



Ref. No. KPCL/MIS(H)-MoEF.EHS/326-2020

Date: 27/11/2020

To

The Additional Principal Chief Conservator of Forests (C)

Ministry of Environment, Forests & Climate Change

Regional office (South Eastern Zone),

1st & 2nd floor, HEPC Building, No.34,

Cathedral Garden Road,

Nungambakkam, Chennai-600034

Sub: Submission of Half Yearly Compliance Report on conditions of Environmental Clearances for Phase – I & II Development of Krishnapatnam Port for the period of April 2020 to September 2020 – Regd.

Ref: Environmental Clearance for Phase – II development of Krishnapatnam Port Letter No. F.No.11-62/2009-IA.III dated: 13.11.2009 and Dt. 16-04-2018.

Dear Sir,

As per General Condition no. 14 of the Environmental Clearance accorded by the MoEF&CC cited, please find herewith attached condition wise six-monthly compliance report of Phase I & II developments of Krishnapatnam Port along with Environmental Monitoring Report for the period from **April 2020 to September 2020**.

Thanking you,

Yours faithfully,

For **KRISHNAPATNAM PORT CO. LTD.,**


27/11/2020

G Venugopal Reddy
DGM-EHS

Encl: 1. Compliance Report on EC Conditions of Krishnapatnam Port Phase I & II development.
2. Environmental Monitoring Report for the Period of April' 2020 to September' 2020.

Copy to:

1. *The Regional Director, CPCB Zonal office, Bangalore.*
2. *The Joint Chief Environmental Engineer, A.P. Pollution Control Board, Zonal Office, Vijayawada.*
3. *Environmental Engineer, A. P. Pollution Control Board, Regional Office, Nellore.*

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KRISHNAPATNAM PORT COMPANY LIMITED



**COMPLIANCE REPORT ON CONDITIONS STIPULATED
IN THE ENVIRONMENTAL CLEARANCE ACCORDED
FOR KRISHNAPATNAM PORT DEVELOPMENT**

PHASE - I & II

PERIOD: APRIL 2020 to SEPTEMBER 2020

Krishnapatnam Port
Compliance Report on Conditions
Stipulated in the

Environmental Clearance
For Phase-I

Development of Krishnapatnam Port
Period: April, 2020 to September, 2020

Compliance Report on Conditions of Environmental Clearance (EC) for Krishnapatnam Port Phase – I;
MoEF Order dated 26.07.2006 - Period of Report “April, 2020 to September, 2020”

S.No	Stipulation	Compliance Status
(A) Specific Conditions:		
1	All the conditions stipulated by Andhra Pradesh State Pollution Control Board in their letter Order No. APPCB/VJA/NLR/633/HO/2004/9/467, dated 25.05.2004 should be strictly implemented.	Noted.
2	Detailed plan for protection of the 9 acres of the mangroves should be provided.	Complied The said 9 acres of land area situated in the salt lands. a) Display boards have been erected to protect this mangrove area b) Tidal exchange to the 9 acres mangrove area is ensured by constructing a pipe culvert.
3	The fisherman and salt pan workers should be rehabilitated as per the Rules of Government of Andhra Pradesh.	Complied. (Not applicable)
4	Adequate shore protection measures, including construction of revetments/rip-raps, should be taken up based on the scientific studies. The action plan for implementing the shore protection measures should be submitted to this Ministry within 6 months from the date of receipt of this letter.	Complied. Scientific studies like Hydro dynamic studies, shoreline monitoring & Marine biodiversity are being conducted for shoreline protection on regular basis.
5	Green belt area should be developed along the project and budget earmarked.	Complied. Greenbelt of 191.5 Ha has been developed along port boundary, around coal yards, avenue & median plantations.
6	For rail and road connectivity of the project, separate application should be submitted to this Ministry.	Complied.
7	The Bay is reported to be calm for most of the days of the year. Even on the day of the visit, having a deep depression in South-West Bay of Bengal, the basin was calm, though the Bay experienced high waves. Hence, dredging operation in the estuary should not have any adverse impact on the existing mangroves blocks.	Noted. Dredging is programmed in phases, ensures the impact, if any, will be minimal.
8	During the rough weather, resulting in high flood tides, dredging operation in the estuary should be stopped.	Noted and being complied.

