાયેલા સીઆરટોડ-૨૦૧૧ મુજબના સીઆરટોડ ઝોન અને તેના હિસ્સાઓની વિગતો

ક્ર. નં.	વિકાસ	સીઆરટોડ					
		૧(એ)	૧(બી)	૩-એનટીએડ	૩(૨૦૦ થી ૫૦૦ મીટર)	૪(એ)	૪(બી)
વિસ્તાર (હેક્ટર)							
૧	ડીસેલિનેશન પ્લાન્ટ, યુટિલિટી કોન્ટ્રોલ, યિન-એમ્બી કાર્ગો સ્ટોરેજ અન્ય સીઆરટોડ મુજબ	૭૨.૩	૪૭.૩	૨૫	૦	૦	૦
૨	ડ્રેજિંગ નિકાલનું સ્થળ	૦.૦	૦.૦	૦.૦	૦.૦	૪.૬	૦.૦
૩	ફ્લોર વિસ્તાર	૦.૦	૦.૦	૦.૦	૦.૦	૦.૨	૦.૦
૪	જીએસપીસી એલએનજી બર્થ	૦.૦	૦.૦	૦.૧	૦.૦	૦.૦	૦.૦
૫	ડીસેલ માટે ઈન્ટેક	૦.૦	૦.૦	૦.૦	૦.૦	૧.૮	૦.૦
૬	એલએનજી આઈટફોલ પોઈન્ટ	૦.૦	૦.૦	૦.૬	૦.૦	૬.૦	૦.૦
૭	મલ્ટીપર્પઝ બેકપ એરિયા	૧૪૭.૭૭	૨.૮	૩.૧૩૪	૧૧૪.૭	૩૧.૬	૩.૬
૮	મલ્ટીપર્પઝ બેકપ એરિયા જહાજ નિર્માણની કામગીરી	૦.૦	૧૨૬.૪	૦.૬	૦.૬	૧૮૦.૦	૧૦.૮

૨૬. સીઆરટોડ એરિયામાં ફક્ત પ્રસ્તાવિત યુટિલિટી કોન્ટ્રોલના વિસ્તારનો હેક્ટર

ક્ર. નં.	કોન્ટ્રોલ	કોન્ટ્રોલ-૧	કોન્ટ્રોલ-૨	કોન્ટ્રોલ-૩	કોન્ટ્રોલ-૪	કોન્ટ્રોલ-૫	કોન્ટ્રોલ-૬	કુલ
૧	કુલ વિસ્તાર (હે)	૪૯.૭૯	૫૪.૯૩	૦.૭૭	૧૩.૧૬	૧.૨૬	૪.૩૯	૧૨૪.૩
૨	સીઆરટોડ ૧(એ) (મેન્યુવ એરિયા) (હે)	૧૩.૪૭	૬.૪૨	૦.૨૮	૦.૬૯	-	૧.૪૯	૨૨.૩૫
૩	સીઆરટોડ ૧(બી) (મેન્યુવ બર્થ) (હે)	૧૦.૬૯	૮.૨૬	૦.૨૯	૦.૪	-	૨.૭૪	૨૨.૬૮
૪	સીઆરટોડ ૧(એ) (ડાયવર્ટ કરાયેલો આરક્ષિત વન વિસ્તાર) (હે)	૨૧.૩૩	૨૯.૩૫	-	૧.૪૪	-	-	૫૨.૧૨
૫	સીઆરટોડ ૧(બી) (ઈન્ટેક/સાલ એરિયા)	-	૩.૬૯	-	૧.૬૭	૦.૪૪	-	૬.૮
૬	સીઆરટોડ ૩ (૨૦૦ મીટર) (હે)	-	૩.૪૭	-	૪.૬૬	૦.૩૫	૦.૧૬	૮.૬૪
૭	સીઆરટોડ ૩ (૨૦૦ થી ૫૦૦ મીટર સુધી) (હે)	-	-	-	-	૦.૪૭	-	૦.૪૭
૮	સીઆરટોડ સિવાયનો એરિયા (હે)	-	-	૦.૨	-	-	-	૦.૨

૨૭. મલ્ટીપર્પઝ બેકપ એરિયા

ક્ર. નં.	વિકાસ	સીઆરટોડ						
		૧(એ)	૧(બી)	૩ (૨૦૦ મીટર સુધી)	૩ (૨૦૦ મીટરથી ૫૦૦ મીટર સુધી)	૪(એ)	૪(બી)	સિવાયનો એરિયા
વિસ્તાર (હેક્ટર)								
૧	મલ્ટીપર્પઝ બેકપ એરિયા	૧૪૭.૭૭	૨.૮	૧૩૪.૪	૧૧૪.૪	૩૧.૬	૩.૬	૧૫૧૦.૫
૨	મલ્ટીપર્પઝ બેકપ એરિયા/જહાજ નિર્માણ એરિયા	૦.૦	૧૨૬.૪	૦.૬	૦.૬	૧૮૦.૦	૧૦.૮	૦
૩	મલ્ટીપર્પઝ મવાહી/ગેસ/કાર્બોનેલિક કાર્ગો સ્ટોરેજ એરિયા	૨૫૨.૩*	૦.૩	૧૧૧.૪૭	૧૧૮.૬	૨૯.૬	૦	૫૫૮.૩

(અનુસંધાન સમગ્રના પાનાં ૫૨)



(અનુસંધાન અભ્યાસના પાઠ્યપુસ્તકો)

- ગુજરાત કોસ્ટલ ઝોન મેનેજમેન્ટ ઓથોરિટી (જીસીઝેડએમએ) એ તારીખ ૨૦મી એપ્રિલ, ૨૦૨૪ના રોજના પત્ર નં. **ENV/10/2024/37/T** થી આ દરખાસ્તની ભલામણ કરી છે.
૨૮. પર્વાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલયના આઈઆરઓએ સાર્વજનિક મુલાકાત લીધી હતી અને તારીખ ૨૩મી ફેબ્રુઆરી, ૨૦૨૪ના રોજના પત્રથી મે. અદાલી પોર્ટર્સ એન્ડ લોજિસ્ટિક્સને મુંદ્રા, ચિલો કચ્છ, ગુજરાતને વોટરફ્રન્ટ ડેવલપમેન્ટ પ્રોજેક્ટ માટે પ્રમાણિત અનુપાલન રીપોર્ટ જાહેર કરાઈ હતો.
 ૨૯. શોરલાઈન ચેન્જ (દરિયાકાંઠાના પટ્ટામાં પરિવર્તન) ની વિગતો: શોરલાઈનમાં ઐતિહાસિક પરિવર્તન દર્શાવે છે કે, આ વિસ્તારમાં દરિયાકાંઠાના પટ્ટામાં પ્રાચીન અનુસાર ફેરફારો "લો ઇસ્ટર્નિંગ કન્ડીશનના વર્ગમાં આવેલી" વિવિધ કુદરતી તેમજ માનવસર્જિત પ્રવૃત્તિઓના પગલે થયા છે. એપીએસડીએડની સંપૂર્ણપણે વિકસિત સુવિધાના કારણે આખા કાંઠાના વિસ્તારમાં દરિયાકાંઠાના પટ્ટામાં પુર્વધારણા મુજબની ફેરફાર સૂચિત વિકાસના કારણે વાર્ષિક ૦.૦૮ મીટર કરતાં ઓછો રહેશે. એપીએસડીએડ દ્વારા ૨૦૨૩માં ગુજરાત ઇન્સ્ટીટ્યુટ ઓફ ડેવલપમેન્ટ ઇન્ફોર્મેશન (ગાઈડ) ના માધ્યમથી મુંદ્રાના સમુદ્રકાંઠા વિસ્તારમાં દરિયાકાંઠાના પટ્ટા ઉપર દેખાતે રાખવાનો આરંભ કરાયો હતો. આખામાં અહીં દરિયાકાંઠાના પટ્ટાના ધોવાણની તેમજ વૃદ્ધિની (એકિએશન), એમ મિશ્ર પ્રક્રિયા થઈ રહી હોવાનું જણાયું હતું. ધોવાણ મોટવાના કાંઠાના પટ્ટામાં કેટલાક સ્થળોએ, વેસ્ટર્ન પોર્ટમાં તેમજ મુંદ્રા પોર્ટના પૂર્વના ભાગે બોચા ટાપુના મુખ નજીકના સ્થળોએ થતું હોવાનું જણાયું હતું. બાકીના વિસ્તારમાં વૃદ્ધિ (એકિએશન) થઈ રહ્યાનું જણાયું હતું. સેટેલાઈટ ઇમેજનો ઉપયોગ કરી બેંગ્લાદેશ સ્થાપિત કરવા તથા ઐતિહાસિક પૃથ્થકરણને યોગ્ય કરાવવા બીજા પ્રોજેક્ટિંગ સહિતના ટ્રાન્સેક્ટ સર્વે દ્વારા થયા હતા. ભવિષ્યમાં પણ દરિયાકાંઠાના પટ્ટામાં ફેરફારોની દેખરેખ વારંવારના બીજા પ્રોજેક્ટિંગ તેમજ નિયમિત સમયાંતરે સેટેલાઈટ ઇમેજનો ઉપયોગ કરાતો રહેશે.
 ૩૦. વૈજ્ઞાનિક મોડલનો ઉપયોગ કરી સૂચિત વોટરફ્રન્ટ ડેવલપમેન્ટ પ્લાનના વિસ્તરણની અસરોનું અંકલન કરવા હાયડ્રોડાયનામિક અભ્યાસ દ્વારા થયો છે. આ અભ્યાસમાંથી એવા તારણો મળે છે કે, ફ્લો ટેલિગ્રામ (સરક્યુલેશન પેટર્ન) ફેરફારો સ્થાનિક પ્રકારના છે અને તેની અસરો વિકાસ હેઠળના વિસ્તાર પુરતી મર્યાદિત છે.
 ૩૧. આ વિસ્તારમાં ધોવાણની અસરોના કારણે પુર અને તે સંબંધિત અસરોનો અભ્યાસ વિસ્તૃત રીતે કરાયો છે. ૧૦૦ વર્ષની માહિતીના આધારે એવું કહી શકાય કે ધોવાણના આવાણની ફીલ્ડવેલી આ વિસ્તારમાં ચાર વર્ષને એકવારની છે. સમુદ્રની વધુમાં વધુ સર્વે બે મીટરની રહેવાની અને તે પણ ૧૦૦ વર્ષમાં એકવાર થવાની આગાહી કરવામાં આવી છે, જેના પગલે દરિયાકાંઠાના પટ્ટામાં નિરાશવાજા વિસ્તારોમાં પાણી ફરી વળવાની શક્યતા રહે છે.
 ૩૨. ડ્રેજિંગની દરખાસ્ત અને ટેકરેશન: વોટરફ્રન્ટ ડેવલપમેન્ટ પ્લાનના વિસ્તરણમાં ક્યાંત લેઆઉટના મહત્તમ રીલે સંતુલન, એપ્રોચ ચેનલ, બેજિંગ અને બેજિંગ એરીયા -૨૧ મીટર ટીડી સુધી એવરડાટ કરવાનો સમાવેશ થાય છે, જેથી ટાપી પડેલા (કેપ્ચરેડ) જહાજોનો સમાવેશ થઈ શકે. મંજૂર કરાયેલા ક્યાંત વોટરફ્રન્ટના વિસ્તારમાં જ લેઆઉટનું મહત્તમ સંતુલન કરવા માટે, ડ્રેજિંગના વધારાના પ્રમાણની જરૂરતની પરિકલના છે. હાલની દરખાસ્ત મુજબ પરિકલના અનુસાર સરિથ પોર્ટ ખાતે કેપિટલ ડ્રેજિંગના પ્રમાણની દરખાસ્ત ૨૦ MCM અને વેસ્ટ પોર્ટ ખાતે ૧૦૦ MCM છે. કેપિટલ ડ્રેજિંગના પગલે પ્રાપ્ત થયેલા મટીરિયલનો ઉપયોગ મંજૂર કરાયેલા વિસ્તારની અંદર જ જગ્યા સમથળ કરવા માટે કરાયો. હાલની દરખાસ્ત મુજબ મેઈનટેનન્સ ડ્રેજિંગની જરૂરત વાર્ષિક ૧૨ એમટીએમની ધારણા છે, જેનો નિકાલ નિયમિત કરાયેલા ઓફશોર સ્થળોએ કરાયો.
 ૩૩. ડ્રેજિંગ અને તેનાથી ઉત્પન્ન થયેલી સામગ્રીના નિકાલની સમુદ્ધી જીવસૃષ્ટિ ઉપરની અસરોની વિસ્તૃત છલાવટ ગુણવત્તાની દ્રષ્ટિએ તેમજ જલ્લાત્મક દ્રષ્ટિએ પણ સેન્ટર ઓફ એડવાન્સ સ્ટડી (સીએસસ) ઈલ મરિન બાયોલોજી, અક્ષમહાઈ સુનિવારિટી દ્વારા કરાઈ હતી અને તેના તારણોની વિશ્લેષણના તથા સંયોજનની ખાતરી માટે, ઈસ્ટર્ન સીપોર્ટ ઉપર એક ઇન્ટિગ્રેટેડ એક્ટિવ મેનેજમેન્ટ પ્રક્રિયા ગુજરાત ઇન્સ્ટીટ્યુટ ઓફ ડેવલપમેન્ટ ઇન્ફોર્મેશન (ગાઈડ) દ્વારા હાથ ધરાઈ હતી. આ સંજોગે પર્વાવરણીય સંશોધન અને મૂલ્યાંકન વિષે પોતાના નિષ્ણાતજ્ઞાન માટે નામકિત છે.
 ૩૪. ૬૨૯ કન્ટેનરના પગલાં સાથે કાર્ગો હેન્ડલિંગની વિગતો: પૂર્વ કદની ૬૨૯ કન્ટેનર સીસ્ટમ: આ પ્રોજેક્ટમાં એક મજબૂત અને સચોટ ૬૨૯ કન્ટેનર સીસ્ટમનો અમલ કરાઈ રહ્યો છે, જેમાં ૬૨૯ (છૂટા વગેરે) ના ઉત્કર્ષનને ન્યૂનતમ સ્તરે રાખવાના વિવિધ પગલાં આવેલી લેવાયા છે. આ સીસ્ટમમાં આ પ્રકારની ટેકનિકલનો સમાવેશ થઈ શકે છે: મિડિયમ સીસ્ટમ, ૬૨૯ કન્ટેનર અને વોટર એયર્સ, વિન્ડ બ્રેકિંગ વોલ/વિન્ડ શિલ્ડ જેવી ૬૨૯ એક્સન ઈક્વિપમેન્ટ બેટાડી શકાય છે, કાર્ગોના આવરણ માટે અને ૬૨૯ એક્સન નિવારણ માટે સોલ્વેન્ટ્સ કન્ટેનર સીસ્ટમ, કાર્ગોના પડી રહેલા ટ્રાન્સાકો ઉપર ૬૨૯ સમેસન્ટસ અથવા બાઈન્ડિંગ એવરડા વગવાવા દ્વારા ૬૨૯ પેટા થવાના નિવારણનો સમાવેશ થઈ શકે છે.
 ૩૫. એઈલ સ્પિલ કન્ડીશનની ચોખ્ખાની વિગતો: એપીએસડીએડ દ્વારા ૬૦૦ ટી (ટીબર ૧) સુધીના ઓઈલ સ્પિલ (અકસ્માતે પ્રવાહી પેટ્રોલિયમ પેદાશનું સમુદ્રનું ટોળાનું અને ફેલ્ડ જવું) ની સ્ટ્રિક્ટોનો રાખવાનો કરવાના હેતુસર એનઓએસડીસીપીએ નિયત કરેલી માઈનિમલનો અનુસારની અસરકારક ઓઈલ સ્પિલ કન્ડીશનની ચોખ્ખા તૈયાર કરી છે. બે સંબંધિત સ્થળોએ મહત્તમ ૬૦૦ ટન ઓઈલ સ્પિલના આકસ્મિક સંભોગોમાં ઓઈલ સ્પિલ મોડલિંગ અભ્યાસ દ્વારા થયો હતો અને તેના પરિણામોએ દર્શાવ્યું હતું કે, આ રીતે ટોળાંને સુધારવાનું ઓઈલ સમુદ્ર કદિ ૧૮ અથવા ૨૪ કલાકમાં અનુક્રમે સિંગલ ટાઈલ અને નીચ ટાઈલ (સીધી કપર) ના સંભોગોમાં પહોંચી શકે છે.
 ૩૬. ઉદભવી શકે તેવા જમીન સંપાદન તથા પુનર્વસવાટ અને પુનર્સ્થાપના પ્રશ્નો: પ્રોજેક્ટનું સૂચિત વિસ્તરણ પર્વાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલય દ્વારા ૨૦૦૮માં મંજૂર કરાયેલા વોટરફ્રન્ટ ડેવલપમેન્ટ પ્લાનના નિયત કરાયેલા માસ્ટર પ્લાનની હદ મર્યાદાના વિસ્તારની અંદર જ થવાનું હોવાથી કોઈ નવી જમીન સંપાદન થવાનું નથી અને તે સંબંધી તેમજ કોઈ પુનર્વસવાટ અને પુનર્સ્થાપના પ્રશ્નો ઉપસ્થિત થવાના નથી.
 ૩૭. રોજગાર ક્ષમતા, રોજગાર મેળવનારા લોકોની સંખ્યા: બાંધકામના તબક્કા દરમિયાન, અંદાજે ૨૦૦ કામદારોને રોજગારી મળશે. પ્રોજેક્ટ કાર્યરત થયા પછી ૧૨૦૦ લોકોને સીધી રોજગારી તેમજ ૩૬૦૦ લોકોનો પરોક્ષ રોજગારીની ધારણા છે. સૂચિત પ્રોજેક્ટથી આ વિસ્તારની સામાજિક-આર્થિક સ્થિતિ ઉપર સકારાત્મક અસર થવાની ધારણા છે.
 ૩૮. પ્રોજેક્ટના ફાયદા: આ પોર્ટ પ્રોજેક્ટનું સૂચિત વિસ્તરણ નાણાકિય રીતે અર્થવંશને પ્રાદેશિક તેમજ રાષ્ટ્રીય સ્તરે વૃદ્ધિમાં પ્રદરૂપ થશે.
 ૩૯. કોર્ટ કેસોની વિગતો: બે મામલા (હાઈકોર્ટમાં એક તથા સુપ્રીમ કોર્ટમાં એક) પડતર છે. તેની વિગતો આ મુજબ છે:
(૧) કેસ નં. ૨૦૧૧નો સીએલ૧૨૪, કેસનું નામ: ખેતી વિભાગ સેવા ટ્રસ્ટ વિ. સુસોઆઈ તથા અન્યો. કોર્ટનું નામ ગુજરાત હાઈકોર્ટ.
(૨) કેસ નં. ૨૦૧૬નો એસએલ૧૨૮૭૮, કેસનું નામ: પ્રવીણસિંહ ભુસાભાઈ ચૌહાણ વિ. ગુજરાત રાજ્ય તથા અન્યો. કોર્ટનું નામ: સુપ્રીમ કોર્ટ
 ૪૦. ઈસ્ટર્ન દ્વારા પ્રોજેક્ટના સમાવેશનો દ્વારા કરવામાં આવેલી સ્વચ્છતાનો ધ્યાનમાં લઈ તેની ૧૫મી મે, ૨૦૨૪ના રોજ મળેલી ૩૬મી મીટિંગમાં વિસ્તૃત ચર્ચા કરવામાં આવી હતી અને આવા પ્રોજેક્ટને લાગુ પડતી તમામ ચોક્કસ નિર્દેશ તથા સંબંધિત મુજબની સામાજ્ય શરતો હેઠળ આ પ્રોજેક્ટને પર્વાવરણીય તેમજ સીઆરટોડની મંજૂરી આપવાની ભલામણ કરાઈ હતી.
 ૪૧. પર્વાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલયે આ દરખાસ્તની વિચારણા એક્સપર્ટ ગ્રુપદ્વારા કમિટીની ભલામણોને (ઈન્ફાસ્ટ્રક્ચર, સીઆરટોડ તથા અન્ય નિલેનિયસ પ્રોજેક્ટ) આધારે કરી હતી અને એવો નિર્ણય કર્યો હતો કે, "મે. અદાલી પોર્ટર્સ એન્ડ એસડીએડ વિ. મુંદ્રા, ચિલો કચ્છ, ગુજરાત ખાતે આવેલા મુંદ્રા પોર્ટના સૂચિત વોટરફ્રન્ટ ડેવલપમેન્ટ પ્લાનના ૩૩૩૫ હેક્ટર વિસ્તારમાં સૂચિત વિસ્તરણ હેઠળ ક્યાંત ૨૨૧ એમએસડીપીએની મંજૂર કરાયેલી ક્ષમતા ઉપરાંત વધારાની ૨૮૬ એમએસડીપીએ મટીરિયલ કાર્ગો હેન્ડલિંગની ક્ષમતા માટે" સુધારા સહિતના ઈસ્ટર્નને બહેરનામા, ૨૦૦૬ તથા સીઆરટોડ બહેરનામા, ૨૦૧૧ હેઠળ, આવા પ્રોજેક્ટને લાગુ પડતી તમામ સંબંધિત મુજબની શરતો ઉપરાંત નીચે દર્શાવ્યા મુજબની ચોક્કસ નિર્દેશ કરાયેલી શરતોના ચાલનને આધિન પર્વાવરણીય અને સીઆરટોડ મંજૂરી આપવામાં આવે.
 ૪૨. સક્ષમ અધિકારીની મંજૂરી સાથે આ ખતી કરવામાં આવે છે.

