O/C

adani
Ports and Logistics

Ref: GPL/ENV/ 2025-26/33 Date: 25.11.2025

To,

The Director,
Ministry of Environment, Forest & Climate Change
Indira Paryavaran, Jor Bagh Road,
New Delhi -110003

Subject: Development of Gopalpur Ports Ltd. Env Compliance.

Ref: No.10-12/2009-IA.III dt:30th March,2011, 14th August 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 September'2025 is being enclosed for your kind consideration.

STATE POLLUTION CONTROL BOARD, ODISHA
REGIONAL OFFICE, BERHAMPUR
26 NOV 2025
RECEIVED
26/11/2025

Thanking You.

Yours Sincerely

For Gopalpur Ports Limited,

Authorized signatory

Copy to:

1. Additional Chief Secretary, Department of Forest & Wildlife, Govt. of Odisha, Secretariat, Bhubaneswar -751001.
2. The Chairmen, Central Pollution Control Board, Parivesh Bhavan, CBD-Cum-office Complex East, Arjune Nagar, Delhi-110032.
3. Addl. Pricipal Chief Conservator of Forest (Central),Ministry of Environment, Forest and Cliamte Change ,Regional office (EZ), A/3, Chandersekharpur, Bhubaneswar-751023
4. The Member Secretary, Odisha State Pollution Control Board, Paribesh Bhavan, A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar-751012,
5. Regional Officer, Odisha State Pollution Control Board, Bharampur, Ganjam.

Gopalpur Ports Limited
At/Po : Arjeepalli, Via- Chatrapur
Dist- Ganjam, State- Odisha, PIN-761045, INDIA
CIN : U63032OR2006PLC008831

Tel : 06811-257900/ 257300 / 257699
FAX : 06811-257799
Website : www.adaniports.com

Registered Office : Adani Corporate House, Shantigram, Near Vaishno Devi Circle, S.G. Highway, Khodiyar, Ahmedabad-382421, Gujrat, INDIA, Tel : +91 79 26565555, FAX : +91 79 25556490



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. Consent for Establishment obtained for 10 MTPA from SPCB Vide CTE No: 24195/Ind-II-NOC-5022dated:06.11.2008 & vide CTE No: 13982/Ind-IINOC-5022 (pt) dated:27-11-2018 for 20MTPA.
(ii)	No construction works other than those permitted in Coastal Regulation Zone Notification, 2011 shall be carried out in Coastal Regulation Zone area.	Noted and Being complied Construction activities are being carried out in line with the approvals accorded and in compliance with the provisions of CRZ notification 2011, as amended till date.
(iii)	The shoreline 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.	Being Complied Beach nourishment is undertaken for 4 MCM in the north side of the Port to address the erosional aspect. Environmental monitoring report (From March 2025 to September 2025) 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 is carried out by use of controlled cutter suction Dredge (CDS). Other mitigation measures are implemented to curtail the turbidity. As a part of existing operation, periodic marine water quality monitoring including turbidity is carried out by engaging MOEF&CC approved laboratory. The details of marine water quality monitoring reports for the period from April'25 to Sept'25 are enclosed.
(v)	Technically qualified institutions shall be engaged to monitor the impact right from the beginning to suggest scientifically accepted mitigation measures such 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 of 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 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.	Being Complied

		Oil Spill Contingency Plan (OSCP) is in place. Utmost care is being taken to avoid spillage of fuel/engine oil and lubricants from site. In case of any accidental spillage, saw dust or sand is being used along with absorbent to arrest the spillage. Used oil/waste oil/waste containing oils are handed over to SPCB approved authorized recyclers. Marine water quality & productivity is monitored by MoEF&CC accredited laboratory, M/s- My World Consultancy Services Pvt. Ltd There is no adverse impact on water quality and marine productivity in the vicinity
(ix)	There shall be no drawl of ground water in CRZ area.	Complied with. There is no withdrawal of ground water from the CRZ area. We have received permission for 02 nos. of bore wells & 01 no's of Piezometers from CGWA for drawl of ground water. NOC No: CGWA/NOC/INF/ORIG/ 2021/ 11458, valid up to 25.03.2026 for 100 m3/ day.
(x)	Environment Management Plan as suggested shall be strictly complied with.	Complied. As per the EMP the Environmental monitoring and mitigation measures are strictly followed. As a part of existing operation periodic monitoring program covering all seasons on various aspects of the marine ecology monitoring is carried out by NABL & MoEF&CC accredited laboratory, M/s- My World Consultancy services Pvt.Ltd The monitoring results

		for the period April'25 to Sept '25 is enclosed.
(xi)	There shall be no disposal of solid and liquid wastes into the Coastal areas.	Being complied. the generated solid waste segregated and disposed of to Authorized Recycler. Similarly, the secondary containment facility provision is implemented at site and further disposal adopted through Authorized recycler for liquid waste.
(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.	Being Complied. As a part of existing operation, one STP of capacity 15 KLD, is functioning for treatment of sewage from township area. 3 nos. of Settling ponds have been constructed for treatment of runoff water. The treated water is being used for dust suppression of internal roads. Periodic testing of water quality is being carried out by MoEF&CC approved laboratory, and the results are being submitted to SPCB/MOEF&CC. All results are well within the prescribed standards. The water treated is being used for horticulture purpose.
(xiii)	The solid waste shall be properly collected, segregated, and disposed as per the provision of solid Waste (Management and Handling) Rules, 2000.	Being Complied Waste management Plan is in place. GPL has developed a vision for making itself – "A Zero Waste to Landfill Port" by adoption of 5R principle of waste management i.e., Reduce, Reuse, Reprocess, Recycle & Recover. Biodegradable waste is being used for

		compost preparation. Recyclable waste is handed over to authorized recyclers.
(xiv)	Installation and operation of DG set if any shall comply with the guidelines of CPCB.	Being Complied CPCB approved DG sets are installed. As a part of existing operation 6 nos. of standby DG Sets of capacity ranging from 100 KVA to 250 KVA are in position for emergency backups & uninterrupted power supply to the water supply system and Port operation system. DG sets monitoring carried out by NABL and MOEFCC accredited laboratory, M/s- My World Consultancy services Pvt.Ltd with frequency monthly/once.
(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.	Being Complied 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 cells for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.	Being Complied Environment Management Cell has been created Headed by Senior Environment personnel.
(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.	Being Complied Green Belt development at site, total 72740 nos saplings were planted, which covers 72.59 acres of total land.

(xviii)	The funds earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes.	Being Complied Adequate funds are ear-marked and available.
(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.	Noted and complied Construction of the project commenced after obtaining 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.	Complied
(ii)	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	Being complied with. GPL ensuring digging activities & further regular marine monitoring is carried out to check the level of turbidity.
(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.	Being complied. a). No excavation or dumping is carried out on private property.

	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.	b). No excavation or dumping is carried out in forest areas, wetlands or other ecological valuable or sensitive areas. c). No excavation work is being undertaken. d). Hazardous Waste Management Rules are being followed at site in strictly.Utmost care is being taken to prevent contamination by spillage.
(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.	Noted and being Complied Construction materials are being procured only from approved quarries. GPL has obtained the CTO of Pallur Hill stone quarry :1404/2024-25 dated: 09.04.2024 for 48000 CUM/ Annum.
(v)	Adequate precautions shall be taken during transportation of the construction material so that it does not affect the environment adversely.	Being complied with. • All vehicles coming into the site will be under a speed restriction of 20 km/hr. • Regular Water sprinkling will be done on the approach road by mobile water tankers. • It will ensure that all vehicles entering the Port have a valid PUC certification.

(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 providing 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.	Complied. Six – Monthly report submitted to the Regional Office of this Ministry Bhubaneswar regarding the implementation of the stipulated conditions vide letter no: GPL/ENV/2025-26/28 dated:05.11.2025.
(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.	Noted and Being Complied
(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.	Noted
(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.	Noted
(xi)	The project proponents shall inform the Regional Office as well as the Ministry, the date of financial closure and final	Complied

	approval of the project by the concerned authorities and the date of start of land development work.	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/Tahsildar's office for 30 days.	Complied
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 Public Liability (Insurance) Act, 1991 and EIA Notification 1994, including the amendments and rules made thereafter.	Noted
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.	Being Complied The PESSO License No. P/EC/OR/14/2531(P420098), dated; 10/01/2024 obtained from Dy. Chief Controller of Explosives, Bhubaneswar having 3 number(s) underground gas tight tanks of capacity 70.00+ 20.00+ 20.00 kiloliters respectively of petroleum Class B connected with 2 number(s) electrically/manually operated dispensing pump(s).

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.	Being Complied. The status of compliance to the various stipulated environmental conditions & mitigation measure uploaded in APSEZ website.
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	Complied. The 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.	Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB submitted on dated: 07th April'2024 vide letter No: GPL/ENV/2025-26/03.
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. The last Environmental statement in FORM-V has been submitted to concern State Pollution Control Board & Regional office vide letter No: GPL/ENV/25-26/09 dated: 08th May 2025.
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	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 regard. A copy of the compliance	Complied

	report shall be submitted within 30 days to the MoEF& CC.	
3.	As per the Ministry's Office Memorandum F.No22-65/2017-Ia.III dated 1st May 2018, the 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.	As per Para 6 (IX) of the said notification which states 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.

ENVIRONMENTAL MONITORING REPORT
FOR THE MONTH OF APRIL-2025 to SEPTEMBER-2025

Submitted to

GOPALPUR PORT LIMITED

At & Po-Arjeepalli, Chatrapur, Ganjam, 761020, Odi sha

GOPALPUR PORT

New Era in Maritime Logistics

Prepared by:

My World Consultancy Services Private Limited
Plot No. 766, Telengapentha,
Cuttack, Odisha 754001
(NABL Approved Laboratory)
NABL TC-11225

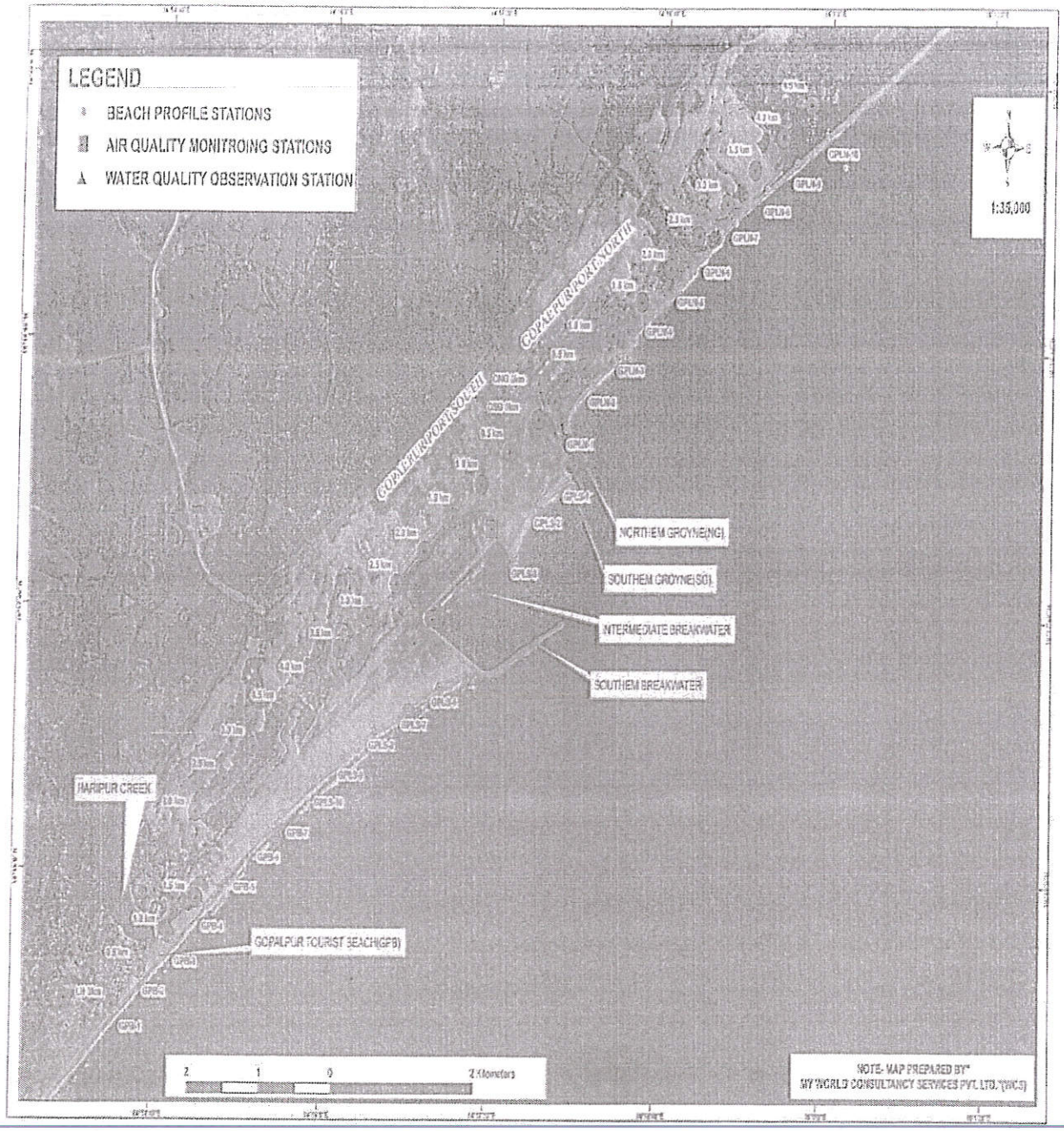


Figure 1 : Sampling locations of different parameters near Gopalpur coast Map

OBJECTIVES:

1. Shoreline Monitoring

Monitoring the erosion/accretion environment, shoreline change along a stretch of approximately 13km (from Gopalpur light house to Arjipalli village), which lies within the Port limit, on monthly basis.

