Ref:GPL/ENV/ 2023-24/ 29

Oct. 6, 2023

To,

The Director
Ministry of Environment, Forest & Climate Change
INDIRA PARYAVARAN
JOR BAGH ROAD,
NEW DELHI – 110 003.

Subject : Development of Gopalpur Ports Ltd." : Env. Compliance.

Ref. : No.10-12/2009-IA.III dt. 30th Mar, 2011, 14th Aug.2018

Dear Sir,

With reference to the above, we are submitting herewith our compliance of the conditions as laid down in different permissions and clearances. The Compliance report till end of Sept. 2023 is being enclosed for your kind consideration.

Yours faithfully,

For Gopalpur Ports Limited,

Authorized signatory

V. Janardhana Rao
Chief Executive Officer
Gopalpur Ports Limited

Copy to:

1. Additional Chief Secretary, Department of Forest & Wildlife, Govt. of Odisha, Secretariat, ,hubaneswar – 751 001.
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD-Cum-Office Complex, East Arjun Nagar, Delhi – 110 032.
3. Addl. Principal Chief Conservator of Forests (Central), Ministry of Environment, Forest and Climate Change, Regional Office (EZ), A/3, Chandersekharpur, Bhubaneswar – 751 023.
4. The Member Secretary,Odisha State Pollution Control Board, Paribesh Bhavan, A/118, Nilakantha Nagar, Unit – VIII, Bhubaneswar - 751 012.Regional Officer, Odisha State Pollution Control Board Bharampur, Ganjam

Gopalpur Ports Limited
NSPC & ISPS Compliment
Regd Office : Arjeepalli, Via - Chhatrapur - 761045, Ganjam, Odisha
(T) 06811-257200 / 257300 / 257899 / 257799 | (F) 06811-257599 | www.gopalpurports.in
CIN : U63032OR2006PLC008831 | ISO CERTIFICATIONS : ISO 900:2015 | ISO 14001:2015 | ISO 45001:2018

Compliance Report for Environmental Clearance No.10-12/2009-IA-III Dated 30th March 2011

Sl. No.	Conditions	Compliance Status
6.		
(i)	"Consent for Establishment" shall be obtained from State Pollution Control Board under Air and Water Act and a copy shall be submitted to the Ministry before start of any construction work at the site.	Complied
(ii)	No construction work other than those permitted in Coastal Regulation Zone Notification, 2011 shall be carried out in Coastal Regulation Zone area.	Being complied with.
(iii)	The shore line map prepared by Institute for Ocean Management, Chennai with regard to the stretch at Gopalpur Port has been examined and it is observed that on the southern side of the port, the area is shown as high to medium accretion while, on the northern side the area is shown as low to medium erosion. This is because the net littoral drift is towards the northern side and due to the break water at the southern port there seems to be accretion at the southern breakwater and low to medium erosion on the northern side. This has to be ratified by adopting suitable sand bypass system from south break water to the northern side of the north break water.	Beach nourishment undertaken for 4 MCM in the groin field to address the erosional aspect Environmental monitoring report (From April 2023 to Sept. 2023) attached.
(iv)	Controlled and proper methods of dredging including state of the art equipment and planning the dredging operation and disposal shall be employed.	Dredging carried out by use of controlled cutter suction. Other mitigation measures implemented to curtail the turbidity.

(v)	Technically qualified institution shall be engaged to monitor the impact right from the beginning to suggest scientifically accepted mitigation measures as and when required on annual basis at least for first 3 years, shall be obtained.	Department of Marine Sciences, Berhampur University engaged to carry out the environmental monitoring project work of Gopalpur port.
(vi)	A high level expert committee shall be constituted including the experts for Monitoring the population of benthic life during and after the construction phase and also to ensure the compliance of other conditions stipulated in the clearance.	High level expert committee has been constituted and periodically reviews the compliance conditions stipulated in the clearance.
(vii)	An additional substratum shall be provided with the breakwaters, thereby adding to the habitat of benthic community especially flora which is very low due to the present geo physical characteristics of the area.	Additional substratum provided during construction of break water and from the studies being carried out by department of Marine Science dept., Berhampur University there is increase in habitat of benthic community.
(viii)	Oil spills if any shall be properly collected and disposed as per the Rules.	Oil Spill Contingency Plan (OSCP) is in place.
(ix)	There shall be no drawl of ground water in CRZ area.	Complied with.
(x)	Environment Management Plan as suggested shall be strictly complied with.	Complied with.
(xi)	There shall be no disposal of solid and liquid wastes into the Coastal areas.	Being complied with and taken care off.
(xii)	Sewage Treatment facility should be provided in accordance with the CRZ notification, 2011. Treated sewage shall be reused for flushing of toilets and horticulture purposes.	Sewage Treatment facility provided and the treated sewage water used for plantation.
(xiii)	The solid waste shall be properly collected, segregated, and disposed as per the provision of solid Waste (Management and Handling) Rules, 2000.	Waste management Plan is in place.

(xiv)	Installation and operation of DG set if any shall comply with the guidelines of CPCB.	CPCB approved DG sets are installed.
(xv)	The approach channel shall be properly demarcated with lighted buoys for safe navigation and adequate traffic control guidelines shall be framed. The fishermen shall be suitably educated and informed about the traffic guidelines.	Channel Marker Buoys have been installed for safe navigation. Fishermen Sensitization is being done regularly for harmony with port operation.
(xvi)	The project proponent shall set up separate environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.	Environment Management Cell has been created Headed by DGM Environment
(xvii)	The project proponent shall take up mangrove plantation/green belt in the project area, wherever possible. Adequate budget shall be provided in the Environment Management Plan for such mangrove development.	Green Belt development work is in progress following land shaping and plantation work.
(xviii)	The funds earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes.	Adequate fund is ear-marked and available.a
(xix)	Under the provisions of Environment (Protection) Act, 1986, legal action shall be initiated against the project proponent if it was found that the construction of the project has been started without obtaining environmental clearance.	Construction of the project commenced after obtaining the Environmental Clearance. Date of project commencement is 10th Nov. 2011.
7.		
(I)	Adequate provision for infrastructure facilities including water supply, fuel and sanitation must be ensured for construction workers during the construction phase of the project to avoid any damage to the environment.	Being complied with.
(ii)	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	Being complied with.

(iii)	Borrow sites for each quarry sites for road construction material and dump sites must be identified keeping in view the following: a) No excavation or dumping on private property is carried out without written consent of the owner. b) No excavation or dumping shall be allowed on wetlands, forest areas or other ecologically valuable or sensitive locations. c) Excavation work shall be done in close consultation with the soil Conservation and Watershed Development Agencies working in the area, and d) Construction spoils including bituminous material and other hazardous materials must not be allowed to contaminate water courses and the dump sites for such materials must be secured so that they shall not leach into the ground water.	Being complied with.
(iv)	The construction material shall be obtained only from approved quarries. In case new quarries are to be opened, specific approvals from the competent authority shall be obtained in this regard.	Being complied with.
(v)	Adequate precautions shall be taken during transportation of the construction material so that it does not affect the environment adversely.	Being complied with.
(vi)	Full support shall be extended to the officers of this Ministry/Regional Office at Bhubaneswar by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.	GPL is committed to provide necessary support.

(vii)	A Six-monthly monitoring report shall need to be submitted by the project proponents to the Regional Office of this Ministry at Bhubaneswar regarding the implementation of the stipulated conditions.	Being complied with.
(viii)	Ministry of Environment and Forests or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary in the interest of environment and the same shall be complied with.	GPL is committed to comply with such condition, if any.
(ix)	The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry.	Taken note of.
(x)	In the event of a change in project profile or change in the implementation agency, a fresh reference shall be made to the Ministry of Environment and Forests.	Will be complied, if any.
(xi)	The project proponents shall inform the Regional Office 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.	Complied The Land development work commenced on 10th November 2011 after approval of the project.
(xii)	A copy of the clearance letter shall be marked to concern Panchayat / local NGO, if any, from whom any suggestion / representation have been made, received while processing the proposal.	Noted and complied.
(xiii)	Orissa Pollution control Board shall display a copy of the clearance letter at the Regional Office, District Industries Centre and Collector's Office/Tahasildar's office for 30 days.	Noted
8.	These stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act 1974, the Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act, 1986, the	Noted

	Public Liability (Insurance) Act, 1991 and EIA Notification 1994, including the amendments and rules made thereafter.	
9.	All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.	Agreed
10.	The project proponent shall advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental Clearance and copies of clearance are available with the State Pollution Control Board and may also be seen on the website of the Ministry of Environment and forests at http://www.envfor.nic.in. The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional Office of this Ministry at Bhubaneswar.	Complied, Vide letter No. GPL/2011/59, dated 11/04/2011
11.	Environmental clearance is subject to final order of the Hon'ble Supreme court of India in the matter of Goa Foundation vs. Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this Project.	Agreed
12.	Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.	Complied

13.	The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitoring data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB.	Complied
14.	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF& CC by e-mail.	Complied
Additional Conditions of the EC Validity Extension Order dated 14th August 2018		
1.	The Project Proponent will submit a Certified Compliance Report within 03 months issued by the MoEF& CC, Regional Office or concerned Regional Office of the Central Pollution Control Board or the Member Secretary of the respective State Pollution Control Board for the conditions stipulated in the Environmental and CRZ Clearance issued earlier	Being Complied
2.	The development plan shall be implemented strictly in accordance to the Coastal Zone Management Plan as drawn up in compliance to the orders of the NGT in this regards. A copy of the compliance report shall be submitted within 30 days to the MoEF& CC.	Being Complied
3.	As per the Ministry's Office Memorandum F.No22-65/2017-Ia.III dated 1st May 2018, the	As per the Para 6 (IX) of the said notification which states

	project proponent is required to prepare and implement Corporate Environment Responsibility (CER) Plan. As per the para 6(II) of the said O.M appropriate funds shall be earmarked for the activities such as infrastructure creation for drinking water supply, sanitation, health, education, skill development, roads, cross drains, electrification including solar power, solid waste management facilities, scientific support and awareness to local farmers to increase yield of crop and fodder, rain water harvesting, soil moisture conservation works, avenue plantation, plantation in community areas etc. The activities proposed under CER shall be restricted to the affected area around the project. The entire activities proposed under the CER shall be treated as project and shall be monitored. The monitoring report shall be submitted to the regional office as a part of half yearly compliance report, and to the District Collector. It should be posted on the website of the Project Proponent.	that *the CER is not applicable in name change, transfer, amendment involving no additional project investment*; this is not applicable to us, as there is no additional project investment.

REPORT

ON AMBIENT AIR QUALITY &

SHORELINE MONITORING OF GOPALPUR PORT

(Consultancy Project)

April, 2023

Prepared by

Dr. Pratap Kumar Mohanty,
Nodal Expert, GPL Env. Monitoring Project
& **Professor,** Department of Marine Sciences
Berhampur University
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Team:
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Submitted to

Gopalpur Ports Limited
Arjeepalli, Via- Chhatrapur
PIN-761020
Ganjam, Odisha, India

GOPALPUR PORT
New Era in Maritime Logistics

Monitoring of Terrestrial Environment

Ambient air quality (PM_{10}, $PM_{2.5}$, SO_2 & NO_2) and noise level were monitored around Gopalpur Port premises at four points, two in the windward and two in the leeward sides. The monitoring programme has been conducted twice in a week at following locations for the month of April, 2023. The observations were carried out for 24 hrs (11.00 am to next day 11.00 am). The coordinates of the four stations of air quality monitoring are; A (19^0 17' 18.69''N, 84^0 56'41.82''E) near southern breakwater, B (19^0 17' 48.1''N, 84^0 57' 03.3''E) near intermediate breakwater, C (19^0 18' 29.0''N, 84^0 57' 41.1''E) near signal station/Environmental Laboratory and D (19^0 18' 50.09''N, 84^0 58'09.12''E) near the entrance gate of Gopalpur port. The details of the monitoring stations are shown on Figure-1. Table-1 below depicts the values of air quality parameters and the noise level for the month of April, 2023 monitored at the four points within the port premises following the national ambient air quality standards (NAAQS, 2009) stipulated by Central Pollution Control Board (CPCB) and Environment (protection) Act, 1986.

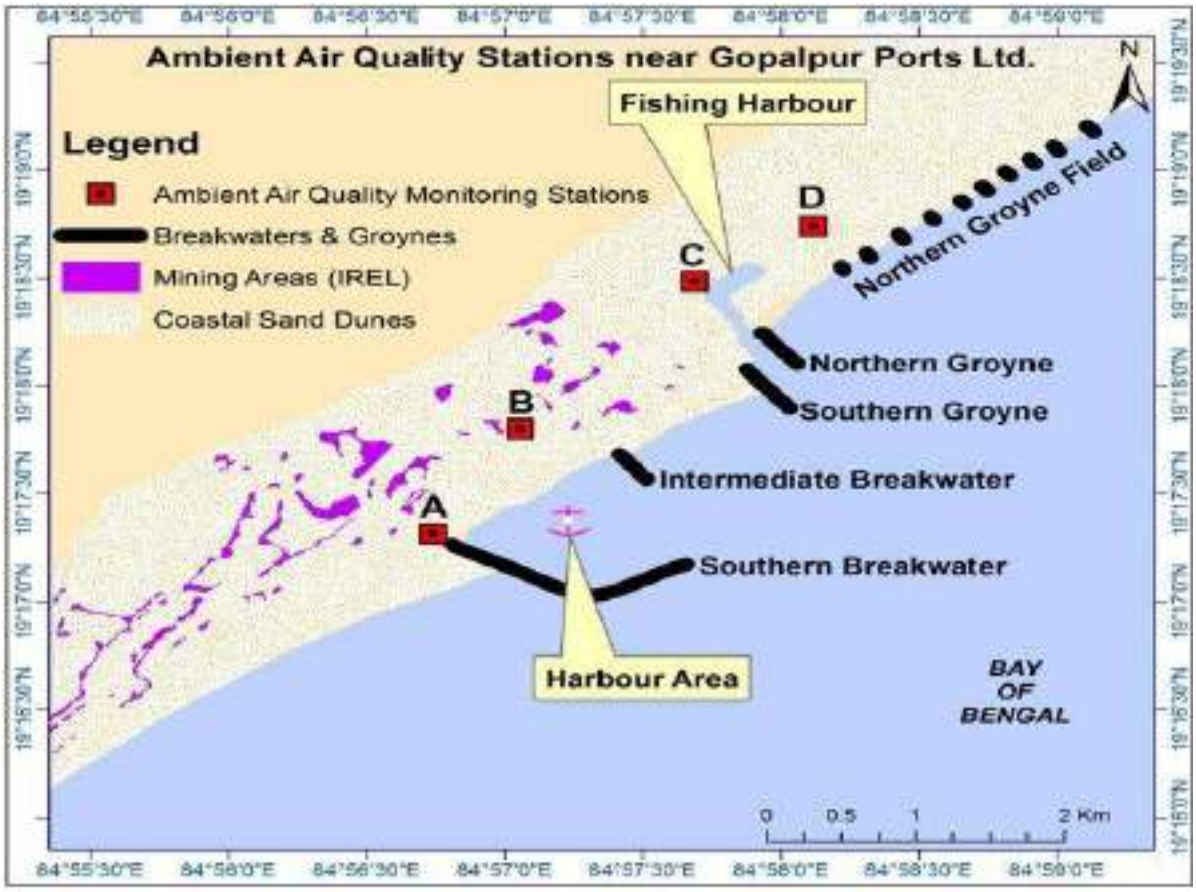

Figure 1: Air quality monitoring stations near Gopalpur port area

Table 1: Ambient Air Quality and Noise level within Gopalpur Port during April, 2023 (PM-Particulate matter, SO_2-Sulphur Dioxide, NO_2-Nitrogen Dioxide, dB-decibel)