9	Regarding the location of stock yard in the salt pan area to be acquired, the proponent should not take up any developmental works in the mangrove area and should ensure that no destruction of mangroves takes place.	Noted.
10	A disaster management plan covering emergency evacuation mechanisms etc., to deal with natural disaster events should be prepared and furnished to the Ministry.	Complied.
11	The company must take up and earmark adequate funds for the socio-economic development and for welfare measures in the area including drinking water supply, vocational training, and fishery related development programmes (like cold storages).	Complied. As part of Corporate Social Responsibility (CSR), socio economic development schemes and welfare measures in the form of Roads, Drains, Drinking water supply by providing tankers and overhead tanks, sanitation and public health, roads and street lighting in the R&R Colonies, supply of cooking gas connections along with stoves, housing, medical aid, educational assistance, student hostel, old age homes, financial aid, imparting vocational trainings for skill development to improve employment opportunities, women empowerment etc., are being taken up for the neighborhood villages with adequate funds earmarked for the same.
12	The fishing activities by the fishermen living in the settlement along the creek should not be hindered and a mechanism may be evolved for the movement of fishing boats vis-a-vis shipping activities.	Complied. The fishermen have been rehabilitated by the GoAP. Mechanism for movement of fishing boats vis-à-vis shipping is evolved keeping in mind the safety, security, ISPS and customs requirements.
13	The Relocation of the fishermen and local communities in the area should be done strictly in accordance with the norms prescribed by the State Government. The relocated communities should be provided with all facilities including health care, education, sanitation and livelihood.	Complied. GoAP Rehabilitated the Fishermen and Local Communities. KPCL provided infrastructure facilities under CSR activities at the Rehabilitation Colony in the form of Roads, Drains, drinking water supply, supply of cooking gas, housing, educational assistance, student hostels, old age homes, financial aid, imparting vocational trainings, women empowerment and public health, Malaria Control measures, Medical and Health camps etc.
14	The company should take up green belt program in the project area including an ecological park and the plan may be submitted to the Ministry within one year.	Complied. Green belt of 191.5 Ha has been developed along port boundary, around coal yards, avenue & median plantations. Ecological park developed.

15	The company may suitably modify the alignment of channel entrance including its width, turning circle, taking into consideration the wave traversal, its intensity etc., to facilitate smoother navigation of ships.	Complied. The channel alignment is firmed up after undertaking numerical navigation simulation studies dated March,2009 by M/s. HR Wallingford, UK.
16	The breakwater alignment and its design should be further modified based on relevant model studies, borehole data etc., keeping in view the tranquility condition required for berthing and maneuvering of ships and subsequent cargo handling operations.	Complied. The alignment and design of breakwaters are firmed up based on geotechnical investigations, geotechnical stability analysis, Numerical model studies under taken by M/s. HR Wallingford, UK, 3D model studies of tranquility conducted at Lanka Hydraulic Laboratories, Sri Lanka and Physical model studies of breakwaters at IITM, Chennai.
17	The height of dumping in the dumping site should be restricted to 30 cm against 90 cm proposed.	Being Complied. Bathymetry of dumping site is being monitoring periodically to avoid build up.
18	The project proponent will not undertake any destruction of mangroves during construction and operation of the project.	Complied. Existing mangrove areas are being protected with suitable barricading, erection of display boards and ensuring the tidal flow.
19	Sewage arising in the port area should be disposed off through septic tank – soak pit system or should be treated along with the industrial effluents to conform to the standards stipulated by Andhra Pradesh Pollution Control Board and should be utilized/ re-cycled for gardening, plantation and irrigation.	Complied. 300 Kilo Liters per day (KLD) capacity of Sewage Treatment Plant (STP) for Amenities Blocks is commissioned in July, 2011. Treated water is being utilized for the green belt development within port premises. Septic tank and soak pit system are being followed for offices and isolated buildings.
20	Adequate plantation should be carried out along the roads of the Port premises and a green belt should be developed.	Complied.
21	Project proponent should prepare and regularly update the Disaster Management Plan from time to time.	Complied. Disaster Management Plan is regularly being updated time to time. last update was on dt:11.06.2018.
22	Fire Fighting arrangements are examined to the new proposal.	Complied. a) Port has developed dedicated fire-fighting system with required equipment and trained professionals. b) Developed Fire contingency plan and implementing the same. c) Port Tugs are also having firefighting equipment