2. Monitoring of Ambient Air Quality

Monitoring of Ambient Air Quality were carried out at 4 stations; two in the windward side and two in the leeward side within the port premises for PM_{10}, $PM_{2.5}$, SO_2, NO_2, NH_3, O_3, As, C_6H_6, BaP, Pb, Ni & CO to measure the maximum ground level concentration (Fig.1).

3. Noise level monitoring

The noise level monitoring was carried out at 4 stations: two in the windward side and two in the leeward side within the port premises.

4. DG stack monitoring

DG stack monitoring was carried out on monthly basis from six DGs available in the port premises.

5. Domestic effluent

The Domestic effluent water was collected from the outlet of the sewage treatment plant available in the port for analysis of different parameters such as pH, BOD, COD, Total suspended solid, Oil and grease & Faecal Coliform.

6. Marine Water Sample

Chemical and microbial parameters

Coastal water samples were collected monthly from the harbour area for analysis of different Chemical parameters like Odour, Colour, pH, DO, BOD, Nitrate, Fluoride, Iron, Total Chromium, Hexavalent Chromium, Phosphorous, Lead, Copper, Manganese, Cadmium, Nickel, Faecal Coliform, Vanadium, Cyanide, Zinc, Selenium, Sulphide, Phenolic Compound & Bio-assay were analysed soon after the collection.

7. Sediment Sample

Chemical Parameters

Sediment samples were collected every month at same location near berth area and analysed for the Chemical parameters like pH, Texture, Sodium, Potassium, Phosphate, Chlorides, Sulphate, PHC, Lead, Mercury, Hexavalent Chromium and Organic Carbon.

8. Ground Water Analysis

Ground water samples were collected from the port premises every month and analysed for colour, order, turbidity, pH, Total hardness, Iron, Chloride, TDS, Calcium, Magnesium, Sulphate, Fluoride, Alkalinity, Salinity, Zinc, Lead and E. Coil.

9. Coal Stack yard

The water samples from the coal stack yard were collected monthly basis from coal stack yard available inside the port premises for analysis of different parameters such us colour, odour, TSS, pH, Temperature, Oil & Grease, TRC, Ammonical Nitrogen, TKN, Free Ammonia, BOD, COD, As & Hg.

10. Biological Parameters

Biological parameters such as light penetration, chlorophyll, primary productivity, phytoplankton, zooplankton, benthic meio fauna and benthic macro fauna within the harbour were analysed at every three-month interval.

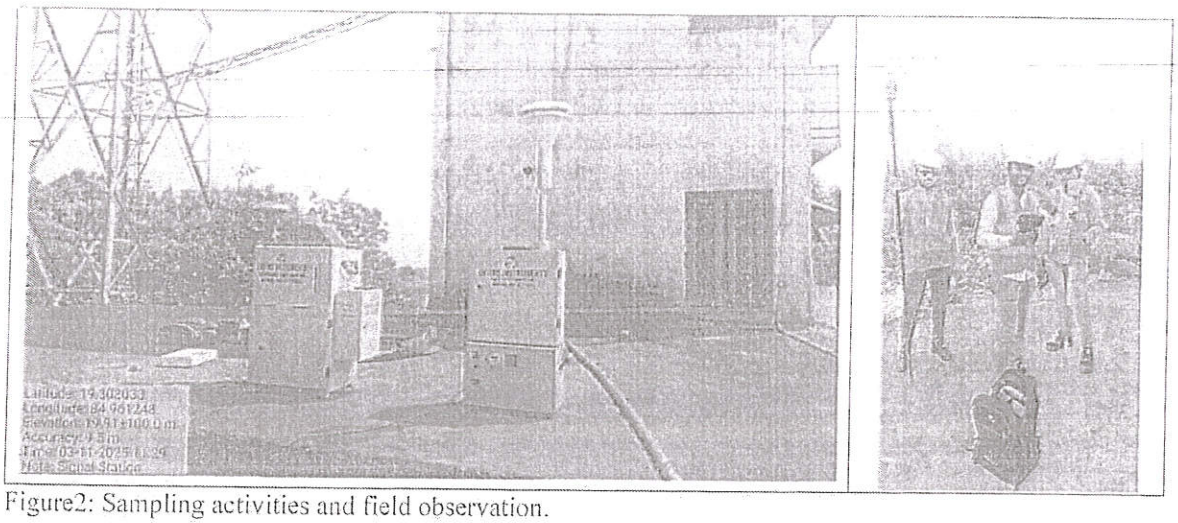


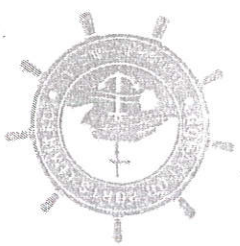
Figure2: Sampling activities and field observation.

Observation Schedule

Table 1: Types and frequency of Observations

Types of Observation	Schedule of Observation	Spatial Variability of observation
Shoreline (ARCPAD_DGPS)	Monthly	Mapping the berm line, representing the shoreline, within the port limit covering 13 km stretch.
Ambient air quality (PM10, PM2.5, SO2, NO2, NH3, O3, As, C6H6, BaP, Pb, Ni & CO)	Twice in a Week	From the four sampling stations within the port environment (Fig. 2)
Noise level	Monthly	Within the port environment as per the guidelines of Central Pollution Control Board (CPCB)
DG Stack Monitoring	Monthly	Monitoring was carried out for the six DGs available inside the port premises.
Domestic effluents	Monthly	pH, BOD, COD, Suspended Solids, Oil & Grease
Coastal Water Sample	Monthly	Odour, Colour, pH, DO, BOD, Nitrate, Fluoride, Iron, Total Chromium, Hexavalent Chromium, Phosphorous, Lead, Copper, Manganese, Cadmium, Nickel, Faecal Coliform, Vanadium, Cyanide, Zinc, Selenium, Sulphide, Phenolic Compound & Bio-assay
Sediment Sample a. Chemical parameters	Monthly	pH, Texture, Sodium, Potassium, Phosphate, Chlorides, Sulphate, PHC,

		Lead, Mercury, Hexavalent Chromium and Organic Carbon
Ground Water	Monthly	colour, order, turbidity, pH, Total hardness, Iron, Chloride, TDS, Calcium, Magnesium, Sulphate, Fluoride, Alkalinity, Salinity, Zinc, Lead and E. Coil
Effluent from Coal stack yard	Monthly	colour, odour, TSS, pH, Temperature, Oil & Grease, TRC, Ammonical Nitrogen, TKN, Free Ammonia, BOD, COD, As & Hg
b. Biological Parameters	Quarterly	as light penetration, chlorophyll, primary productivity, phytoplankton, zooplankton, benthic meio fauna and benthic macro fauna





1. Shoreline monitoring

Table-1.1 and Figure 3 present monthly measurements of shoreline distances (in meters) between the berm line and a reference line along Gopalpur Port South from April-2025 to September-2025. Measurements were taken at 0 km, 0.5 km, 1.0 km, 2.5 km, 3.0 km, 3.5 km, 4.0 km, and 4.5 km intervals. In April-2025, shoreline length ranged from 685.8meters at 0 km to 766.6 meters at 4.5 km, peaking at 1145.4 meters at 2.5 km. At 0 km, the values remain relatively stable, ranging from 678.7 (May 25) to 687.949 (Sep 25). At 0.5 km, a decrease is observed from 672.3 (April 25) to 628.352 (July 25). At 1.0 km, values peak in May2025 (856.6) and remain consistently high across months The highest variations occur at 2.5 km, where values fluctuate between 1133.04 (Sep 2025) and 1154.7 (May 25). Beyond 3.0 km, values show some fluctuations but remain relatively higher in April 2025 and May 2025 compared to following months. These monthly fluctuations, particularly at the 2.5 km mark, reflect dynamic coastal processes influenced by seasonal changes and geomorphological factors.

Table 1.2 and Figure 4 illustrate shoreline distances along Gopalpur Port North from the dataset represents monthly variations in shoreline characteristics from April 2025 to September 2025 across different distances (0 km to 4.5 km). At the Northern Groin (0 km) a fluctuating trend is observed, with values declining from 311.255 (Aug 2025) to 281.2 (May 2025). The lowest value occurs in May 2025, suggesting gradual sediment reduction or possible erosion at the groin location. particularly at 0.5 km, where values drop from 197.362 (Aug 25) to 191.2 (May 25). The relatively stable values at 1.0 km (205.362- 217.7) and 1.5 km (167.038- 187.4) experiencing alternating sediment deposition and erosion. At 2.0 km to 3.5 km North a consistent increase in values is observed, with a peak in April 2025 (274.5 at 3.5 km), At 4.0 km to 4.5 km North a consistent increase in values is observed, with a peak in April 2025 (759.3 at 4.5 km), suggesting significant sediment build-up further north of the groin. This pattern indicates that sediment is being transported northward and deposited at greater distances from the groin.

Table1.3 and Figure 5 provide shoreline distances from April 2025 to Sep 2025 along Gopalpur Tourist Beach, measured from 0 km to 3.0 km. The shoreline observations at Gopalpur Tourist Beach (GPB) from April 2025 to Sep 2025 reveal seasonal variations in shoreline distribution. In April 2025, shoreline levels were relatively low near the beach (0 km- 1.5 km), while higher values at 2.0 km (749.1m) and 3.0 km (755.076m). From May 2025, a slight decline was observed in nearshore areas, possibly due to seasonal erosion or sediment redistribution, while the 2.0 km - 3.0 km section remained consistently high (737-755 m), confirming it as a stable sediment deposition zone, By Sep 2025, nearshore values stabilized, and maximum sediment accumulation was recorded at 2.5 km (740.1m) and 3.0 km (755.076m). These trends suggest that Gopalpur Tourist Beach experiences dynamic shoreline changes influenced by wave action and monsoonal effects.

Shoreline monitoring

Table 1.1: Shoreline (m) analysis along Gopalpur Port South (Shoreline represents the distance in meter between berm line and the reference line in Fig. 1) from April 2025 to September 2025.