STN	Date	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	SO_2 (µg/m^3)	NO_2 (µg/m^3)	Noise level (dB)
A	03.04.2023	68.34	28.61	2.07	2.37	48.37
	04.04.2023	70.42	32.49	2.64	2.43	54.29
	10.04.2023	75.94	29.33	0.318	2.94	56.37
	11.04.2023	80.18	39.27	3.42	3.07	61.22
	17.04.2023	82.67	40.64	2.92	1.83	57.43
	18.04.2023	74.92	34.27	2.84	2.08	60.92
	24.04.2023	85.18	42.67	3.07	2.94	52.99
	25.04.2023	83.75	37.28	2.43	1.67	62.17
	Mean	**77.68**	**35.57**	**2.46**	**2.42**	**56.72**
	Range	68.34-85.18	28.61-42.67	0.318-3.42	1.67-3.07	48.37-62.17
B	03.04.2023	84.38	37.19	2.07	2.07	53.46
	04.04.2023	80.18	35.22	2.61	1.86	57.91
	10.04.2023	88.19	38.28	2.94	1.67	62.75
	11.04.2023	76.27	36.27	3.18	2.94	58.49
	17.04.2023	86.17	41.33	3.75	2.64	53.77
	18.04.2023	89.55	38.27	2.82	3.17	48.67
	24.04.2023	80.67	35.22	2.64	4.29	50.16
	25.04.2023	82.19	40.61	3.27	3.76	57.33
	Mean	**83.45**	**37.80**	**2.91**	**2.80**	**55.32**
	Range	76.27-89.55	35.22-41.33	2.07-3.75	1.67-4.29	48.67-62.75
C	06.04.2023	88.43	41.95	3.27	2.99	62.85
	07.04.2023	91.08	43.77	3.46	2.76	66.19
	12.04.2023	85.38	32.46	2.39	3.18	57.61
	13.04.2023	81.67	28.64	3.44	4.08	59.17
	20.04.2023	86.72	30.76	2.83	3.86	67.22
	21.04.2023	92.18	43.18	2.73	2.73	63.48
	27.04.2023	89.43	35.86	2.99	2.91	52.18
	28.04.2023	93.72	44.99	3.46	3.43	50.82
	Mean	**88.58**	**37.70**	**3.07**	**3.24**	**59.94**
	Range	81.67-93.72	28.64-44.99	2.39-3.46	2.73-4.08	50.82-67.22
D	06.04.2023	79.38	27.61	1.61	2.62	57.22
	07.04.2023	85.61	30.18	1.83	3.48	62.39
	12.04.2023	88.18	33.49	2.43	3.94	54.19
	13.04.2023	84.39	28.61	2.67	2.67	58.66
	20.04.2023	90.43	42.38	2.81	2.43	60.46
	21.04.2023	82.17	36.72	2.57	3.18	48.37
	27.04.2023	76.27	39.44	3.11	2.98	54.33
	28.04.2023	72.91	31.08	1.92	3.27	59.27
	Mean	**82.42**	**33.69**	**2.37**	**3.07**	**56.86**
	Range	72.91-90.43	27.61-42.38	1.61-3.11	2.43-3.94	48.37-62.39
Reference value (NAAQS, 2009)		**100**	**60**	**80**	**80**	**70-75 (Env. P. Act, 1986)**

The ambient air quality parameters (PM_{10}, $PM_{2.5}$, SO_2, and NO_2) monitored during April, 2023 at all the points within the port premises are well within the NAAQS threshold value stipulated by CPCB. Further, noise levels monitored during April, 2023 are also well within the permissible limits of Environment Protection Act, 1986 for industrial zones.

Authorized Signatory
(Dr. P. K. Mohanty)
Nodal Expert, GPL Env. Monitoring Project &
Professor, Department of Marine Sciences,
Berhampur University, Berhampur-760007

Physical Oceanography and Meteorology Laboratory (POML)
Department of Marine Sciences
Berhampur University
Accredited by NAAC

Test Certificate

Submitted to	Gopalpur Port Ltd., Arjeepalli, Ganjam-761020
Reference/Approval No	GPL/WO/22-23/20 dated 28th April, 2022
Sample Description	Shoreline Monitoring (Beach width & volume)
Sampling and Analysis period	Monthly (April, 2023)
Sample Location	Observation made at 25 transects for Gopalpur beach (7), port north (10) and south (8) beach covering a stretch of 13 km and maintaining a distance of 500 m between two successive transect
Methods and Instrument Used	Observation made with Trimble Total station and data were processed with Arc-View GIS following coastal protection manual (CERC, 2006)

Observation Report

Beach Width (m) and Beach Volume (m^3/m) of Gopalpur tourist beach (GPB), Port south beach (GPLS) and Port north beach (GPLN) during April, 2023.

	GPB_1	GPB_2		GPB_3	GPB_4		GPB_5	GPB_6		GPB_7
Width	44.8	44.9		105.6	114.0		136.7	194.5		196.3
Volume	82.9	92.8		215.5	101.0		306.6	871.9		505.4
	GPLS_1	GPLS_2		GPLS_3	GPLS_6		GPLS_7	GPLS_8	GPLS_9	GPLS_10
Width	362.41	234.21		322.5	459.8		549.0	489.6	307.1	213.8
Volume	1210.6	665.3		725.8	974.9		1456.9	1989.4	890.9	559.3
	GPLN_1	GPLN_2	GPLN_3	GPLN_4	GPLN_5	GPLN_6	GPLN_7	GPLN_8	GPLN_9	GPLN_10
Width	80.5	156.2	167.2	127.7	210.6	84.1	159.1	84.9	83.2	94.8
Volume	354.4	1263.3	1188.0	735.2	1258.5	345.9	1129.3	466.9	352.0	480.3

Authorized Signatory
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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/22-23/20 dated 28th April, 2022
Sample Description	Shoreline Monitoring (Shoreline Position)
Sampling and Analysis period	Monthly (April , 2023)
Sample Location	Observation made for the coastline from Gopalpur beach to port north beach over a stretch of 13 km and at the sand spit of Rushikulya River mouth
Methods and Instrument Used	Observations were carried out with real time differential Global positioning System (DGPS) ArcPad and data were processed in Arc-View GIS environment.

Observation Report

Table 1: Shoreline Position (m) of Gopalpur Tourist Beach (GPB), Gopalpur Port South (GPLS) and Gopalpur Port North (GPLN) beach with reference to baseline on the backshore during April, 2023. The distance between two successive transects were maintained at 500m.

GPB_1	GPB_2	GPB_3	GPB_4	GPB_5	GPB_6	GPB_7
133.1	136.0	158.3	146.7	756.4	758.3	768.7

GPLS_1	GPLS_2	GPLS_3	GPLS_6	GPLS_7	GPLS_8	GPLS_9	GPLS_10
716.1	682.4	998.6	1148.9	1027.3	932.8	796.3	781.4

GPLN_1	GPLN_2	GPLN_3	GPLN_4	GPLN_5	GPLN_6	GPLN_7	GPLN_8	GPLN_9	GPLN_10
310.2	207.3	237.2	234.6	258.3	264.1	247.5	321.3	375.3	412.3

Table 2: Length (km), Perimeter (km) and Area (sq. km) of sand spit to the south of Rushikulya mouth during April, 2023.

Parameter	Sand Spit
Length (km)	4.07
Perimeter (km)	9.21
Area (sq. km)	103.2

Authorized Signatory
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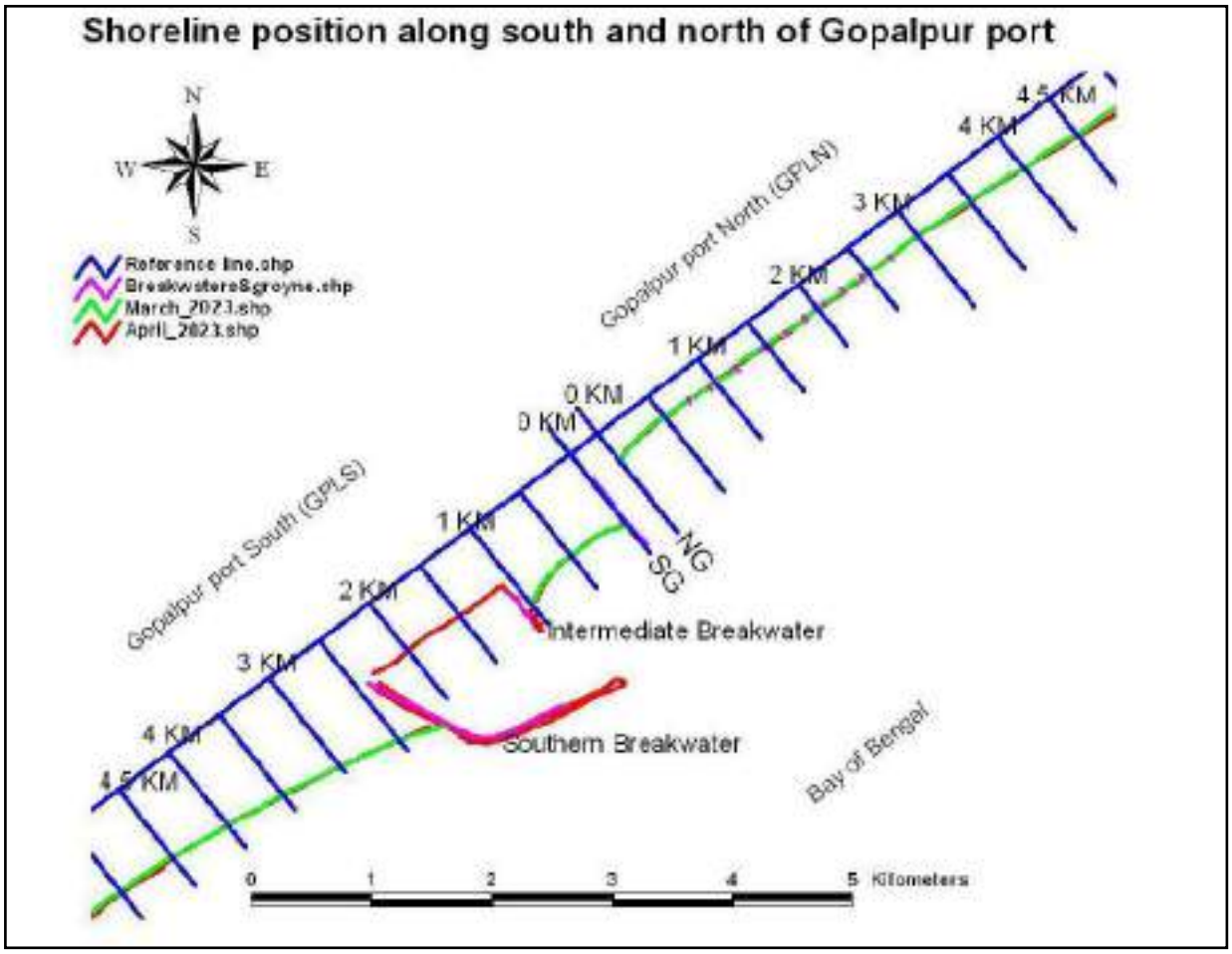

Fig. 1: Shoreline at south/north of Gopalpur port during April, 2023 with reference to March, 2023.

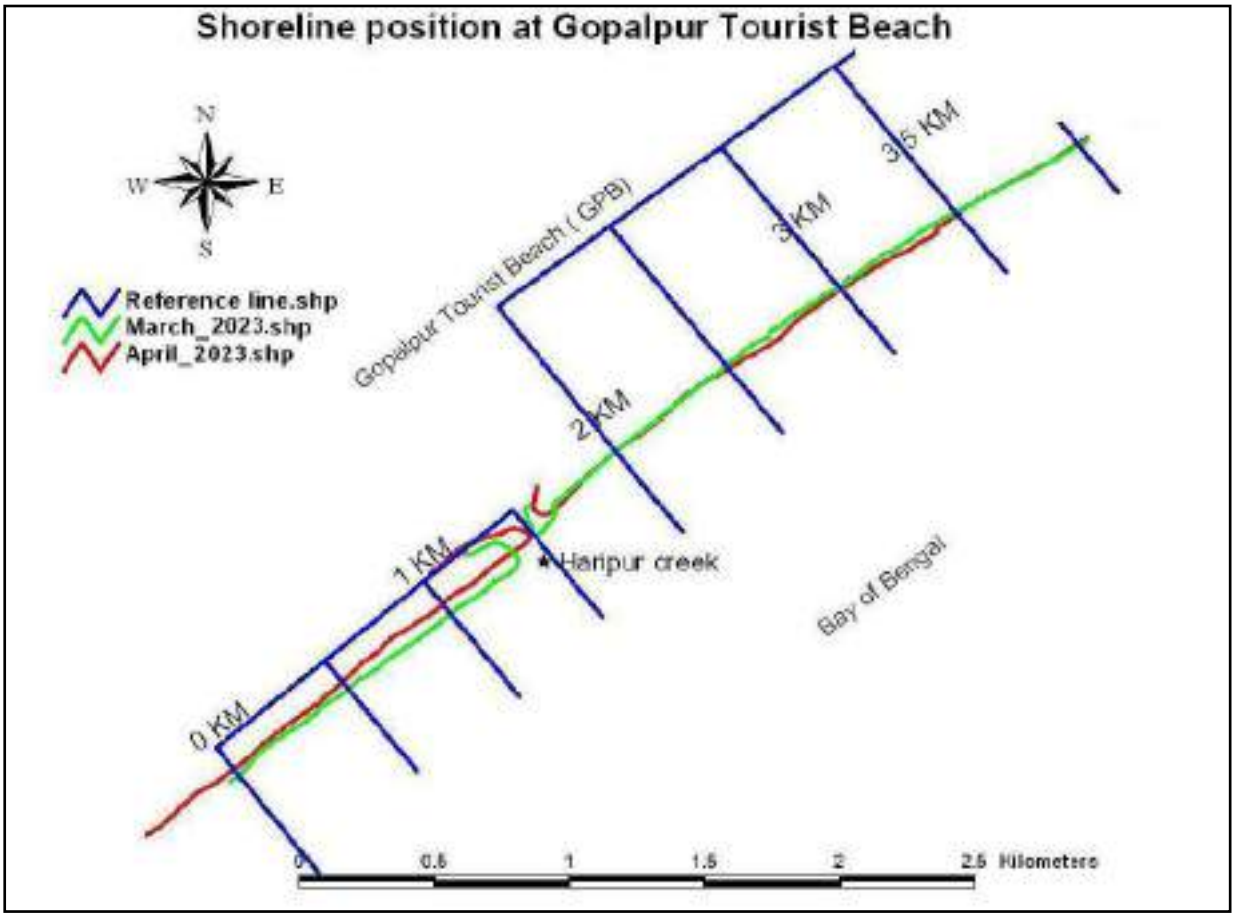

Fig. 2: Shoreline at Gopalpur beach during April, 2023 with reference to March, 2023.