23	There should be no withdrawal of ground water in CRZ area, for this project. The proponent should ensure that as a result of the proposed constructions, ingress of saline water into ground water does not take place. Piezometers should be installed for regular monitoring for this purpose at appropriate locations on the project site.	Noted and being-Complied There is no withdrawal of ground water, required water coming from Nakkala kalava & Muthukur reservoir under the permitted quantity.
24	The project should not be commissioned till the requisite water supply and electricity to the project are provided by the PWD/Electricity Department.	Noted. Required necessary permissions like water supply and electricity supply are obtained from concern departments.
25	Specific arrangements for rainwater harvesting should be made in the project design and the rain water so harvested should be optimally utilized. Details in this regard should be furnished to this Ministry's Regional Office at Bangalore within 3 months.	Complied.
26	The facilities to be constructed in the CRZ area as part of this project should be strictly in conformity with the provisions of the CRZ Notification, 1991 as amended subsequently.	Complied.
27	Green buffer zone should be provided all around the project area in consultation with local forest department and the report submitted to this Ministry's Regional Office at Bangalore.	Complied. Green belt of 191.5 Ha has been developed along port boundary, around coal yards, avenue & median plantations.
28	No product other than those permissible in the Coastal Regulation Zone Notification, 1991 should be stored in the Coastal Regulation Zone area.	Noted.
(B) General Conditions		
1	Construction of the proposed structures should be undertaken meticulously conforming to the existing Central/local rules and regulations including Coastal Regulation Zone Notification 1991 & its amendments. All the construction designs / drawings relating to the proposed construction activities must have approvals of the concerned State Government Departments / Agencies.	Complied. The construction designs / drawings are in conformity to the detailed project reports approved by GoAP and consistent with the CRZ Notification.
2	Adequate provisions for infrastructure facilities such as water supply, fuel, sanitation etc., should be ensured for construction workers during the construction phase of the project so as to avoid felling of trees/mangroves and pollution of water and the surroundings.	Complied. Adequate provisions including water supply, fuel and sanitation are ensured for construction workers.