GPLS	SG 0 km	0.5 km	1.0 km	2.5 km	3.0 km	3.5 km	4.0 km	4.5 km
Apr-25	685.8	672.3	847.6	1145.4	1035.3	911.5	821.7	766.6
May-25	678.7	665.3	856.6	1154.7	1033.7	903.3	818.4	763.2
June-25	682.635	630.412	825.365	1135.625	1019.363	932.366	845.251	791.252
July-25	685.325	628.352	820.32	1138.22	1020.352	931.56	847.35	790.214
Aug-25	686.325	630.241	821.52	1139.652	1021.252	930.633	848.62	791.214
Sep-25	687.949	629.982	823.657	1133.04	1012.254	922.044	841.359	790.066

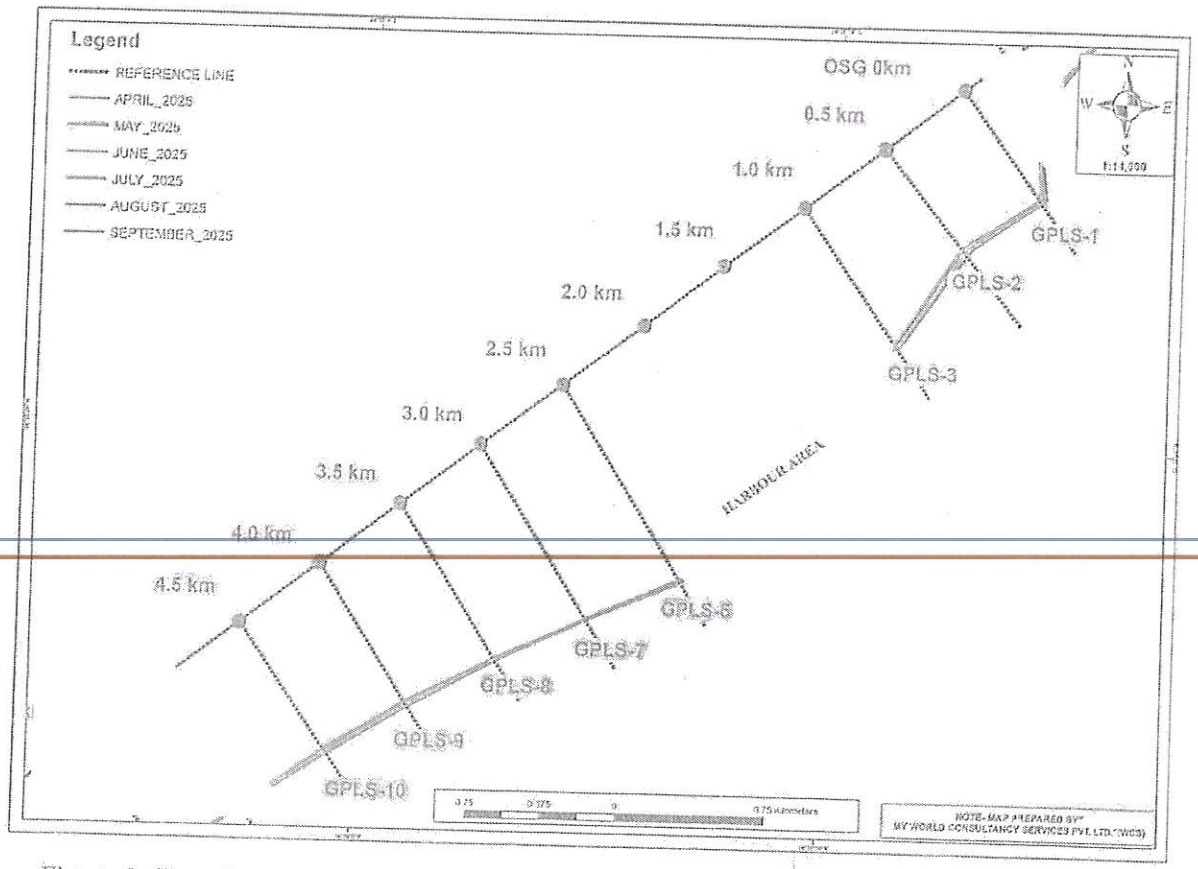


Figure 3: Shoreline change at south of Gopalpur port from April-2025 to September-2025

Table 1.2: Shoreline (m) analysis along Gopalpur Port north (Shoreline represents the distance in meter between berm line and the reference line in Fig. 2) from April 2025 to September 2025.

GPLN	NG 0 km	0.5 km	1.0 km	1.5 km	2.0 km	2.5 km	3.0 km	3.5 km	4.0 km	4.5 km
Apr-25	283.5	191.9	217.7	187.4	219.1	213.1	215.1	274.5	324.2	759.3
May-25	281.2	191.2	209.7	186.5	219.4	212.7	213.4	267.1	314.7	373.4
June-25	308.7	195.362	205.362	171.258	260.365	201.632	180.254	270.362	335.625	400.251
July-25	310.221	196.323	210.32	175.352	262.312	209.65	182.33	271.25	338.363	402.363
Aug-25	311.255	197.362	211.254	176.325	260.354	210.336	185.621	270.321	339.652	405.115
Sep-25	308.7	193.524	216.316	167.038	256.351	195.92	176.028	264.625	332.064	394.134

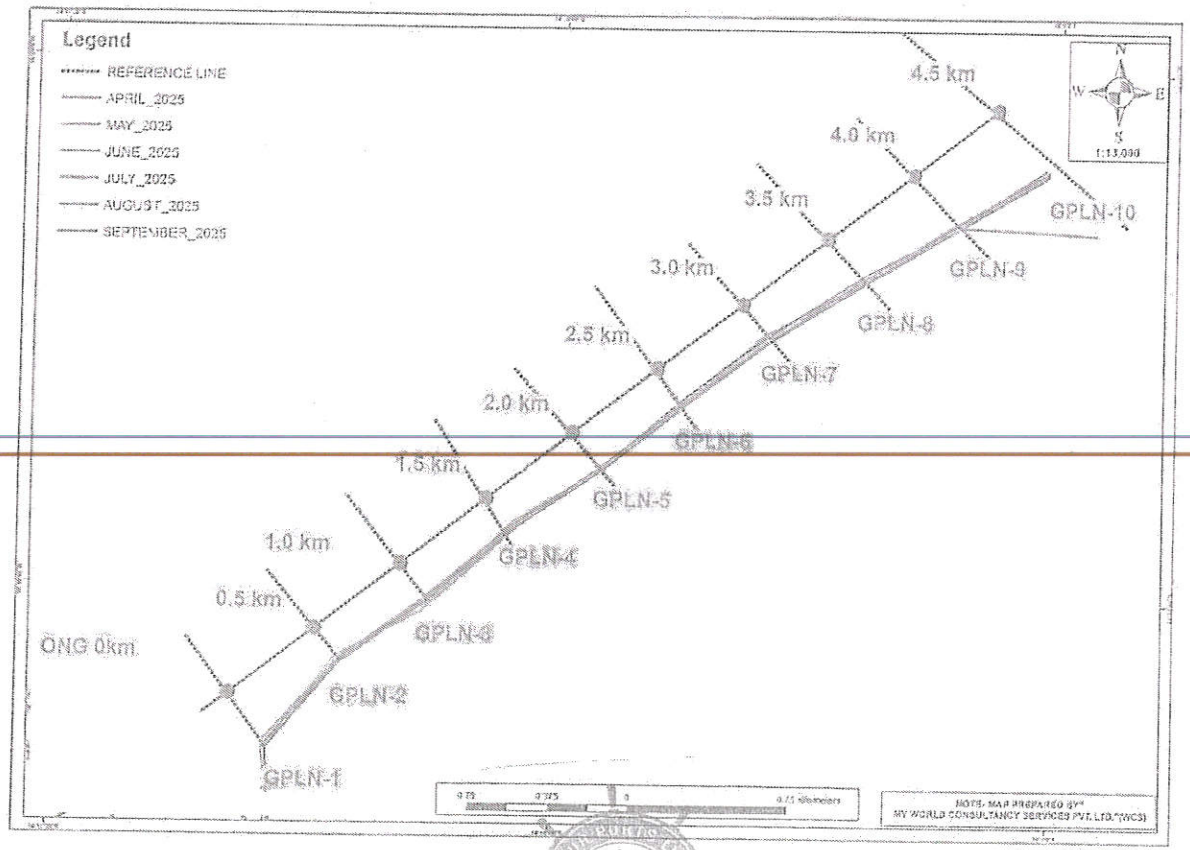


Figure 4: Shoreline change at north of Gopalpur port from April-2025 to September-2025

Table 1.3: Shoreline (m) analysis along Gopalpur tourist beach (Shoreline represents the distance in meter between berm line and the reference line in Fig. 3) from April 2025 to September 2025

GPB	LH 0 km	0.5 km	1.0 km	1.5 km	2.0 km	2.5 km	3.0 km
Apr-25	87.3	89.6	115.1	120.8	749.1	740.1	742.9
May-25	83.8	89.4	111.3	112.2	743.5	739	737.6
June-25	72.158	91.25	111	108.356	741.352	730.256	750.254
July-25	70.695	90.252	112.636	110.542	740.254	728.365	752.365
Aug-25	71.25	91.241	111.25	112.632	741.254	730.251	751.32
Sep-25	74.026	90.34	106	107.332	742.667	732.73	755.076

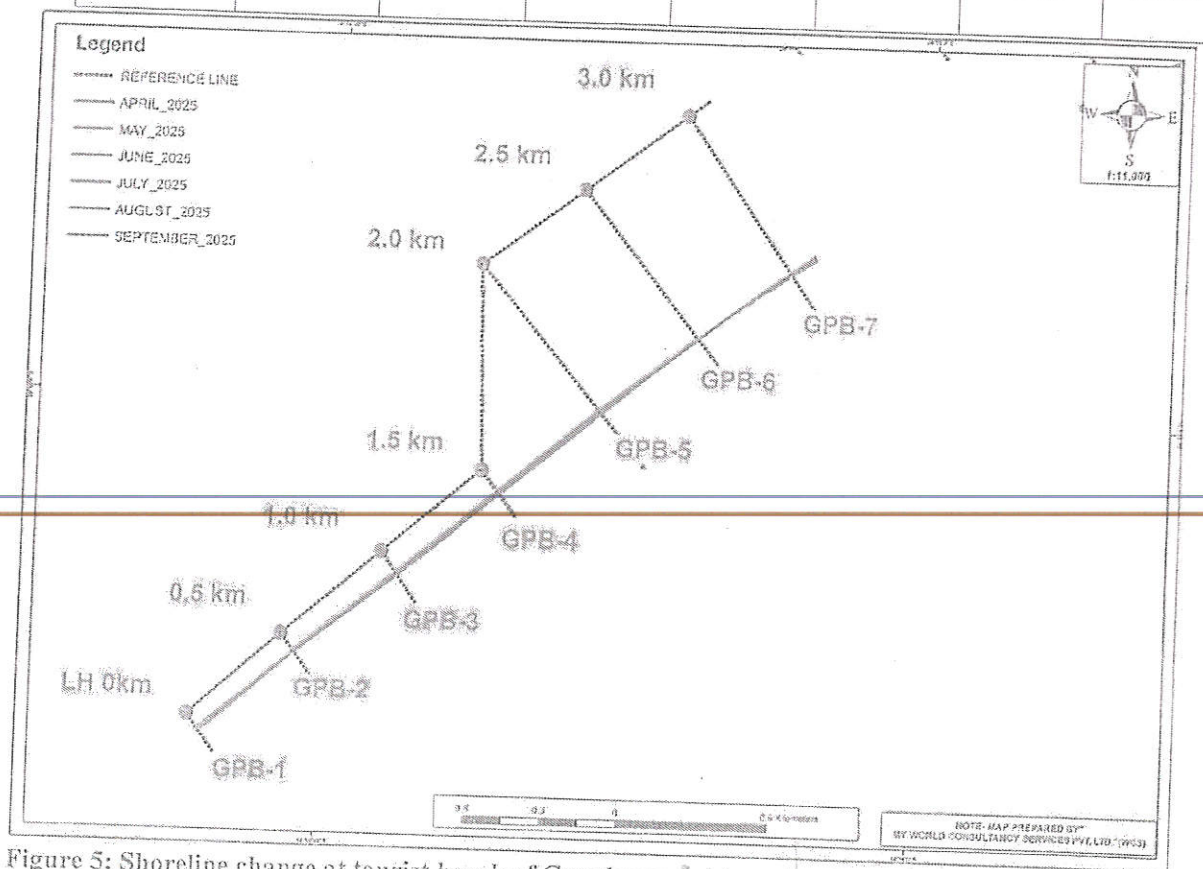


Figure 5: Shoreline change at tourist beach of Gopalpur port from April-2025 to September-2025

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2. Ambient air quality

Ambient air quality (PM10, PM2.5, SO2, NO2, NH3, O3, As, C6H6, BaP, Pb, Ni & CO) was monitored around the Port premises at four points, two in the windward and two in the leeward sides (Figure 2) from April 2025 to September 2025. The coordinates of the four stations of air quality monitoring are; A-19°18'51.59" N 84°58'6.88" E (Near Main Gate), B-19°18'29.18" N 84°57'40.84" E (At Signal Station), C-19°17'45.3" N 84°57'19.79" E (At Substation-2),D-19°17'17.72" N 84°56'51.72" E (At Substation-4), (Figure 1). The four points of monitoring are fixed in such a way that the impact of the port on air quality can be assessed up to a distance in down wind direction (both during strong sea breeze and land breeze time) where maximum ground level concentration is anticipated. Table-2.1. 2.2, 2.3 and 2.4 depict the air quality values for the study period at the four points within the port premises along with the national ambient air quality standard (NAAQS) norms stipulated by MoEFCC.