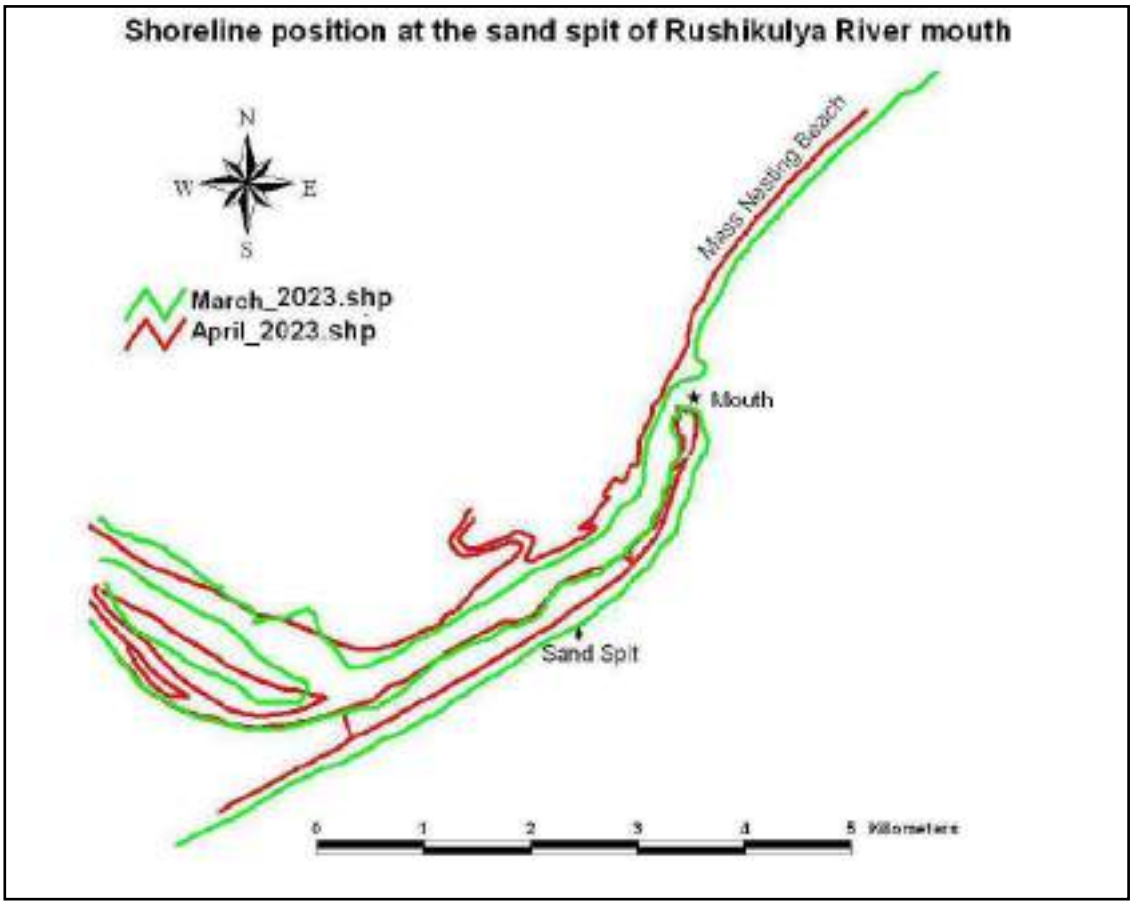

Fig. 3: Shoreline position near Rushikulya River Mouth during April, 2023 with reference to March, 2023

Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/22-23/20 dated 28th April, 2022
Sample Description	Shoreline Monitoring (Littoral Environment Observation)
Sampling and Analysis period	Monthly (April, 2023)
Sample Location	Gopalpur Tourist Beach, Gopalpur Port & Rushikulya Mouth
Methods and Instrument Used	Measuring stuff, compass, floating cork are used to measure LEO following Schneider (1981) and Mohanty et al., (2012)

Observation Report

Littoral Environment Observation at Gopalpur Tourist beach, Gopalpur port and Rushikulya mouth for the month of April, 2023.

Breaker type	Breaker height (m)	Breaker angle (deg)	Wave period (sec)	Wave direction	Uprush (m/s)	Backwash (m/s)	Surf zone width (m)
Gopalpur Tourist Beach							
Spilling	1.24	5	12.33	SSE	1.19	1.12	100
Gopalpur Port							
Plunging	1.37	13	10.02	SE	1.19	0.97	110
Rushikulya Mouth							
Spilling	1.16	12	8.37	SSE	1.14	1.10	95

Authorized Signatory
(Dr. P. K. Mohanty)
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Professor, Department of Marine Sciences,
Berhampur University, Berhampur-760007

Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/22-23/20 dated 28th April, 2022
Sample Description	Sediment characteristics (mean grain size, sorting, Skewness and Kurtosis)
Sampling and Analysis period	(April, 2023)
Sample Location	Gopalpur Tourist Beach (GPB) , Gopalpur Port South (GPLS), Gopalpur Port North (GPLN) & Rushikulya Sand Spit
Methods used	The sediment samples are collected at backshore (BS), Midshore (MS) and Foreshore (FS) for each transect with an interval of 1km starting from Light house. For Gopalpur port south and port north, the observations were taken with reference to southern groyne and northern groyne respectively. The statistics of sediment mean grain size and sorting are carried out following Folk & Ward (1957); Blott and Pye (2001)

Analysis of Reports

Sediment grain size analysis at Gopalpur Tourist beach, Gopalpur port south and north and Rushikulya mouth for the month of April, 2023.

Gopalpur Tourist Beach

	GPB_2			GPB_4			GPB_6		
	BS	**MS**	**FS**	**BS**	**MS**	**FS**	**BS**	**MS**	**FS**
Mean	C	M	M	M	C	M	M	C	M
Sorting	MWS	MWS	MWS	MDS	MWS	MWS	MDS	MDS	MDS
Skewness	FSK	CSK	CSK	SYM	SYM	SYM	SYM	CSK	CSK
Kurtosis	VPK	LPK	LPK	LPK	PLK	LPK	MSK	LPK	MSK

Gopalpur Port South

	GPLS_1			GPLS_3			GPLS_7			GPLS_9		
	BS	**MS**	**FS**	**BS**	**MS**	**FS**	**BS**	**MS**	**FS**	**BS**	**MS**	**FS**
Mean	M	M	M	M	F	M	M	M	M	C	C	M
Sorting	PS	MWS	MDS	MDS	MDS	PS	MWS	MDS	MWS	MWS	MWS	MDS
Skewness	FSK	SYM	SYM	CSK	VCSK	VCSK	CSK	CSK	CSK	CSK	VCSK	SYM
Kurtosis	VPK	LPK	MSK	MSK	LPK	PLK	MSK	MSK	LPK	PLK	MSK	MSK

Gopalpur Port North

	GPLN_1			GPLN_3			GPLN_5			GPLN_7			GPLN_9		
	BS	**MS**	**FS**	**BS**	**MS**	**FS**	**BS**	**MS**	**FS**	**BS**	**MS**	**FS**	**BS**	**MS**	**FS**
Mean	M	M	M	C	M	M	M	M	M	M	M	M	M	M	M
Sorting	MDS	MDS	MDS	MWS	MDS	MDS	MDS	MDS	MDS	MDS	MDS	MDS	MDS	MDS	MDS
Skewness	SYM	CSK	SYM	CSK	CSK	SYM	CSK	SYM	CSK	SYM	SYM	CSK	SYM	CSK	CSK
Kurtosis	VLPK	MSK	PLK	PLK	MSK	MSK	PLK	PLK	MSK	MSK	MSK	MSK	MSK	PLK	LPK

Rushikulya Sand Spit

	BS	**MS**	**FS**
Mean	C	M	M
Sorting	MDS	MDS	MDS
Skewness	SYM	SYM	SYM
Kurtosis	MSK	LPK	MSK

Legends:

Mean: Fine Sand (**FS**) Medium Sand (**M**) Coarse Sand (**C**) Very Fine Sand (**VFS**)

Sorting: Well Sorted (**WS**) Moderately Well Sorted (**MWS**) Moderately Sorted (**MDS**) Poorly Sorted (**PS**)

Skewness: Symmetrical (**SYM**), Coarse Skewed (**CSK**), Fine Skewed (**FSK**), VCS-Very coarse skewed,

Kurtosis: Platykurtic (**PLK**), Leptokurtic (**LPK**), Mesokurtic (**MSK**), Very Platykurtic (**VPK**), Very Leptokurtic (**VLPK**)

Authorized Signatory
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REPORT

ON

ENVIRONMENTAL MONITORING OF GOPALPUR PORT

(Consultancy Project)

May, 2023

Prepared by

VISIONTEK Consultancy Services Pvt. Ltd.,
Nodal Expert, GPL Env. Monitoring Project
Plot No- M22 23, Chandaka Industrial Estate, Patia,
Bhubaneswar-751024

Visiontek Consultancy Services Pvt .Ltd
(An Enviro Engineering Consulting Cell)

Submitted to

Gopalpur Ports Limited
Arjeepalli, Via- Chhatrapur
PIN-761020, Ganjam, Odisha, India

GOPALPUR PORT
New Era in Maritime Logistics

Test Certificate

Submitted to	Gopalpur Port Ltd., Arjeepalli, Ganjam-761020
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Ambient air quality and Noise level Monitoring
Sampling and Analysis period	Monthly (May, 2023)
Sample Location	Observations were carried out twice a week for 24 hrs at 4 locations for air quality, and at the same locations once in a month for Noise level.
Methods and Instrument Used	Following National Ambient Air Quality Standards (NAAQS, 2009) stipulated by Central Pollution Control Board (CPCB) and Environment (protection) Act, 1986.

Observation report

Table 1: Ambient Air Quality and Noise level within Gopalpur Port during May, 2023 (PM-Particulate matter, SO_2-Sulphur Dioxide, NO_2-Nitrogen Dioxide, dB-decibel) at station A andB

STATION	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	Noise level (dB)
A (19° 17′ 18.69″N, 84° 56′ 1.82″E)	03.05.2023	67.28	27.61	3.07	2.57	59.37
	04.05.2023	71.69	29.37	2.91	2.64	
	08.05.2023	82.46	30.43	2.81	3.18	
	09.05.2023	65.22	24.18	2.57	3.49	
	15.05.2023	79.18	34.61	2.84	3.11	
	16.05.2023	86.37	38.24	3.07	4.38	
	22.05.2023	84.18	39.61	3.18	3.76	
	23.05.2023	88.33	40.28	4.08	3.48	
	Mean	**78.09**	**33.04**	**3.07**	**3.33**	
	Range	65.22-88.33	24.18-40.28	2.57-4.08	2.57-4.38	
B (19° 17′ 48.1″N, 84° 57′ 03.3″E)	03.05.2023	79.18	38.15	2.99	2.49	54.92
	04.05.2023	76.27	32.16	2.83	3.76	
	08.05.2023	84.36	46.57	2.73	3.48	
	09.05.2023	78.28	52.67	2.94	3.67	
	15.05.2023	80.64	34.92	1.67	2.94	
	16.05.2023	82.38	37.27	3.27	4	
	22.05.2023	75.18	41.08	2.07	37	
	23.05.2023	76.37	35.37	3.42	4.29	
	Mean	**79.08**	**39.77**	**2.74**	**7.70**	
	Range	75.18-84.36	32.16-52.67	2.57-4.08	2.57-4.38	
Reference value (NAAQS, 2009)		**100**	**60**	**80**	**80**	**70-75 (Env. P. Act, 1986)**

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Table 2: Ambient Air Quality and Noise level within Gopalpur Port during May, 2023 (PM-Particulate matter, SO_2-Sulphur Dioxide, NO_2-Nitrogen Dioxide, dB-decibel) at station C and D.