નકલ રવાના

૧. સચિવ શ્રી, વન અને પર્વાવરણ વિભાગ, ૮મો માળ, બલોક-૧૪, નવા સચિવાલય, ગાંધીનગર-૩૮૨૦૧૦.
૨. ડેપ્યુટી કમિશનર જનરલ (સી), પર્વાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલય, સંકલિત પ્રાદેશિક કચેરી, ગાંધીનગર, એ-વિંગ, અરવલ ભવન, ૧-૩ સર્કલ પાસે, સેક્ટર-૧૦એ, ગાંધીનગર-૩૮૨૦૧૦.
૩. સભ્ય સચિવ, કેન્દ્રીય પ્રદૂષણ નિયંત્રણ બોર્ડ, પરિવેષ ભવન, સીબીડી-કમ-ઓફિસ કોમ્પ્લેક્સ, ઈસ્ટ અર્બુન નગર, ઈલ્હી-૩૨.
૪. સભ્ય સચિવ, ગુજરાત પ્રદૂષણ નિયંત્રણ બોર્ડ, પર્વાવરણ ભવન, સેક્ટર-૧૦એ, ગાંધીનગર (ગુજરાત)-૩૮૨૦૧૦.
૫. પરિવેષ પોર્ટલ.
૬. ગાઈ ઇલેક્ટ્રોનિક્સ ઇલેક્ટ્રોનિક્સ/વેબસાઈટ/રેકોર્ડ ઇલેક્ટ્રોનિક્સ

ઈસ્ટર્ન ચોક્કસ શરતો (પોર્ટર્સ, હાઈકોર્ટ, હેક્ટર, ડ્રેજિંગ માટે)

ક્ર. નં.	ઈસ્ટર્ન શરતો
૧.	ચોક્કસ શરતો
૧.૧	બાંધકામની પ્રવૃત્તિ સુરતપણે સીઆરટોડ બહેરનામા, ૨૦૧૧ની બેગવાઈઓ અનુસાર કરવાની રહેશે. કોસ્ટલ રેગ્યુલેશન ઝોન બહેરનામા હેઠળ મંજૂરી હોય તે

ઈસ્ટર્ન શરતો

- ૧.૨૬ ધાના - છત ઉપરથી વહેનારા તેમજ જમીની સપાટી ઉપરથી વહેનારા વરસાદી પાણીના સંગ્રહ - રેઈન વોટર હાર્વેસ્ટિંગની વ્યવસ્થા અમલી બનાવવાની રહેશે. જમીની સપાટી ઉપરથી વહેનારા પાણીના રીચાર્જિંગ માટે ઉપયોગ પહેલાં તેમાંથી સરોવરો મેટર, ઓઈલ અને ગ્રીસ દૂર કરવા તેની મી-ટ્રીટમેન્ટ કરવાની રહેશે.
- ૧.૨૭ સૂચિત એક્ટીવિટી એરિયામાં વીજળીની કુલ જરૂરતમાંથી ઓછામાં ઓછી ૫% સીર ઉર્જી/ગ્રીન/બિનપરંપરાગત સ્ત્રોતોમાંથી પુરી થાય તેની તકેદારી લેવી.
- ૧.૨૮ ઈએમપીના એક ભાગરૂપે કરાયેલા તમામ કમિટમેન્ટ્સનું ભાષાક્રિય બેગવાઈઓ સાથે પાલન કરવાનું રહેશે. ભલામણોના અનુપાલનનો રીપોર્ટ પર્વાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલયની પ્રાદેશિક કચેરીને છ માસિક અનુપાલન રીપોર્ટની સાથે સ્પષ્ટ કરવાનો રહેશે.
- ૧.૨૯ મંત્રાલયના તારીખ ૩૦મી સપ્ટેમ્બર, ૨૦૨૦ના ઓફિસ મેમોરેન્ડમ નં. F.No.22-65/2017-IA.III મુજબ પ્રોજેક્ટ પ્રોપોનેન્ટે બહેર પરામર્શ વખતે સ્પષ્ટ કરવામાં આવેલી સિદ્ધાંતોના ઉપાય માટે કરાયેલા તમામ કમિટમેન્ટ્સનું પાલન કરવાનું રહેશે. પ્રોજેક્ટ પ્રોપોનેન્ટે બહેર સુભાવણીમાં કરેલા તમામ કમિટમેન્ટ્સના આધારે તેમને કરેલી દરખાસ્તો મુજબની પ્રવૃત્તિઓનો આરંભ કરવાનો રહેશે, તેમાં પર્વાવરણ મેનેજમેન્ટ પ્લાનનો સમાવેશ કરવાનો રહેશે અને તે મંત્રાલયને સુવસ્ત કરવાનો રહેશે. પ્રદૂષણ નિયંત્રણ, પર્વાવરણના રક્ષણ તથા સંવર્ધન, પુનર્વસવાટ અને પુનર્સ્થાપના, વન્યજીવન અને વન સંવર્ધન/રક્ષણ અંગેના એમપીવી સહિતના પગલાં, કોમ્પ્લેટરેટી વર્નીફરલ વગેરે પ્રોજેક્ટ પ્રોપોનેન્ટ દ્વારા સામાજિક અસર મૂલ્યાંકન તથા પુનર્વસવાટ અને પુનર્સ્થાપના પગલાંની ચોખ્ખાની કરાયેલી દરખાસ્ત અથવા તે ઈસ્ટર્ન સીપોર્ટ ટેયાર કરતી વખતે ટેયાર કરાયેલી ચોખ્ખા અથવા તે ઈસ્ટર્ન દ્વારા નિયત કરવા હોય તે મુજબની તમામ કામગીરી કરવાની રહેશે અને તે ઈએમપીનો એક ભાગ બની રહેશે.
- ૧.૩૦ ભારતની આદરણીય સુપ્રીમ કોર્ટ, આદરણીય ગુજરાત હાઈકોર્ટ તથા અન્ય કોર્ટના કોર્ટ ઓફ લોના આ પ્રોજેક્ટને લાગુ પડતા આખરી આદેશોને આધિન આ પર્વાવરણીય મંજૂરી આપવામાં આવી છે.

ઈસ્ટર્ન ધોરણસરની શરતો (પોર્ટર્સ, હાઈકોર્ટ, હેક્ટર, ડ્રેજિંગ માટે)