The maximum PM10 (76.42µg/m³) and PM2.5 value (35.37 µg/m³) were recorded during the month of May-2025 and during the month of August-2025 at station 'B' due to large number of vehicular emission and road dust whereas the minimum PM 10 (38.06 µg/m³) and PM2.5 (16.43 µg/m³) were recorded during the month of June 2025 and April 2025 at station 'D' and station 'C'. The maximum SO2 (7.01 µg/m³) and NO2 (19.62 µg/m³) were recorded during the month of August 2025 at station 'B' respectively due to high vehicular emission. Whereas the minimum SO2 (2.46 µg/m³)) was recorded and NO2 (2.35 µg/m³)) was recorded at station 'C' during the month of May 2025 and April 2025.

The average value of Pm10 was recorded at station A, B, C and D are 56.91,57.43,54.55 and 51.76. respectively whereas the average PM2.5 at station was A, B, C and D are 25.20,27.25,24.74 and 22.52 respectively the average value of SO_2 was recorded at station A, B, C and D are 5.45,5.23,4.83 and 4.72 respectively whereas the average value of NO2 at station A, B,C and D are 12.55,12.22,11.47,10.82 respectively

The ambient air quality monitored parameters at the four points within the port premises from April 2025 to September 2025 are well within the NAAQ threshold limit stipulated by CPCB. Thus, the ongoing port operational activities are not detrimental to the air quality in the terrestrial environment.

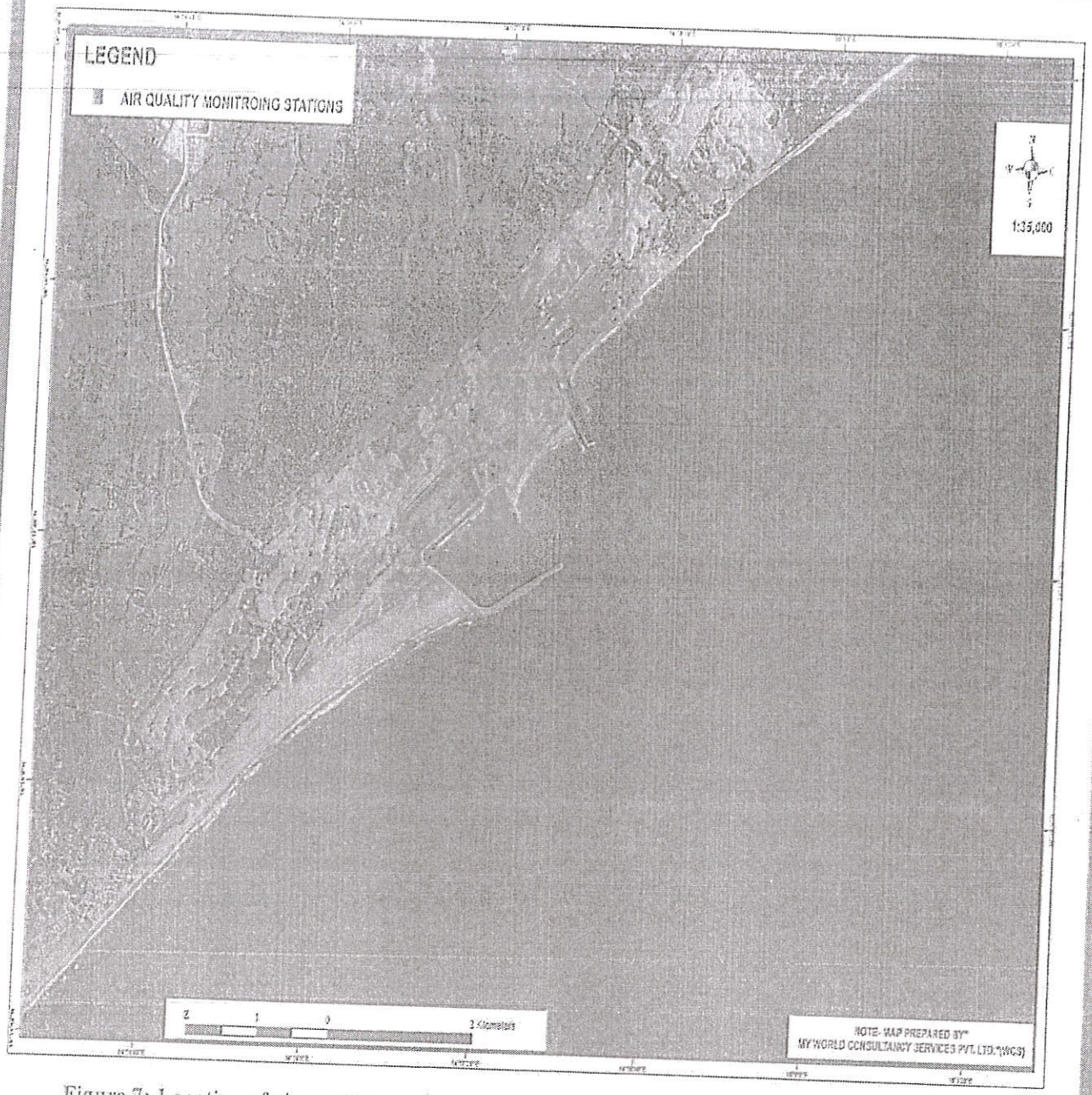


Figure 7: Location of air quality monitoring stations within the Gopalpur port area.

Table 2.1: Ambient Air Quality within Gopalpur Port premises Near Main Gate (Station-A) (PM10, PM2.5, SO2, NO2, NH3, O3, As, C6H6, BaP, Pb, Ni & CO)

Near Main Gate (Station-A)					
	Date	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2(µg/m3)	NO2(µg/m3)
April-2025	03.04.2025	74.39	26.37	4.62	5.22
	04.04.2025	69.28	24.18	4.83	4.89
	11.04.2025	67.34	22.38	4.97	5.37
	12.04.2025	72.69	24.93	3.94	4.76
	16.04.2025	75.81	26.98	5.27	5.39
	17.04.2025	64.28	21.08	5.61	5.82
	24.04.2025	56.43	16.53	5.73	5.94
	25.04.2025	61.76	19.76	4.69	5.37
May-2025	01.05.2025	73.48	25.43	4.38	4.89
	02.05.2025	75.27	26.84	4.62	5.43
	14.05.2025	65.76	21.33	4.28	5.31
	15.05.2025	69.17	23.46	3.94	4.58
	21.05.2025	66.87	21.57	4.97	5.46
	23.05.2025	70.34	23.83	4.83	5.27
	26.05.2025	66.94	21.53	5.27	5.91
	28.05.2025	54.38	18.57	5.16	6.24
Reference value (NAAQS, 2009)		100 (24 Hours)	60 (24 Hours)	80 (24 Hours)	80 (24 Hours)

Near Main Gate (Station-A)													
	Date	PM10 (µg/m³)	PM2.5 (µg/m³)	SO2 (µg/m³)	NO2 (µg/m³)	NH3 (µg/m³)	O_3 (µg/m³)	CO (mg/m³)	AS (ng/m³)	C_6H_6 (µg/m³)	BaP (ng/m³)	Pb (µg/m³)	Ni (µg/m³)
June-2025	02.06.2025	59.04	30.28	6.62	18.50	24.98	12.40	0.247	<1.0	<1.0	<1.0	<0.1	<1.0
	06.06.2025	53.64	27.51	6.01	16.81	22.69	11.26	0.224	<1.0	<1.0	<1.0	<0.1	<1.0
	10.06.2025	48.15	24.69	5.39	15.09	20.37	10.11	0.201	<1.0	<1.0	<1.0	<0.1	<1.0
	14.06.2025	46.05	23.61	5.16	14.43	19.48	9.67	0.193	<1.0	<1.0	<1.0	<0.1	<1.0
	16.06.2025	48.00	24.61	5.38	15.04	20.30	10.08	0.201	<1.0	<1.0	<1.0	<0.1	<1.0
	20.06.2025	51.42	26.37	5.76	16.11	21.75	10.80	0.215	<1.0	<1.0	<1.0	<0.1	<1.0
	24.06.2025	54.99	28.20	6.16	17.23	23.26	11.55	0.230	<1.0	<1.0	<1.0	<0.1	<1.0
	28.06.2025	42.65	21.87	4.78	13.36	18.04	8.96	0.178	<1.0	<1.0	<1.0	<0.1	<1.0
July-2025	03.07.2025	61.22	31.40	6.86	19.19	25.90	12.86	0.256	<1.0	<1.0	<1.0	<0.1	<1.0
	07.07.2025	59.31	30.42	6.65	18.59	25.09	12.46	0.248	<1.0	<1.0	<1.0	<0.1	<1.0
	11.07.2025	46.03	23.60	5.16	14.42	19.47	9.67	0.193	<1.0	<1.0	<1.0	<0.1	<1.0
	15.07.2025	51.56	26.44	5.78	16.16	21.81	10.83	0.216	<1.0	<1.0	<1.0	<0.1	<1.0
	19.07.2025	48.03	24.63	5.38	15.05	20.32	10.09	0.201	<1.0	<1.0	<1.0	<0.1	<1.0
	21.07.2025	50.00	25.64	5.60	15.67	21.15	10.50	0.209	<1.0	<1.0	<1.0	<0.1	<1.0
	25.07.2025	52.76	27.06	5.91	16.54	22.32	11.08	0.221	<1.0	<1.0	<1.0	<0.1	<1.0
	29.07.2025	47.70	24.46	5.34	14.95	20.18	10.02	0.200	<1.0	<1.0	<1.0	<0.1	<1.0
Aug-2025	05.08.2025	62.29	31.94	6.98	19.52	26.35	13.08	0.223	<1.0	<1.0	<1.0	<0.1	<1.0
	08.08.2025	58.21	29.85	6.52	18.24	24.62	12.22	0.195	<1.0	<1.0	<1.0	<0.1	<1.0
	11.08.2025	43.38	22.25	4.86	13.60	18.35	9.11	0.182	<1.0	<1.0	<1.0	<0.1	<1.0
	14.08.2025	52.54	26.94	5.89	16.46	22.22	11.03	0.220	<1.0	<1.0	<1.0	<0.1	<1.0
	18.08.2025	50.84	26.07	5.70	15.93	21.51	10.68	0.213	<1.0	<1.0	<1.0	<0.1	<1.0
	21.08.2025	51.34	26.33	5.75	16.09	21.72	10.78	0.215	<1.0	<1.0	<1.0	<0.1	<1.0
	25.08.2025	54.73	28.06	6.13	17.15	23.15	11.49	0.229	<1.0	<1.0	<1.0	<0.1	<1.0
	28.08.2025	46.47	23.83	5.21	14.56	19.66	9.76	0.194	<1.0	<1.0	<1.0	<0.1	<1.0
Sep-2025	01.09.2025	58.01	29.75	6.50	18.18	24.54	12.18	0.243	<1.0	<1.0	<1.0	<0.1	<1.0
	05.09.2025	56.42	28.93	6.32	17.68	23.86	11.85	0.236	<1.0	<1.0	<1.0	<0.1	<1.0
	09.09.2025	43.98	22.55	4.93	13.78	18.60	9.24	0.184	<1.0	<1.0	<1.0	<0.1	<1.0
	12.09.2025	50.35	25.82	5.64	15.78	21.30	10.57	0.211	<1.0	<1.0	<1.0	<0.1	<1.0
	15.09.2025	49.05	25.16	5.50	15.37	20.75	10.30	0.205	<1.0	<1.0	<1.0	<0.1	<1.0
	18.09.2025	50.55	25.92	5.66	15.84	21.38	10.61	0.211	<1.0	<1.0	<1.0	<0.1	<1.0
	22.09.2025	53.33	27.35	5.98	16.71	22.56	11.20	0.223	<1.0	<1.0	<1.0	<0.1	<1.0
	26.09.2025	45.57	23.37	5.11	14.28	19.28	9.57	0.191	<1.0	<1.0	<1.0	<0.1	<1.0
	Mean (range)	56.91	25.20	5.45	12.55	21.78	10.81	0.213	<1.0	<1.0	<1.0	<0.1	<1.0
Reference value (NAAQS, 2009)		100 (24 Hours)	60 (24 Hours)	80 (24 Hours)	80 (24 Hours)	400 (24 Hour)	180 (1 Hour)	4 (1 Hour)	6 (Annual)	5 (Annual)	1 (Annual)	1.0 (24 Hour)	20 (Annual)