STATION	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	Noise level (dB)
C (19° 18' 29.0"N, 84° 57' 41.1"E)	05.05.2023	80.64	34.07	2.37	2.82	62.73
	06.05.2023	79.37	26.51	3.48	4.39	
	11.05.2023	75.61	35.19	3.18	2.94	
	12.05.2023	80.46	42.38	4.08	3.18	
	17.05.2023	75.38	40.67	2.92	3.76	
	18.05.2023	86.42	34.18	2.73	3.51	
	25.05.2023	87.39	35.94	1.67	3.47	
	26.05.2023	91.67	30.76	3.44	2.97	
	Mean	**82.12**	**34.96**	**2.98**	**3.38**	
	Range	75.38-91.67	26.51-42.38	1.67-4.08	2.82-4.39	
D (19° 18' 50.09"N, 84° 58'09.12"E)	05.05.2023	74.38	31.54	2.64	2.88	58.34
	06.05.2023	69.28	28.64	2.84	3.46	
	11.05.2023	84.67	39.48	2.44	3.72	
	12.05.2023	88.91	37.64	2.38	3.91	
	17.05.2023	87.29	39.43	3.17	2.86	
	18.05.2023	80.64	29.73	2.67	2.99	
	25.05.2023	75.27	26.43	3.11	4.27	
	26.05.2023	84.92	41.05	2.94	3.84	
	Mean	**80.67**	**34.24**	**2.77**	**3.49**	
	Range	69.28-88.91	26.43-41.05	2.38-3.17	2.86-4.27	
Reference value (NAAQS, 2009)		100	60	80	80	70-75 (Env. P. Act, 1986)

Authorized Signatory
Nodal Expert, GPL Env. Monitoring Project

Visiontek Consultancy Services Pvt. Ltd. BBSR

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	DG Stack monitoring
Date of Sampling and Analysis period	28.05.2023
Sample Location	Gopalpur Port (six locations)

Observation Report

Stack Details	DG-1 (100 KVA)	DG-2 (100 KVA)	DG-3 (100 KVA)	DG-1 (250 KVA)	DG-2 (250 KVA)	DG-3 (250 KVA)	Limit	Method of Test
Locations	Meter Room	Substation - 1	Colony	Central Store	Meter Room	Substation -4		
Flue Gas Temperature (k)	377	351	344	371	350	386	----	
Flue Gas Velocity (m/s)	10.69	7.15	6.87	7.13	6.25	10.82	-----	
Quantity of emission (m^3/hr)	604.19	404.11	388.29	402.98	353.25	611.54	----	
PM (g/kwh)	0.14	0.11	0.11	0.12	0.07	0.13	≤0.2	IS11255: part-1-1985
SO_2(g/kwh)	0.12	0.14	0.12	0.15	0.13	0.13	NM	IS11255: part-2-1985
NO_x + HC (g/kwh)	0.21	0.25	0.22	0.20	0.19	0.22	≤4.0	IS11255: part-7-200& EPA Method 429
Co(g/kwh)	0.31	0.33	0.34	0.40	0.46	0.52	≤3.5	EPA Method-10

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Domestic Effluent (STP WATER)
Date of Sampling and Analysis period	18.05.2023
Sample Location	Gopalpur Port (19.315126^0 and 84.970971^0)
Method	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Observation Report

Sl No	Parameters	Unit	Results	Standard	Methods
1	pH		7.3	6.5-8.5	APHA 23RD Edition 2017:4500 H^+B
2	BOD	mg/L	12.4	MAX30	IS 3025 (P-44) : 1993 RA 2003
3	COD	mg/L	114.6	MAX250	APHA 23RD Edition 2017:5220c
4	Suspended Solids	mg/L	22.00	MAX100	APHA 23RD Edition 2017:2540D
5	Oil & grease	mg/L	4.7	MAX10	APHA 23RD Edition 2017:5520B

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Test Certificate

Submitted to	Gopalpur Port Ltd., Arjeepalli, Ganjam-761020
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Shoreline Monitoring (Beach width & volume, shoreline length, sediment)
Sampling and Analysis period	Monthly (May, 2023)
Sample Location	Observation made at 8 transects for Gopalpur beach (2), port north (3) and south (3) beach covering a stretch of 13 km
Methods and Instrument Used	Observation made with Trimble Total station and data were processed with Arc-View GIS following coastal protection manual (CERC, 2006). For shoreline, observations were carried out with real time differential Global positioning System (DGPS) ArcPad and data were processed in Arc-View GIS environment. The statistics of sediment mean grain size are carried out following Folk & Ward (1957).

Observation Report

Beach Width (m), Beach Volume (m^3/m), shoreline length (m) and sediment grain size (mean and sorting) at specific locations of Gopalpur during May, 2023.

	Beach Width (m)	Beach Volume (m^3/m)	Shoreline length (m)	Sediment
Tourist beach	49.2	94.2	89	Medium and moderately sorted
Haripur creek	105.2	95.1	95.2	Fine and moderately well sorted
Southern breakwater	464.2	989.6	1029.1	Medium and moderately sorted
Intermediate breakwater	313.5	742.0	727.9	Medium Sand and Poorly Sorted
Southern groin	344.2	1202.5	616.8	Medium and moderately sorted
Northern groin	80.6	359.0	159.2	Medium and moderately sorted
Marine Thana	149.6	1111.4	199.2	Medium and moderately sorted
Arjipalli	80.2	351.8	213.7	Medium and moderately sorted

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Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Shoreline Monitoring (Littoral Environment Observation)
Sampling and Analysis period	Monthly (May, 2023)
Sample Location	Gopalpur Tourist Beach and Gopalpur Port
Methods and Instrument Used	Measuring stuff, compass, floating cork are used to measure LEO following Schneider (1981) and Mohanty et al., (2012)

Observation Report

Littoral Environment Observation at Gopalpur Tourist beach and Gopalpur port for the month of May, 2023.

Breaker type	Breaker height (m)	Breaker angle (deg)	Wave period (sec)	Wave direction	Uprush (m/s)	Backwash (m/s)	Surf zone width (m)
Gopalpur Tourist Beach							
Plunging	1.7	10	12.14	SSE	1.44	0.99	110
Gopalpur Port							
Plunging	1.43	15	9.35	SE	1.19	0.98	115

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Marine Water Sample
Sampling and Analysis period	Monthly (May, 2023)
Sample Location	Harbour area, **Latitude- 19° 17' 21" N/Longitude-84° 56' 55" E**
Method adopted	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Water quality of Harbour area

Water parameters	May, 2023	Standard	Methods
pH	7.83	6.5-9	Microprocessor based pH system Model 1012
DO (mg/l)	4.55	> 3mg/L	Winkler's Titration method following Grasshoff et al (1999)
Colour & Odour	bluish & Odourless	--	----
Fecal coliform (CFU/ml)	430	--	APHA, 1999
BOD (mg/L)	2.95	<5	Winkler's Titration method following Grasshoff et al. (1999)
Salinity (PSU)	32.8	--	Mohr-Knudsen Argentometric titration method
EC (mS/Cm)	47.42	--	Hanna HI 98194 portable multi parameter water quality meter
TDS (PPT)	34.62	--	Hanna HI 98194 portable multi parameter Water Quality meter
TSM($g.l^{-1}$)	0.835	--	Filtration method using Vacuum pump and filtration unit
Sulphate(mg/L)	117.9	--	APHA 4500 $SO_4^{2-}E$
Phosphate (mg/ L)	0.043	0.1 mg/L	APHA 4500 PD
Nitrate (mg/L)	0.524	1.0 mg/L	APHA 4500 NO_3E
Chloride (mg/L)	18157	--	APHA 4500 CL B
PHC (mg/L)	0.18	10 mg/L	EPA 3510
Lead(mg/L)	0.073	0.1 mg/L	APHA 3111 B,C
Mercury (mg/L)	0.002	0.1 mg/L	APHA 3500 Hg
Hexavalent Chromium(mg/L)	0.016	0.05 mg/L	APHA 3500 Cr B

Sources of standards:

Primary water quality criteria for class SW-IV waters (Harbour) as per EPA, 1986

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Nodal Expert, GPL Env. Monitoring Project

Visiontek Consultancy Services Pvt. Ltd. BBSR

Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Marine sediment Sample
Sampling and Analysis period	Monthly (May, 2023)
Sample Location	Harbour area, **Latitude- 19° 17' 21" N/Longitude-84° 56' 55" E**
Method adopted	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Sediment quality of Harbour area

Sediment parameters	May, 2023	Methods
Texture (Mean & sorting)	Medium & moderately sorted	Sieve Analysis method using RETSCH AS 200
pH	7.44	IS2720 (P:26)1987
Sodium (mg/kg)	589	VCSPL/SOP/Soil14
Potassium (mg/kg)	15.65	VCSPL/SOP/Soil15
Phosphate (mg/kg)	12.92	Methods of analysis of soil by HLS Tandon*
Chloride (mg/kg)	4081	USDA:1954 US -affirmed 2010
Sulphate (mg/kg)	222.1	Methods of analysis of soil by HLS Tandon*
PHC (µg/L)	0.004	UNEP 1992
Lead (mg/kg)	0.14	EPA 3050 B
Mercury (mg/kg)	0.003	EPA 3050 B
Hexavalent chromium (mg/kg)	0.07	Methods of analysis of soil by HLS Tandon*
Organic carbon (%)	0.12	Methods of analysis of soil by HLS Tandon*

*Methods of analysis of Soils, Plants, Waters, and Fertilizers by HLS Tandon published by FDCO, New Delhi, 1993.

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Potable Water Sample
Sampling and Analysis period	Monthly (May, 2023)
Sample Location	Harbour area, **Latitude- 19.294355°N/Longitude-84.94502°E**
Method adopted	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Potable Water quality near port area

Water parameters	May, 2023	Standard	Methods
Colour & Odour	Result	Agreeable	APHA 23RD EDITION 2017: 2150B
Turbidity (ntu)	0.56	1	APHA 23RD EDITION 2017: 2130B
pH	8.12	6.5-8.5	APHA 23RD EDITION 2017: 4500H+B
Total Hardness (mg/l)	134.8	200	APHA 23RD EDITION 2017: 2340C
Iron(mg/l)	0.15	0.3	APHA 23RD EDITION 2017: 3500 Fe,B
Chloride (mg/L)	77.86	250	APHA 23RD EDITION 2017:Cl-B
TDS (mg/l)	270.4	500	APHA 23RD EDITION 2017: 2540C
Calcium(mg/l)	32.6	75	APHA 23RD EDITION 2017: 3500 Ca,B
Magnesium(mg/l)	13.1	30	APHA 23RD EDITION 2017: 3500 Mg,B
Sulphate(mg/L)	62.8	200	APHA 23RD EDITION 2017: 4500 SO_4^{2-}E
Flouride(mg/l)	0.23		APHA 23RD EDITION 2017: 4500 FC
Alakalinity(mg/l)	173.6	200	23RD EDITION 2017:2320B
Salinity(ppt)	0.21	--	Mohr-Knudsen Argentometric titration method
Zinc(mg/l)	0.08	5	23RD EDITION 2017:311B
Lead(mg/L)	0.001	0.01	23RD EDITION 2017:311B
E. Coli (MPN/100 ml)	<1.8	SHALL NOT BE DETACTABLE IN ANY 100 ML SAMPLE	23RD EDITION 2017:9221F

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(Committed For Better Environment)

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Committed For Better Environment

ISO 9001:2015
ISO 14001:2015
ISO 45001:2018 (OH&S)
ISO/IEC 17025:2005

REPORT

ON

ENVIRONMENTAL MONITORING OF GOPALPUR PORT

(Consultancy Project)

June, 2023

Prepared by

VISIONTEK Consultancy Services Pvt. Ltd.,
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Submitted to

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Arjeepalli, Via- Chhatrapur
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GOPALPUR PORT
New Era in Maritime Logistics

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	**Ambient air quality and Noise level Monitoring**
Sampling and Analysis period	Monthly (June, 2023)
Sample Location	Observations were carried out twice a week for 24 hrs at 4 locations for air quality, and at the same locations once in a month for Noise level.
Methods and Instrument Used	Following National Ambient Air Quality Standards (NAAQS, 2009) stipulated by Central Pollution Control Board (CPCB) and Environment (protection) Act, 1986.

Test Certificate

Observation report:

Table 1: Ambient Air Quality and Noise level within Gopalpur Port during June, 2023 (PMParticulate matter, SO_2-Sulphur Dioxide, NO_2-Nitrogen Dioxide,dB-decibel) at station A and B.

STATION	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	Noise level (dB)
A (19⁰ 17' 18.69''N, 84⁰ 56' 1.82''E)	**02.06.2023**	72.67	25.4	2.65	3.12	59.37
	03.06.2023	82.19	31.38	2.49	3.87	
	12.06.2023	85.37	28.67	3.17	2.99	
	13.06.2023	86.19	32.46	3.27	3.84	
	21.06.2023	90.43	26.75	2.94	2.73	
	22.06.2023	84.08	28.42	2.85	2.84	
	26.06.2023	72.38	20.79	3.75	3.07	
	27.06.2023	77.19	27.94	3.48	2.91	
	Mean	**81.31**	**27.73**	**3.08**	**3.17**	
	Range	72.38-90.43	20.79-32.46	2.49-3.75	2.73-3.87	
B (19⁰ 17' 48.1''N, 84⁰ 57' 03.3''E)	**02.06.2023**	67.28	21.67	3.27	2.11	54.92
	03.06.2023	76.18	23.76	2.95	3.27	
	12.06.2023	92.17	37.08	3.42	3.42	
	13.06.2023	78.43	29.71	2.73	2.82	
	21.06.2023	64.27	24.43	2.55	3.66	
	22.06.2023	77.27	30.57	3.71	4.19	
	26.06.2023	84.07	35.72	4.09	3.75	
	27.06.2023	83.43	30.37	3.74	3.83	
	Mean	**79.08**	**39.77**	**2.74**	**7.70**	
	Range	75.18-84.36	32.16-52.67	2.57-4.08	2.57-4.38	
Reference value (NAAQS, 2009)		**100**	**60**	**80**	**80**	**70-75 (Env. P. Act, 1986)**

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Table 2: Ambient Air Quality and Noise level within Gopalpur Port during June, 2023 (PM-Particulate matter, SO_2-Sulphur Dioxide, NO_2-Nitrogen Dioxide, dB-decibel) at station C and D

STATION	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	Noise level (dB)
C (19° 18' 29.0''N, 84° 57' 41.1''E)	**07.06.2023**	91.38	38.76	2.94	4.27	62.73
	08.06.2023	94.28	30.49	2.46	3.61	
	16.06.2023	86.28	28.61	2.88	3.27	
	17.06.2023	84.17	28.43	3.76	4.38	
	23.06.2023	85.52	38.49	3.88	2.88	
	24.06.2023	73.76	29.75	2.46	2.67	
	28.06.2023	80.54	37.42	3.24	3.27	
	29.06.2023	73.49	24.66	3.07	3.94	
	Mean	**83.68**	**32.08**	**3.09**	**3.54**	
	Range	73.49 94.28	24.66-38.76	2.46-3.88	2.67-4.38	
D (19° 18' 50.09''N, 84° 58'09.12''E)	**07.06.2023**	69.46	22.67	2.62	3.07	58.34
	08.06.2023	86.17	28.73	2.73	2.94	
	16.06.2023	77.94	25.94	3.49	3.11	
	17.06.2023	84.38	32.84	4.27	3.57	
	23.06.2023	76.24	29.73	3.66	3.68	
	24.06.2023	82.92	30.44	2.97	2.92	
	28.06.2023	84.27	37.19	3.83	4.31	
	29.06.2023	73.42	26.15	2.99	3.94	
	Mean	**79.35**	**29.21**	**3.32**	**3.44**	
	Range	69.46-86.17	22.67-37.19	2.62-4.27	2.92-4.31	
Reference value (NAAQS, 2009)		**100**	**60**	**80**	**80**	**70-75 (Env. P. Act, 1986)**