3	<p>The project authorities must take necessary arrangements for disposal of solid wastes and for the treatment of effluents by providing a proper waste water treatment plant outside the CRZ area. The quality of treated effluents, solid wastes and noise level etc., must conform to the standards laid down by the competent authorities including the Central / State Pollution Control Board and the Union Ministry of Environment and Forests under the Environment (Protection) Act, 1986, whichever are more stringent.</p>	<p>Complied.</p> <p>a) Solid wastes are being collected, segregated and disposed as under:</p> <table border="1" data-bbox="1227 268 2094 579"> <thead> <tr> <th data-bbox="1227 268 1305 343">S. No.</th> <th data-bbox="1312 268 1700 343">Material</th> <th data-bbox="1706 268 2094 343">Method of Disposal</th> </tr> </thead> <tbody> <tr> <td data-bbox="1227 347 1305 419">1</td> <td data-bbox="1312 347 1700 419">Biodegradable waste</td> <td data-bbox="1706 347 2094 419">Composting & used as manure/ Send to Pig farms</td> </tr> <tr> <td data-bbox="1227 424 1305 499">2</td> <td data-bbox="1312 424 1700 499">Non-Biodegradable waste</td> <td data-bbox="1706 424 2094 499">Disposal to recyclers</td> </tr> <tr> <td data-bbox="1227 504 1305 579">3</td> <td data-bbox="1312 504 1700 579">Used Oils/Used Batteries</td> <td data-bbox="1706 504 2094 579">Disposal to approved vendors of APPCB</td> </tr> </tbody> </table> <p>b) 300 KLD STP is commissioned and operational outside the CRZ area.</p> <p>c) Treated effluent conforms to norms and is recycled for Green Belt development.</p> <p>d) Noise levels are regularly being monitored and they comply to standards.</p>	S. No.	Material	Method of Disposal	1	Biodegradable waste	Composting & used as manure/ Send to Pig farms	2	Non-Biodegradable waste	Disposal to recyclers	3	Used Oils/Used Batteries	Disposal to approved vendors of APPCB
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4	<p>The proponents should provide for a regular monitoring mechanism so as to ensure that the treated effluents conform to the prescribed standards. The records of analysis reports must be properly maintained and made available for inspection to the concerned State / Central officials during their visits.</p>	<p>Complied.</p> <p>a) Environmental Monitoring is being carried out through an agency accredited to NABL and approved by MoEF&CC. Results of monitoring confirm to norms and periodical Monitoring Reports are being submitted to APPCB regularly.</p> <p>b) Records of analysis reports are properly maintained and are being made available for inspection to the concerned state/ central officials during their visits.</p>												
5	<p>In order to carry out the environmental monitoring during the operational phase of the project, the project authorities should provide an environmental laboratory well equipped with standard equipment and facilities and qualified manpower to carry out the testing of various environmental parameters.</p>	<p>Complied.</p>												
6	<p>The sand dunes and mangroves, if any, on the site should not be disturbed in any way.</p>	<p>Noted and being Complied.</p>												

7	A copy of the clearance letter will be marked to the concerned Panchayat/local NGO, if any, from whom any suggestion/representation has been received while processing the proposal.	Complied. Copies of Environmental Clearance letters were submitted to Sarpanch, Krishnapatnam Grama Panchayat, Nellore on 10 th August, 2006 and to President, Nellore District Mechanized Fishing Boat Operators Association on 10 th August, 2006.
8	The Andhra Pradesh Pollution Control Board should display a copy of the clearance letter at the Regional Office, District Industries Centre and Collector's Office/Tehsildar's Office for 30 days.	Complied.
9	The funds earmarked for environment protection measures should be maintained, in a separate account and there should be no diversion of these funds for any other purpose. A year-wise expenditure on environmental safeguards should be reported to this Ministry's Regional Office at Bangalore and the State Pollution Control Board.	Noted. The expenditure incurred for the environmental safeguards for the year 2019-20 is Rs. 10.95 Crores and budget for 2020-21 is Rs. 13.59 Crores.
10	Full support should be extended to the officers of this Ministry's Regional Office at Bangalore and the officers of the Central and State Pollution Control Boards by the project proponents during their inspection for monitoring purposes, by furnishing full details and action plans including the action taken reports in respect of mitigative measures and other environmental protection activities.	Noted and being complied.
11	In case of deviation or alteration in the project including the implementing agency, a fresh reference should be made to this Ministry for modification in the clearance conditions or imposition of new ones for ensuring environmental protection.	Noted.
12	The Ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry.	Noted.
13	The Ministry or any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environmental protection, which should be complied with.	Noted.
14	The project proponent should advertise in at least two local newspapers widely circulated in the region around the project, one of which should be in the vernacular language of the locality concerned, informing that the project has been accorded environmental clearance and copies of clearance letters are available with the State Pollution	Complied. Advertisement was published in Local Newspaper namely Andhra Jyothi dated 11.08.2006. A copy of the advertisement was submitted to the Regional Office, Bangalore of MoEF vide our Letter No.KP/MOEF/346 dated 23.08.2007.