Table 2.2: Ambient Air Quality within Gopalpur Port premises Near Signal Station (Station-B) (PM10, PM2.5, SO2, NO2, NH3, O3, As, C6H6, BaP, Pb, Ni & CO)

	Near Signal Station (Station-B)				
	Date	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2(µg/m3)	NO2(µg/m3)
April-2025	03.04.2025	69.27	23.18	3.67	4.39
	04.04.2025	73.18	25.32	3.94	4.27
	11.04.2025	68.64	22.64	3.42	3.27
	12.04.2025	63.57	20.16	4.67	4.28
	16.04.2025	64.18	21.37	3.19	2.97
	17.04.2025	72.83	24.53	4.68	4.79
	24.04.2025	71.96	23.79	4.94	4.83
	25.04.2025	68.43	22.46	3.82	3.68
May-2025	01.05.2025	71.44	25.31	4.28	4.62
	02.05.2025	68.27	24.09	4.94	5.13
	14.05.2025	66.39	22.82	3.86	3.79
	15.05.2025	74.53	26.71	4.67	5.13
	21.05.2025	67.94	22.99	3.46	3.67
	23.05.2025	64.18	20.57	4.28	4.39
	26.05.2025	59.73	19.39	3.84	4.28
	28.05.2025	76.42	27.15	3.72	4.16
Reference value (NAAQS, 2009)		100 (24 Hours)	60 (24 Hours)	80 (24 Hours)	80 (24 Hours)

	Near Signal Station (Station-B)												
	Date	PM10 (µg/m³)	PM2.5 (µg/m³)	SO2 (µg/m³)	NO2 (µg/m³)	NH3 (µg/m³)	O_3 (µg/m³)	CO (mg/m³)	AS (ng/m³)	C_6H_6 (µg/m³)	BaP (ng/m³)	Pb (µg/m³)	Ni (µg/m³)
June-2025	02.06.2025	59.34	33.53	6.65	18.60	25.10	12.46	0.249	<1.0	<1.0	<1.0	<0.1	<1.0
	06.06.2025	53.91	30.46	6.04	16.89	22.80	11.32	0.227	<1.0	<1.0	<1.0	<0.1	<1.0
	10.06.2025	48.39	27.34	5.42	15.16	20.47	10.16	0.203	<1.0	<1.0	<1.0	<0.1	<1.0
	14.06.2025	46.28	26.15	5.18	14.50	19.58	9.72	0.194	<1.0	<1.0	<1.0	<0.1	<1.0
	16.06.2025	48.24	27.25	5.40	15.12	20.41	10.13	0.203	<1.0	<1.0	<1.0	<0.1	<1.0
	20.06.2025	51.68	29.20	5.79	16.20	21.86	10.85	0.217	<1.0	<1.0	<1.0	<0.1	<1.0
	24.06.2025	55.27	31.23	6.19	17.32	23.38	11.61	0.232	<1.0	<1.0	<1.0	<0.1	<1.0
	28.06.2025	42.86	24.21	4.80	13.43	18.13	9.00	0.180	<1.0	<1.0	<1.0	<0.1	<1.0
July-2025	03.07.2025	61.53	34.76	6.89	19.28	26.03	12.92	0.259	<1.0	<1.0	<1.0	<0.1	<1.0
	07.07.2025	59.61	33.68	6.68	18.68	25.22	12.52	0.250	<1.0	<1.0	<1.0	<0.1	<1.0
	11.07.2025	46.26	26.14	5.18	14.50	19.57	9.71	0.194	<1.0	<1.0	<1.0	<0.1	<1.0
	15.07.2025	51.82	29.28	5.80	16.24	21.92	10.88	0.218	<1.0	<1.0	<1.0	<0.1	<1.0
	19.07.2025	48.27	27.27	5.41	15.13	20.42	10.14	0.203	<1.0	<1.0	<1.0	<0.1	<1.0
	21.07.2025	50.25	28.39	5.63	15.75	21.26	10.55	0.211	<1.0	<1.0	<1.0	<0.1	<1.0
	25.07.2025	53.03	29.96	5.94	16.62	22.43	11.14	0.223	<1.0	<1.0	<1.0	<0.1	<1.0
	29.07.2025	47.94	27.08	5.37	15.02	20.28	10.07	0.201	<1.0	<1.0	<1.0	<0.1	<1.0
Aug-2025	05.08.2025	62.60	35.37	7.01	19.62	26.48	13.15	0.263	<1.0	<1.0	<1.0	<0.1	<1.0
	08.08.2025	58.50	33.05	6.55	18.33	24.75	12.29	0.246	<1.0	<1.0	<1.0	<0.1	<1.0
	11.08.2025	43.60	24.63	4.88	13.66	18.44	9.16	0.183	<1.0	<1.0	<1.0	<0.1	<1.0
	14.08.2025	52.80	29.83	5.91	16.55	22.33	11.09	0.222	<1.0	<1.0	<1.0	<0.1	<1.0
	18.08.2025	51.10	28.87	5.72	16.01	21.62	10.73	0.215	<1.0	<1.0	<1.0	<0.1	<1.0
	21.08.2025	51.60	29.15	5.78	16.17	21.83	10.84	0.217	<1.0	<1.0	<1.0	<0.1	<1.0
	25.08.2025	55.00	31.07	6.16	17.24	23.27	11.55	0.231	<1.0	<1.0	<1.0	<0.1	<1.0
	28.08.2025	46.70	26.38	5.23	14.63	19.75	9.81	0.196	<1.0	<1.0	<1.0	<0.1	<1.0
Sep-2025	01.09.2025	58.30	32.94	6.53	18.27	24.66	12.24	0.245	<1.0	<1.0	<1.0	<0.1	<1.0
	05.09.2025	56.70	32.03	6.35	17.77	23.98	11.91	0.238	<1.0	<1.0	<1.0	<0.1	<1.0
	09.09.2025	44.20	24.97	4.95	13.85	18.70	9.28	0.186	<1.0	<1.0	<1.0	<0.1	<1.0
	12.09.2025	50.60	28.59	5.67	15.86	21.40	10.63	0.213	<1.0	<1.0	<1.0	<0.1	<1.0
	15.09.2025	49.30	27.85	5.52	15.45	20.85	10.35	0.207	<1.0	<1.0	<1.0	<0.1	<1.0
	18.09.2025	50.80	28.70	5.69	15.92	21.49	10.67	0.213	<1.0	<1.0	<1.0	<0.1	<1.0
	22.09.2025	53.60	30.28	6.00	16.80	22.67	11.26	0.225	<1.0	<1.0	<1.0	<0.1	<1.0
	26.09.2025	45.80	25.88	5.13	14.35	19.37	9.62	0.192	<1.0	<1.0	<1.0	<0.1	<1.0
	Mean (range)	57.43	27.25	5.23	12.22	21.89	10.87	0.217	<1.0	<1.0	<1.0	<0.1	<1.0
Reference value (NAAQS, 2009)		100 (24 Hours)	60 (24 Hours)	80 (24 Hours)	80 (24 Hours)	400 (24 Hour)	180 (1 Hour)	4 (1 Hour)	6 (Annual)	5 (Annual)	1 (Annual)	1.0 (24 Hour)	20 (Annual)

Table 2.3: Ambient Air Quality within Gopalpur Port premises SubStation-2 (Station-C) (PM10, PM2.5, SO2, NO2, NH3, O3, As, C6H6, BaP, Pb, Ni & CO)

SubStation-2 (Station-C)					
	Date	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2(µg/m3)	NO2(µg/m3)
April-2025	03.04.2025	64.39	20.67	2.95	2.35
	04.04.2025	59.43	18.65	2.67	3.19
	11.04.2025	67.93	22.86	3.16	2.48
	12.04.2025	62.86	19.73	3.46	2.94
	16.04.2025	76.19	26.84	3.28	3.67
	17.04.2025	64.39	21.07	4.12	3.29
	24.04.2025	54.28	16.43	3.94	3.67
	25.04.2025	64.18	22.31	2.68	2.91
May-2025	01.05.2025	57.32	17.34	3.22	3.14
	02.05.2025	61.82	20.63	2.94	2.86
	14.05.2025	63.76	19.85	3.46	3.27
	15.05.2025	59.84	17.29	3.84	2.98
	21.05.2025	71.39	24.99	3.49	3.27
	23.05.2025	64.85	21.48	3.76	3.39
	26.05.2025	58.41	18.34	2.46	3.14
	28.05.2025	67.88	23.82	2.87	2.94
Reference value (NAAQS, 2009)		100 (24 Hours)	60 (24 Hours)	80 (24 Hours)	80 (24 Hours)