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Observation Report

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	DG Stack monitoring
Date of Sampling and Analysis period	27.06.2023
Sample Location	Gopalpur Port (six locations)

Stack Details	DG-1 (100 KVA)	DG-2 (100 KVA)	DG-3 (100 KVA)	DG-1 (250 KVA)	DG-2 (250 KVA)	DG-3 (250 KVA)	Limit	Method of Test
Locations	Meter Room	Substation - 1	Colony	Central Store	Meter Room	Substation - 4		
Flue Gas Temperature (k)	374	356	341	368	354	378	----	
Flue Gas Velocity (m/s)	9.86	6.94	6.83	6.99	7.53	9.72	-----	
Quantity of emission (m^3/hr)	557.23	392.24	386.03	395.07	425.59	459.37	----	
PM (g/kwh)	0.12	0.10	0.09	0.14	0.12	0.11	≤0.2	IS11255: part-1-1985
SO_2(g/kwh)	0.15	0.12	0.11	0.13	0.15	0.13	NM	IS11255: part-2-1985
NO_x + HC (g/kwh)	0.24	0.21	0.26	0.19	0.22	0.22	≤4.0	IS11255: part-7-200& EPA Method 429
Co(g/kwh)	0.28	0.34	0.42	0.39	0.56	0.49	≤3.5	EPA Method-10

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Observation Report

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Domestic Effluent (STP WATER)
Date of Sampling and Analysis period	16.06.2023
Sample Location	Gopalpur Port (19.315126^0 and 84.970971^0)
Method	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Sl No	Parameters	Unit	Results	Standard	Methods
1	pH		7.6	6.5-8.5	APHA 23RD Edition 2017:4500 H$^+$B
2	BOD	mg/L	14.8	MAX30	IS 3025 (P-44) : 1993 RA 2003
3	COD	mg/L	122.7	MAX250	APHA 23RD Edition 2017:5220c
4	Suspended Solids	mg/L	28.4	MAX100	APHA 23RD Edition 2017:2540D
5	Oil & grease	mg/L	5.3	MAX10	APHA 23RD Edition 2017:5520B

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Observation Report

Beach Width (m), Beach Volume (m^3/m), shoreline length (m) and sediment grain size (mean and sorting) at specific locations of Gopalpur during June, 2023.

Submitted to	Gopalpur Port Ltd., Arjeepalli, Ganjam-761020
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Shoreline Monitoring (Beach width & volume,shoreline length, sediment)
Sampling and Analysis period	Monthly (June, 2023)
Sample Location	Observation made at 8 transects for Gopalpur beach (2), port north (3) and south (3) beach covering a stretch of 13 km
Methods and Instrument Used	Observation made with Trimble Total station and data were processed with Arc-View GIS following coastal protection manual (CERC, 2006). For shoreline, observations were carried out with real time differential Global positioning System (DGPS) ArcPad and data were processed in Arc-View GIS environment. The statistics of sediment mean grain size are carried out following Folk & Ward (1957).

	Beach Width (m)	Beach Volume (m^3/m)	Shoreline length (m)	Sediment
Tourist beach	45.9	93.9	41.3	Medium and moderately sorted
Haripur creek	104.0	95.3	76.26	coarse and moderately sorted
Southern breakwater	468.3	1008.7	1058.4	Medium and moderately well sorted
Intermediate breakwater	306.5	751.3	797.4	Medium and moderately sorted
Southern groin	352.6	1252.7	667.35	Medium and moderately sorted
Northern groin	83.4	430.7	146.6	Fine and moderately well sorted
Marine Thana	152.4	1108.7	207.2	Medium and moderately sorted
Arjipalli	70.1	309.3	221.3	Fine and moderately sorted

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Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Shoreline Monitoring (Littoral Environment Observation)
Sampling and Analysis period	Monthly (June, 2023)
Sample Location	Gopalpur Tourist Beach and Gopalpur Port
Methods and Instrument Used	Measuring stuff, compass, floating cork are used to measure LEO following Schneider (1981) and Mohanty et al., (2012)

Observation Report

Littoral Environment Observation at Gopalpur Tourist beach and Gopalpur port for the month of June, 2023.

Breaker type	Breaker height (m)	Breaker angle (deg)	Wave period (sec)	Wave direction	Uprush (m/s)	Backwash (m/s)	Surf zone width (m)
Gopalpur Tourist Beach							
Spilling	1.53	8	8.89	SE	1.25	1.09	110
Gopalpur Port							
Spilling	1.44	18	8.34	SSE	1.30	0.90	120

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Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Marine Water Sample
Sampling and Analysis period	Monthly (June, 2023)
Sample Location	Harbour area, **Latitude- 19° 17' 21" N/Longitude-84° 56' 55"E**
Method adopted	Grasshoff et al., 2009, APHA, 1999 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Water quality of Harbour area

Water parameters	June, 2023	Standard	Methods
pH	7.45	6.5-9	Microprocessor based pH system Model 1012
DO (mg/l)	5.12	> 3mg/L	Winkler's Titration method following Grasshoff et al (1999)
Colour & Odour	bluish & Odourless	--	-------
Fecal coliform (CFU/ml)	520	--	APHA, 1999
BOD (mg/L)	3.29	<5	Winkler's Titration method following Grasshoff et al (1999)
Salinity (PSU)	30.2	--	Mohr-Knudsen Argentometric titration method
EC (mS/Cm)	43.28	--	Hanna HI 98194 portable multi parameter water quality meter
TDS (PPT)	32.84	--	Hanna HI 98194 portable multi parameter Water Quality meter
TSM($g.l^{-1}$)	0.943	--	Filtration method using Vacuum pump and filtration unit
Sulphate(mg/L)	142.6	--	APHA 4500 $SO_4^{2-}E$
Phosphate (mg/ L)	BDL	0.1 mg/L	APHA 4500 PD
Nitrate (mg/L)	0.632	1.0 mg/L	APHA 4500 NO_3E
Chloride (mg/L)	16716	--	APHA 4500 CL'B
PHC (mg/L)	0.11	10 mg/L	EPA 3510
Lead(mg/L)	0.086	0.1 mg/L	APHA 3111 B,C
Mercury (mg/L)	0.002	0.1 mg/L	APHA 3500 Hg
Hexavalent Chromium(mg/L)	0.019	0.05 mg/L	APHA 3500 Cr B

Sources of standards:

Primary water quality criteria for class SW-IV waters (Harbour) as per EPA, 1986

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Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Marine sediment Sample
Sampling and Analysis period	Monthly (June, 2023)
Sample Location	Harbour area, **Latitude- 19° 17' 21" N/Longitude-84° 56' 55"E**
Method adopted	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Sediment quality of Harbour area

Sediment parameters	June, 2023	Methods
Texture (Mean)	Medium & poorly sorted	Sieve Analysis method using RETSCH AS 200
pH	8.23	IS2720 (P:26)1987
Sodium (mg/kg)	537.5	VCSPL/SOP/Soill14
Potassium (mg/kg)	10.52	VCSPL/SOP/Soill15
Phosphate (mg/kg)	24.6	Methods of analysis of soil by HLS Tandon*
Chloride (mg/kg)	3414	USDA:1954 US -affirmed 2010
Sulphate (mg/kg)	199	Methods of analysis of soil by HLS Tandon*
PHC (µg/L)	0.007	UNEP 1992
Lead (mg/kg)	BDL	EPA 3050 B
Mercury (mg/kg)	0.005	EPA 3050 B
Hexavalent chromium (mg/kg)	0.09	Methods of analysis of soil by HLS Tandon*
Organic carbon (%)	0.10	Methods of analysis of soil by HLS Tandon*

*Methods of analysis of Soils, Plants, Waters, and Fertilizers by HLS Tandon published by FDCO, New Delhi, 1993.

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Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Potable Water Sample
Sampling and Analysis period	Monthly (June, 2023)
Sample Location	Harbour area, **Latitude- 19.294355^{0}N/Longitude-84.94502^{0}E**
Method adopted	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Potable Water quality near port area

Water parameters	**June, 2023**	Standard	Methods
Colour & Odour	Result	Agreeable	APHA 23RD EDITION 2017: 2150B
Turbidity (ntu)	0.59	1	APHA 23RD EDITION 2017: 2130B
pH	7.67	6.5-8.5	APHA 23RD EDITION 2017: 4500H+B
Total Hardness (mg/l)	143.8	200	APHA 23RD EDITION 2017: 2340C
Iron(mg/l)	0.18	0.3	APHA 23RD EDITION 2017: 3500 Fe,B
Chloride (mg/L)	53.4	250	APHA 23RD EDITION 2017:CL-B
TDS (mg/l)	263.8	500	APHA 23RD EDITION 2017: 2540C
Calcium(mg/l)	35.3	75	APHA 23RD EDITION 2017: 3500 Ca,B
Magnesium(mg/l)	13.8	30	APHA 23RD EDITION 2017: 3500 Mg,B
Sulphate(mg/L)	18.65	200	APHA 23RD EDITION 2017: 4500 SO_4^{2-}E
Flouride(mg/l)	0.19		APHA 23RD EDITION 2017: 4500 FC
Alakalinity(mg/l)	188.5	200	23RD EDITION 2017:2320B
Salinity(ppt)	0.09	--	Mohr-Knudsen Argentometric titration method
Zinc(mg/l)	0.03	5	23RD EDITION 2017:311B
Lead(mg/L)	BDL	0.01	23RD EDITION 2017:311B
E. Coli (MPN/100 ml)	<1.8	SHALL NOT BE DETACTABLE IN ANY 100 ML SAMPLE	23RD EDITION 2017:9221F

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ISO 9001:2015
ISO 14001:2015
ISO 45001:2018 (OH&S)
ISO/IEC 17025:2005

REPORT

ON

ENVIRONMENTALMONITORING OF GOPALPUR PORT

(Consultancy Project)

July, 2023

Prepared by

VISIONTEK Consultancy Services Pvt. Ltd.,
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Visiontek Consultancy Services Pvt .Ltd
(An Enviro Engineering Consulting Cell)

Submitted to

Gopalpur Ports Limited
Arjeepalli, Via- Chhatrapur
PIN-761020, Ganjam, Odisha, India

GOPALPUR PORT
New Era in Maritime Logistics

Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	**Ambient air quality and Noise level Monitoring**
Sampling and Analysis period	Monthly (July, 2023)
Sample Location	Observations were carried out twice a week for 24 hrs at 4 locations for air quality, and at the same locations once in a month for Noise level.
Methods and Instrument Used	Following National Ambient Air Quality Standards (NAAQS, 2009) stipulated by Central Pollution Control Board (CPCB) and Environment (protection) Act, 1986.

Observation report:

Table 1: Ambient Air Quality and Noise level within Gopalpur Port during July, 2023at station A and B.

STATION	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	Noise level (dB)
A Near South break water (19° 17' 18.69"N, 84° 56' 1.82"E)	**03.07.2023**	75.7	25.16	2.43	2.58	57.46
	04.07.2023	77.67	27.64	3.19	3.88	
	10.07.2023	72.69	23.49	3.16	3.18	
	11.07.2023	70.46	24.61	3.11	2.58	
	18.07.2023	78.91	28.35	3.46	2.49	
	19.07.2023	67.77	23.49	3.16	2.58	
	25.07.2023	63.67	21.64	3.07	3.27	
	26.07.2023	74.99	26.49	2.95	3.24	
	Mean	**72.73**	**25.11**	**3.07**	**2.98**	
	Range	63.67-78.91	21.64-28.35	2.43-3.46	2.49-3.88	
B Near intermediate breakwater (19° 17' 48.1"N, 84° 57' 03.3"E)	**03.07.2023**	83.39	32.38	2.99	3.35	55.37
	04.07.2023	77.59	35.06	3.44	2.58	
	10.07.2023	69.58	23.29	4.29	3.12	
	11.07.2023	77.61	25.78	3.28	3.19	
	18.07.2023	84.38	27.86	2.59	3.36	
	19.07.2023	79.27	24.31	2.78	2.91	
	25.07.2023	76.59	25.69	2.16	3.28	
	26.07.2023	67.09	21.91	2.85	3.19	
	Mean	**76.94**	**27.04**	**3.05**	**3.12**	
	Range	67.09-84.38	21.91-35.06	2.16-4.29	2.58-3.36	
Reference value (CPCB/NAAQS, 2009)		**100**	**60**	**80**	**80**	**70-75 (CPCB/Noise pollution Rule - 2000)**

(PM-Particulate matter, SO_2-Sulphur Dioxide, NO_2-Nitrogen Dioxide,dB-decibel)

Table 2: Ambient Air Quality and Noise level within Gopalpur Port during July, 2023 at station C and D.