૧. **વૈજ્ઞાનિક અનુપાલન:**
 - ૧.૧ બાંધકામની પ્રવૃત્તિ સુરતપણે સીઆરટોડ બહેરનામા, ૨૦૧૧ની બેગવાઈઓ અનુસાર તેમજ રાજ્ય સરકાર દ્વારા તૈયાર કરાયેલી સ્ટેટ કોસ્ટલ ઝોન મેનેજમેન્ટ ચોખ્ખા અનુસાર કરવાની રહેશે. કોસ્ટલ ઝોન રેગ્યુલેશન ઝોન એરીયામાં કોસ્ટલ રેગ્યુલેશન ઝોન બહેરનામા હેઠળ મંજૂરીને પાત્ર હોય તે ચિવાચની કોઈ બાંધકામ કામગીરી કરી શકાશે નહીં.
 - ૧.૨ પ્રોજેક્ટને વીજળી પુરવઠો આપતી એજન્ટી પાસેથી પુરવઠાની પુરવઠાની પ્રાથમિક મંજૂરી મેળવવાનું તેમજ પ્રોજેક્ટ માટે મંજૂર કરાયેલા લોડનું પ્રમાણપત્ર મેળવવાનું રહેશે.
 - ૧.૩ ડીગ્રાના સંગ્રહ માટે વીક કન્ટેનર ઓફ એક્ટિવિટી, ફાયર સિસ્ટમ, કોસ્ટ ગાર્ડ, સિવિલ એવીએશન વિભાગ વગેરે પાસેથી મંજૂરીઓ સહિતની તમામ વૈજ્ઞાનિક મંજૂરીઓ, જે કઈ લાગુ પડતી હોય તે મુજબ પ્રોજેક્ટ પ્રોપોનેન્ટે સંબંધિત સક્ષમ અધિકારીઓ પાસેથી પ્રાપ્ત કરવાની રહેશે.
૨. **એર ક્વોલિટી મોનિટોરિંગ અને પ્રીવેન્શન:**
 - ૨.૧ પ્રોજેક્ટ પ્રોપોનેન્ટે પોર્ટ એરીયાની અંદર તેમજ બહાર મળી ઓછામાં ઓછા ચાર સ્થળોએ (અંદર એક તથા બહાર દરેક એકબીજાથી ૧૨૦° ના એંગલે ગ્રહ), જે અધિક અને ડાઈનમિક દિશાઓને પણ આવરી લેતા હોય તેવા સ્થળોએ એપ્રિએન્ડ એર ક્વોલિટી મોનિટોરિંગ હાથ ધરવા માટે સીસ્ટમ સ્થાપિત કરવાની રહેશે, જેના થકી મુખ્ય પ્રદૂષકો સંબંધિત સામાજ્ય/માપવડોનું નિરીક્ષણ (અર્થાત પાર્ટિક્યુલેટ મેટર - PM ઉત્કર્ષનના સંદર્ભમાં PM૧૦ તથા PM૨.૫ અને SO2 તથા NOx ના ઉત્કર્ષનના સંદર્ભમાં SO2 અને NOx નું નિરીક્ષણ) કરાય.
 - ૨.૨ નિયત કરાયેલા ફ્યુગિટિવ ઉત્કર્ષન ધોરણોનું અનુપાલન કરી શકાય તે માટે ૬૨૯ પેટા કરતા, ફ્યુગિટિવ ૬૨૯ સહિતના તમામ એવો સહિતના પોર્લેન્ડ સુરોગ્ય એર પોલ્યુશન કન્ટ્રોલ (એપીસી) સીસ્ટમ પુરી પાડવાની રહેશે.
 - ૨.૩ ડેક/સૂચિત સુવિધા વિસ્તારમાં કમના સ્થળને આવરી લેવાનું રહેશે. એ ૬૨૯ કર્ટન ટરીકે કામ કરશે તેમજ સાર્વજનિક ઉપરથી એ રીટે ચૂલ્કા ડિસ્ચાર્જ હાંસલ થઈ શકશે. આ કર્ટન અથવા તે ફાઈડ ડ્રાઇ કોન્ટેનરના અસર કરતા પવનના ડિસ્પર્શને નિયંત્રિત કરવામાં ખૂબજ અસરકારક બની રહેશે, જેના કારણે કચરો ફેલાતો અટકશે તેમજ કામદારો માટે હાનિકારક પુરો પાડીને તેમના માટે કામના સ્થળે વધુ સારી સ્થિતિ પુરી પાડશે.
 - ૨.૪ બેલ્ટિંગ (અપટીની સફાઈ), તેમજ રંગકામ કરવાના હોય તેવા તમામ સ્થળોએ ૬૨૯ કન્ટેનરનો ઉપયોગ કરવાનો રહેશે અને તેના પૂરક ટરીકે અસરકારક વેલાવા માટે સ્ટેક્સનો પણ ઉપયોગ કરવાનો રહેશે.
 - ૨.૫ જીહાજોએ વખતોવખત નિયત કરાતા ઉત્કર્ષનના માપવડોનું પાલન કરવાનું રહેશે.
 - ૨.૬ બેકપ પાવરના સ્ત્રોત ટરીકે ડીગ્રા પાવર જનરેટિંગ સેટ્સનો ઉપયોગ કરવાનો હોય તો એ એન્ડલોગ્સ (આવરલ હેઠળ બંધ) પ્રકારના હોવા જોઈએ અને તે પર્વાવરણ (રક્ષણ) ધારા, ૧૯૮૬ સંતર્ગત કરાયેલા નિયમો મુજબના હોવા જોઈએ. ડીગ્રા સેટ્સના સ્ટેક્સની ઉચાઈ તમામ પ્રસાધિત ડીગ્રા સેટ્સની સંતુલિત ક્ષમતા માટે જરૂરી ઉચાઈ જેટલી જ હોવી જોઈએ. તેમાં લો સ્ક્રાપર ડીગ્રાનો ઉપયોગ કરવો. ડીગ્રા સેટ્સ બેટાડવાનું સ્થળ રાખવું પ્રદૂષણ નિયંત્રણ બોર્ડ સાથેના પરામર્શમાં નિયત કરવાનું રહેશે.
 - ૨.૭ એક વિગતવાર ટ્રાફિક મેનેજમેન્ટ અને ટ્રાફિક ડીવેલપમેન્ટ ચોખ્ખા તૈયાર કરવાની રહેશે, જેના થકી એવી ખાતરી કરવાની રહેશે કે પ્રોજેક્ટના ૦૫ કી.મી. ત્રિજ્યાવા સુધીના આયુગાપુના વિસ્તારમાં સોડની ઠાલના સ્તરની સેવાઓ બાધી શકાય અને તેમાં પ્રોજેક્ટના અમલ પછી સુધારો કરી શકાય. આ ચોખ્ખા પ્રોજેક્ટ દ્વારા કરવામાં આવતા અથવા સૂચિત વિકાસ અને વૃદ્ધિ પામનારા વસવાટની કુલ અસરના આધારે તૈયાર કરાવી જોઈએ અને તે સાર્વજનિક આસપાસના ૦૫ કી.મી. ત્રિજ્યાના વિસ્તારમાં વિવિધ પરિસ્થિતિઓ અનુસાર જગ્યા અને સમયને ધ્યાનમાં લેતી હોવી જોઈએ તેમજ આ ટ્રાફિક મેનેજમેન્ટ ચોખ્ખાને રાખવાના શહેરી વિકાસ વિભાગ અને પી ડબલ્યુ ડી સક્ષમ અધિકારીઓ ચોખ્ખા કરાયેલી હોવી જોઈએ તેમજ પ્રમાણિત કરવી જોઈએ, તેના આધારે સોડની ક્ષમતામાં વધારો થઈ શકે તેમ હોવો જોઈએ તેમજ એ અધિકૃત તંત્રની ચોખ્ખાના હિસ્સાઓના અમલીકરણ માટે સંમતિ હોવી જોઈએ તેમજ તેમાં એ વિભાગોનું સામેલગવું પણ હોવું જોઈએ.
૩. **પાણીની ગુણવત્તાનું મોનિટોરિંગ અને સંવર્ધન**
 - ૩.૧ પ્રોજેક્ટના પ્રોપોનેન્ટે એની તકેદારી લેવાની રહેશે કે, પ્રોજેક્ટની સાર્વજનિક ખાતરી કોઈપણ પ્રવૃત્તિના કારણે કોઈ ક્રીક કે નદી અવરોધાતી નથી અને પાણીનો મુક્ત પ્રવાહ જળવાઈ રહે છે.
 - ૩.૨ ખોદાણની કામગીરી હાથ ધરતી વખતે પાણીની ગુણવત્તા સંબંધિત રીતે ખરાબ થતી નિવારવા ચોખ્ખા પગલાં લેવાના રહેશે. ડ્રેજિંગ એરીયાની અંદર ડ્રેજિંગ વખતે સરોવરો સેડીમેન્ટના ફેલાવાને નિયંત્રિત રાખવા સિલ્ટના કર્તનનો ઉપયોગ કરવાનો રહેશે.
 - ૩.૩ સૂચિત પ્રોજેક્ટના સ્થળે લાંગરતા કોઈપણ જહાજ તેના ઓનબોર્ડ ગંદા પાણીનો ટ્રીટ કર્યા વિના એરસુરી/ચોળવામાં નિકાલ કરશે નહીં. આવા તમામ ગંદા પાણીનો નિકાલ પ્રોજેક્ટ સાર્વજનિક ખાતરી સૂચિત એક્સપુઝેન્ડ ટ્રીટમેન્ટ પ્લાનમાં કરાયો.
 - ૩.૪ આકસ્મિક ક્યુચલ સ્પિલ અને કાર્ગો હેન્ડલ સ્પિલના કિસ્સામાં એને મર્યાદિત રાખવા, નિયંત્રણમાં લેવા તેમજ ટીકવર કરવા માટે પગલાં લેવાના જોઈએ.
 - ૩.૫ પ્રોજેક્ટના પ્રોપોનેન્ટે ઈન્ટેકના પાણી અને ડિસ્ચાર્જના પાણીના તાપમાન વચ્ચેના તફાવતને મેનેજ કરવા માટે ચોખ્ખા તૈયાર કરવાની રહેશે અને તેનો અમલ કરવાનો રહેશે.
 - ૩.૬ બાંધકામની સાર્વજનિક ખાતરી ક્યુચલ/એવિન ઓઈલ તથા લુક્રિકન્ટ્સનું સ્પિલેવ ઓર્ગેનિક પ્રદૂષણના સ્ત્રોતો બની રહે છે અને તેનાથી સમુદ્રી જીવસૃષ્ટિને વિપરિત અસર થાય છે. સુરોગ્ય નિવારણના પગલાં તેમજ સ્પિલેવ થવાના કિસ્સામાં તેને ટ્રેપ કરવા માટે જરૂરી ચંચળા પુરી પાડીને એ નિવારવાનું રહેશે.
 - ૩.૭ તાજા પાણીનો કુલ ઉપયોગ પ્રોજેક્ટની વિગતોમાં સ્પષ્ટ કરાયેલી સૂચિત જરૂરતથી વધતો જોઈએ નહીં. તાજા પાણીનો ઉપયોગ માટે સક્ષમ અધિકારી પાસેથી આગોતરા મંજૂરી મેળવવાની રહેશે.
 - ૩.૮ પ્રોજેક્ટમાંથી પેદા થતા ગંદા પાણીની ટ્રીટમેન્ટ માટે સુરોગ ટ્રીટમેન્ટ પ્લાનની વ્યવસ્થા કરવાની રહેશે. ટ્રીટ કરાયેલા પાણીનો ઉપયોગ બાગાસત, ફ્લોરિંગ, બેકવોશ, એસવીએસી હેતુઓ તથા ૬૨૯ એક્સન માટે કરવાની રહેશે.
 - ૩.૯ ટ્રીટમેન્ટ કરાયેલા એક્સપુઝેન્ડ/ટ્રીટ કરાયા વિનાના એક્સપુઝેન્ડ બહેર સિવરમાં/ડિસ્પોઝાલ/ડ્રેનેજ સીસ્ટમમાં ડિસ્ચાર્જ કરવા તથા એના સંમતિ ડિસ્પોઝાલ પોર્લેન્ડ માટે સક્ષમ અધિકારી પાસેથી પ્રમાણપત્ર મેળવવાનું રહેશે.
 - ૩.૧૦ જળ સંસાધન મંત્રાલય પાસેથી આગોતરા મંજૂરી વિના નદીના કુદરતી પ્રવાહને વાળી શકાશે નહીં.
 - ૩.૧૧ વોટરફ્રન્ટની સુવિધા ખાતે સ્થાપિત ધોવાણને નિયંત્રિત કરવા માટેના તમામ પગલાં લેવાના રહેશે. જમીની વિસ્તારમાંથી સમુદ્રી જળમાં માટી વહી જતી અસરકારક શોરલાઈન બાઈન્ડી લાઈન ખાતે અર્થ પ્રોટેક્શનનું કામ કરવાનું રહેશે.
૪. **સામાજિક મોનિટોરિંગ અને નિવારણ**



કચ્છની શોધવા શરતો (પોર્ટલ, કાર્બન, હેલોજન, ડ્રેજિંગ માટે)