SubStation-2 (Station-C)													
	Date	PM10 (µg/m³)	PM2.5 (µg/m³)	SO2 (µg/m³)	NO2 (µg/m³)	NH3 (µg/m³)	O_3 (µg/m³)	CO (mg/m³)	AS (ng/m³)	C_6H_6 (µg/m³)	BaP (ng/m³)	Pb (µg/m³)	Ni (µg/m³)
June-2025	02.06.2025	57.32	30.65	6.43	17.96	24.25	12.04	0.240	<1.0	<1.0	<1.0	<0.1	<1.0
	06.06.2025	52.08	27.85	5.84	16.32	22.03	10.94	0.218	<1.0	<1.0	<1.0	<0.1	<1.0
	10.06.2025	46.74	25.00	5.24	14.65	19.77	9.82	0.196	<1.0	<1.0	<1.0	<0.1	<1.0
	14.06.2025	44.71	23.91	5.01	14.01	18.91	9.39	0.187	<1.0	<1.0	<1.0	<0.1	<1.0
	16.06.2025	46.60	24.92	5.22	14.60	19.71	9.79	0.195	<1.0	<1.0	<1.0	<0.1	<1.0
	20.06.2025	49.92	26.70	5.60	15.64	21.12	10.48	0.209	<1.0	<1.0	<1.0	<0.1	<1.0
	24.06.2025	53.39	28.55	5.99	16.73	22.58	11.21	0.223	<1.0	<1.0	<1.0	<0.1	<1.0
	28.06.2025	41.40	22.14	4.64	12.97	17.51	8.69	0.173	<1.0	<1.0	<1.0	<0.1	<1.0
July-2025	03.07.2025	59.44	31.79	6.66	18.63	25.14	12.48	0.249	<1.0	<1.0	<1.0	<0.1	<1.0
	07.07.2025	57.58	30.79	6.46	18.05	24.36	12.09	0.241	<1.0	<1.0	<1.0	<0.1	<1.0
	11.07.2025	44.69	23.90	5.01	14.00	18.90	9.38	0.187	<1.0	<1.0	<1.0	<0.1	<1.0
	15.07.2025	50.06	26.77	5.61	15.69	21.17	10.51	0.209	<1.0	<1.0	<1.0	<0.1	<1.0
	19.07.2025	46.63	24.94	5.23	14.61	19.72	9.79	0.195	<1.0	<1.0	<1.0	<0.1	<1.0
	21.07.2025	48.54	25.96	5.44	15.21	20.53	10.19	0.203	<1.0	<1.0	<1.0	<0.1	<1.0
	25.07.2025	51.23	27.39	5.74	16.05	21.67	10.76	0.214	<1.0	<1.0	<1.0	<0.1	<1.0
	29.07.2025	46.31	24.76	5.19	14.51	19.59	9.73	0.194	<1.0	<1.0	<1.0	<0.1	<1.0
Aug-2025	05.08.2025	60.47	32.34	6.78	18.95	25.58	12.70	0.253	<1.0	<1.0	<1.0	<0.1	<1.0
	08.08.2025	56.51	30.22	6.34	17.71	23.90	11.87	0.236	<1.0	<1.0	<1.0	<0.1	<1.0
	11.08.2025	42.12	22.52	4.72	13.20	17.82	8.84	0.176	<1.0	<1.0	<1.0	<0.1	<1.0
	14.08.2025	51.00	27.28	5.72	15.98	21.58	10.71	0.213	<1.0	<1.0	<1.0	<0.1	<1.0
	18.08.2025	49.36	26.40	5.53	15.47	20.88	10.37	0.207	<1.0	<1.0	<1.0	<0.1	<1.0
	21.08.2025	49.85	26.66	5.59	15.62	21.08	10.47	0.209	<1.0	<1.0	<1.0	<0.1	<1.0
	25.08.2025	53.13	28.41	5.96	16.65	22.47	11.16	0.222	<1.0	<1.0	<1.0	<0.1	<1.0
	28.08.2025	45.11	24.12	5.06	14.14	19.08	9.47	0.189	<1.0	<1.0	<1.0	<0.1	<1.0
Sep-2025	01.09.2025	56.32	30.12	6.31	17.65	23.82	11.83	0.236	<1.0	<1.0	<1.0	<0.1	<1.0
	05.09.2025	54.77	29.29	6.14	17.16	23.17	11.50	0.229	<1.0	<1.0	<1.0	<0.1	<1.0
	09.09.2025	42.70	22.83	4.79	13.38	18.06	8.97	0.179	<1.0	<1.0	<1.0	<0.1	<1.0
	12.09.2025	48.88	26.14	5.48	15.32	20.68	10.26	0.205	<1.0	<1.0	<1.0	<0.1	<1.0
	15.09.2025	47.62	25.47	5.34	14.92	20.14	10.00	0.199	<1.0	<1.0	<1.0	<0.1	<1.0
	18.09.2025	49.07	26.24	5.50	15.38	20.76	10.31	0.205	<1.0	<1.0	<1.0	<0.1	<1.0
	22.09.2025	51.78	27.69	5.80	16.23	21.90	10.87	0.217	<1.0	<1.0	<1.0	<0.1	<1.0
	26.09.2025	44.24	23.66	4.96	13.86	18.71	9.29	0.185	<1.0	<1.0	<1.0	<0.1	<1.0
	Mean (range)	54.55	24.74	4.83	11.47	21.14	10.50	0.209	<1.0	<1.0	<1.0	<0.1	<1.0
Reference value (NAAQS, 2009)		100 (24 Hours	60 (24 Hours	80 (24 Hour	80 (24 Hour	400 (24 Hour)	180 (1 Hour)	4 (1 Hour)	6 (Annual)	5 (Annual)	1 (Annual)	1.0 (24 Hour)	20 (Annual)

Table 2.4: Ambient Air Quality within Gopalpur Port premises SubStation-4 (Station-D) (PM10, PM2.5, SO2, NO2, NH3, O3, As, C6H6, BaP, Pb, Ni & CO)

SubStation-4 (Station-D)					
	Date	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2(µg/m3)	NO2(µg/m3)
April-2025	03.04.2025	63.81	19.45	4.12	3.94
	04.04.2025	65.28	21.08	3.86	3.27
	11.04.2025	61.09	18.63	3.92	3.46
	12.04.2025	56.27	17.39	3.48	3.29
	16.04.2025	64.93	20.94	4.29	3.86
	17.04.2025	62.19	19.37	3.27	3.19
	24.04.2025	59.17	18.73	4.20	4.19
	25.04.2025	69.38	24.68	3.64	2.93
May-2025	01.05.2025	62.93	20.38	3.62	3.84
	02.05.2025	64.28	22.19	4.13	3.96
	14.05.2025	66.37	23.64	4.24	3.87
	15.05.2025	71.92	25.67	3.85	3.79
	21.05.2025	59.78	18.39	4.21	4.13
	23.05.2025	64.18	22.43	4.36	3.92
	26.05.2025	54.27	17.26	3.75	3.83
	28.05.2025	68.43	24.18	2.94	3.13
Reference value (NAAQS, 2009)		100 (24 Hours)	60 (24 Hours)	80 (24 Hours)	80 (24 Hours)

SubStation-4 (Station-D)													
	Date	PM10 (µg/m³)	PM2.5 (µg/m³)	SO2 (µg/m³)	NO2 (µg/m³)	NH3 (µg/m³)	O_3 (µg/m³)	CO (mg/m³)	AS (ng/m³)	C_6H_6 (µg/m³)	BaP (ng/m³)	Pb (µg/m³)	Ni (µg/m³)
June-2025	02.06.2025	52.69	26.75	5.91	16.51	22.29	12.49	0.220	<1.0	<1.0	<1.0	<0.1	<1.0
	06.06.2025	47.87	24.30	5.37	15.00	20.25	11.35	0.200	<1.0	<1.0	<1.0	<0.1	<1.0
	10.06.2025	42.97	21.81	4.82	13.47	18.18	10.18	0.180	<1.0	<1.0	<1.0	<0.1	<1.0
	14.06.2025	41.10	20.86	4.61	12.88	17.38	9.74	0.172	<1.0	<1.0	<1.0	<0.1	<1.0
	16.06.2025	42.84	21.74	4.80	13.42	18.12	10.15	0.179	<1.0	<1.0	<1.0	<0.1	<1.0
	20.06.2025	45.89	23.30	5.14	14.38	19.41	10.88	0.192	<1.0	<1.0	<1.0	<0.1	<1.0
	24.06.2025	49.08	24.91	5.50	15.38	20.76	11.63	0.205	<1.0	<1.0	<1.0	<0.1	<1.0
	28.06.2025	38.06	19.32	4.27	11.93	16.10	9.02	0.159	<1.0	<1.0	<1.0	<0.1	<1.0
July-2025	03.07.2025	54.64	27.74	6.13	17.12	23.11	12.95	0.229	<1.0	<1.0	<1.0	<0.1	<1.0
	07.07.2025	52.93	26.87	5.93	16.59	22.39	12.55	0.221	<1.0	<1.0	<1.0	<0.1	<1.0
	11.07.2025	41.08	20.85	4.61	12.87	17.38	9.74	0.172	<1.0	<1.0	<1.0	<0.1	<1.0
	15.07.2025	46.02	23.36	5.16	14.42	19.46	10.91	0.193	<1.0	<1.0	<1.0	<0.1	<1.0
	19.07.2025	42.86	21.76	4.81	13.43	18.13	10.16	0.179	<1.0	<1.0	<1.0	<0.1	<1.0
	21.07.2025	44.62	22.65	5.00	13.98	18.88	10.58	0.187	<1.0	<1.0	<1.0	<0.1	<1.0
	25.07.2025	47.09	23.90	5.28	14.76	19.92	11.16	0.197	<1.0	<1.0	<1.0	<0.1	<1.0
	29.07.2025	42.57	21.61	4.77	13.34	18.01	10.09	0.178	<1.0	<1.0	<1.0	<0.1	<1.0
Aug-2025	05.08.2025	55.59	28.22	6.23	17.42	23.51	13.17	0.233	<1.0	<1.0	<1.0	<0.1	<1.0
	08.08.2025	51.95	26.37	5.82	16.28	21.97	12.31	0.217	<1.0	<1.0	<1.0	<0.1	<1.0
	11.08.2025	38.72	19.65	4.34	12.13	16.38	9.18	0.162	<1.0	<1.0	<1.0	<0.1	<1.0
	14.08.2025	46.89	23.80	5.26	14.69	19.83	11.11	0.196	<1.0	<1.0	<1.0	<0.1	<1.0
	18.08.2025	45.38	23.03	5.09	14.22	19.19	10.75	0.190	<1.0	<1.0	<1.0	<0.1	<1.0
	21.08.2025	45.82	23.26	5.14	14.36	19.38	10.86	0.192	<1.0	<1.0	<1.0	<0.1	<1.0
	25.08.2025	48.84	24.79	5.48	15.31	20.66	11.58	0.204	<1.0	<1.0	<1.0	<0.1	<1.0
	28.08.2025	41.47	21.05	4.65	13.00	17.54	9.83	0.174	<1.0	<1.0	<1.0	<0.1	<1.0
Sep-2025	01.09.2025	51.77	26.28	5.80	16.22	21.90	12.27	0.217	<1.0	<1.0	<1.0	<0.1	<1.0
	05.09.2025	50.35	25.56	5.64	15.78	21.30	11.93	0.211	<1.0	<1.0	<1.0	<0.1	<1.0
	09.09.2025	39.25	19.92	4.40	12.30	16.60	9.30	0.164	<1.0	<1.0	<1.0	<0.1	<1.0
	12.09.2025	44.93	22.81	5.04	14.08	19.01	10.65	0.188	<1.0	<1.0	<1.0	<0.1	<1.0
	15.09.2025	43.78	22.22	4.91	13.72	18.52	10.38	0.183	<1.0	<1.0	<1.0	<0.1	<1.0
	18.09.2025	45.11	22.90	5.06	14.14	19.08	10.69	0.189	<1.0	<1.0	<1.0	<0.1	<1.0
	22.09.2025	47.60	24.16	5.34	14.92	20.13	11.28	0.199	<1.0	<1.0	<1.0	<0.1	<1.0
	26.09.2025	40.67	20.64	4.56	12.75	17.20	9.64	0.170	<1.0	<1.0	<1.0	<0.1	<1.0
	Mean (range)	51.76	22.52	4.72	10.82	19.44	10.89	0.192	<1.0	<1.0	<1.0	<0.1	<1.0
Reference value (NAAQS, 2009)		100 (24 Hours)	60 (24 Hours)	80 (24 Hours)	80 (24 Hours)	400 (24 Hour)	180 (1 Hour)	4 (1 Hour)	6 (Annual)	5 (Annual)	1 (Annual)	1.0 (24 Hou	20 (Annual)

3. Noise level monitoring:

The noise level monitoring was carried out at different selected locations according to its importance. The highest average noise level was recorded at station "A" (Near Main Gate) due to high Vehicular movement and the lowest value was recorded at station "D" (Substation-4). The average day and night noise And monitoring values at station A-19°18'51.59" N 84°58'6.88" E (Near Main Gate), B-19°18'29.18" N 84°57'40.84" E (At Signal Station), C-19°17'45.3" N 84°57'19.79" E (At Substation-2),D-19°17'17.72" N 84°56'51.72" E (At Substation-4), from April 2025 to September 2025 are presented in Table 3.1.

The noise level monitored during the day and night time is also well within the NAAQ thresholds stipulated by MoEFCC for industrial 75dB in day time and 70dB during night time zones.