STATION	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	Noise level (dB)
C Near signal Station (19^0 18' 29.0''N, 84^0 57' 41.1''E)	06.07.2023	82.61	20.91	3.29	3.78	61.28
	07.07.2023	78.46	26.14	3.82	3.94	
	12.07.2023	75.68	23.95	3.58	2.19	
	13.07.2023	76.37	25.64	2.98	3.59	
	21.07.2023	75.7	24.08	3.92	3.66	
	22.07.2023	83.16	28.97	2.94	2.94	
	28.07.2023	81.57	31.67	3.07	3.66	
	29.06.2023	78.62	31.49	4.19	3.47	
	Mean	**79.02**	**26.61**	**3.47**	**3.40**	
	Range	75.68-83.16	20.91-31.67	2.94-4.19	2.19-3.94	
D Near entrance Gate (19^0 18' 51.59''N, $84^0$58'6.49''E)	06.07.2023	75.35	32.31	2.37	3.7	64.76
	07.07.2023	74.26	34.16	2.08	3.61	
	12.07.2023	82.46	36.34	3.91	2.48	
	13.07.2023	87.59	27.18	2.94	3.16	
	21.07.2023	71.38	24.65	3.07	3.58	
	22.07.2023	75.38	24.38	4.16	3.42	
	28.07.2023	80.18	37.91	3.97	2.94	
	29.06.2023	79.38	29.48	4.33	3.79	
	Mean	**78.25**	**30.80**	**3.35**	**3.34**	
	Range	71.38-87.59	24.38-37.91	2.08-4.33	2.48-3.79	
Reference value (CPCB/NAAQS, 2009)		**100**	**60**	**80**	**80**	**70-75** (CPCB/ Noise pollution Rule - 2000)

(PM-Particulate matter, SO_2-Sulphur Dioxide, NO_2-Nitrogen Dioxide, dB-decibel)

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	**Effluent from Coal stack yard**
Date of Sampling and Analysis period	19.07.2023
Sample Location	Gopalpur Port (Four locations)

Observation Report

Stack Details	Stack Yard-1	Stack Yard-2	Stack Yard-3	Stack Yard-4	Limit	Method of Test
Location	Near substation-1					
pH	8.6	7.9	8.1	8.4	6.5-9	Microprocessor based pH system Model 1012
EC (mS/Cm)	407.5	400.6	409.3	450.6	-----	Hanna HI 98194 portable multi parameter water quality meter
TDS (mg/l)	260.8	256.4	262.0	288.4	----	Hanna HI 98194 portable multi parameter Water Quality meter

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Domestic Effluent (STP WATER)
Date of Sampling and Analysis period	19.07.2023
Sample Location	Gopalpur Port (19.315126° and 84.970971°)
Method	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Observation Report

Sl No	Parameters	Unit	Results	Standard	Methods
1	pH		8.2	6.5-8.5	APHA 23RD Edition 2017:4500 H+B
2	BOD	mg/L	11.6	MAX30	IS 3025 (P-44) : 1993 RA 2003
3	COD	mg/L	107.9	MAX250	APHA 23RD Edition 2017:5220c
4	Suspended Solids	mg/L	14.4	MAX100	APHA 23RD Edition 2017:2540D
5	Oil & grease	mg/L	1.7	MAX10	APHA 23RD Edition 2017:5520B

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Test Certificate

Submitted to	Gopalpur Port Ltd., Arjeepalli, Ganjam-761020
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Shoreline Monitoring (Beach width & volume,shoreline length, sediment)
Sampling and Analysis period	Monthly (July, 2023)
Sample Location	Observation made at 8 transects for Gopalpur beach (2), port north (3) and south (3) beach covering a stretch of 13 km
Methods and Instrument Used	Observation made with Trimble Total station and data were processed with Arc-View GIS following coastal protection manual (CERC, 2006). For shoreline, observations were carried out with real time differential Global positioning System (DGPS) ArcPad and data were processed in Arc-View GIS environment. The statistics of sediment mean grain size are carried out following Folk & Ward (1957).

Observation Report

Beach Width (m), Beach Volume (m^3/m), shoreline length (m) and sediment grain size (mean and sorting)at specificlocations of Gopalpur during July, 2023.

	Beach Width (m)	Beach Volume (m^3/m)	Shoreline length (m)	Sediment
Tourist beach	33.5	62.3	76.4	Medium and moderately well sorted
Haripur creek	117.9	128.6	104.3	Medium and moderately well sorted
Southern breakwater	342.7	1024.9	1090.9	Medium and moderately well sorted
Intermediate breakwater	298.9	691.5	805.4	Medium and moderately well sorted
Southern groin	450.0	970.2	661.1	Fine and moderately well sorted
Northern groin	73.2	375.5	126.9	Medium and moderately sorted
Marine Thana	156.6	1106.9	194.3	Medium and moderately sorted
Arjipalli	85.1	364.4	179.7	Coarse and moderately well sorted

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Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Shoreline Monitoring (Littoral Environment Observation)
Sampling and Analysis period	Monthly (July, 2023)
Sample Location	Gopalpur Tourist Beach and Gopalpur Port
Methods and Instrument Used	Measuring stuff, compass, floating cork are used to measure LEO following Schneider (1981) and Mohanty et al., (2012)

Observation Report

Littoral Environment Observation at Gopalpur tourist beach and Gopalpur port for the month of July, 2023.

Breaker type	Breaker height (m)	Breaker angle (deg)	Wave period (sec)	Wave direction	Uprush (m/s)	Backwash (m/s)	Surf zone width (m)
Gopalpur Tourist Beach							
Spilling	1.68	20	9.69	SSE	1.2	0.90	85
Gopalpur Port							
Spilling	1.52	15	9.41	SSE	1.11	0.90	95

Authorized Signatory
Nodal Expert, GPL Env. Monitoring Project &

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Marine Water Sample (Physico-chemical)
Sampling and Analysis period	Monthly (July, 2023)
Sample Location	Harbour area, **Latitude- 19° 17' 21" N/Longitude-84° 56' 55"E**
Method adopted	Grasshoff et al., 2009, APHA, 1999& NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Water quality of Harbour area

Water parameters	July, 2023	Standard	Methods
pH	7.81	6.5-9	Microprocessor based pH system Model 1012
DO (mg/l)	5.73	> 3mg/L	Winkler's Titration method following Grasshoff et al (1999)
Colour & Odour	bluish & Odourless	--	------
Fecal coliform (CFU/ml)	731	--	APHA, 1999
BOD (mg/L)	4.49	<5	Winkler's Titration method following Grasshoff et al (1999)
Salinity (PSU)	29.74	--	Mohr-Knudsen Argentometric titration method
EC (mS/Cm)	41.61	--	Hanna HI 98194 portable multi parameter water quality meter
TDS (PPM)	27.51	--	Hanna HI 98194 portable multi parameter Water Quality meter
TSM(gl^{-1})	1.273	--	Filtration method using Vacuum pump and filtration unit
Sulphate(mg/L)	131.23	--	APHA 4500 $SO_4^{2-}E$
Phosphate (mg/L)	BDL	0.1 mg/L	APHA 4500 PD
Nitrate (mg/L)	0.874	1.0 mg/L	APHA 4500 NO_3E
Chloride (mg/L)	16461.8	--	APHA 4500 CL^-B
PHC (mg/L)	0.73	10 mg/L	EPA 3510
Lead(mg/L)	0.034	0.1 mg/L	APHA 3111 B,C
Mercury (mg/L)	0.001	0.1 mg/L	APHA 3500 Hg
Hexavalent Chromium(mg/L)	0.028	0.05 mg/L	APHA 3500 Cr B

Sources of standards:

Primary water quality criteria for class SW-IV waters (Harbour) as per EPA, 1986

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Marine sediment Sample (Physico-chemical)
Sampling and Analysis period	Monthly (July, 2023)
Sample Location	Harbour area, **Latitude- 19° 17' 21" N/Longitude-84° 56' 55"E**
Method adopted	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Sediment quality of Harbour area

Sediment parameters	July, 2023	Methods
Texture (Mean)	Fine&moderately well sorted	Sieve Analysis method using RETSCH AS 200
pH	8.12	IS2720 (P:26)1987
Sodium (mg/kg)	499.55	VCSPL/SOP/Soill14
Potassium (mg/kg)	11.43	VCSPL/SOP/Soill15
Phosphate (mg/kg)	23.49	Methods of analysis of soil by HLS Tandon*
Chloride (mg/kg)	3328	USDA:1954 US -affirmed 2010
Sulphate (mg/kg)	185.8	Methods of analysis of soil by HLS Tandon*
PHC (µg/L)	0.008	UNEP 1992
Lead (mg/kg)	BDL	EPA 3050 B
Mercury (mg/kg)	0.004	EPA 3050 B
Hexavalent chromium (mg/kg)	0.07	Methods of analysis of soil by HLS Tandon*
Organic carbon (%)	0.11	Methods of analysis of soil by HLS Tandon*

*Methods of analysis of Soils, Plants, Waters, and Fertilizers by HLS Tandon published by FDCO, New Delhi, 1993.

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Biological parameters of Marine Water and sediment Sample
Sampling and Analysis period	Monthly (July, 2023)
Sample Location	Harbour area, **Latitude- 19° 17' 21" N/Longitude-84° 56' 55"E**
Method adopted	Grasshoff et al., 2009, APHA, 1999 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Water quality (Biological parameters of Marine Water and sediment Sample) of Harbour area

Station		Parameters	Results (May, 2023 to July, 2023) (Value in average)
Harbour Area Latitude- 19° 17' 21" N Longitude- 84° 56' 55" E	Marine Water	Light penetration (m)	1.5
		Chlorophyll (mg/m^3)	1.5
		Primary productivity (g.C/m^3/hr)	0.047
		Phytoplankton (no. of cells/l)	1480
		Zooplankton (no. of individuals/l)	124
	Sediment	Benthic meiofauna (per m^2)	3542
		Benthic macrofauna (per m^2)	4674

Sources of standards:

Primary water quality criteria for class SW-IV waters (Harbour) as per EPA, 1986

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Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	DG Stack monitoring
Date of Sampling and Analysis period	31.07.2023
Sample Location	Gopalpur Port (six locations)

Test Certificate

Analysis Reports

Table 1: DG Stack monitoring

Stack Details	DG-1 (100 KVA)	DG-2 (100 KVA)	DG-3 (100 KVA)	DG-1 (250 KVA)	DG-2 (250 KVA)	DG-3 (250 KVA)	Limit	Method of Test
Locations	Meter Room	Substation - 1	Colony	Central Store	Meter Room	Substation - 4		
Flue Gas Temperature (k)	364	370	370	378	397	408	----	
Flue Gas Velocity (m/s)	9.99	7.82	6.95	6.81	6.55	10.36	------	
Quantity of emission (m^3/hr)	528.71	384.79	391.62	394.64	343.83	542.61	----	
PM (g/kwh)	0.8	0.10	0.11	0.7	0.12	0.9	≤0.2	IS11255: part-1-1985
SO_2(g/kwh)	0.11	0.8	0.14	0.7	0.15	0.11	NM	IS11255: part-2-1985
NO_x + HC (g/kwh)	0.18	0.12	0.11	0.28	0.23	0.21	≤4.0	IS11255: part-7-200& EPA Method 429
Co(g/kwh)	0.13	0.18	0.25	0.26	0.31	0.45	≤3.5	EPA Method-10

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Potable Water Sample
Sampling and Analysis period	Monthly (July, 2023)
Sample Location	Harbour area,**Latitude- 19.288230^{0}N/Longitude-84.944381^{0}E**
Method adopted	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Potable Water quality near port area

Water parameters	July, 2023	Standard	Methods
Colour & Odour	Result	Agreeable	APHA 23RD EDITION 2017: 2150B
Turbidity (ntu)	0.12	1	APHA 23RD EDITION 2017: 2130B
pH	7.72	6.5-8.5	APHA 23RD EDITION 2017: 4500H+B
Total Hardness (mg/l)	56.84	200	APHA 23RD EDITION 2017: 2340C
Iron(mg/l)	0.06	0.3	APHA 23RD EDITION 2017: 3500 Fe,B
Chloride (mg/L)	0.15	250	APHA 23RD EDITION 2017:CL:B
TDS (mg/l)	90.67	500	APHA 23RD EDITION 2017: 2540C
Calcium(mg/l)	31.4	75	APHA 23RD EDITION 2017: 3500 Ca.B
Magnesium(mg/l)	10.7	30	APHA 23RD EDITION 2017: 3500 Mg.B
Sulphate(mg/L)	08.94	200	APHA 23RD EDITION 2017: 4500 SO_4^{2-}E
Flouride(mg/l)	0.08		APHA 23RD EDITION 2017: 4500 FC
Alakalinity(mg/l)	192.5	200	23RD EDITION 2017:2320B
Salinity(ppt)	0.27	--	Mohr-Knudsen Argentometric titration method
Zinc(mg/l)	BDL	5	23RD EDITION 2017:311B
Lead(mg/L)	BDL	0.01	23RD EDITION 2017:311B
E. Coli (MPN/100 ml)	<1.8	SHALL NOT BE DETECTABLE IN ANY 100 ML SAMPLE	23RD EDITION 2017:9221F

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REPORT

ON

ENVIRONMENTALMONITORING OF GOPALPUR PORT

(Consultancy Project)

August, 2023

Prepared by

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Nodal Expert, GPL Env. Monitoring Project
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Visiontek Consultancy Services Pvt .Ltd
(An Enviro Engineering Consulting Cell)

Submitted to

Gopalpur Ports Limited
Arjeepalli, Via- Chhatrapur
PIN-761020, Ganjam, Odisha, India

GOPALPUR PORT
New Era in Maritime Logistics

Test Certificate

Submitted to	Gopalpur Port Ltd., Arjeepalli, Ganjam-761020
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	**Ambient air quality and Noise level Monitoring**
Sampling and Analysis period	Monthly (August, 2023)
Sample Location	Observations were carried out twice a week for 24 hrs at 4 locations for air quality, and at the same locations once in a month for Noise level.
Methods and Instrument Used	Following National Ambient Air Quality Standards (NAAQS, 2009) stipulated by Central Pollution Control Board (CPCB) and Environment (protection) Act, 1986.

Observation report:

Table 1: Ambient Air Quality and Noise level within Gopalpur Port during August, 2023 at station A and B.

STATION	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	Noise level (dB)
A **Near South break water** (19° 17' 18.69"N, 84° 56' 1.82"E)	02.08.2023	68.43	23.57	2.61	1.37	68.46
	03.08.2023	72.91	28.43	2.73	2.61	
	08.08.2023	83.49	30.18	2.94	3.75	
	09.08.2023	86.27	33.76	3.58	3.94	
	16.08.2023	74.83	30.51	4.61	3.88	
	17.08.2023	77.19	33.94	3.94	4.07	
	22.08.2023	62.48	20.48	2.07	3.58	
	23.08.2023	67.27	22.57	2.19	3.64	
	Mean	**74.11**	**27.93**	**3.08**	**3.36**	
	Range	62.48-86.27	20.48-33.94	2.07-4.61	1.37-4.07	
B **Near intermediate breakwater** (19° 17' 48.1"N, 84° 57' 03.3"E)	02.08.2023	74.16	26.58	2.84	2.34	64.18
	03.08.2023	67.67	21.94	2.67	2.18	
	08.08.2023	83.46	31.68	3.83	3.67	
	09.08.2023	87.18	34.92	4.28	3.51	
	16.08.2023	79.64	28.76	4.35	4.07	
	17.08.2023	77.38	26.88	3.81	3.92	
	22.08.2023	62.18	21.93	2.53	2.66	
	23.08.2023	64.34	25.83	2.67	2.18	
	Mean	**74.50**	**27.32**	**3.37**	**3.07**	
	Range	62.18-87.18	21.93-34.92	2.53-4.35	2.18-4.07	
Reference value (CPCB/NAAQS, 2009)		100	60	80	80	70-75 (CPCB/Noise pollution Rule - 2000)

(PM-Particulate matter, SO_2-Sulphur Dioxide, NO_2-Nitrogen Dioxide,dB-decibel)

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Table 2: Ambient Air Quality and Noise level within Gopalpur Port during August, 2023 at station C and D.