પરિશિષ્ટ ૧

૧. શોધવા શરતો
- ૧.૧ બાંધકામની પ્રવૃત્તિ શરૂઆત પહેલાં સીઆરટોડ ૧૫૬૨નામા, ૨૦૧૧ની જોગવાઈઓ અનુસાર કરવાની રહેશે. કોરટલ રેન્જુલેશન ઝોન ૧૫૬૨નામા હેઠળ મંજૂરી હોય તે સિવાયનું કોઈ બાંધકામ/પ્રવૃત્તિ કોરટલ રેન્જુલેશન ઝોનના વિસ્તારમાં કરવાના રહેશે નહીં.
- ૧.૨ ગુજરાત કોરટલ ઝોન મેનેજમેન્ટ ઓથોરિટી દ્વારા તારીખ ૨૦મી એપ્રિલ, ૨૦૨૪ના રોજના પત્ર નં. ENV/10/2024/37/T માં નિર્દેશિત કરાયેલી તમામ ભલામણો અને શરતોનું પાલન કરવાનું રહેશે.
- ૧.૩ સીઆરટોડ વિસ્તારમાં તમામ સૂચિત સ્ટોરેજ સીઆરટોડ ૧૫૬૨નામા, ૨૦૧૧ અનુસારના હોવા જોઈશે. સીઆરટોડ વિસ્તારમાં સીઆરટોડ ૧૫૬૨નામા, ૨૦૧૧માં ઉલ્લેખ હોય તે સિવાયની કોઈ પ્રોજેક્ટના સ્ટોરેજને મંજૂરી નથી.
- ૧.૪ સીઆરટોડ-૧એના વિસ્તારમાં ૨૫૨.૩ હેક્ટરનો મટીપર્પઝ બેકઅપ સિસ્ટમ પ્રસ્તાવિત છે, તેમાં મંજૂરીને પાત્ર હોય તેવી પ્રવૃત્તિઓ જ હાથ ધરી શકાશે. સૂચિત બેકઅપ સિસ્ટમમાં કોઈપણ સંબંધિત મેન્યુઅલ કાપી શકાશે નહીં અને મેન્યુઅલની આસપાસ ૫૦ મીટરનો બફર વિસ્તાર જાળવવાનો રહેશે.
- ૧.૫ સૂચિત મટીપર્પઝ બેકઅપ સિસ્ટમમાં કોઈપણ સંબંધિત મેન્યુઅલ કાપી શકાશે નહીં અને મેન્યુઅલની આસપાસ ૫૦ મીટરનો બફર વિસ્તાર જાળવવાનો રહેશે.
- ૧.૬ જીસીએસએમએની શરતોમાં નિર્દેશિત કરાયા મુજબ અને પીપીએ આપેલી સંમતિ અનુસાર ૧૦૦ હેક્ટરના વિસ્તારમાં કોમ્પેન્સેટરી મેન્યુઅલ વનીકરણ પ્રોજેક્ટના અર્થે કરવાનું રહેશે. તેમજ રાજ્યના વન વિભાગ અથવા તે રાજ્ય સરકાર દ્વારા અધિકૃત કરાયેલી કોઈપણ અન્ય એવન્ટી સાથેના પર્યાવરણ દ્વારા તે માટેની યોજના હાથ ધરાવવાની રહેશે. આ યોજના પસંદ કરવા, વન અને જળવાયુ પરિવર્તન મંત્રાલયના આદેશો અનુસાર ઠરાવ કરવાની રહેશે. યોજનામાં સ્પષ્ટ કરવાની રહેશે અને યોજનાના અનુવાદનના રીપોર્ટ દરમિયાન મોનિટોરિંગ રીપોર્ટમાં સ્પષ્ટ કરવાના રહેશે.
- ૧.૭ પોર્ટના બાંધકામના કારણે કોઈ મેન્યુઅલ કાપી શકાશે નહીં કે તેને અસર પહોંચાડી તેની ખાતરી કરવાની રહેશે.
- ૧.૮ ડીએલએસ પ્લાનમાંથી નિકળતા ખાસ પાણી તેમજ એવએનજીના સી-ગ્રેડિફિકેશન સુનિશ્ચિત નિકળતા કુલિંગ પ્રક્રિયાના પાણીનો નિકાલ વૈજ્ઞાનિક અભ્યાસના માધ્યમથી સોળાની કદાચેલા ઓફશોર સ્થળે કરવાનો રહેશે. ગુજરાત રાજ્ય પ્રદૂષણ નિયંત્રણ બોર્ડ પાસેથી નો અભ્યાસના સર્ટિફિકેટ પ્રાપ્ત કરવાનું રહેશે.
- ૧.૯ સુટિલિટી કોર્પોરેશન બાંધકામ સીઆરટોડ ઉપર ગ્રેન્ડી ગર્ડર લોડિંગ ટેકનોલોજીના માધ્યમથી કરવાની દરખાસ્ત છે, જેના કારણે હેવી મશીનરીના પરિવહન માટે કોઈ રોડના નિર્માણની જરૂર પડે તેવી અને તેના પગલે તેની જમીન/મેન્યુઅલ વિસ્તારમાં વ્યવસ્થા/જમીન અસર રહેશે. એનવીએસટીએમ દ્વારા કરાયેલા સીઆરટોડ મેનિજ અનુસાર મેન્યુઅલને ધનાઈ વાસ્તવિક નુકસાન ફ્રમ ૦.૬૨ હેક્ટર પુરતું મર્યાદિત રહેશે. પીપી દ્વારા ૧૦૦ હેક્ટરના વિસ્તારમાં કોમ્પેન્સેટરી મેન્યુઅલ વનીકરણ કરાશે.
- ૧.૧૦ પ્રોજેક્ટને પર્યાવરણીય મંજૂરી પ્રાથમિક સીટ ઇલાઈએ ૧૫૬૨નામા, ૨૦૦૬ની જોગવાઈઓ હેઠળ અર્પાઈ છે. તેનો અર્થ અન્ય કોઈ ધારા/નિયમ/નિયમન હેઠળ લેવાની જરૂરી બહારથી/સંમતિ/મંજૂરીઓ મળવાની થતી નથી. પ્રોજેક્ટના પ્રોપોનેટ આ પ્રોજેક્ટને લાગુ પડતા હોય તેવી અન્ય ધારા/નિયમનો અથવા તે કારણે હેઠળની બહારથી/મંજૂરીઓ પ્રાપ્ત કરવાની રહેશે.
- ૧.૧૧ ગુજરાત ઇન્વેસ્ટમેન્ટ ઓફ ડેવલપમેન્ટ (ગાઈડ) દ્વારા હાથ ધરાયેલા મરીન બાયોલોજી અભ્યાસમાં દર્શાવવામાં આવેલી તમામ ભલામણોનો અમલ કરવાનો રહેશે. પર્યાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલયના પ્રાદેશિક કાર્યાલયને આ ભલામણોના અનુવાદન અંગેની વિગતો જાણીતી કરવાનો રહેશે.
- ૧.૧૨ બાંધકામ દરમિયાન અને તે પછી આ વિસ્તારની પર્યાવરણીય લક્ષણિકાઓનું સતત મોનિટોરિંગ પાણીની ગુણવત્તામાં, કોરટલ હાથરોજીમાં, સમુદ્રના તળિયામાં પ્રદૂષણ તેમજ સમુદ્રી જીવજીવિતના વૈવિધ્ય તથા જથ્થાત્મક ફેરફારના સંદર્ભમાં કરવા રહેવાનું છે. આ દેખરેખના અહેવાલનો રીપોર્ટ સંબંધિત અર્થસરના, પર્યાવરણ, વન તથા જળવાયુ પરિવર્તન મંત્રાલયને જાણીતી રીપોર્ટ સાથે સ્પષ્ટ કરવા રહેવાનું છે.
- ૧.૧૩ પ્રોજેક્ટ પ્રોપોનેટને એ વાતની ખાતરી કરવાની રહેશે કે, પ્રોજેક્ટ સાર્થક ખાતેની કોઈપણ પ્રવૃત્તિના પગલે કોઈપણ ક્ષતિ અથવા તેની સંભાવના પ્રવાહ અવરોધક નથી અને પાણીનો મુક્ત પ્રવાહ જાળવવાઈ રહે છે.
- ૧.૧૪ પાણીની અંદર કોઈપણ પ્રકારના બાયોલોજીકલ મંજૂરી મળતી નથી.
- ૧.૧૫ કલોરિડ કન્સેન્ટ્રેશન ઓફ ક્લોરિડ તથા જંજીવ/ટ્રાન્સફર ટાવરને ૬૨૨ સેસન સીસ્ટમ (ડીએસએસ) પુરી પાડવાની રહેશે. હેલ્થરિંગ, ટ્રાન્સફર અને સ્ટોરેજ દરમિયાન વોટર ક્લિનર/ફોલિંગ સીસ્ટમ સાથે ૬૨૨ સેસન સીસ્ટમ પુરી પાડવાની રહેશે, જેથી ૬૨૨ વાહાવરમાં ભળી જાય નહીં. વધુમાં, ડ્રીનબેસ્ટ કામગીરી દરમિયાન છૂલકનું વાતાવરણમાં ભળી જવાનું નિવારી શકે/અટકાવી શકે/ તેને કાબુમાં રાખી શકે.
- ૧.૧૬ સામર જેવી સામગ્રી સહિતનો બાંધકામનો કચરો તેમજ અન્ય જોખમી સામગ્રીનું પ્રદૂષણ જાળવવાનો અર્થસર કરે નહીં તેની ખાસ તકેદારી લેવાની રહેશે અને આવી સામગ્રી માટેની ડમ્પસાઈટ સુરક્ષિત કરેલી હોવી જરૂરી છે, જેથી તેનું પ્રદૂષણ ભૂગર્ભ જળ સુધી પહોંચે નહીં.
- ૧.૧૭ ઇંધણ એન્જિન/ઓઈલ તેમજ બાંધકામની સાઈટના લુપ્તિ-કન્સેન્ટ્રેશન સ્પિલેજ ઓર્ગેનિક પ્રદૂષણનો સ્ત્રોત બનતી રહે છે, જે સમુદ્રી જીવજીવિત, ખાસ કરીને બેન્થોસને અસર કરે છે. એના નિવારણ માટે યોગ્ય તકેદારીના પગલાં લેવાના રહેશે તેમજ સ્પિલેજને પાણીમાં ભળતું અટકાવવા માટે પણ યોગ્ય વ્યવસ્થા કરવાની રહેશે.
- ૧.૧૮ ઓઈલ સ્પિલેજ નિવારણ અને મિટિગેશન યોજના હાથ ધરાવવાની રહેશે. ઓઈલ સ્પિલેજ પ્રદૂષણના કિસ્સામાં સાઈટને સાફ કરવા માટે સિલ્ક ટેકનોલોજી અપનાવવો એકમાત્ર પાલન ટેવાર કરવાનો રહેશે. સીસાકર કચેરી શકાય તેવો વેસ્ટ (ઓઈલ રજ) અધિકૃત સીસાકરવચને પુરો પાડીને તેનો નિકાલ કરવાનો રહેશે.
- ૧.૧૯ સાઈટના સ્ટોર જે ઓઈલ સ્પિલેજ માટે તાકિદની સીસાકર સીસ્ટમ તથા ઓઈલ સ્પિલેજ કન્સેન્ટ્રેશન ધ્યાન તેમજ અન્ય કોઈપણ જોખમી સામગ્રીના સ્પિલેજ સામેના પગલાંની વ્યવસ્થા ટેવાર હોવી જોઈશે. આ સંદર્ભમાં મોકડીલ નિયમિત સમયાંતરે થતી રહેવી જોઈશે અને તેનું ડોક્યુમેન્ટેશન કરી સ્થાનિક પ્રદૂષણ નિયંત્રણ બોર્ડ, પોર્ટ અધિકારીઓ તેમજ પર્યાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલયના ઇન્સપેક્શન દરમિયાન તેમની સમક્ષ તે સ્પષ્ટ કરવાનું રહેશે.
- ૧.૨૦ પ્રવાહી/ગેસીઅસ પ્રોજેક્ટનું હેલ્થરિંગ સામેલ હોવાથી, 'BLEVE' અભ્યાસ અને મિટિગેશનના પગલાં તેમજ સુરક્ષાની તકેદારીઓ સહિતનું સંપૂર્ણ રિસ્ક એસેસમેન્ટ ટેવાર કરવાનું રહેશે અને મજબૂત સુરક્ષા ધોરણે તેમજ અદ્યતન ફાયર ડીટેક્શન તથા નિવારણ ટેકનિક્સ સહિતનો અમલ કરવાનો રહેશે. તેનો રીપોર્ટ જાણીતી કરવાનો રહેશે.
- ૧.૨૧ કુદરતી આપત્તિઓ, ઓઈલ સ્પિલેજ તેમજ અન્ય વેસ્ટ, ડ્રેજિંગ અને ડમ્પિંગની સમુદ્રી પર્યાવરણ તેમજ પર્યાવરણ ઉપરની અસર અંગેના જોખમોનું મૂલ્યાંકન તેમજ મેનેજમેન્ટ પ્લાન ટેવાર કરવાના રહેશે અને તેનું સુરક્ષા પાલન કરવાનું રહેશે. એની તકેદારી લેવાની રહેશે કે, પ્રોજેક્ટની અસરના એકાદમી સમુદ્રી પર્યાવરણને પ્રતિકુળ અસર થાય નહીં. સમુદ્રી પર્યાવરણ મેનેજમેન્ટ પ્લાનનું મોનિટોરિંગ તથા અનુવાદનની સ્થિતિનો રીપોર્ટ જાણીતી કરવાનો રહેશે.
- ૧.૨૨ રિસ્ક એસેસમેન્ટ રીપોર્ટ, ડીગ્રાડેશન મેનેજમેન્ટ પ્લાન તથા સુરક્ષા માર્ગદર્શિકાની તમામ ભલામણોનું અમલ પાલન કરવાનું રહેશે.
- ૧.૨૩ પ્રોજેક્ટ પ્રોપોનેટને પોર્ટ એકીકરણ અંદર તેમજ બહાર મળી ઓછામાં ઓછા ચાર સ્થળોએ (અંદર એક તથા બહાર દરેક એકબીજાથી ૧૨૦° ના અંજલે ગ્રાહ), જે અનિવચન અને ડમ્પિંગનું સિસ્ટમને પહોંચાડી લેતા હોય તેવા સ્થળોએ એન્જિન/એન્ટિ એર ક્લોઝિંગ મોનિટોરિંગ હાથ ધરવા માટે સીસ્ટમ સ્થાપિત કરવાની રહેશે, જેના થકી મુખ્ય પ્રદૂષકો સંબંધિત સામાન્ય/આર્પેડોનું નિરીક્ષણ (અર્થાત પાર્ટિક્યુલેટ મેટર - PM ઉલ્લેખના સંદર્ભમાં PM10 તથા PM2.5 અને SO2 તથા NOx ના ઉલ્લેખના સંદર્ભમાં SO2 અને NOx નું નિરીક્ષણ) કરાય.
- ૧.૨૪ નિયત કરાયેલા ફ્યુજિટિવ ઉલ્લેખ ધોરણોનું અનુવાદન કરી શકાય તે માટે ૬૨૨ પેદા કરવા, ફ્યુજિટિવ ૬૨૨ સહિતના તમામ સ્ત્રોતો સહિતના પોઈન્ટ સુરોચ્ય એર પોલ્યુશન કન્સેન્ટ્રેશન (એન્સી) સીસ્ટમ પુરી પાડવાની રહેશે.
- ૧.૨૫ ઉલ્લેખ તથા હવાની ગુણવત્તાના મોનિટોરિંગ તેમજ મેન્યુઅલ સ્ટેક મોનિટોરિંગ તથા હવાની ગુણવત્તા/ફ્યુજિટિવ ઉલ્લેખનો મેન્યુઅલ મોનિટોરિંગના પસિલામો પર્યાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલયની પ્રાદેશિક કચેરી, સીપીસીબીની ઝોનલ કચેરી તથા એરપોલીસીબી પ્રાદેશિક કચેરીને જાણીતી કરવાનો રહેશે અને રીપોર્ટની સાથે સુપરત કરવાના રહેશે.