	Control Board and may also be seen at Website of the Ministry of Environment & Forests at http://www.envforin.in .The advertisement should be made within 7 days from the date of issue of the clearance letter and a copy of the same should be forwarded to the Regional Office of this Ministry at Bangalore.	
15	The project proponents should inform the Regional Office at Bangalore 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. Details were furnished to the MoEF&CC, Regional Office, Bangalore, vide our letter no. KP/MOEF/60 dated 16 th Feb, 2007. Financial Closure: 16.10.2006 Approval of the Project by GoAP: 17.09.2004 Start of Land Development June, 2006
16	The above mentioned stipulations will be enforced among others under the Water (Prevention and Control of Pollution) Act 1974, the Air (Prevention and Control of Pollution) Act, 1981, the Environment (protection) Act, 1986, the Hazardous Chemicals (Manufacture, Storage and Import) Rules, 1989, the Coastal Regulation Zone Notification, 1991 and its subsequent amendments and the Public Liability Insurance Act, 1991 and the Rules made there under from time to time. The project proponents should also ensure that the proposal complies with the provisions of the approved Coastal Zone Management Plan of Andhra Pradesh State and the Supreme Court's order dated 18 th April, 1996 in the Writ Petition No.664 of 1993 to the extent the same are applicable to this proposal.	Noted.

Krishnapatnam Port
Compliance Report on Conditions
Stipulated in the
Environmental Clearance
For Phase-II
Development of Krishnapatnam Port
Period: April, 2020 to September, 2020

Compliance report on conditions of Environmental Clearance (EC) for Krishnapatnam Port for Phase – II
MoEF Order dated 13.11.2009 Period of Report “April, 2020 to September, 2020”

S. No.	Stipulation	Compliance Status
5. Specific Conditions:		
1.	All the conditions as stipulated by the Forests & Environment Department, Govt. of Andhra Pradesh vide letter No.2286/CZMA/2009, dated 11.05.2009 shall be strictly complied.	Complied.
2.	<p>All the details / information submitted by the project proponent vide letter No.KP/MOEF/PH-II/174, dated 17.08.2009 shall be strictly complied.</p> <p>The details are as follows:</p> <p>(i) Southern Boundary of proposed dredge disposal area of Phase-II shall be moved towards North to coincide with Northern Boundary of Phase-I dredge disposal area.</p> <p>(ii) Impact of bridges & conveyor across creeks to be re-examined to avoid impact on mangroves.</p> <p>(iii) To engage INCOIS or other reputed organization to monitor coastal behavior for a longer period.</p> <p>(iv) Runoff from Coal Stock piles shall be collected in dump ponds and recycled for dust suppression and fire protection.</p>	<p>Complied.</p> <p>(i) Southern Boundary of proposed dredge disposal area of Phase-II has been moved towards North to coincide with Northern Boundary of Phase-I dredge disposal area</p> <p>(ii) Belt Conveyors and Road Bridge crossings have no impact on Mangroves. Railway Bridge Location is reworked to avoid disturbance to mangroves.</p> <p>(iii) M/s. Indian National Centre for Ocean Information Services (INCOIS) was engaged for coastal monitoring. As per their Report for 2008-10, the port development has not impacted the coast.</p> <p>(iv) Runoff from coal storage yards is routed through peripheral drains, collection pits and guard (Dump) ponds with facility to recycle the water for dust suppression.</p>
3.	The hydro-dynamic studies shall be undertaken to ascertain the impact to the shoreline in the stretch and ecologically sensitive areas and the report shall be submitted to the Ministry.	<p>Complied.</p> <p>a) The hydro-dynamic studies to ascertain the impact of port development on the shoreline in the stretch have been carried out through M/s.HR Wallingford, UK. No long term impact is noticed due to minimal net drift along the coast at Krishnapatnam Port.</p> <p>b) However, as recommended in their report dated October, 2007, 7 Km of coast line both North and South of the port entrance is monitored through M/s. Indian National Centre for Ocean Information Services (INCOIS), Hyderabad using satellite imagery.</p>