STATION	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	Noise level (dB)
C **Near signal Station** **(19° 18' 29.0''N, 84° 57' 41.1''E)**	**04.08.2023**	70.38	21.67	2.84	2.34	63.49
	05.08.2023	72.94	23.51	2.67	2.68	
	11.08.2023	89.43	28.67	3.92	2.94	
	12.08.2023	91.85	26.43	4.27	3.82	
	18.08.2029	84.67	30.99	4.68	3.64	
	19.08.2023	86.26	28.61	3.76	3.51	
	28.08.2023	79.46	24.38	2.34	2.46	
	29.08.2023	73.55	26.72	2.85	2.67	
	Mean	**81.07**	**26.37**	**3.42**	**3.01**	
	Range	70.38-91.85	21.67-30.99	2.34-4.68	2.34-3.82	
D **Near entrance Gate** **(19° 18' 51.59''N, 84°58'6.49''E)**	**04.08.2023**	64.51	22.64	2.33	2.11	70.54
	05.08.2023	68.83	24.91	2.57	2.38	
	11.08.2023	88.43	34.83	3.72	3.72	
	12.08.2023	82.64	31.62	3.86	3.92	
	18.08.2029	89.46	34.28	4.16	3.46	
	19.08.2023	90.18	36.88	4.88	4.15	
	28.08.2023	62.48	29.73	2.94	2.43	
	29.08.2023	76.42	26.49	2.71	2.67	
	Mean	**77.87**	**30.17**	**3.40**	**3.11**	
	Range	62.48-90.18	22.64-36.88	2.33-4.88	2.11-4.15	
Reference value (CPCB/NAAQS, 2009)		**100**	**60**	**80**	**80**	**70-75** (CPCB/ Noise pollution Rule - 2000)

(PM-Particulate matter, SO_2-Sulphur Dioxide, NO_2-Nitrogen Dioxide, dB-decibel)

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	**Effluent from Coal stack yard**
Date of Sampling and Analysis period	11.08.2023
Sample Location	Gopalpur Port (Four locations)

Observation Report

Stack Details	Stack Yard-1	Stack Yard-2	Stack Yard-3	Stack Yard-4	Limit	Method of Test
Location	Near substation-1					
pH	8.4	8.2	8.1	8.2	6.5-9	Microprocessor based pH system Model 1012
EC (mS/Cm)	403.4	408.3	412.5	407.8	-----	Hanna HI 98194 portable multi parameter water quality meter
TDS (mg/l)	258.2	261.3	264.0	261.0	----	Hanna HI 98194 portable multi parameter Water Quality meter

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Domestic Effluent (STP WATER)
Date of Sampling and Analysis period	22.08.2023
Sample Location	Gopalpur Port (19.315126° and 84.970971°)
Method	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Observation Report

Sl No	Parameters	Unit	Results	Standard	Methods
1	pH		7.8	6.5-8.5	APHA 23RD Edition 2017:4500 H^+B
2	BOD	mg/L	12.7	MAX30	IS 3025 (P-44) : 1993 RA 2003
3	COD	mg/L	118.4	MAX250	APHA 23RD Edition 2017:5220c
4	Suspended Solids	mg/L	18.6	MAX100	APHA 23RD Edition 2017:2540D
5	Oil & grease	mg/L	3.8	MAX10	APHA 23RD Edition 2017:5520B

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Test Certificate

Observation Report

Beach Width (m), Beach Volume (m^3/m), and sediment grain size (mean and sorting) at specific locations of Gopalpur during August, 2023.

	Beach Width (m)	Beach Volume (m^3/m)	Sediment
Tourist beach	39.9	80.2	Medium and moderately sorted
Haripur creek	113.5	91.8	Coarse and moderately sorted
Southern breakwater	361.2	1221.2	Fine and moderately well sorted
Intermediate breakwater	300.1	715.4	Medium and moderately well sorted
Southern groin	438.5	993.6	Medium and moderately sorted
Northern groin	88.0	422.5	Medium and well sorted
Marine Thana	145.0	1100.1	Coarse and moderately well sorted
Arjipalli	78.1	366.5	Medium and moderately sorted

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Shoreline Monitoring (Shoreline Position)
Sampling and Analysis period	Monthly (August , 2023)
Sample Location	Observation made for the coastline from Gopalpur beach to port north beach over a stretch of 13 km and at the sand spit of Rushikulya River mouth
Methods and Instrument Used	Observations were carried out with real time differential Global positioning System (DGPS) ArcPad and data were processed in Arc-View GIS environment.

Observation Report

Table 1: Shoreline Position (m) of Gopalpur Tourist Beach (GPB), Gopalpur Port South (GPLS) and Gopalpur Port North (GPLN) beach with reference to baseline on the backshore during August, 2023. The distance between two successive transects were maintained at 500m.

GPB_1	GPB_2	GPB_3	GPB_4	GPB_5	GPB_6	GPB_7
60.2	77.8	74.1	88.4	701.8	669.9	689.7

GPLS_1	GPLS_2	GPLS_3	GPLS_6	GPLS_7	GPLS_8	GPLS_9	GPLS_10
681.7	643.3	816.9	1095.8	951.1	849.2	764.3	734.1

GPLN_1	GPLN_2	GPLN_3	GPLN_4	GPLN_5	GPLN_6	GPLN_7	GPLN_8	GPLN_9	GPLN_10
205.4	178.0	208.1	196.8	207.0	225.9	184.8	273.0	310.4	367.7

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Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Shoreline Monitoring (Littoral Environment Observation)
Sampling and Analysis period	Monthly (August, 2023)
Sample Location	Gopalpur Tourist Beach and Gopalpur Port
Methods and Instrument Used	Measuring stuff, compass, floating cork are used to measure LEO following Schneider (1981) and Mohanty et al., (2012)

Observation Report

Littoral Environment Observation at Gopalpur tourist beach and Gopalpur port for the month of August, 2023.

Breaker type	Breaker height (m)	Breaker angle (deg)	Wave period (sec)	Wave direction	Uprush (m/s)	Backwash (m/s)	Surf zone width (m)
Gopalpur Tourist Beach							
Spilling	1.60	15	11.57	SSE	1.32	1.00	95
Gopalpur Port							
Plunging	1.64	20	11.15	SE	1.1	0.88	100

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Marine Water Sample (Physico-chemical)
Sampling and Analysis period	Monthly (August, 2023)
Sample Location	Harbour area, **Latitude- 19° 17' 21" N/Longitude-84° 56' 55"E**
Method adopted	Grasshoff et al., 2009, APHA, 1999& NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Water quality of Harbour area

Water parameters	August, 2023	Standard	Methods
pH	7.84	6.5-9	Microprocessor based pH system Model 1012
DO (mg/l)	5.93	> 3mg/L	Winkler's Titration method following Grasshoff et al (1999)
Colour & Odour	bluish & Odourless	--	-------
Fecal coliform (CFU/ml)	967	--	APHA, 1999
BOD (mg/L)	3.68	<5	Winkler's Titration method following Grasshoff et al. (1999)
Salinity (PSU)	30.26	--	Mohr-Knudsen Argentometric titration method
EC (mS/Cm)	45.28	--	Hanna HI 98194 portable multi parameter water quality meter
TDS (PPM)	29.34	--	Hanna HI 98194 portable multi parameter Water Quality meter
TSM($g.l^{-1}$)	1.386	--	Filtration method using Vacuum pump and filtration unit
Sulphate(mg/L)	134.9	--	APHA 4500 $SO_4^{2-}E$
Phosphate (mg/ L)	BDL	0.1 mg/L	APHA 4500 PD
Nitrate (mg/L)	0.916	1.0 mg/L	APHA 4500 NO_3E
Chloride (mg/L)	16862	--	APHA 4500 CL-B
PHC (mg/L)	0.84	10 mg/L	EPA 3510
Lead(mg/L)	0.041	0.1 mg/L	APHA 3111 B,C
Mercury (mg/L)	0.001	0.1 mg/L	APHA 3500 Hg
Hexavalent Chromium(mg/L)	0.016	0.05 mg/L	APHA 3500 Cr B

Sources of standards:Primary water quality criteria for class SW-IV waters (Harbour) as per EPA, 1986

Authorized Signatory
Nodal Expert, GPL Env. Monitoring Project

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Marine sediment Sample (Physico-chemical)
Sampling and Analysis period	Monthly (August, 2023)
Sample Location	Harbour area, **Latitude- 19° 17' 21" N/Longitude-84° 56' 55"E**
Method adopted	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Sediment quality of Harbour area

Sediment parameters	August, 2023	Methods
Texture (Mean)	Fine&moderately well sorted	Sieve Analysis method using RETSCH AS 200
pH	8.21	IS2720 (P:26)1987
Sodium (mg/kg)	532.7	VCSPL/SOP/Soil114
Potassium (mg/kg)	10.46	VCSPL/SOP/Soil115
Phosphate (mg/kg)	24.68	Methods of analysis of soil by HLS Tandon*
Chloride (mg/kg)	3467	USDA:1954 US -affirmed 2010
Sulphate (mg/kg)	185.8	Methods of analysis of soil by HLS Tandon*
PHC (µg/L)	0.007	UNEP 1992
Lead (mg/kg)	BDL	EPA 3050 B
Mercury (mg/kg)	0.002	EPA 3050 B
Hexavalent chromium (mg/kg)	0.12	Methods of analysis of soil by HLS Tandon*
Organic carbon (%)	0.10	Methods of analysis of soil by HLS Tandon*

*Methods of analysis of Soils, Plants, Waters, and Fertilizers by HLS Tandon published by FDCO, New Delhi, 1993.

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	DG Stack monitoring
Date of Sampling and Analysis period	22.08.2023
Sample Location	Gopalpur Port (six locations)

Analysis Reports

Table 1: DG Stack monitoring

Stack Details	DG-1 (100 KVA)	DG-2 (100 KVA)	DG-3 (100 KVA)	DG-1 (250 KVA)	DG-2 (250 KVA)	DG-3 (250 KVA)	Limit	Method of Test
Locations	Meter Room	Substation - 1	Colony	Central Store	Meter Room	Substation - 4		
Flue Gas Temperature (k)	358	367	374	367	381	408	----	
Flue Gas Velocity (m/s)	9.83	8.04	7.13	6.73	7.28	8.43	-----	
Quantity of emission (m^3/hr)	490.82	394.8	384.92	396.43	354.39	473.91	----	
PM (g/kwh)	0.7	0.9	0.10	0.9	0.14	0.11	≤0.2	IS11255: part-1-1985
SO_2(g/kwh)	0.13	0.19	1.5	0.13	0.12	0.09	NM	IS11255: part-2-1985
NO_x + HC (g/kwh)	0.17	0.11	0.12	0.24	0.21	0.19	≤4.0	IS11255: part-7-200& EPA Method 429
Co(g/kwh)	0.11	0.15	0.21	0.23	0.29	0.38	≤3.5	EPA Method-10

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Potable Water Sample
Sampling and Analysis period	Monthly (August, 2023)
Sample Location	Harbour area,**Latitude- 19.288230°N/Longitude-84.944381°E**
Method adopted	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Potable Water quality near port area

Water parameters	August, 2023	Standard	Methods
Colour & Odour	Result	Agreeable	APHA 23RD EDITION 2017: 2150B
Turbidity (ntu)	0.13	1	APHA 23RD EDITION 2017: 2130B
pH	7.70	6.5-8.5	APHA 23RD EDITION 2017: 4500H+B
Total Hardness (mg/l)	59.63	200	APHA 23RD EDITION 2017: 2340C
Iron(mg/l)	0.06	0.3	APHA 23RD EDITION 2017: 3500 Fe,B
Chloride (mg/L)	0.17	250	APHA 23RD EDITION 2017:CL-B
TDS (mg/l)	88.47	500	APHA 23RD EDITION 2017: 2540C
Calcium(mg/l)	20.3	75	APHA 23RD EDITION 2017: 3500 Ca,B
Magnesium(mg/l)	2.4	30	APHA 23RD EDITION 2017: 3500 Mg,B
Sulphate(mg/L)	8.32	200	APHA 23RD EDITION 2017: 4500 SO_4^{2-}E
Flouride(mg/l)	0.09		APHA 23RD EDITION 2017: 4500 FC
Alakalinity(mg/l)	193.6	200	23RD EDITION 2017:2320B
Salinity(ppt)	0.23	--	Mohr-Knudsen Argentometric titration method
Zinc(mg/l)	BDL	5	23RD EDITION 2017:311B
Lead(mg/L)	BDL	0.01	23RD EDITION 2017:311B
E. Coli (MPN/100 ml)	<1.8	SHALL NOT BE DETECTABLE IN ANY 100 ML SAMPLE	23RD EDITION 2017:9221F

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Committed For Better Environment

ISO 9001: 2015
ISO 14001:2015
ISO 45001:2018 (OH&S)
ISO/IEC 17025:2005

REPORT

ON

ENVIRONMENTALMONITORING OF GOPALPUR PORT

(Consultancy Project)

September, 2023

Prepared by

VISIONTEK Consultancy Services Pvt. Ltd.,
Nodal Expert, GPL Env. Monitoring Project
Plot No- M22 23, Chandaka Industrial Estate, Patia,
Bhubaneswar-751024

Visiontek Consultancy Services Pvt .Ltd
(An Enviro Engineering Consulting Cell)

Submitted to

Gopalpur Ports Limited
Arjeepalli, Via- Chhatrapur
PIN-761020, Ganjam, Odisha, India

GOPALPUR PORT
New Era in Maritime Logistics

Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	**Ambient air quality and Noise level Monitoring**
Sampling and Analysis period	Monthly (September, 2023)
Sample Location	Observations were carried out twice a week for 24 hrs at 4 locations for air quality, and at the same locations once in a month for Noise level.
Methods and Instrument Used	Following National Ambient Air Quality Standards (NAAQS, 2009) stipulated by Central Pollution Control Board (CPCB) and Environment (protection) Act, 1986.

Observation report:

Table 1: Ambient Air Quality and Noise level within Gopalpur Port during September, 2023 at station A and B.