- ૩.૧૦ જળ સંચયન મંત્રાલય પાસેથી આગોતરા મંજૂરી વિના નદીના કુદરતી પ્રવાહને વાળી શકાશે નહીં.
- ૩.૧૧ વોટરફ્રન્ટની સુવિધા ખાતે સપાટીના ધોવાણને નિયંત્રિત કરવા માટેના તમામ પગલાં લેવાના રહેશે. જમીની વિસ્તારમાંથી સમુદ્રી જળમાં માટી વહી જતી અટકાવવા શોરલાઈન બાંધવાની જાણીતી કરવાની રહેશે અને તેના સંબંધી રીપોર્ટ મંત્રાલયના પ્રાદેશિક અધિકારીને જાણીતી કરવાનો રહેશે.
૪. અવાજનું મોનિટોરિંગ અને નિવારણ
- ૪.૧ નિયત માર્ગદર્શિકાઓ અનુસાર અવાજના સ્તરનો સર્વે કરવાનો રહેશે અને તેના સંબંધી રીપોર્ટ મંત્રાલયના પ્રાદેશિક અધિકારીને જાણીતી કરવાનો રહેશે. અવાજનું સર્વે કરવાનો રહેશે.
- ૪.૨ સાર્થક ઉપર વાહનો, પાવર મશીનરી તથા ઉપકરણોનો અવાજ નિયત મર્યાદાથી વધુ હોવો જોઈશે નહીં. ઉપકરણોની નિયમિત સમયાંતરે સર્વે કરવાની રહેશે. વધુ પડતો અવાજ ઉપકરણોમાં મફતર બેસાડવા, તેના મેઈન્ટેનન્સ અને તેને સાવરણ પુરું પાડવા ઉપર ધ્યાન સપાટું જોઈશે.
- ૪.૩ અવાજના જમીની સ્તરોની અસરના મિટિગેશનના પગલાંને ડીપ્લોમેટ માટે એકોસ્ટિક એન્ડોગ્રાફ, ગ્રાઉન્ડ - રનવેય માટે નોઈઝ બેરિયર ટેમ્પલ તે ઉપકરણોનું સંચયન કરવા લોકો માટે ઇન્ફર ડિવિઝનની વ્યવસ્થા થવી જોઈશે.
- ૪.૪ ઈ (પી) એ સિવાય, ૧૯૮૬ અનુસાર, અર્થાત ડિવિઝન સમય દરમિયાન ૭૫ ડીબી(એ) અને રાત્રીના સમય દરમિયાન ૭૦ ડીબી(એ) ની મર્યાદા મુજબ વાતાવરણમાં અવાજનું સ્તર રહેવું જોઈશે.
૫. ઈર્ષ સંચયના પગલાં
- ૫.૧ તમામ સામાન્ય ઉપયોગના વિસ્તારો, સ્ટ્રીટ લાઈટ્સ, પ્રોજેક્ટ એકીકરણની આસપાસના પાર્કિંગ માટે સોલર લાઈટ પ્રકારીના હેલુસ્ટર બિલ્ડિંગના ધાબે - છત ઉપર સોલર પાવર જનરેશન સુવિધા બેસાડી અને તેનું નિયમિત મેઈન્ટેનન્સ કરવું.
- ૫.૨ એકોસ્ટિક માટે પ્રોજેક્ટ એકીકરણમાં એવર્સીવ લાઈટ્સનો ઉપયોગ કરવો.
૬. કચરાનું વ્યવસ્થાપન
- ૬.૧ ડ્રેજિંગ કરાયેલા મટીરિયલનો નિકાલ નિયંત્રિત કરાયેલા વિસ્તારમાં સુરક્ષિત રીતે કરવાનો રહેશે.
- ૬.૨ ડમ્પિંગના કારણે શોરલાઈનમાં વિક્ષેપ થવો જોઈશે નહીં. શોરલાઈનમાં ફેરફારોનો સમયાંતરે અભ્યાસ થવો રહેવો જોઈશે અને જરૂરી લાગે ત્યારે મિટિગેશનના પગલાં લેવાવા જોઈશે. તેની વિગતો જાણીતી કરવાનો રહેશે.
- ૬.૩ એકસુએન્ટ તથા અન્ય કચરાની ડ્રીટમેન્ટ માટે અવશ્યક વ્યવસ્થાઓ કરવી જરૂરી છે અને તે બાબતની તકેદારી લેવાની રહેશે કે તે કન્સ્ટ્રીક્ટ અથવા અન્ય પ્રદૂષણ નિયંત્રણ બોર્ડ સહિતના સમક્ષ અધિકારીઓ દ્વારા અભ્યાસનિષેધ (પ્રોટેક્શન) એન્ટ, ૧૯૮૬ અનુસાર સ્થાપિત કરાયેલા ધોરણોને અનુરૂપ હોવી જોઈશે.
- ૬.૪ અન્ય કચરાનું મેનેજમેન્ટ અને નિકાલ સોલિડ વેસ્ટ મેનેજમેન્ટ ઝોન, ૨૦૧૬ અનુસાર નિયમોને અનુરૂપ થવું જોઈશે.
- ૬.૫ બાંધકામ અને ડીમોલિશનની કામગીરીમાંથી અથવા તે સંબંધિત પ્રવૃત્તિઓમાંથી ઉત્પન્ન થતા કોઈપણ કચરાનું મેનેજમેન્ટ કન્સ્ટ્રક્શન એન્ડ ડીમોલિશન વેસ્ટ મેનેજમેન્ટ ઝોન, ૨૦૧૬ને અનુરૂપ થવું જોઈશે.
- ૬.૬ મ્યુનિસિપલ સોલિડ વેસ્ટનું હેલ્થરિંગ કરવા સમક્ષ અધિકારી તરફથી એ મતભંગનું પ્રમાણપત્ર પ્રાપ્ત કરવાનું રહેશે, જેમાં પાલિકાના ટંકની અન્ય કચરાના હેલ્થરિંગની ક્ષમતા સમક્ષ તેમજ પ્રોજેક્ટમાંથી ઉત્પન્ન થનારા મ્યુનિસિપલ સોલિડ વેસ્ટના હેલ્થરિંગ માટેની તેમની પુરતી ક્ષમતા દર્શાવવામાં આવેલી હોવી જોઈશે.
- ૬.૭ મરક્યુરીનું પ્રદૂષણ નિવારણ વ્યવસ્થા સીએફએલ અને ટીએફએલ સાથે એકત્ર કરવા જોઈશે અને નિયમનકારી અધિકારીની પ્રવર્તમાન માર્ગદર્શિકાઓ/નિયમોને અનુરૂપ તેનો નિકાલ થવો જોઈશે/સીસાકરવચ માટે રવાના કરવા જોઈશે.
- ૬.૮ ડીએમપીના એક ભાગરૂપે ટાકિદની પરિસ્થિતિઓનો સામનો કરવા માટે ઓઈલ સ્પિલેજ કન્સેન્ટ્રેશન ધ્યાન ટેવાર કરવી જોઈશે. સિલ્ક ટેકનોલોજી ઓઈલની રીકવરી અને તે માટેના ઉપકરણોનું મૂલ્યાંકન થવું જોઈશે. ઓઈલ સ્પિલેજ મેનેજમેન્ટ માટેની MARPOL અને સિલ્ક ટેકનોલોજી માર્ગદર્શિકાઓનું પાલન થવું જોઈશે. કોસ્ટ ગાર્ડના સંકલન હેઠળ ટર્મિનલની ઓઈલ કન્સેન્ટ્રેશન ધ્યાન ટેવાર કરવા માટેની વ્યવસ્થા તેમાં આવી રહેવાની હોવી જોઈશે.
૭. ઝીન બેસ
- ૭.૧ પ્રોજેક્ટની વિગતોમાં અપરેલી માહિતી અનુસાર ઝીન બેસનો નિકાલ કરવાનો રહેશે અને સીપીસીબીની માર્ગદર્શિકાઓ અનુસાર તેમાં સ્થાનિક વિસ્તારના હોય તેવા વૃક્ષોનું વાવવેર કરવાનું રહેશે.
- ૭.૨ જમીની ઉપરની સપાટીની ઉપજાડ માટેનો સંગ્રહ અભગથી કરવાનો રહેશે અને તેનો ઉપયોગ ઝીન બેસના નિકાલમાં કરવાનો રહેશે.
૮. સમુદ્રી પર્યાવરણ
- ૮.૧ માછલીઓની ડ્રોઈંગ તથા સ્પોનિંગ સીઝન વખતે ડ્રેજિંગ કરી શકાશે નહીં.
- ૮.૨ ડ્રેજિંગ વગેરે નિયંત્રિત રીતે કરવાનું રહેશે, જેનાથી સમુદ્રી પર્યાવરણમાં તેની અસર મર્યાદિત કરી શકાય.
- ૮.૩ ડ્રેજિંગનો કાર્યક્રમ એ રીતે આયોજિત કરવાનો રહેશે કે જેથી તેના કારણે પેદા થતી ડફોજાક ઝડપથી ફેલાઈ જાય અને માછલીઓની વસતી ઉપર તેના કારણે સ્ટ્રેટ નિવારી શકાય.
- ૮.૪ ડ્રેજિંગની કામગીરી કરતી વખતે કોઈ સરકારી એવન્ટી/સંચયના માધ્યમથી સ્વચ્છ મોનિટોરિંગ કરાવવાનું રહેશે, જેથી તેની અસરનું મૂલ્યાંકન થઈ શકે અને કોઈ વિપરિત અસર થતી જણાય તો પ્રાથમિકતાના ધોરણે તેની સામે જરૂરી પગલાં લઈ શકાય.
- ૮.૫ એક વિસ્તૃત સમુદ્રી ઈન્વેસ્ટિગેશન મેનેજમેન્ટ યોજના એનસાઈઓના અથવા તે મરીન, બ્રેકિસ વોટર અને ફ્રેશ વોટર ઈકોલોજી તથા બાયોડાયવર્સિટી વિષયની કોઈ અન્ય નામાસિત સંસ્થાના માધ્યમથી ટેવાર કરવાની રહેશે અને સંચય બાયોડાયવર્સિટી બોર્ડ તથા સીઆરટોડ ઓથોરિટીને તે સુપર કરવાની રહેશે તેમજ તેને સંતોષ થાય તે રીતે તેનો અમલ કરવાનો રહેશે. આ રીપોર્ટ ઇન્વેસ્ટિગેશન બાયોડાયવર્સિટી, કોરલ અને કોરલ કોમ્યુનિટી, મોલુસ્ક, સી ગ્રાસી, સી વીડ્ઝ, સ્પાઇડર ડેલ્ટેડ, માછલીઓ, અન્ય સમુદ્રી તથા જળજીવિતના માઈક્રો, મેક્રો તથા મેગા પ્રાણીઓ તેમજ વનસ્પતિ જીવો, જેમાં બેન્થોસ, પ્લેન્ક્ટોન, કાચળા, પક્ષીઓ વગેરે ઉપર, તેમજ ઉત્પાદકતા ઉપર પ્રોજેક્ટની પ્રવૃત્તિઓની અસરના અભ્યાસ ઉપર આધારિત હોવો જોઈશે. માહિતીનું એકત્રીકરણ તેમજ અસરનું મૂલ્યાંકન ધોરણસરની સર્વેની પદ્ધતિઓ મુજબનું હોવું જોઈશે અને તેમાં જાણપાટીની નીચેની ફોટોગ્રાફીનો સમાવેશ હોવો જોઈશે.
- ૮.૬ સી વીડ્ઝ, સી ગ્રાસી, મડફલેટ્સ, સેટીના ટીલા, મલ્કોલોગ, એકીનોડમર્સ, ઝાંખા, કાચળા, કોરલ, સમુદ્ર કાંઠાની વનસ્પતિઓ, મેનગ્રોવ તથા સમુદ્રી ઈન્વેસ્ટિગેશન અન્ય માઈક્રો, મેક્રો અને મેગા પ્રાણી તેમજ વનસ્પતિ સુધીના કોમ્યુનિટીના સંદર્ભમાં પણ સમુદ્રી પર્યાવરણનું નિયમિત રીતે મોનિટોરિંગ થવું જોઈશે.
- ૮.૭ પ્રોજેક્ટના પ્રોપોનેટને એ બાબતની તકેદારી લેવાની રહેશે કે, જળ પરિવહનના ટ્રાફિકની વિપરિત અસર નહીંના પગલે સમંતર જળચર અભ્યાસક્રમને થતી હોવી જોઈશે.
૯. બેન્થોસના પગલાં
- ૯.૧ બેન્થોસની જાળવણી વ્યવસ્થાસિદ્ધ આરોગ્ય અને સલામતી માટેના આંતરરાષ્ટ્રીય ધોરણોને અનુરૂપ થવી જોઈશે અને વૈજ્ઞાનિક સહિતના પ્રદૂષકો અનિયમિત સ્તરે એકત્ર થતા અને કમર્સિયલ/આરોગ્યના જાતોના જાતોમાં જતા નિવારણ માટે પુરતા ફ્રેટ એર ડેલિવેરેટર્સ, બોલરર્સ અને પંખાની વ્યવસ્થા હોવી જોઈશે.
- ૯.૨ કાચળાઓને સુરક્ષાપૂર્ણ કરવા પડાવી જોઈશે કે તેનો ૬૨૨ માસ, ઈન્ફર મફ્ટ અથવા ઈન્ફર પ્લગ જેવા પર્યાવરણ મોડેલિંગ ઇન્સ્ટ્રુમેન્ટ વચાટે પણ અને જ્યાં પણ જરૂરી હોય ત્યારે પહેરી રાખે. કાચળાનું (વાઈલેશન) જોખમ રહેવું હોય તેવા કાચળાઓને ખાસ વિસ્કો-ઇલાસ્ટિક હાથ મોજા પહેરવા જોઈશે.
- ૯.૩ કોઈપણ જુના જથ્થાના રીપોર્ટિંગના કામમાં એન્ટેસ્ટેટ તથા ફેરોસેન ગેસના હેલ્થરિંગ કરતી વખતે અભંગિત ઉચ્ચ સ્તરીય કાચળા લેવાની રહેશે. તે ઉપરાંત, સાર્થક ખાતે એન્ટેસ્ટેટ મટીરિયલના કાચળામાં સંગ્રહ માટે પણ સંપૂર્ણ સાવરણ પુરું પાડવું જોઈશે અને એ પછી તેનો સીટીએસટીએફ નિકાલ કરવો જોઈશે.
- ૯.૪ તમામ કાચળાઓને તેમજ કાર્યરણને અનુરૂપ સુરક્ષાની વ્યવસ્થા કરવાની રહેશે અને દરેક કાચળા તથા કમર્સિયલ આગળ જોખમ અંગેની જાણીતી વાલિમમાં તથા મોક ડ્રીલમાં સામેલ થશે અને તે નિયમિત રીતે ચોખાશે. તમામ ધોરણસરના સલામતી તથા વ્યવસ્થાસિદ્ધ જોખમ નિવારણના પગલાંનો અમલ કરવાનો રહેશે અને સંબંધિત અધિકારીઓ દ્વારા અનિયમિત બનાવો/અકસ્માતો નિવારણ તેનું મોનિટોરિંગ કરાશે.
- ૯.૫ ડીગ્રાડેશન મેનેજમેન્ટ પ્લાન તથા ટ્રાઈટાઈટિફિકેશન એન્ડ રિસ્ક એસેસમેન્ટ (ટીસ) આધારિત ઇન્વેસ્ટિગેશન પ્રોપોનેટ પ્લાનનો અમલ કરવાનો રહેશે.

કદ કદ પ્રવૃત્તિ ગુનો ગણાશે નહીં ?

આ કાયદામાં કંઈ-કંઈ બાબતોનો સમાવેશ ગુનાહત કૃત્યમાં થશે નહીં તેની સ્પષ્ટતા કરવામાં આવી છે જેમાં,

(૧) પ્રદક્ષિણા, યાત્રા, પરિક્રમા તેમજ ઉપાસના, હરિપથ, કીર્તન, પ્રવચન, ભજન, પ્રાચીન અને પરંપરાગત વિદ્યાઓ અને કળાઓનો ઉપદેશ, તેનો અભ્યાસ, પ્રચાર, પ્રસાર તેમજ મૂત સંતોના ચમત્કારો, ધાર્મિકઉપદેશકોના ચમત્કારો કે જેનાથી શારીરિક ઈજા કે આર્થિક નુકસાન થતું નથી તેના વિશે સાહિત્યનો પ્રચાર અને પ્રસાર કરવો

(૨) ઘર, મંદિર, દરગાહ, ગુરુદ્વારા, ચર્ચ અથવા અન્ય ધાર્મિક સ્થળો જેવા સ્થળોએ પ્રાર્થના, ઉપાસના અને તમામ ધાર્મિક વિધિઓ જેનાથી શારીરિક હાની કે આર્થિક નુકસાન થતું નથી તે કરવી

(૩) તમામ ધાર્મિક ઉજવણીઓ, તહેવારો, પ્રાર્થનાઓ, સરઘસ અને તેને લગતા અન્ય કોઈ પણ કાર્યો, મજત, નવાસ, મોહરમ શોભાયાત્રા અને અન્ય તમામ ધાર્મિક વિધિઓ કરવી, ધાર્મિક વિધિઓ અનુસાર ભાવકોના કાન અને નાક વધિવા, કેશલોચન જેવી ધાર્મિક વિધિ કરવી તેમજ વાસ્તુશાસ્ત્ર અને ભૂગર્ભજળના સ્રોત લગતી સલાહ, જ્યોતિષીની સલાહ આપવી વિગેરે પ્રવૃત્તિ ગુનો ગણાશે નહિ.

'કાળા ખાદુ'

માટેની સીધી સત્તા આપવામાં આવી છે. યોગ્ય અને ઝડપી કાર્યવાહી સુનિશ્ચિત કરવા વિજ્ઞાનસ ઓફીસરની નિયુક્તિની જોગવાઈ પણ કરવામાં આવી છે. વિજ્ઞાનસ ઓફીસર પોલીસ ઈન્સ્પેક્ટર કે તેનાથી ઉપલા સંવર્ગના રહેશે. વિજ્ઞાનસ ઓફીસરે પોતાના અધિકારક્ષેત્રના વિસ્તારમાં સુચિત કાયદામાં જણાવેલા ગુનાઓ શોધી કાઢવા અને અટકાવવા, ભોગ બનનાર કે તેના પરિવારના સભ્ય દ્વારા પોલીસ સ્ટેશનમાં ફરિયાદ દાખલ કર્યા પછી તેના પર યોગ્ય અને ઝડપી કાર્યવાહી સુનિશ્ચિત કરવા અને સંબંધિત પોલીસ સ્ટેશનને જરૂરી સલાહ, માર્ગદર્શન અને મદદ આપવાની રહેશે. વિજ્ઞાનસ ઓફીસરની ફરજમાં અવરોધ કે બાધા કરનારને ત્રણ માસની કેદ અથવા ૫ હજાર સુધીનાં દંડ સાથેની કેદની સજાની જોગવાઈ કરવામાં આવેલ છે. જેથી વિજ્ઞાનસ ઓફીસર પોતાનું કાર્ય સારી રીતે અને ઝડપથી કરી શકે.

દરમિયાન અંધશ્રદ્ધા વિરોધી વિધેયક

ગૃહમાં જણાવ્યું હતું કે, વર્ષ ૨૦૦૮માં કુરરજીભાઈ બાવળિયા આવું જ ખાનગી બિલ તરીકે લાવ્યા હતા. ત્યારે અર્જુનભાઈ મોઠવાણિયા કોંગ્રેસ પક્ષના નેતા હતા. કોઈક કાળે જાદૂ થયો કે તે બંને આજે ભાજપમાં છે. ૨૦૦૮નું બિલ અને આજે રજૂ થયેલું બિલ લગભગ સમાન છે. વર્ષ ૨૦૦૮ અને ૨૦૧૨માં આવું બિલ ખાનગી બિલ તરીકે લેવાયું હતું.

પોલેન્ડમાં મોદી

કરશે. જેમાં કીવમાં રાજનીતિક, વ્યાપાર, આર્થિક, રોકાણ, શિક્ષા, સાંસ્કૃતિક, જનસંપર્ક, માનવીય સહાયતા અને અન્ય ક્ષેત્રોમાં દ્વિપક્ષીય સંબંધો ઉપર ચર્ચા કરશે. આ યાત્રાથી ભારત અને યુકેન વચ્ચે નિરંતર સંપર્કને પ્રોત્સાહન મળવાની સંભાવના છે.

વડાપ્રધાન નરેન્દ્ર મોદી આગામી શુક્રવારે યુકેન પ્રવાસે પહોંચશે. આ મહત્વના ગણાવાઈ રહેલા પ્રવાસ પહેલાં વડાપ્રધાને બુધવારે જણાવ્યું હતું કે, બંને દેશ (યુકેન અને રશિયા) વચ્ચે વાતચીત દ્વારા જ સ્થાયી શાંતિ સ્થાપિત થઈ શકે છે. સંવાદથી શાંતિ સ્થાપશે, તેવી મને

પર યુકેન સંકટનું સમાધાન શક્ય નથી, તેવું મોદીએ કહ્યું હતું. કીવ પહોંચીને મોદી યુકેનના રાષ્ટ્રપતિ વોલોડીમીર ઝેલેન્સ્કી સાથે યુકેન સંકટના સમાધાન પર ચર્ચા - વિચાર - વિમર્શ કરશે.