Table 3.1: Noise level (dB) within Gopalpur Port premises at station A, B, C, and D during Day Time

Day Time					
Month	Date	Station A	Station B	Station C	Station D
April 2025	24.04.2025	65.43	62.83	61.09	59.29
May 2025	21.05.2025	65.41	61.51	59.89	59.12
June 2025	13.06.2025	62.8	62.8	58.1	56.8
July 2025	18.07.2025	64.2	59.6	59.5	58.2
Aug 2025	25.08.2025	63.7	61.9	58.6	57.3
Sep 2025	15.09.2025	64.3	60.7	59.2	58.7
Avg.		64.3	61.6	59.4	58.2

Table 3.2: Noise level (dB) within Gopalpur Port premises at station A, B, C, and D during Night Time

Night Time					
Month	Date	Station A	Station B	Station C	Station D
April 2025	24.04.2025	62.77	61.84	58.16	59.36
May 2025	21.05.2025	62.93	60.23	60.22	59.94
June 2025	13.06.2025	59.6	58.5	55.8	54.1
July 2025	18.07.2025	61.1	60.4	56.2	52.4
Aug 2025	25.08.2025	60.7	59.3	54.4	53.2
Sep 2025	15.09.2025	61.2	58.3	56.4	52.8
Avg.		61.4	59.8	56.9	55.3

5. The DG Stack Monitoring

DG Stack available inside the port premises and their observed value from April 2025 to September 2025 are presented in Table 4.1 and Table 4.2

Table 4.1: DG stack parameters with in Gopalpur port (DG-1, DG-2, DG-3)

Central Store DG-1 (250 KVA)						
	April 2025	May 2025	June 2025	July 2025	Aug 2025	Sep 2025
Flue Gas Temperature (K)	381	387	395	415	387	445
Flue Gas Velocity	9.3	11.48	12.5	11.86	11.48	13.14
Particulate Metter (PM)	0.12	0.11	0.12	0.14	0.11	0.14
Concentration of Sulphur Dioxide as SO_2	0.13	0.14	0.16	0.13	0.14	0.15
Carbon Monoxide as CO	0.18	0.19	0.20	0.18	0.19	0.22
Quantity of gas flow in Nm3/hr	165.5	201.2	192.52	175.08	201.19	153.35
NOx+HC	0.23	0.26	0.24	0.22	0.26	0.25
Meter Room DG-2 (250KVA)						
	April 2025	May 2025	June 2025	July 2025	Aug 2025	Sep 2025

Flue Gas Temperature (K)	307	394	405	421	394	451
Flue Gas Velocity	3.8	7.28	12.52	10.8	7.28	13.76
Particulate Metter (PM)	0.1	0.12	0.14	0.11	0.12	0.13
Concentration of Sulphur Dioxide as SO_2	0.16	0.13	0.15	0.14	0.13	0.17
Carbon Monoxide as CO	0.17	0.21	0.22	0.16	0.21	0.2
Quantity of gas flow in Nm3/hr	118.38	125.31	136.82	148.25	125.31	158.49
NOx+HC	0.21	0.24	0.18	0.23	0.24	0.19
Substation-4 DG-3 (250KVA)						
	April 2025	May 2025	June 2025	July 2025	Aug 2025	Sep 2025
Flue Gas Temperature (K)	401	412	423	432	412	441
Flue Gas Velocity	9.69	11.88	10.52	9.85	11.88	12.81
Particulate Metter (PM)	0.14	0.1	0.12	0.14	0.10	0.16
Concentration of Sulphur Dioxide as SO_2	0.18	0.16	0.16	0.15	0.16	0.18
Carbon Monoxide as CO	0.15	0.18	0.20	0.22	0.18	0.22
Quantity of gas flow in Nm3/hr	166.22	195.51	185.62	182.56	195.51	150.85
NOx+HC	0.26	0.23	0.24	0.26	0.23	0.22

Table 4.2: DG stack parameters with in Gopalpur port (DG-4, DG-5, DG-6)

Meter Room DG-4 (100KVA)						
	April 2025	May 2025	June 2025	July 2025	Aug 2025	Sep 2025
Flue Gas Temperature (K)	369	376	391	408	376	438
Flue Gas Velocity	8.69	10.96	9.86	11.52	10.96	12.49
Particulate Metter (PM)	0.13	0.114	0.12	0.15	0.114	0.170
Concentration of Sulphur Dioxide as SO_2	0.17	0.15	0.16	0.13	0.15	0.14
Carbon Monoxide as CO	0.19	0.2	0.22	0.16	0.2	0.18
Quantity of gas flow in Nm3/hr	163.68	205.03	202.85	194.2	205.03	148.07
NOx+HC	0.18	0.21	0.24	0.28	0.21	0.23
Colony DG-5 (100KVA)						
	April 2025	May 2025	June 2025	July 2025	Aug 2025	Sep 2025
Flue Gas Temperature (K)	372	384	418	391	384	424
Flue Gas Velocity	8.59	11.36	9.52	10.81	11.36	12.15
Particulate Metter (PM)	0.09	0.12	0.16	0.14	0.12	0.15
Concentration of Sulphur Dioxide as SO_2	0.19	0.18	0.20	0.14	0.18	0.16

Carbon Monoxide as CO	0.21	0.17	0.18	0.20	0.17	0.19
Quantity of gas flow in Nm3/hr	157.49	200.53	202.85	183.62	200.53	149.8
NOx+HC	0.26	0.19	0.22	0.27	0.19	0.21
Substation-1 DG-6 (100KVA)						
	April 2025	May 2025	June 2025	July 2025	Aug 2025	Sep 2025
Flue Gas Temperature (K)	367	373	368	415	373	421
Flue Gas Velocity	10.38	11.92	10.52	9.82	11.92	12.45
Particulate Metter (PM)	0.13	0.14	0.15	0.18	0.14	0.18
Concentration of Sulphur Dioxide as SO_2	0.17	0.16	0.15	0.17	0.16	0.15
Carbon Monoxide as CO	0.18	0.23	0.22	0.24	0.23	0.21
Quantity of gas flow in Nm3/hr	191.23	216.66	205.42	182.56	216.66	153.57
NOx+HC	0.16	0.24	0.22	0.28	0.24	0.2

5. Domestic effluent water

The domestic effluent water sample was collected from the outlet of the sewage treatment plant inside the Gopalpur port. Different water quality parameters were analysed to understand the water quality of the domestic effluent discharge. The average value of the different parameters like pH (7.661), BOD (11.85), COD (77.05), Suspended solid (64.96) and oil and grease (4.34) during the last six months (April 2025 to September 2025) and the monthly analysed values are depicted in table 5.1.

Table 5.1 Domestic effluent parameters of the Gopalpur port

Table 5.1 Domestic effluent parameters of the Gopalpur port

Parameter	April 2025	May 2025	June 2025	July 2025	August 2025	Sep 2025
pH Value	6.9	7.1	7.816at 27.2°C	8.026 at 27.2 °C	8.683 at 29.2°C	7.442 at 27.8 °C
Total Suspended Solid as TSS	59.48	53.79	68.5	72.8	70.9	64.3
Biochemical Oxygen Demand as BOD	21.93	20.86	6.2	7.4	7.9	6.8
Chemical Oxygen Demand as COD	167.37	155.95	30	38	37	34
Oil &Grease	4.28	4.39	<4.0	<4.0	<4	<4.0
Faecal Coliform	--	--	280	240	220	280

6. Marine Water quality

Water samples were collected from port berth area (19°17'21" N 84°56' 55" E) for determination of their physico-chemical and biological properties. The samples were taken to the laboratory soon after the collection. Due care was taken to avoid contamination during sampling. The chemical and biological properties of water and sediment samples were measured following prescribed methods by Indian Standards. The detail observed/analyzed parameters and their threshold values are provided below.

Water quality parameters such as pH, dissolved oxygen (DO), color and odour, faecal coliform, biological oxygen demand (BOD), Lead, Cadmium, Hexavalent Chromium, Total Chromium, Copper, Zinc, Selenium, Nickel, Cyanide, Fluoride, Phosphorous, Sulphide, Phenolic Compound, Bio-Assay, Manganese, Iron, Vanadium, Nitrate for the period from April 2025 to September 2025 of Gopalpur port (harbour area) are presented in Table 6.1. It is evident that most of the parameters are well within the permissible limit/standard. During the observation period it is noticed that pH of water ranged from 7.14-7.88 with mean value of 7.57, representing alkaline nature of the harbour area. The maximum and minimum vales were recorded during April 2025 to September 2025 respectively The Dissolved Oxygen ranges from 6.2-7.05 with average value of 6.65 mg/l for last six month.

The maximum Dissolved Oxygen was recorded during May 2025 and the minimum value was recorded during Sep 2025. The Faecal coliform values ranged from 220-1600 MPN/100ml with average value of 740 MPN/100ml .The maximum value was recorded during May 2025, and the minimum value was recorded during August 2025. The BOD value ranged from 3.08-4.5 with average value of 3.81 mg/l. The maximum value was recorded during August 2025 and the minimum value was recorded during May 2025.The Phosphate concentration was ranged between 0.063 to 0.078 with average value of 0.07 mg/l during last six months. Nitrate concentration ranged between 0.358 to 6.32 mg/l with average value of 4.17 mg/l, the maximum value recorded during the month of April 2025 and the minimum value recorded during the month of April 2025. The Hexavalent chromium varied from BDL to <0.01 mg/l with average value of <0.01 mg/l

From the analysis of water quality parameters, it can be stated that the water quality of harbour area is good as almost all parameters are well within the permissible limits.

Table 6.1: Marine Water Quality parameters during April 2025 to September 2025 from Gopalpur port, Harbor area.

Water Parameters	April 2025	May 2025	June 2025	July 2025	August 2025	Sep 2025	Average	Method
pH Value	7.14	7.18	7.63 at 28.1°C	7.81 at 26.4°C	7.872 at 29.1°C	7.763 at 28.4°C	7.57	IS 3025 (Part-11): 2022
Dissolve Oxygen as DO	6.97	7.05	6.8	6.4	6.5	6.2	6.65	IS 3025 (Part 38): 1989 RA 2019
Colour	Bluish	Bluish	5	5	5	5	5	IS 3025 (Part 4): 2021
Odour	Odourless	Odourless	Agreeable	Agreeable	Agreeable	Agreeable	--	IS 3025 (Part-5): 2018
Faecal Coliform	1600	1800	240	300	220	280	740	IS 1622: 1981 RA 2019
Biochemical Oxygen Demand as BOD (3 Days)	3.15	3.08	4.2	4.0	4.5	3.9	3.81	IS 3025 (Part 44): 2023
Lead as Pb	BDL	BDL	0.34	0.3	0.4	0.32	0.34	IS 3025(Part-47):2024
Cadmium as Cd			0.022	0.02	0.027	0.024	0.02	IS 3025(Part-41)1992 RA 2023
Hexavalent Chromium as Cr+6	BDL	BDL	<0.01	<0.01	<0.01	<0.01	<0.01	IS 3025 (Part-52): 2003 RA 2019
Total Chromium as Cr	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	IS 3025 (Part-52): 2003 RA 2019
Copper as Cu	--	--	0.06	0.07	0.09	0.07	0.07	IS 3025 (Part 42): 2024
Zinc as Zn	--	--	<0.01	<0.001	<0.01	<0.001	<0.001	IS 3025 (Part-49): 1994
selenium	--	--	<0.05	<0.01	<0.05	<0.01	<0.01	IS 3025(Part-56)2003 RA 2023
Nickel as Ni	--	--	0.031	0.034	0.037	0.033	0.03	IS 3025(Part-54)2003 RA 2019
Cyanide as CN	--	--	<0.001	<0.05	<0.001	<0.05	<0.05	IS 3025 (Part-27): 1986
Fluoride as F	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	APHA 24th Ed. (4500-F- D): 2023
Phosphorus as P	0.069	0.072	0.072	0.070	0.078	0.063	0.07	IS 3025 (Part-31): Sec-1:2022
Sulphide	--	--	<0.001	<0.05	<0.001	<0.05	<0.05	IS 3025(Part-29)2022
Phenolic compounds as C_6H_5OH	2.64	2.44	<0.001	<0.001	<0.001	<0.001	<0.001	IS 3025 (Part 43)1992 RA 2019

Bio-Assay	--	--	100 % Survival of the fish in 100% Raw water within 24 hr.	100 % Survival of the fish in 100% Raw water within 24 hr.	100 % Survival of the fish in 100% Raw water within 24 hr.	100 % Survival of the fish in 100% Raw water within 24 hr.	100 % Survival of the fish in 100% Raw water within 24 hr.	IS 6582 (Part 2) 2001 RA 2019
Manganese as Mn	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	Apha 24th Edition:2023 3111B
Iron as Fe	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	IS 3025 (Part 53): 2024
Vanadium	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	IS 3025 : Part 74 : 2022
Nitrate as NO3	0.358	0.413	6.32	5.57	7.17	5.21	4.17	APHA 24th Ed. (4500-NO3-B): 2023

Sources:

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

2. Guidelines for coastal water quality, Dept. of Environment, Govt, of India, General notice ne 620 of 1999

3. Central Pollution Control Board, Pollution Control Acts, Rules and Notifications, Fourth Edition, Ministry of Environment and Forests, 2001, 897pp.