STATION	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	Noise level (dB)
"A" near southern break water (19^0 17' 18.69"N, 84^0 56' 1.82"E)	**04.09.2023**	64.35	24.28	4.84	2.15	57.3
	05.09.2023	68.24	24.99	3.93	1.94	
	12.09.2023	70.18	25.37	3.61	2.44	
	13.09.2023	71.69	26.13	3.54	2.47	
	20.09.2023	75.39	27.34	3.19	1.94	
	21.09.2023	72.18	26.81	3.58	2.42	
	25.09.2023	63.27	21.37	4.64	2.61	
	26.09.2023	70.68	24.97	3.83	3.12	
	Mean	**69.50**	**25.16**	**3.90**	**2.39**	
	Range	63.27-75.39	21.37-27.34	3.19-4.84	1.94-3.12	
"B" Near intermediate break water (19^0 17' 48.1"N, 84^0 57' 03.3"E)	**04.09.2023**	73.91	26.87	3.41	2.31	62.4
	05.09.2023	68.43	21.37	3.83	2.73	
	12.09.2023	70.58	26.34	3.46	1.64	
	13.09.2023	64.29	21.62	3.85	2.83	
	20.09.2023	68.37	22.35	4.07	2.44	
	21.09.2023	74.28	26.84	4.93	1.62	
	25.09.2023	69.33	23.08	3.86	3.13	
	26.09.2023	67.24	22.58	3.49	2.66	
	Mean	**69.55**	**23.88**	**3.86**	**2.42**	
	Range	64.29-74.28	21.37-26.87	3.41-4.93	1.62-3.13	
Reference value (NAAQS, 2009)		**100**	**60**	**80**	**80**	**70-75 (Env. P. Act, 1986)**

(PM-Particulate matter, SO_2-Sulphur Dioxide, NO_2-Nitrogen Dioxide, dB-decibel)

Table 2: Ambient Air Quality and Noise level within Gopalpur Port during September, 2023 at station C and D.

STATION	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	Noise level (dB)
"C" near signal station/environment laboratory (19^0 18' 29.0"N, 84^0 57' 41.1"E)	06.09.2023	71.39	25.95	3.28	3.24	65.9
	07.09.2023	68.75	23.07	3.46	3.22	
	15.09.2023	76.18	21.57	3.91	1.08	
	16.09.2023	73.24	21.37	2.83	2.94	
	22.09.2023	80.42	28.94	2.67	3.27	
	23.09.2023	76.37	26.49	2.61	3.53	
	27.09.2023	76.22	25.32	3.46	3.84	
	28.09.2023	78.37	26.17	2.92	3.97	
	Mean	75.12	24.86	3.14	3.14	
	Range	68.75-80.42	21.37-28.94	2.61-3.91	1.08-3.97	
"D" Near entrance gate (19^0 18' 51.59"N, 84^0 58'6.49"E)	06.09.2023	78.38	26.37	2.64	2.31	63.5
	07.09.2023	76.17	25.43	2.92	2.76	
	15.09.2023	86.27	28.42	3.18	1.28	
	16.09.2023	79.33	26.76	3.04	1.61	
	22.09.2023	82.49	27.51	3.66	2.37	
	23.09.2023	80.17	27.18	3.72	2.64	
	27.09.2023	76.43	25.99	3.16	2.94	
	28.09.2023	81.27	28.94	3.42	3.12	
	Mean	80.06	27.08	3.22	2.38	
	Range	76.17-86.27	25.43-28.94	2.64-3.72	1.28-3.12	
Reference value (NAAQS, 2009)		100	60	80	80	70-75 (Env. P. Act, 1986)

(PM-Particulate matter, SO_2-Sulphur Dioxide, NO_2-Nitrogen Dioxide, dB-decibel)

Authorized Signatory
Nodal Expert, GPL Env. Monitoring Project

Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	**Effluent from Coal stack yard**
Date of Sampling and Analysis period	16.09.2023
Sample Location	Gopalpur Port (Four locations)

Observation Report

Stack Details	Stack Yard-1	Stack Yard-2	Stack Yard-3	Stack Yard-4	Limit	Method of Test
Location	Near substation-1					
pH	8.6	8.4	8.8	8.4	6.5-9	Microprocessor based pH system Model 1012
EC (mS/Cm)	403.25	406.37	408.47	404.64	-----	Hanna HI 98194 portable multi parameter water quality meter
TDS (mg/l)	258	260	261.4	258.9	----	Hanna HI 98194 portable multi parameter Water Quality meter

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Domestic Effluent (STP WATER)
Date of Sampling and Analysis period	22.09.2023
Sample Location	Gopalpur Port (19.315126^0 and 84.970971^0)
Method	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Observation Report

Sl No	Parameters	Unit	Results	Standard	Methods
1	pH		7.9	6.5-8.5	APHA 23RD Edition 2017:4500 H+B
2	BOD	mg/L	14.3	MAX30	IS 3025 (P-44) : 1993 RA 2003
3	COD	mg/L	122.8	MAX250	APHA 23RD Edition 2017:5220c
4	Suspended Solids	mg/L	21.3	MAX100	APHA 23RD Edition 2017:2540D
5	Oil & grease	mg/L	3.9	MAX10	APHA 23RD Edition 2017:5520B

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Test Certificate

Methods and Instrument Used	Observation made with Trimble Total station and data were processed with Arc-View GIS following coastal protection manual (CERC, 2006). For shoreline, observations were carried out with real time differential Global positioning System (DGPS) ArcPad and data were processed in Arc-View GIS environment. The statistics of sediment mean grain size are carried out following Folk & Ward (1957).

Observation Report

Beach Width (m), Beach Volume (m^3/m), and sediment grain size (mean and sorting)at specificlocations of Gopalpur during September, 2023.

	Beach Width (m)	Beach Volume (m^3/m)	Sediment
Tourist beach	36.9	77.0	Medium and moderately sorted
Haripur creek	91.3	54.0	Medium and moderately well sorted
Southern breakwater	322.6	1048.0	Fine and moderately well sorted
Intermediste breakwater	264.9	595.4	Medium and moderately well sorted
Southern groin	430.5	920.1	Medium and moderately well sorted
Northern groin	68.7	325.3	Medium and moderately well sorted
Marine Thana	143.9	1079.5	medium and moderately well sorted
Arjipalli	78.1	346.5	coarse and moderately well sorted

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Shoreline Monitoring (Shoreline Position)
Sampling and Analysis period	Monthly (September , 2023)
Sample Location	Observation made for the coastline from Gopalpur beach to port north beach over a stretch of 13 km and at the sand spit of Rushikulya River mouth
Methods and Instrument Used	Observations were carried out with real time differential Global positioning System (DGPS) ArcPad and data were processed in Arc-View GIS environment.

Observation Report

Table 1: Shoreline Position (m) ofGopalpur Tourist Beach (GPB), Gopalpur Port South (GPLS) and Gopalpur Port North (GPLN) beach with reference to baseline on the backshore duringSeptember, 2023. The distance between two successive transects were maintained at 500m.

GPB_1	GPB_2	GPB_3	GPB_4	GPB_5	GPB_6	GPB_7
49.7	45.2	56.8	54.7	688.1	707.3	647.6

GPLS_1	GPLS_2	GPLS_3	GPLS_6	GPLS_7	GPLS_8	GPLS_9	GPLS_10
649.4	618.7	788.6	1069.2	922.1	842.3	752	713.8

GPLN_1	GPLN_2	GPLN_3	GPLN_4	GPLN_5	GPLN_6	GPLN_7	GPLN_8	GPLN_9	GPLN_10
232.8	197.6	213.2	166.3	186.5	203.4	160.3	273.0	329.9	363.6

Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Shoreline Monitoring (Littoral Environment Observation)
Sampling and Analysis period	Monthly (September, 2023)
Sample Location	Gopalpur Tourist Beach and Gopalpur Port
Methods and Instrument Used	Measuring stuff, compass, floating cork are used to measure LEO following Schneider (1981) and Mohanty et al., (2012)

Observation Report

Littoral Environment Observation at Gopalpur tourist beach and Gopalpur port for the month of September, 2023.

Breaker type	Breaker height (m)	Breaker angle (deg)	Wave period (sec)	Wave direction	Uprush (m/s)	Backwash (m/s)	Surf zone width (m)
Gopalpur Tourist Beach							
Spilling	1.70	20	9.35	SSE	1.20	0.96	90
Gopalpur Port							
Plunging	1.66	20	11.15	SSE	1.31	1.03	100

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Nodal Expert, GPL Env. Monitoring Project

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Marine Water Sample (Physico-chemical)
Sampling and Analysis period	Monthly (September, 2023)
Sample Location	Harbour area, **Latitude- 19^0 17' 21" N/Longitude-84^0 56' 55"E**
Method adopted	Grasshoff et al., 2009, APHA, 1999& NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Water quality of Harbour area

Water parameters	**September, 2023**	Standard	Methods
pH	7.91	6.5-9	Microprocessor based pH system Model 1012
DO (mg/l)	6.34	> 3mg/L	Winkler's Titration method following Grasshoff et al (1999)
Colour & Odour	bluish & Odourless	--	-------
Fecal coliform (CFU/ml)	967	--	APHA, 1999
BOD (mg/L)	3.51	<5	Winkler's Titration method following Grasshoff et al. (1999)
Salinity (PSU)	29.87	--	Mohr-Knudsen Argentometric titration method
EC (mS/Cm)	44.36	--	Hanna HI 98194 portable multi parameter water quality meter
TDS (PPM)	28.42	--	Hanna HI 98194 portable multi parameter Water Quality meter
TSM($g.l^{-1}$)	1.682	--	Filtration method using Vacuum pump and filtration unit
Sulphate(mg/L)	128.6	--	APHA 4500 $SO_4^{2-}E$
Phosphate (mg/ L)	BDL	0.1 mg/L	APHA 4500 PD
Nitrate (mg/L)	1.384	1.0 mg/L	APHA 4500 NO_3E
Chloride (mg/L)	17324	--	APHA 4500 CL-B
PHC (mg/L)	0.78	10 mg/L	EPA 3510
Lead(mg/L)	0.038	0.1 mg/L	APHA 3111 B,C
Mercury (mg/L)	0.001	0.1 mg/L	APHA 3500 Hg
Hexavalent Chromium(mg/L)	0.018	0.05 mg/L	APHA 3500 Cr B

Sources of standards:Primary water quality criteria for class SW-IV waters (Harbour) as per EPA, 1986

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Marine sediment Sample (Physico-chemical)
Sampling and Analysis period	Monthly(September,2023)
Sample Location	Harbour area, **Latitude- 19^0 17' 21" N/Longitude-84^0 56' 55"E**
Method adopted	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Sediment quality of Harbour area

Sediment parameters	September, 2023	Methods
Texture (Mean)	Fine&moderately well sorted	Sieve Analysis method using RETSCH AS 200
pH	6.89	IS2720 (P:26)1987
Sodium (mg/kg)	574	VCSPL/SOP/Soill14
Potassium (mg/kg)	17.85	VCSPL/SOP/Soill15
Phosphate (mg/kg)	10.43	Methods of analysis of soil by HLS Tandon*
Chloride (mg/kg)	4073	USDA:1954 US -affirmed 2010
Sulphate (mg/kg)	194.64	Methods of analysis of soil by HLS Tandon*
PHC (µg/L)	0.004	UNEP 1992
Lead (mg/kg)	BDL	EPA 3050 B
Mercury (mg/kg)	0.003	EPA 3050 B
Hexavalent chromium (mg/kg)	0.08	Methods of analysis of soil by HLS Tandon*
Organic carbon (%)	0.11	Methods of analysis of soil by HLS Tandon*

*Methods of analysis of Soils, Plants, Waters, and Fertilizers by HLS Tandon published by FDCO, New Delhi, 1993.

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	DG Stack monitoring
Date of Sampling and Analysis period	27.09.2023
Sample Location	Gopalpur Port (six locations)

Analysis Reports

Table 1: DG Stack monitoring

Stack Details	DG-1 (100 KVA)	DG-2 (100 KVA)	DG-3 (100 KVA)	DG-4 (250 KVA)	DG-5 (250 KVA)	DG-6 (250 KVA)	Limit	Method of Test
Locations	Meter Room	Substation - 1	Colony	Central Store	Meter Room	Substation - 4		
Flue Gas Temperature (k)	362	359	368	374	403	384	----	
Flue Gas Velocity (m/s)	8.73	7.49	8.18	7.37	6.97	7.92	-----	
Quantity of emission (m^3/hr)	474.65	412.38	991.64	389.43	361.28	474.2	----	
PM (g/kwh)	0.12	0.08	0.10	0.12	0.14	0.11	≤0.2	IS11255: part-1-1985
SO_2(g/kwh)	0.08	0.11	0.13	0.18	0.17	0.14	NM	IS11255: part-2-1985
NO_x + HC (g/kwh)	0.18	0.11	0.14	0.23	0.28	0.18	≤4.0	IS11255: part-7-200& EPA Method 429
Co(g/kwh)	0.10	0.17	0.23	0.28	0.32	0.37	≤3.5	EPA Method-10

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Test Certificate

Submitted to	**Gopalpur Port Ltd., Arjeepalli, Ganjam-761020**
Reference/Approval No	GPL/WO/2023-24/25 dated 27th May, 2023
Sample Description	Potable Water Sample
Sampling and Analysis period	Monthly (September, 2023)
Sample Location	Harbour area,**Latitude- 19.288230°N/Longitude-84.944381°E**
Method adopted	Grasshoff et al., 2009 & NCCR sea water analysis protocol to COMAPS, Govt. of India

Analysis Reports

Table 1: Potable Water quality near port area

Water parameters	September, 2023	Standard	Methods
Colour & Odour	Result	Agreeable	APHA 23RD EDITION 2017: 2150B
Turbidity (ntu)	0.11	1	APHA 23RD EDITION 2017: 2130B
pH	7.64	6.5-8.5	APHA 23RD EDITION 2017: 4500H+B
Total Hardness (mg/l)	21.23	200	APHA 23RD EDITION 2017: 2340C
Iron(mg/l)	0.06	0.3	APHA 23RD EDITION 2017: 3500 Fe,B
Chloride (mg/L)	0.19	250	APHA 23RD EDITION 2017:CL-B
TDS (mg/l)	65.8	500	APHA 23RD EDITION 2017: 2540C
Calcium(mg/l)	6.82	75	APHA 23RD EDITION 2017: 3500 Ca,B
Magnesium(mg/l)	0.98	30	APHA 23RD EDITION 2017: 3500 Mg,B
Sulphate(mg/L)	8.27	200	APHA 23RD EDITION 2017: 4500 SO_4^{2-}E
Flouride(mg/l)	0.05		APHA 23RD EDITION 2017: 4500 FC
Alakalinity(mg/l)	16.2	200	23RD EDITION 2017:2320B
Salinity(ppt)	0.21	--	Mohr-Knudsen Argentometric titration method
Zinc(mg/l)	BDL	5	23RD EDITION 2017:311B
Lead(mg/L)	BDL	0.01	23RD EDITION 2017:311B
E. Coli (MPN/100 ml)	<1.8	SHALL NOT BE DETECTABLE IN ANY 100 ML SAMPLE	23RD EDITION 2017:9221F

VISIONTEK CONSULTANCY SERVICES PVT. LTD.

Authorized Signatory
Nodal Expert, GPL Env. Monitoring Project

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ISO 9001:2015
ISO 14001:2015
ISO 45001:2018 (OH&S)
ISO/IEC 17025:2005