ભારત બંધ મિશ્ર

હતા. બાદમાં માફામાફી થઈ હતી. ભારત બંધના એલાનમાં સંગઠનોનો એક વર્ગ વિરોધમાં અને બીજો તરફેણમાં હોવાથી મિશ્ર અસર વર્તાઈ હતી. બિહારમાં ટ્રેનો રોકવામાં આવી હતી, પટણામાં ટોળાને વિખેરવા પોલીસે લાકીયાઈ કરવો પડ્યો હતો. રાજસ્થાનમાં ૧૬ જિલ્લામાં શાળાઓ સજ્જડ બંધ રહી હતી. પરીક્ષાઓ મોકૂફ રખાઈ હતી. નેશનલ કન્ફેડરેશન ઓફ અત્યંજ એન્ડ આદિવાસી ઓર્ગેનાઈઝેશને ચુક્રદાને અત્યંજ અને આદિવાસીઓના બંધારણિય અધિકાર વિરુદ્ધ ગણાવ્યો છે. અત્યંજ અને આદિવાસી સંગઠનો પ્રેરિત ભારત બંધને કોંગ્રેસ, ટીએમસી, સપા, બસપા, આરજેડી, જેએમએમ સાથે એનડીએના સમર્થક લોજપા-રામવિસાલે પણ ટ્રેકે આપ્યો હતો. રાજસ્થાનના ભરતપુરમાં ઈન્ટરનેટ

રોકવામાં આવી હતી. મધ્યપ્રદેશના વ્વાલિયરમાં શાળાઓ બંધ કરવાઈ હતી. ઉજ્જૈનમાં પ્રદર્શનકારીઓ અને દુકાનદારો વચ્ચે રક્તકથ થઈ હતી. યુપીમાં પ્રદર્શનકારીઓ અને પોલીસ વચ્ચે ઉગ્ર બંધાવ થઈ હતી. આગરા ક્લેક્ટર કચેરી ઉપર બસપાનો ઝડપે ફરકવાયો હતો.

વિરોધ પ્રદર્શન જારી

અલીએ લગાવ્યા હતા. દિલ્હીમાં જંતર-મંતર ખાતે પણ આ ઘટનાનાં વિરોધમાં પ્રદર્શનો થયાં હતાં. આવી જ રીતે તેલંગાણામાં પણ તખીયો દ્વારા આજે વિરોધ પ્રદર્શન કરવામાં આવ્યા હતાં. દરમિયાન આરજી કર મેડિકલ કોલેજમાં તોડફોડ અને ડિંસાની ઘટનામાં ત્રણ પોલીસકર્મીઓને સસ્પેન્ડ કરાયા હતા, જેમાં બે આસિસ્ટન્ટ પોલીસ કમિશનર અને એક ઈન્સ્પેક્ટરનો સમાવેશ થાય છે. કોલકાતાની આ હેવાનિયત મુદ્દે પશ્ચિમ બંગાળનાં વિપક્ષી નેતા સુવેન્દુ અધિકારીએ મુખ્યમંત્રી પદેથી મમતા બેનરજીનાં રાજીનામાની માગણી કરતાં કહ્યું હતું કે, તેમણે પોતાની વિશ્વસનીયતા ગુમાવી દીધી છે.

બિનઆધિકૃત રાત ગરહાજર શિક્ષકોને પગાર ચૂકવવાનો નથી

અમદાવાદ, તા. ૨૧ : ગુજરાત વિધાનસભાના સત્રમાં આજે બિનઅધિકૃત ગેરહાજર રહેતા તેમજ નિયમિત પગાર સાથે વિદેશ પ્રવાસે જનારા શિક્ષકોનો મુદ્દો ઊછળ્યો હતો. જે સંદર્ભે રાજ્યસરકારે સ્પષ્ટતા કરી હતી કે, છેલ્લા ત્રણ વર્ષમાં બિનઅધિકૃત ગેરહાજર અને વિદેશ પ્રવાસના કારણે ગેરહાજર રહેલા ૧૩૪ શિક્ષકને ફરજમાંથી અસ્તરફ કરાયા છે અને આવા કોઈપણ શિક્ષકોને પગાર ચૂકવવામાં આવતો નથી.

આજે વિધાનસભા ગૃહમાં શિક્ષકમંત્રી કુબેર ડિંચેરે વધુ સ્પષ્ટતા કરતાં કહ્યું હતું કે, વર્ષ ૨૦૧૯થી ૨૦૨૨ દરમિયાન વિદ્યા સમીક્ષા કેન્દ્ર દ્વારા મળતી ઓનલાઇન હાજરીની વિગતો પરથી બિનઅધિકૃત ગેરહાજર શિક્ષકો માહિતીનું એનાલિસીસ કરી તેમના વિરુદ્ધ નિયમાનુસારની કાર્યવાહી કરાઈ છે.

ક્ર. નં.	ઈંગ્લીશી શરતો
૯.૬	બાંધકામ મંજૂરી માટે સંબંધિત ઈંદણ, મોબાઈલ ટોઈલેટ્સ, મોબાઈલ એસટીપી, સલામત પીવાના પાણી, તબીબી આરોગ્ય સંભાળ, બાળ સંભાળ વગેરે માટેની જોગવાઈઓ સહિતની આવાસ વ્યવસ્થા સાર્થક ઉપર જ કરવાની રહેશે. આવાસ વ્યવસ્થા હંગામી માળખાના સ્વરૂપે હોઈ શકે, જે પ્રોજેક્ટ પૂર્ણ થતા હટાવી શકાય.
૯.૭	કામદારોની વ્યાવસાયિક આરોગ્ય તપાસ નિયમિત રીતે થવી જોઈશે.
૧૦. પર્વાવરણીય જવાબદારી	
૧૦.૧	કંપની પાસે સુચોચિત પર્વાવરણીય નીતિ હોવી જોઈશે અને તેને બોર્ડ ઓફ ડાયરેક્ટર્સ દ્વારા ચોક્કસ રીતે બહાલી મળેલી હોવી જોઈશે. આ પર્વાવરણીય નીતિમાં સ્ટાન્ડર્ડ ઓપરેટિંગ પ્રોસિયર્સ નિયત કરાયેલી હોવી જોઈશે અને તેમાં ચોક્કસ એન્ડ બેટેન્લીઝની જોગવાઈઓ હોવી જોઈશે, જેના સહી પર્વાવરણીય/વન/વન્યજીવનના ધોરણ/શરતોના કોઈપણ ભંગ/સાતરવા/ઉલ્લંઘન ઉપાગર થઈ શકે. કંપની પાસે પર્વાવરણીય/વન/વન્યજીવનના ધોરણ/શરતોના કોઈપણ ભંગ/સાતરવા/ઉલ્લંઘનનું રીપોર્ટિંગ શેરહોલ્ડર્સ ડિવિડેન્ડકોને કરવા માટેની સુવ્યાખ્યાઈત સીસ્ટમ હોવી જોઈશે. આ મતલબના બોર્ડના ઠરાવની નકલ પર્વાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલયને છ માસિક રીપોર્ટ સાથે મોકલવાની રહેશે.
૧૦.૨	એક વર્ષિક અધિકારીના વડપણ હેઠળનું એક અલગ પર્વાવરણ વિભાગ પ્રોજેક્ટ અને કંપનીના હેડક્વાર્ટરના, એમ બન્ને સ્તરે સ્થાપિત હોવું જોઈશે અને તેમાં ચોક્કસ લાયકાત ધરાવતા કર્મચારી હોવા જોઈશે. વર્ષિક અધિકારી સીધા સંસ્થાના વડાને રીપોર્ટ કરતા હોવા જોઈશે.
૧૦.૩	ઈએમપી તથા પર્વાવરણીય શરતોનું પાલન કરતો એકલાન પ્લાન તથા કંપનીની જવાબદારીની મેટ્રિક્સ ટેબલ કરાવા જોઈશે અને તેને સહાય અધિકારીની ચોક્કસ રીતે માન્યતા પ્રાપ્ત હોવી જોઈશે. પર્વાવરણીય સહાયના પગલાં માટે વાર્ષિક ધોરણે ભંડોળ ફાળવવામાં આવવું જોઈશે, જે અલગ ખાતામાં રાખવામાં આવવું જોઈશે અને તેનો બીજા કોઈપણ હેતુસર ઉપયોગ થવો જોઈશે નહીં. એકલાન પ્લાનના અમલીકરણનો વાર્ષિક મુજાતનો અહેવાલ છ માસિક અનુપાલન અહેવાલ સાથે મંત્રાલય/પ્રાદેશિક કચેરીમાં રીપોર્ટ કરવાનો રહેશે.
૧૦.૪	વાર્ષિક ધોરણે સ્વયં પર્વાવરણીય ઓડિટ હાથ ધરાવું જોઈશે. દર ત્રણ વર્ષે ત્રીજા પક્ષકાર દ્વારા પર્વાવરણ ઓડિટ થવું જોઈશે.
૧૧. પ્રતિઈ	
૧૧.૧	પ્રોજેક્ટના પ્રોપોનેન્ટે તેમના પ્રોજેક્ટને અણચેલી પર્વાવરણીય મંજૂરી તથા તેની સાથેની પર્વાવરણીય શરતો અને સલામતીના પગલાં પોતાના ખર્ચે જાહેર કરવાના રહેશે અને તે માટે તેમણે સ્થાનમાં ઓછા બે સ્થાનિક, વિવિધતા અથવા તો રાજ્યના કોય તેવા અખબારોમાં તેની જાહેરખબર સાત દિવસમાં પ્રકાશિત કરવાની રહેશે, જેમાંથી એક સ્થાનિક ભાષાનું હોવું જોઈશે. તે ઉપરાંત, એ મંજૂરી કામગીરી ધોરણે પ્રોજેક્ટ પ્રોપોનેન્ટની વેબસાઈટ ઉપર પણ દર્શાવવાની રહેશે.
૧૧.૨	પ્રોજેક્ટ પ્રોપોનેન્ટ દ્વારા આ પર્વાવરણીય મંજૂરીની નકલો સ્થાનિક સંસ્થાઓના વડાઓ, પંચાયતો, પાલિકોને તથા સંબંધિત સરકારી કચેરીઓને પણ પુરી પાડવાની રહેશે અને તેઓ એ મળ્યાની તારીખથી ૩૦ માટે તે ડિસ્કલે કરશે.
૧૧.૩	પ્રોજેક્ટના પ્રોપોનેન્ટ નિયત કરાયેલી પર્વાવરણીય શરતોના અનુપાલનનું સ્ટેટસ, મોનિટોર કરાયેલી માહિતીના પરિણામો સહિત પોતાની વેબસાઈટ ઉપર અપલોડ કરશે અને અર્ધવાર્ષિક ધોરણે તે અપડેટ કરશે.
૧૧.૪	પ્રોજેક્ટના પ્રોપોનેન્ટ નિયત કરાયેલી પર્વાવરણીય શરતોના અનુપાલનના સ્ટેટસના છ માસિક રીપોર્ટ એન્વાયનમેન્ટ કમિશનર પોર્ટલ ઉપરની પર્વાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલયની વેબસાઈટ ઉપર રજૂ કરશે.
૧૧.૫	પ્રોજેક્ટના પ્રોપોનેન્ટ દરેક નાણાકીય વર્ષ માટેનું એન્વાયનમેન્ટ સ્ટેટમેન્ટ પર્વાવરણ (રક્ષણ) નિયમો, ૧૯૮૬ અને તે પછીના તેમાં થયેલા સુધારા અન્વયે નિયત કરાયા મુજબ સંબંધિત રાજ્ય પ્રદૂષણ નિયંત્રણ બોર્ડને ફોર્મ-૫માં રજૂ કરશે અને એ પછી તે કંપનીની વેબસાઈટ ઉપર પણ તે દર્શાવશે. ૪

ક્ર. નં.	ઈંગ્લીશી શરતો
૧૧.૬	પ્રદૂષકોના સ્તરના માપદંડો, નામે PM2.5, PM10, SO2, NOx (એમ્બિયન્ટ લેવેલ) અથવા તો ફોર્મવારના માપદંડો, જે પ્રોજેક્ટ માટે નિર્દિષ્ટ કરાયા હોય તેનું મોનીટરીંગ કરાશે અને કંપનીના મુખ્ય ગેટ નજીક સુવિધાજનક સ્થળે તે દર્શાવશે તેમજ જાહેર જનતાની ખાસ માટે મુકાશે.
૧૧.૭	પ્રોજેક્ટના અધિકારીઓએ રાજ્ય પ્રદૂષણ નિયંત્રણ બોર્ડ તથા રાજ્ય સરકાર દ્વારા નિર્દિષ્ટ કરાયા મુજબની શરતોનું ચૂસ્તપણે પાલન કરવાનું રહેશે.
૧૧.૮	પ્રોજેક્ટના પ્રોપોનેન્ટે ઈઆઈએ/ઈએમપી રીપોર્ટમાં કરાયેલા તમામ કમિટમેન્ટ્સ તથા ભલામણોનું, જાહેર સુનાવણી દરમિયાન કરાયેલી કમિટમેન્ટ્સનું તથા એકસપર્ટ અહેવાલ કમિટી સમક્ષ તેમના પ્રેઝન્ટેશન વખતે કરાયેલા કમિટમેન્ટ્સનું સંપૂર્ણપણે પાલન કરવાનું રહેશે.
૧૧.૯	પર્વાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલય (MoEF&CC) ની આગેવારી મંજૂરી વિના પ્રોજેક્ટમાં કોઈપણ વધુ વિસ્તરણ કે સુધારા કરી શકાશે નહીં.
૧૧.૧૦	વાસ્તવિક માહિતી સુધારવા કે પછી ખોટી/ઉપજાવી કાર્ટેલી માહિતી રજૂ કરવાથી આ પર્વાવરણીય મંજૂરી પાલી ખેંચી શકાય છે અને પર્વાવરણ (રક્ષણ) ધારા, ૧૯૮૬ હેઠળ તે બદલ કાર્યવાહી પણ થઈ શકે છે.
૧૧.૧૧	સૂચવવામાં આવેલા સુરક્ષાના પગલાંના સમયબદ્ધ રીટેલ અને સંતોષકારક રીટેલ અમલની ખાતરી માટે, ઉપરોક્તમાંથી કોઈપણ શરતોનું પાલન સંતોષકારક રીટેલ થવું નહીં હોય તો મંત્રાલય પર્વાવરણ (રક્ષણ) ધારા, ૧૯૮૬ની જોગવાઈઓ હેઠળ મંજૂરી પરત ખેંચી શકે છે અથવા તો તે સ્થગિત કરી શકે છે.
૧૧.૧૨	મંત્રાલય જરૂરી જણાય તો વધારાની શરતો નિયત કરી શકે છે. કંપની એ શરતોનું પાલન સમયબદ્ધ રીટેલ કરવા બંધાયેલી છે.
૧૧.૧૩	મંત્રાલયની પ્રાદેશિક કચેરી નિયત કરાયેલી શરતોના પાલનની દેખરેખ રાખશે. પ્રોજેક્ટના અધિકારીઓએ પ્રાદેશિક કચેરીના અધિકારી (ઓ) ને જરૂરી ડેટા/માહિતી/મોનીટરીંગ રીપોર્ટ્સ પુરા પાડીને સંપૂર્ણ સહકાર આપવાનો રહેશે.
૧૧.૧૪	ઉપરોક્ત શરતોનો અમલ ઈન્ટેન્ડ-એલીઆ ડોટર (પ્રોવેન્શન એન્ડ કન્ટ્રોલ ઓફ પોલ્યુશન) એક્ટ, ૧૯૮૪, ઈ એર (પ્રોવેન્શન એન્ડ કન્ટ્રોલ ઓફ પોલ્યુશન) એક્ટ, ૧૯૮૬, હેઝાર્ડસ એન્ડ અઇર વેરટ્સ (મેનેજમેન્ટ એન્ડ ટ્રાન્સપોઝિશન મુવમેન્ટ) રૂલ્સ, ૨૦૧૬ તથા પર્યાવરણ લાયસેન્સિંગ ઈન્સ્ટ્રુક્શન એક્ટ, ૧૯૮૧ તથા તેમાં થયેલા સુધારા સહિત તથા ભારતની આદરણીય સુગ્રીમ કોર્ટ હાઈકોર્ટ તથા કોઈપણ અન્ય કોર્ટ ઓફ લો દ્વારા આ વિષય ઉપર જારી કરાયેલા આદેશોની જોગવાઈઓ અનુસાર કરાશે.
૧૧.૧૫	આ ઈસી સામેની કોઈપણ અપીલ જો કોઈ કરાય તો એ નેશનલ ગ્રીન ટ્રિબ્યુનલ સમક્ષ, ઈ નેશનલ ગ્રીન ટ્રિબ્યુનલ એક્ટ, ૨૦૧૦ની કલમ ૧૬ હેઠળ ૩૦ દિવસમાં કરવાની રહેશે.
૧૨. ચોક્કસ શરતો	
૧૨.૧	આ સુનિષ્ઠે મટીરિયલ હેન્ડલિંગમાં ઉત્પાદન પ્રક્રિયા દરમિયાન સંભવિત આગના જોખમ સામે રક્ષણની વ્યવસ્થા કરવાની રહેશે. ફાયર ફાઈટિંગ સીસ્ટમ નિયત ધોરણે મુજબની હોવી જોઈશે.