		<p>c) From the INCOIS report for the period October 2008 to January 2010, the coastline is found to be stable.</p> <p>d) Shoreline monitoring further carried out in-house also revealed that the coast line is unaffected except for seasonal variations.</p>
4.	Ministry has taken a decision that the plantation of mangroves shall be undertaken on an area of 50 ha. as the Phase-II of the project spreads over 800 ha.	<p>Complied.</p> <p>1. Mangroves development in 50 Ha is undertaken in the port, in the areas suggested by GoAP.</p> <ul style="list-style-type: none"> • For the current year 2020-21, Rs. 3.77 lakh is budgeted towards mangrove protection.
5.	Six monthly monitoring shall be carried out and a comparative analysis shall be made to examine for any mitigative measures required.	<p>Complied.</p> <p>a) The Six Monthly Environmental Monitoring Report of AAQ, Noise, Marine and ground water, Marine Sediment and Soil with comparative analysis are examined, findings shows all values are within limits and no mitigative measures required. Reports are being submitted to Ministry and APPCB. Same is enclosed to this report as Appendix-I.</p>
6.	The temperature, salinity and tidal inflow shall be monitored weekly.	<p>Complied.</p> <p>Monitoring is being carried out on weekly basis with an accredited NABL consultant are being reported.</p>
7.	The greenbelt of 100 m. width shall be developed around the coal stack yard as per the request in the public hearing.	<p>During Public Hearing it was requested to form 100 m width of green belt along boundary.</p> <p>MoEF has been requested vide ltr. No.: KP/MOEF/113 dt. 29th August 2012 to modify this condition suitably.</p> <p>100 m Green belt along the boundary and 20 m wide green belt around coal stack yards is being developed as requested during public hearing.</p>
8.	Impact on the drawl of the water from the Kandaleru Creek shall be regularly monitored and report submitted to the Ministry.	<p>Noted and being Complied</p> <p>Water is not drawn from Kandaleru Creek and quality of water is being reported.</p>
9.	Continuous monitoring on disposal of dredged material shall be put in place for both pre and post monsoon periods.	<p>Complied</p> <p>Bathymetry of the disposal area of dredged material i.e., the dumping grounds is being monitored periodically.</p>

10.	No construction work other than those permitted in Coastal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.	Noted and being Complied. No construction works at site.
11.	Oil spills if any shall be properly collected and disposed as per the Rules.	Complied. Oil Spills, if any, shall be managed as per the approved Oil Spill Contingency Plan. We have Procured Oil Boom, Skimmer and chemicals. Staff are trained to cater to Tier-I Oil spills. As per Disaster Management Plan, Indian Coast Guard will be alerted to Coordinate.
12.	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.	Complied. The approach channel is marked with lighted buoys for safe navigation. Adequate traffic control guidelines are framed and copy thereof was submitted to the Fisheries Department to suitably inform fishermen.
13.	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.	Complied. Environmental Cell has been set-up under the supervision of the COO. Environmental review meetings are being held regularly for effective implementation of stipulated safeguards. i) Accreditation to International Management Systems a. Krishnapatnam Port is accredited to and complying with the following International management Systems: <ul style="list-style-type: none"> • ISO: 14001 Environmental Management System • ISO: 9001 Quality Management System • OHSAS 18001 OH & Safety Management • ISO: 28000 Specification for Security Management System for the Supply Chain. b. Following environmental protection measures are being implemented in the port: i) To Improve AAQ: <ul style="list-style-type: none"> • Installation and operation of Mechanical Dust Suppression System (MDSS) with 248 nos of sprinklers at coal stacking and wagon loading areas. • Deploying 25 no's of Truck mounted sprinklers for roads and transit areas.

- Deploying 13 nos. of heavy duty Atomized Sprayers
- Deploying Hoppers for unloading
- Mechanized coal handling at 2 berths within the land so far transferred on lease by GoAP. Conveyor covering with hood.
- Developed paved roads and resorted to mechanical sweeping of roads.
- Tarpaulin Covering of Railway wagons coal transport vehicles destined to outside the port.
- Developed wind shield/screen and warehouses of 12 m height on west part of (Fast Track Process) FTP-1 and North side towards Krishnapatnam village in coal yards.
- 191.5 Ha. of Greenbelt has been developed along port boundary, around coal yards and avenue & median plantations.
- Developed firefighting contingency plan, procured necessary fire tenders and other equipment and deployed trained personnel.
- Monitoring AAQ at 7 locations through NABL accredited & MoEF approved agency.
- Commissioned 3 no's CAAQM Equipment's in the port & linked to APPCB website. **ii) To Improve Water Quality:**
- Developed runoff drains, collections pits, guard ponds for coal storage yards with provision for recycling for dust suppression.
- Developed truck wash with oil separator and settlement pits with provision for recycling for dust suppression.
- Developed 300 KLD STP and treated effluent is recycled for dust suppression and green belt.
- Monitoring of Marine water quality, Marine sediment quality, Surface Water Quality and ground water quality at regular intervals.