7. Sediment Quality

Sediment samples were collected from port berth area (19°17'21" N 84°56' 55" E) for determination of their physico-chemical properties. The sediment pH varied from 6.63-6.81 with mean value of 6.73 indicating prevalence of alkali medium within the sedimentary environment (Table 7.1). Sodium level in sediment varied from 728.63-741.63 mg/kg with mean value of 736.16 mg/kg. Maximum values were observed during May 2025 and minimum during June 2025. Potassium values are varied from 9.63-11.76 mg/kg with mean value of 10.72 mg/kg. The sediment phosphate value is ranged from 25.61-30.56 mg/kg with average value of 28.77 mg/kg. The maximum value recorded during the month of June 2025 where as the minimum value recorded during the month of Sep 2025. The sediment chloride value is varied from 2950.5-3012.52 mg/kg with average value of 2998.92 mg/kg. The maximum value was recorded during June 2025 whereas the minimum value recorded during April 2025, the maximum Sulphate value (234.45) was observed during April 2025 while it was minimum (225.6) in the month of June 2025. The value of petroleum hydro carbon (PHC) was ranged from 0.0028-0.0035pg/L with mean value of 0.003 during the sampling period. The value of lead varied from 0.011-0.018 g/kg during the entire sampling period. The mercury value was varied from 0.001-0.003 with average value of 0.002.

The Levels of hexavalent chromium value is varied from 16.58-22.64 with average value of 19.36. The Percentage of organic carbon varied from 0.3 -0.38%. With average value of 0.35.

From the analysis of Sediment quality parameters of the harbour area from April 2025 to September 2025, it can be stated that the Sediment quality of harbour area is good as almost all parameters and parameters are well within the permissible limits.

Table 7.1 Sediment parameters during April 2025 to September 2025

	April 2025	May 2025	June 2025	July 2025	August 2025	Sep 2025	Average	Method
Texture	Fine & moderately well sorted	Fine & moderately well sorted	Fine & moderately well sorted	Fine & moderately well sorted	Fine & moderately well sorted	Fine & moderately well sorted	--	WCS/SOP/SOIL
pH Value	6.71	6.74	6.75 at 26.2 °C	6.63 at 25.1 °C	6.81 at 26.2 °C	6.73 at 25.1 °C	6.73	IS 2720 (Part-26): 1987
Available Sodium as Na	735.6	741.63	728.63	735.2	735.27	740.6	736.16	USEPA 6010D,2014. Rev No.4:2014
Available Potassium as K	11.76	10.84	11.25	10.53	9.63	10.28	10.72	USEPA 6010D,2014. Rev No.4:2014
Available Phosphorous as P	29.94	30.14	30.56	28.12	28.27	25.61	28.77	WCS/SOP/SOIL
Chloride	2950.5	3010.68	3012.52	3004.28	3004.22	3011.34	2998.92	USDA:1954 US-affirmed 2010
Sulphate	234.45	229.41	225.6	231.7	231.8	228.6	230.26	WCS/SOP/SOIL
PHC	0.0031	0.0029	0.0035	0.0028	0.0032	0.003	0.003	UNEP 1992

Lead	0.016	0.014	0.015	0.018	0.011	0.016	0.015	EPA 3050B
Mercury	0.003	0.002	0.003	0.002	0.001	0.002	0.002	EPA 3050B
Hexavalent Chromium	22.64	20.72	19.85	18.0	18.35	16.58	19.36	WCS/SOP/SOIL
Organic Carbon	0.38	0.34	0.38	0.36	0.32	0.3	0.35	IS 2720 (Part-22):1972 RA 2020

8. Ground Water

The potable water was collected from the drinking water available inside the port and analysed for different water quality parameters like, colour, order, turbidity, pH, Total hardness, Iron, Chloride, TDS, Calcium, Magnesium, Sulphate, Fluoride, Alkalinity, Salinity, Zine, Lead and E. Coil and the values are within the permissible limit. The monthly values and the average values are depicted in Table 8.1

Table 8.1 Ground Water parameters during April 2025 to September 2025

Ground water parameter	April 2025	May 2025	June 2025	July 2025	August 2025	Sep 2025	Average
Colour	--	--	1	1	2	1	1.25
Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	--
Turbidity	0.64	0.68	<0.1	<0.1	<0.1	<0.1	0.66
pH Value	7.32	7.29	7.327 at 27.2°C	7.208 at 27.6°C	7.23 at 29.5°C	7.193 at 27.1°C	7.26
Total Hardness as $CaCO_3$	162.41	160.82	176.0	140.0	132	186	159.54
Iron as Fe	0.23	0.24	<0.02	<0.02	<0.02	<0.02	0.24
Chloride as Cl	58.64	63.17	47.99	55.98	50.98	67.98	57.46
Total Dissolved Solid as TDS	273.58	259.74	226	253	240	235	247.89
Calcium as Ca	27.43	28.97	32.87	40.08	43.29	35.27	34.65
Magnesium as Mg	22.81	21.64	22.84	9.72	32.08	23.81	22.15
Sulphate as SO_4	24.61	26.37	1.35	1.48	1.21	1.63	9.44
Fluoride as F	BDL	BDL	<0.02	<0.02	<0.02	<0.02	--
Total Alkalinity as $CaCO_3$	142.6	139.24	120	130	135	130	132.81
Salinity	0.11	0.09	0.05	0.05	0.05	0.05	0.067
Zinc as Zn	0.0001	0.0001	<0.05	<0.05	<0.05	<0.05	0.0001
Lead as Pb	BDL	BDL	<0.01	<0.01	<0.01	<0.01	<0.01
E.Coli	<1.8	<1.8(MPN/100ml)	<2.0	<2.0	<2.0	<2.0	<2.0

9. Effluent from coal stack yard

The water from the coal stack yard was collected from coal stack yard available inside the port premises for analysis of different parameters such as colour, odour, TSS, pH, Temperature, Oil & Grease, TRC, Ammonical Nitrogen, TKN, Free Ammonia, BOD, COD, As & Hg. The monthly average value of the parameters are depicted in table 9.1

Table 9.1 Coal stack yard parameters during April 2025 to September 2025

Settling pit-1							
parameter	April 2025	May 2025	June 2025	July 2025	August 2025	Sep 2025	Average
Colour	--	--	5	10	5	5	6.25
Odour	--	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Suspended Solids as TSS	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
pH Value	7.2	7.1	7.215 at 26.2°C	7.63at 27.2 °C	6.81 at 26.9°C	7.732 at 27.1 °C	7.28
Temperature	--	--	26.5	27.0	25.8	27.2	26.63
Oil &Grease	--	--	<4.0	<4.0	<4.0	<4.0	<4.0
Total Residual Chlorine	--	--	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Amonical Nitrogen	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kajeldahl Nitrogen	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Free Ammonia	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Biochemical Oxygen Demand as BOD (5 Days at 20°C)	--	--	6.5	7.0	8.7	7.5	7.43
Chemical Oxygen Demand	--	--	15	16	20	17	17.0
Arsenic as As	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury as Hg	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Settling pit-2							
parameter	April 2025	May 2025	June 2025	July 2025	August 2025	Sep 2025	Average
Colour	--	--	5	4	3	4	4
Odour	--	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Suspended Solids as TSS	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
pH Value	6.9	7.2	8.05 at 27.4°C	7.86 at 28.0 °C	8.163 at 29.4°C	7.67 at 27.2 °C	7.64
Temperature	--	--	26.8	27.0	26.1	27.3	26.80
Oil &Grease	--	--	<4.0	<4.0	<4.0	<4.0	<4.0
Total Residual Chlorine	--	--	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Amonical Nitrogen	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kajeldahl Nitrogen	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Free Ammonia	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Biochemical Oxygen Demand as BOD (5 Days at 20°C)	--	--	22.6	18	24.4	21	21.5
Chemical Oxygen Demand	--	--	34	32	40	36	35.5
Arsenic as As	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury as Hg	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Settling pit-3							
parameter	April 2025	May 2025	June 2025	July 2025	August 2025	Sep 2025	Average
Colour	--	--	5	10	3	5	5.75
Odour	--	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Suspended Solids as TSS	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
pH Value	7.1	7.1	7.28 at 27.3°C	7.186 at 27.2°C	7.768 at 29.3°C	7.026 at 27.7 °C	7.24
Temperature	--	--	26.4	27.1	25.9	26.8	26.55
Oil &Grease	--	--	<4.0	<4.0	<4.0	<4.0	<4.0
Total Residual Chlorine	--	--	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Amonical Nitrogen	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kajeldahl Nitrogen	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Free Ammonia	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Biochemical Oxygen Demand as BOD (5 Days at 20°C)	--	--	6.8	22.1	7.2	27.5	15.9
Chemical Oxygen Demand	--	--	22	34	20	40	29
Arsenic as As	--	--	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury as Hg	--	--	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Conclusion:

The shoreline, sediment, and wave dynamics at Gopalpur from April 2025 to September 2025 exhibit significant seasonal variations. Shoreline distances show fluctuations, with maximum variations at 2.5 km along Gopalpur Port South, indicating dynamic sediment transport. The northern shoreline experiences erosion at the groin but gains sediment at farther distances, suggesting northward sediment transport. Gopalpur Tourist Beach remains a stable deposition zone beyond 2.0 km, while nearshore areas experience erosion during May 2025.

Overall, the coastal processes at Gopalpur are highly dynamic, driven by seasonal monsoonal effects, wave action, and sediment transport, shaping its shoreline evolution.

Ambient air quality such as PM10, PM2.5, SO_2, NO_2 were monitored twice in a week at the four points within the port premises from April 2025 to September 2025. It is observed that air pollution is mainly due to high particulate matter. The maximum Particulate matter recorded at station 'B' where major port activities are in progress and high vehicular movement. The maximum SO_2 was recorded at station 'B' and NO, were recorded at station "B" due to high vehicular movement. The values observed are well within the NAAQ norms stipulated by MoFFCC and Environment (protection) Act, 1956. Further, sound level monitored during the day and nighttime is within the permissible limits stipulated by CPCB for industrial 75dB in day time and 70dB in the night time. Thus, the ongoing port activities at present are not detrimental to the air quality and noise level and indicates a pollution free terrestrial port environment.

Water quality parameters of port harbour area monitored for the period from April 2025 to September 2025 include, pH, dissolved oxygen (DO), color and odour, faecal coliform, biological oxygen demand (BOD), Lead, Cadmium, Hexavalent Chromium, Total Chromium, Copper, Zinc, Selenium, Nickel, Cyanide, Fluoride, Phosphorous, Sulphide, Phenolic Compound, Bio-Assay, Manganese, Iron, Vanadium, Nitrate. All the parameters are well within the standard limit during the sampling period.

Sediment quality of port harbour area was assessed by examining sediment texture (mean grain size, sorting, skewness, and kurtosis), pH, sodium, potassium, phosphate, chloride, sulphate, PHC, lead, mercury, organic carbon and hexavalent chromium. Sediment is alkaline in nature while phosphate, PHC, mercury, organic carbon and hexavalent chromium are present in trace amount. The metal concentrations both in water and sediment are within the permissible limit.

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