તારીખ: ૧૩/૦૮/૨૦૨૪

પર્વાવરણીય અને સીઆરઝ મંજૂરી (EC & CRZ Clearance)ની આ નકલ અંગ્રેજીમાં જારી કરાઈ છે અને તેની અસલ કોપી MoEF&CCની વેબસાઈટ ઉપર પ્રાપ્ય છે. તેની અંદર સમાવિષ્ટ આદેશને તે અનુરૂપ છે અને તે ફક્ત માહિતીના હેતુસર જ છે. કોઈ વિસંગતાના કિસ્સામાં, અંગ્રેજીનું અસલ પર્વાવરણીય અને સીઆરઝ મંજૂરી (EC & CRZ Clearance)ની જ માથ રહેશે અને એપીએલેઈટ કોર્ટ સંદેશવતા ઉભી થવા માટે જવાબદાર રહેશે નહીં.

ડૉ. અમરેશ્વર રાવુ,
સભ્ય સચિવ, MoEF&CC (EC)
હાસ ડિપાર્ટમેન્ટ હસ્તાક્ષર કરાયા

Annexure - 29

Bhagwat Swaroop Sharma

From: Bhagwat Swaroop Sharma
Sent: Wednesday, May 29, 2024 5:59 PM
To: ecompliance-guj@gov.in; iro.gandhingr-mefcc@gov.in
Cc: ec-rdw.cpcb@gov.in; ro-gpcb-kute@gujarat.gov.in; ms-gpcb@gujarat.gov.in; mefcc.ia3@gmail.com; monitoring-ec@nic.in; direnv@gujarat.gov.in; Anil Trivedi; Sujalkumar Shah
Subject: Half Yearly EC Compliance Report WFDP Submission for Period of Oct.2023 to March 2024
Attachments: EC and CRZ Compliance Report-WFDP_2009_Oct'23 to Mar'24-part-1.pdf



APSEZL/EnvCell/2024-25/010

Date: 29.05.2024

To
The Inspector General of Forest / Scientist C,
Integrated Regional Office (IRO),
Ministry of Environment, Forest and Climate Change,
Aranya Bhawan, A Wing, Room No. 409,
Near CH 3 Circle, Sector – 10A,
Gandhinagar – 382007.
E-mail: ecompliance-guj@gov.in, iro.gandhingr-mefcc@gov.in

Sub : Half yearly Compliance report for Environment and CRZ Clearance for "Water Front Development Project at Mundra, Dist. Kutch, Gujarat.

Ref : i) Environment and CRZ clearance granted to M/s Adani Ports & SEZ Limited vide letter dated 12th January, 2009 and 19th January, 2009 bearing MoEF letter No. 10-47/2008- IA.III.
ii) Environment and CRZ clearance Extension order granted to Water Front Development Project at Mundra in Kutchh District (Gujarat) vide letter dated 7th October, 2015 bearing MoEF letter No. 10-47/2008- IA.III.
iii) MoEF&CC's Order dated 18.09.2015

Dear Sir,

Please refer to the above cited reference for the said subject matter. In connection to the same, it is to state that copy of the compliance report for the Environmental and CRZ Clearance for the period of October 2023 to March 2024 is being submitted through soft copy (e-mail communication).

Kindly consider above submission and acknowledge.

Thank you,
Yours Faithfully,
For, **M/s Adani Ports and Special Economic Zone Limited**

A handwritten signature in blue ink, appearing to read "Bhagwat Swaroop Sharma".

Bhagwat Swaroop Sharma
Head – Environment
Mundra & Tuna Port

Encl: As above
Copy to:

- 1) The Director (IA Division), Ministry of Environment, Forests & Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003.
- 2) The Zonal Officer, Regional Office, CPCB – Western Region, Parivesh Bhawan, Opp. VMC Ward Office No. 10, Subhanpura, Vadodara – 390023.
- 3) The Member Secretary, GPCB – Head Office, Paryavaran Bhavan, Sector 10 A, Gandhi Nagar – 382010.
- 4) The Director, Forests & Environment Department, Block – 14, 8th floor, Sachivalaya, Gandhi Nagar – 382010.
- 5) The Regional Officer, Regional Office GPCB (Kutch-East), Gandhidham – 370201.

Bhagwat Swaroop Sharma

From: Bhagwat Swaroop Sharma
Sent: Wednesday, May 29, 2024 5:59 PM
To: ecompliance-guj@gov.in; iro.gandhingr-mefcc@gov.in
Cc: ec-rdw.cpcb@gov.in; ro-gpcb-kute@gujarat.gov.in; ms-gpcb@gujarat.gov.in; mefcc.ia3@gmail.com; monitoring-ec@nic.in; direnv@gujarat.gov.in; Anil Trivedi; Sujalkumar Shah
Subject: Half Yearly EC Compliance Report WFDP Submission for Period of Oct.2023 to March 2024
Attachments: EC and CRZ Compliance Report-WFDP_2009_Oct'23 to Mar'24-part-1.pdf



APSEZL/EnvCell/2024-25/010

Date: 29.05.2024

To
The Inspector General of Forest / Scientist C,
Integrated Regional Office (IRO),
Ministry of Environment, Forest and Climate Change,
Aranya Bhawan, A Wing, Room No. 409,
Near CH 3 Circle, Sector – 10A,
Gandhinagar – 382007.
E-mail: ecompliance-guj@gov.in, iro.gandhingr-mefcc@gov.in

Sub : Half yearly Compliance report for Environment and CRZ Clearance for "Water Front Development Project at Mundra, Dist. Kutch, Gujarat.

Ref : i) Environment and CRZ clearance granted to M/s Adani Ports & SEZ Limited vide letter dated 12th January, 2009 and 19th January, 2009 bearing MoEF letter No. 10-47/2008- IA.III.
ii) Environment and CRZ clearance Extension order granted to Water Front Development Project at Mundra in Kutchh District (Gujarat) vide letter dated 7th October, 2015 bearing MoEF letter No. 10-47/2008- IA.III.
iii) MoEF&CC's Order dated 18.09.2015

Dear Sir,

Please refer to the above cited reference for the said subject matter. In connection to the same, it is to state that copy of the compliance report for the Environmental and CRZ Clearance for the period of October 2023 to March 2024 is being submitted through soft copy (e-mail communication).

Kindly consider above submission and acknowledge.

Thank you,
Yours Faithfully,
For, **M/s Adani Ports and Special Economic Zone Limited**

A handwritten signature in blue ink, appearing to read "Bhagwat Swaroop Sharma".

Bhagwat Swaroop Sharma
Head – Environment
Mundra & Tuna Port

Encl: As above
Copy to:

- 1) The Director (IA Division), Ministry of Environment, Forests & Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003.
- 2) The Zonal Officer, Regional Office, CPCB – Western Region, Parivesh Bhawan, Opp. VMC Ward Office No. 10, Subhanpura, Vadodara – 390023.
- 3) The Member Secretary, GPCB – Head Office, Paryavaran Bhavan, Sector 10 A, Gandhi Nagar – 382010.
- 4) The Director, Forests & Environment Department, Block – 14, 8th floor, Sachivalaya, Gandhi Nagar – 382010.
- 5) The Regional Officer, Regional Office GPCB (Kutch-East), Gandhidham – 370201.

Annexure - 30

Ref No. APSEZL/EnvCell/2024-25/052

Date: 02.09.2024

To,
Member Secretary
Gujarat Pollution Control Board
Paryavaran Bhavan,
Sector-10-A, Gandhinagar – 382010

Dear Sir,

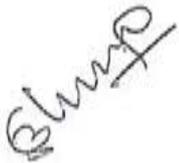
Sub: Environmental Statement for the financial year ending 31st March, 2024 for **M/s Adani Ports and Special Economic Zone Limited.**

Ref: Consent Order No. AWH – 117045, date of issue 14/02/2022, valid up to 20/11/2026.

With reference to the above-mentioned subject and reference, please find enclosed Environmental Statement in Form V prescribed under Rule 14 of the Environment (Protection) Rules 1986, for **M/s Adani Ports and Special Economic Zone Limited, Plot No. 169/P & Unsurveyed / Reclaimed Land near Navinal Isand, Taluka: Mundra, Dist. Kutch - 370421** for the financial year ending 31st March 2024.

Thank you,

Yours faithfully,
For **Adani Ports and Special Economic Zone Limited**



Authorized Signatory

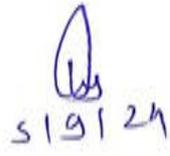
Encl: As above.

Copy to: The Regional Officer, Gujarat Pollution Control Board (East-Kutch), Gandhidham.

Adani Ports and Special Economic Zone Ltd
Adani House,
PO Box No. 1
Mundra, Kutch 370 421
Gujarat, India
CIN: L63090GJ1998PLC034182

Tel +91 2838 25 5000
Fax +91 2838 25 51110
info@adani.com
www.adani.com

Registered Office: Adani Corporate House, Shantigram, Nr. Vaishno Devi Circle, S.G. Highway, Khodiyar, Ahmedabad – 382421, Gujarat, India



Gujarat Pollution Control Board
Head Office
Sector No.-10-A,
Gandhinagar-382010

Ref No. APSEZL/EnvCell/2024-25/055

Date: 02.09.2024

To,

Member Secretary**Gujarat Pollution Control Board**

Paryavaran Bhavan,

Sector-10-A, Gandhinagar-382010

Dear Sir,

Sub: Environmental Statement for the financial year ending 31st March, 2024 for **M/s Adani Ports and Special Economic Zone Limited (WFDP-West Port)**.**Ref:** 1. Consent Order No. AWH – 113458 issue dated 28.06.2021 Valid till 01.02.2027.

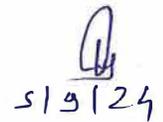
With reference to the above-mentioned subject and reference, please find enclosed Environmental Statement in Form V prescribed under Rule 14 of the Environment (Protection) Rules 1986, for **M/s Adani Ports and Special Economic Zone Limited (WFDP-West Port), Village: Tunda, Taluka: Mundra, Dist. Kutch - 370421** for the financial year ending 31st March 2024.

Thank you,

Yours faithfully,

For **Adani Ports and Special Economic Zone Limited**

Authorized Signatory


Gujarat Pollution Control Board
Head Office
Sector No.-10-A,
Gandhinagar-382010

Encl: As above.

Copy to: The Regional Officer, Gujarat Pollution Control Board, Gandhidham

Ref No. APSEZL/EnvCell/2024-25/053

Date: 02.09.2024

To,
Member Secretary
Gujarat Pollution Control Board
Paryavaran Bhavan,
Sector-10-A, Gandhinagar – 382010

Dear Sir,

Sub: Environmental Statement for the financial year ending 31st March, 2024 for **M/s Mundra LPG Terminal Pvt. Ltd. (MLTPL)**.

Ref: Consent Order AWH – 134895 issue dated 12.06.2024 Valid till 27.06.2029 (PCB ID: - 53331)

With reference to the above mentioned subject and reference, please find enclosed Environmental Statement in Form V prescribed under Rule 14 of the Environment (Protection) Rules 1986, for **M/s Mundra LPG Terminal Pvt. Ltd. (MLTPL), Plot No. 169/P, Navinal Island, Mundra, Tal. Mundra, Dist. Kutch – 370421** for the financial year ending 31st March 2024.

Thank you,

Yours faithfully,
For **Mundra LPG Terminal Pvt. Ltd. (MLTPL)**



Authorized Signatory

Encl: As above.

Copy to: **The Regional Officer, Gujarat Pollution Control Board (East-Kutch), Gandhidham.**

5/9/24
Gujarat Pollution Control Board
Head Office
Sector No.-10-A,
Gandhinagar-382010

Mundra LPG Terminal Pvt Ltd
Adani House,
PO Box No. 1
Mundra, Kutch 370 421
Gujarat, India
CIN: U40106GJ2015PTC084303

Tel +91 2838 25 5000
Fax +91 2838 25 51110
info@adani.com
www.adani.com

Registered Office: "Adani Corporate House", Shantigram, Near Vaishno Devi Circle, S. G. Highway, Khodiyar, Ahmedabad 382421, Gujarat.