ii) To Improve Oil Spillage Control:

		<ul style="list-style-type: none"> • Developed Oil Spill Contingency plan for Tier-I spills, procured necessary equipment and chemicals and deployed trained personnel. • Trainings and periodical mock drills are being organized for the work force • Developed on-site emergency plan duly reviewed by former DGFASLI and submitted to District administration for integrating with Off-Site Emergency plan. <p>iii) To improve occupational Health:</p> <ul style="list-style-type: none"> • Personal Protection Equipment (PPEs) are provided to all the workers and ensuring that all the work force uses the same regularly • Periodical health checkup at the port dispensary is ensured for workers engaged in coal handling
14.	No destruction of mangrove is permitted. 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.	<p>Noted and being Complied.</p> <ol style="list-style-type: none"> 1. We raised Mangroves in 50 Ha in the Port in the area suggested by GoAP. 2. For the current year 2020-21 Rs. 3.77 lakh is budgeted towards Mangrove Protection.
15.	The funds earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes.	<p>Complied.</p> <p>An amount of Rs. 10.95 Crores has been utilized for Environment management for 2019-20 and budget for 2020-21 Rs. 13.59 Crores</p>
16.	There shall be no withdrawal of groundwater in Coastal Regulation Zone area, for this project. In case any groundwater is proposed to be withdrawn from outside the CRZ area, specific prior permission from the concerned State / Central Groundwater Board shall be obtained in this regard.	<p>Complied.</p> <p>No groundwater is being drawn from the Coastal Regulation Zone.</p>
17.	The Hazardous waste generated shall be properly collected and handled as per the provisions of Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008.	<p>Complied.</p> <p>Hazardous waste like used oils / grease and batteries are being collected and handled as per the provisions of Hazardous Waste (Management, Handling and Trans boundary Movement) Rules, 2016.</p>

18.	The waste water generated from the activity shall be collected, treated and reused properly.	Complied. A 300 KLD STP is commissioned and is operational. The treated effluent is recycled for greenbelt development												
19.	Sewage Treatment facility should be provided in accordance with the CRZ Notification.	Complied.												
20.	No solid waste will be disposed of in the Coastal Regulation Zone area. The solid waste shall be properly collected, segregated and disposed as per the provision of Solid Waste (Management and Handling) Rules, 2000.	<p>Noted and Complied. Solid wastes are being collected, Segregated and disposed as under</p> <table border="1"> <thead> <tr> <th>S. No.</th> <th>Material</th> <th>Method of Disposal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Biodegradable waste</td> <td>Composting & used as manure/ Send to Pig Farms</td> </tr> <tr> <td>2</td> <td>Non-Biodegradable waste</td> <td>Disposal to approved recyclers</td> </tr> <tr> <td>3</td> <td>Used Oils/Used Batteries</td> <td>Batteries are procured on buy back basis and Used oil is being disposed to approved vendors of APPCB</td> </tr> </tbody> </table>	S. No.	Material	Method of Disposal	1	Biodegradable waste	Composting & used as manure/ Send to Pig Farms	2	Non-Biodegradable waste	Disposal to approved recyclers	3	Used Oils/Used Batteries	Batteries are procured on buy back basis and Used oil is being disposed to approved vendors of APPCB
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3	Used Oils/Used Batteries	Batteries are procured on buy back basis and Used oil is being disposed to approved vendors of APPCB												
21.	Installation and operation of DG set if any shall comply with the guidelines of CPCB.	Noted. Diesel Generating Sets being used are in the range of 80 KVA to 500 KVA only as back up for emergency lighting & safety during power breakdowns and these sets comply with the guidelines of Central Pollution Control Board (CPCB).												
22.	There shall be no reclamation / dredging of areas.	Not applicable. This condition is deleted vide MoEF letter no. F. No. 11-62/2009-IA.III Dated: 2 nd March, 2010.												
23.	Air quality including the VOC shall be monitored regularly as per the guidelines of CPCB reported.	<p>Not applicable.</p> <p>a) This condition pertaining to VOC monitoring is deleted vide MoEF letter F. No. 11-62/2009-IA.III Dated: 2ndMarch, 2010.</p> <p>b) Air quality monitoring is regularly being carried out at 7 locations through an agency accredited by NABL and approved by MoEF&CC. Results of monitoring comply with the norms. Periodical Monitoring Reports are being submitted regularly to APPCB.</p>												
24.	The project proponent shall undertake green belt development.	Complied.												