Annexure – 31

APSEZ FIRE SERVICES

PREPARED BY: Dr. RAKESH CHATURVEDI
AGM, APSEZ/FIRE SERVICES,
MUNDRA, KUTCH ,GUJARAT

MOBILE FIRE FIGHTING SYSTEM AT PORT:



- (1). Foam Tender - 01:**
- Water Tank capacity - 6000 liters
 - Foam Tank capacity - 3000 liters
 - Pump discharge - 4000 LPM
 - Aluminized Suit - 01 no.
 - 35' ft Aluminum Extension Ladder - 01 no.
 - Delivery Hose - 15 no.
 - Other fire fighting equipment's kept inside the tender



- (2).Foam Tender - 02 :**
- Water Tank capacity - 5000 liters
 - Foam Tank capacity - 1000 liters
 - Pump discharge - 4000 liters
 - Aluminized Suit - 01 no.
 - 35' ft Aluminum Extension Ladder - 01 no.
 - Delivery Hose - 15 no.
 - Other fire fighting related equipments



- (3). Foam Tender - 03**
- Water Tank capacity - 9000 liters Foam Compound
 - Foam Compound - 3000liters
 - Pump discharge - 4000 LPM
 - seven layer Aluminized Suit - 01 no.
 - Delivery Hose - 17 no.
 - 35' ft Aluminum Extension Ladder - 01 no.
 - Other fire fighting equipments kept inside the tender

MOBILE FIRE FIGHTING SYSTEM



(4). Multi Purpose Fire Tender:

- Water Tank capacity - 8000 liters
- Foam Tank capacity - 000 liters
- Pump discharge - 4000 LPM
- Aluminized Suit - 01 no.
- 35' ft Aluminum Extension Ladder - 01 no.
- Delivery Hose - 14 no.
- Other fire fighting equipment's kept inside the tender



(5). Aviation Mini Fire Tender:

- Water Tank capacity - 1000 liters
- Dry Chemical Powder capacity - 500Kg
- Pump discharge -
- Foam Compound - 20 liters X 2 no. (AR AFFF)
- Aluminized Suit - 01 no.
- 22' ft Aluminum Extension Ladder - 01 no.
- Delivery Hose - 04 no.
- Other fire fighting related equipments

MOBILE FIRE FIGHTING SYSTEM



(6). Water Tender :02 WEST Basin

- Water Tank capacity - 6000 liters
- Pump discharge - 2200 LPM
- Foam Compound - 20 liters X 5 no. (AG AFFF)
- Aluminized Suit - 01 no.
- Delivery Hose - 15 no.
- 35' ft Aluminum Extension Ladder - 01 no.
- Other fire fighting equipments kept inside the tender



(7). Total 06 Nos Water Bousers : No - 1,2,7,9,10&12

- Water Tank capacity - 17 KL EACH
 - Pump discharge - 2250 LPM
- Water Bouser no-1 & 12 are without water monitors



(8). Trailer Pump : No - 03 nos

- Pump discharge - 1800 LPM

Fire Pump House Detail

Location of Fire Pump house	Electric Operated Jockey Pump		Diesel Operated Jockey Pump		Electric Operated Pump		Diesel Operated Pump		Water Storage (M3)
	Quantity	Capacity (M3/Hr)	Quantity	Capacity (M3/Hr)	Quantity	Capacity (M3/Hr)	Quantity	Capacity (M3/Hr)	
Terminal-1/MLTPL (Sweet Water)	1	225	1	225	0	NA	3	1050	10386
Terminal-1 /MLTPL (Sea Water)	0	NA	0	NA	0	NA	6	1050	Sea Water
Terminal-1 /MLTPL (Foam Pump House)	0	NA	0	NA	1	30	1	30	24 (Foam Storage)
Terminal-2	1	30	0	NA	0	NA	2	273	Sea Water
CT-2	1	25	0	NA	1	273	1	273	Sea Water
Dry Cargo Area	1	20	0	NA	2	273	1	273	1300
Liquid Terminal-01	1	90	0	NA	0	NA	3	795	6108
Liquid Terminal-02	1	40	0	NA	4	616	2	616	11000
CT-4	2	10.8	0	NA	1	273	1	273	550
CT-03	2	10.8	0	NA	1	273	1	273	828
Adani House	1	10	0	NA	1	136	1	136	550
Adani Hospital	1	10.8	0	NA	1	97	1	82	100
Airport	0	NA	0	NA	1	100	0	NA	25
Exim Yard	0	NA	0	NA	1	100	0	NA	5
West Port PH-1	1	10.8	1	NA	1	273	2	273	1100
West Port PH-2	1	30	2	NA	1	273	2	273	1100

Details of portable and fixed firefighting & personnel protective & rescue equipment

SL NO	LIST OF EQUIPMENT	MAIN PORT	WEST BASIN	MLTPL
1	Fire extinguisher	2590	632	274
2	Single headed hydrants/Double headed hydrants	547	278	0/96
3	Foam Mobile Unit/ Mobile foam monitor/ Ground Monitors	28/5/4	11/0/2	0/0/10
4	Fixed water Monitors/Fixed Foam Monitor	20/83	213/0	21/18
5	Wet /Dry risers system	20/23	29/9	4/ 0
6	Hose boxes	251	83	139
7	Hose reel hose/ Hose station	63/12	81/57	11 / 0
8	Breathing apparatus/ Spares cylinders	28/25	3/3	4/2
9	Seven-layer aluminium suit/ Three-layer Nomex suits	5/23	1/3	2/ 6
10	MX Foam Generator/ HX Foam Generator	10/04	0/0	0/0
11	Hydraulic spreader & cutters/ Power Cutter	2/2	1/1	0/0
12	Portable Oxygen Meter/ Portable H2S & CH4 Meter/ Portable Ammonia gas monitor/ CO meter	3/3/3	4/0/0/6	0/1/0
13	Cryogenic suits/ Chemical Suit	3/6	0/0	2 /3
14	Thermal Imaging Camera & Pneumatic Airlifting Bag	3/6	1 /0	0
15	10Ltr CAPS/ 50Ltr CAPS/ Tripod Ladder	3/2	0/0	0/0
16	Vertical Stretcher / Battery operated Control rate Ascender Descender	1/1	1/0	0/0
17	Horizontal Basket Stretcher/ Spine Board	1/2	1/1	1/2
18	Battery operated Grinding Machine	2	1	0

Master list of Portable Fire Fighting Equipment

Sr.No	Location	DCP, 5/6 KG	DCP, 10 KG	DCP 25 KG	DCP, 50/75 KG	DCP,9 KG	ABC, 1 KG	ABC, 2 KG	ABC, 5 /6KG	ABC, 9/10 KG	M.FOAM M,50 LTR	M.FOAM, 09 LTR	W,CO2, 09 LTR	CO2, 2/3 KG	CO2, 4.5 KG	CO2, 6.5 KG	CO2,9 KG	CO2, 22.5 KG	CAFS 10 Ltr	CAF S 50 Ltr	Total
1	coly yard	0	0	0	0	0	4	19	0	0	0	0	0	3	4	0	0	0	0	0	30
2	SHANTIVAN	37	0	0	2	6	9	35	49	0	0	0	0	4	17	0	0	0	0	0	159
3	F/STN	0	0	4	38	10	29	103	285	53	1	12	1	130	209	9	1	6	0	0	891
4	CT 2	1	0	1	1	0	7	38	14	0	0	0	0	57	53	0	0	0	0	0	172
5	DRY CARGO	32	0	1	29	30	3	38	104	27	1	0	0	12	59	1	1	0	0	0	338
6	LT	34	0	1	15	6	0	2	114	14	5	0	0	1	50	8	3	0	0	0	253
7	A/HOUES	5	0	0	1	2	23	3	7	2	0	0	0	1	36	0	7	0	0	0	87
8	AGRIY PARK	1	0	0	0	0	0	2	18	1	0	0	0	3	22	0	0	0	0	0	47
9	AIRPORT	0	0	0	6	0	0	0	4	1	1	0	0	5	11	0	5	6	0	0	39
10	CT 3	9	0	0	0	12	0	41	101	4	0	0	0	182	98	1	0	0	0	0	448
11	TERMINAL-02	2	0	0	1	1	11	16	22	4	0	0	0	1	21	0	0	0	0	1	80
12	RAILWAY/STN	12	0	0	0	2	3	3	47	1	1	1	0	1	33	0	0	0	0	0	104
13	TWONSHIP	71	0	0	0	1	1	56	69	0	0	0	0	3	7	1	0	0	0	1	210
14	EXIMYARD	2	0	0	0	5	0	4	7	3	0	0	0	0	15	0	0	0	0	0	36
15	PMC AREA	5	9		0	2	0	2	4	1	4	4	2	2	12	0	0	0	0	0	47
16	SECURITY TRANING SCHOOL	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	4
17	PUB- CUSTOM	1	1		0	0	1	10	19	0	0	0	0	0	23	2	2		0	0	59
18	CENTAR KICHEN	6	0	0	0	0	0		1	0	0	0	0	0	4	0	0	0	0	0	11
19	A/OUTSIDE	0	0	0	0	0	0	7	15	2		1		2	7	0	0	0	0	0	34
20	VIDHYA MANDIR	0	0	0	0	0	0	3	7	2	0	0	0	0	5	0	0	0	0	0	17
21	GUEST HOUSE	1	0	0	0	0	0	3	0	0	0	0	0	0	4	0	0	0	0	0	8
22	T2 CT RTG	0	0	0	0	1	1	1	49	8	0	0	0	26	17	0	0	0	0	0	103
23	CT4	0	0	0	4	0	2	17	80	4	0	0	0	0	129	62	0	0	0	0	298
24	Adani Hospital	13	0	0	1	1	0	4	4	0	0	2	0	0	0	13	0	0	0	0	38
	Total	232	10	7	98	79	94	408	1021	127	13	20	3	433	837	98	19	12	0	2	3513

GAS TIGHT SUIT

MANUFACTURER: DU-PONT

TYPE: GAS TIGHT SUIT

STYLE CODE: TYFB SERIES

PART NUMBER: A00097A

NOS. OF LAYER: SEVEN LAYER

WEIGHT & FABRIC: LIGHT WEIGHT NON-WOVEN FABRIC

COLOUR: HIGH VISIBILITY LIME GREEN COLOR

VISOR: MULTI LAMINATED ANTI MIST VISOR

GLOVES: REPLACEABLE GLOVES THROUGH RESPIREX

CUFF LOCKING SYSTEM

SAFETY SHOES: DETACHABLE HAZMAX FPA SAFETY

BOOTS TESTED FOR RESISTANCE TO OVER 300 CHEMICALS

TEMPERATURE RANGE: (70 DEGREE CENTIGRADE TO

-90 DEGREE CENTIGRADE)

CERTIFICATIONS: EN-943-2:2002 (ET)

APPLICATIONS: FOR WORKING IN CONDITION WHERE LEVEL A/TYPE 1 PROTECTION IS REQUIRED

PROTECT AGAINST 300 TYPES OF CHEMICALS WHICH ARE IN LIQUID AND GASEOUS FORMS.



DISTRESS SIGNAL UNIT

- The FireFly II has a robust and watertight housing which can be attached to the waist belt or shoulder strap and is activated with a slide switch.
- The instrument has three LEDs which light up alternatively and indicate proper functioning.
- The FireFly II S differs from the FireFly II by a key that is pulled out to activate the instrument. Both devices have a highly sensible motion alarm. In case the user does not move for 20 seconds, a prealarm sounds for 7 seconds. In order to prevent a false alarm, the user only needs to move his body. If he does not move, the full alarm sounds after 7 seconds.
- This full alarm has a level of 95 dB [measured at a distance of 3 m!] and will sound for approx. 5 hours with a fully charged battery.
- On both instruments the full alarm can also be turned on manually with the slide switch. A discharged battery is indicated by a short beep signal that is repeated every 5 seconds.



CUT OFF SAW

- Cut Off Saw is useful to cut metal, shutter, roof, sheet, bar and similar metal sections as also concrete/RCC and other building material during force-entry in rescue operations.



Parameters	Sharpex (EHS 350)
Displacement (cc)	64.1
Wheel Diameter	300 / 350
Fuel Capacity (lit.)	0.74
Cutting Capacity	125 mm
Weight (kg)	10.2

PNEUMATIC LIFTING BAG

- **Advantages :**

Simple & quick to use with compressed air.

Maintenance free due to they have no sliding parts.

Light & easy to handle compared with other jacking equipment.

Can be use in the smallest of spaces because the bags are very thin.

- **Brand :** Holmetro
- **Model :** LAB 4 UN
- **Type :** Low Pressure
- **Sizes :** Small
- **Lifting capacity :** 39.2 / 4 kN / t.
- **Dimensions :** 700X700 mm.
- **Height Inflated :** 620 mm.
- **Max. WP :** 0.5 bar



- **Model Info. :** Each set consist of 1 X Storage bag, 2 X Lifting bag of equal capacity, 1 X Pressure reducer, 2 X Low pressure hose, 1 X Twin control unit with safety valves, 1 X Repair set.

TRIPOD RESCUE TOOL

- It can be use to access in confined spaces with two mounted pulleys at the head of the Tripod in the prolongation of the main leg for passing a cable having two auxiliary eye bolts as attachment points.
- Aluminum alloy cast head, legs in aluminium.
- Steel support-shoes provided with rubber sole to increase friction and impart more stability.
- Strength of anchorage point greater than 10 kN.



SMOKE EJECTOR

- **Body Structure**

Made of especially anti corrosive coated steel structure with aluminum impeller dully coated.

- **Engine**

7.5 HP petrol engine.

- **Impeller**

Cast aluminum alloy impeller.

- **Suction Capacity**

3000 cu. Ft./min.

- **Hose**

Anticorrosive with nylon PVC reinforced of 10 meter. at suction port and delivery port.

COMBI TOOL

- Cutting force 247 / 25.2 kN / t
- Cutting opening 191 mm
- Weight, ready for use 10.8 kg spreading 268 mm
- Max. spreading force 200 / 20.4 kN / t
- Min. spreading force arms closed (25mm from tips) 26.0 / 2.7 kN / t
- Squeezing force 46 / 4.7 kN / t
- Pulling range 181 mm
- Pulling force 61.2 / 6.2 kN / t
- Round bar 24 mm
- Max. working pressure 720 / 72 bar / MPa
- Temperature range -20° +55° °C
- EN 13204 BK26/268-E-10.8



SPREADER

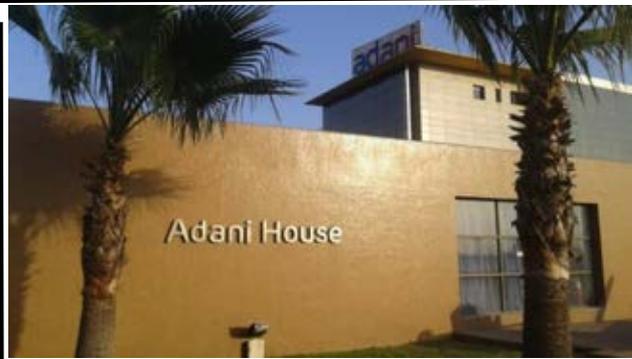


- Model : CT 4150 C
- Max. cutting force : 380 / 38.8 kN / t
- Max. spreading : 360 mm
- Max. spreading force : 211 / 21.5 kN / t
- Weight, ready for use : 14.2 kg
- Equipped with : CORE™
- Cutting opening : 229 mm
- Max. squeezing force : 76 / 7.8 kN / t
- Max. pulling distance : 416 mm
- Max. pulling force : 51 / 5.2 kN / t
- Round bar (acc. to EN 13204) : 32 mm
- Max. working pressure : 720 / 72 bar / MPa
- Temperature range : -20° +55° °C

HYDRAULIC POWER PACK



Fire safety equipment installed in all high rise building at Adaniport



Adani House



1. Fire detection & alarm system panel



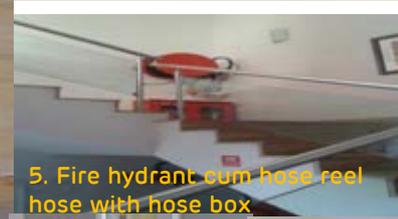
2. Multi smoke detector



3. Manual call point



6. Yard fire hydrants with hose boxes



5. Fire hydrant cum hose reel hose with hose box



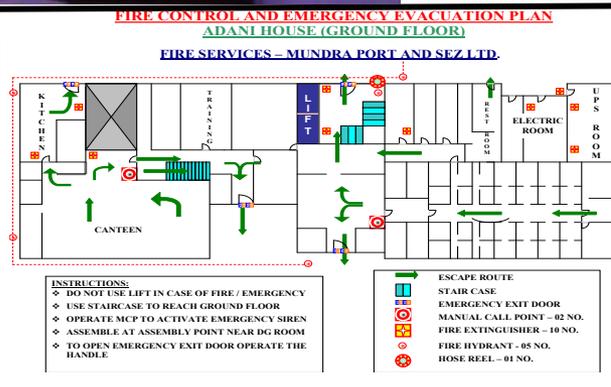
4. Fire extinguisher



7. fixed fire suppression NFS 125 for It server protection



8. Access control system along with public announcement system



Fabrication of Fire test Tray as per Indian Standard 15683 and testing of Fire Extinguishing medium.



WE SERVE TO SAVE

Thank You

APSEZ - FIRE SERVICES