		a) Greenbelt has been developed progressively in the port i.e., 100 m wide greenbelt along periphery and 20 m around coal and iron ore stacks, total Greenbelt required by end of Phase-I &II is 191.5 Ha.
25.	Necessary clearances from all the concerned agencies shall be obtained before initiating the project.	Complied. Clearances from the concerned agencies like Krishnapatnam Village Panchayat, Fishing Boat Operators Association, Nellore; NOC from Revenue Department for dispensing HSD, Rail Transport Clearance from Ministry of Railways, Customs Clearance for handling of Cargo, Appointment of KPCL as Conservator from GoAP etc., have already been obtained as part of Phase-I development. Further, clearances from the following statutory authorities have also been obtained. NSPC, ISPS, Coast Guards and NHO.
26.	Project proponent shall install necessary oil spill mitigation measures in the shipyard. The details of the facilities provided shall be informed to this Ministry within 3 months from the date of receipt of this letter.	Complied. a) Oil Spill Contingency Response Plan is in place to cater to Tier –I spills. In pursuance, we have provided the following facilities. i) Spill response equipment and chemicals to handle Tier-1 Oil Spills ii) Shoreline cleaning equipment iii) A team of well trained professionals to handle Oil Spill Contingencies / emergencies with the coordination of Indian Coast Guard. b) Details were furnished to the MoEF&CC Regional Office, Bangalore, vide our letter no. KP/MoEF/PH-II/20 dated 2 nd February, 2010
27.	No hazardous chemicals shall be stored in the Coastal Regulation Zone area.	Complied. No hazardous chemicals are stored in CRZ area.
28.	The project shall not be commissioned till the requisite water supply and electricity to the project are provided by the PWD / Electricity Department.	Complied.
29.	Specific arrangements for rainwater harvesting shall be made in the project design and the rain water so harvested shall be optimally utilized.	Complied. Rain water harvesting pits are developed near buildings. For the general area, rain water harvesting ponds are also developed at suitable locations.

30.	The facilities to be constructed in the CRZ area as part of this project shall be strictly in conformity with the provisions of the CRZ Notification, 1991 and its amendment. The facilities such as office building and residential buildings which do not require waterfront and foreshore facilities shall not be constructed within the Coastal Regulation Zone area.	Noted and being complied.
1. General Conditions:		
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.	Noted. Adequate provisions including water supply, and sanitation are ensured for construction workers.
ii.	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	Noted.
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.	Noted. No excavation or dumping on private property is being carried out.
	(b). No excavation or dumping shall be allowed on wetlands, forest areas or other ecologically valuable or sensitive locations.	Noted.
	(c). Excavation work shall be done in close consultation with the Soil Conservation and Watershed Development Agencies working in the area, and	Noted.
	(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 groundwater.	Noted.
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.
v.	Adequate precautions shall be taken during transportation of the construction material so that it does not affect the environment adversely.	Noted.

vi.	Full support shall be extended to the officers of this Ministry / Regional Office at Bangalore 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 and other environmental protection activities.	Noted.
vii.	Ministry of Environment & Forests or any other competent authority may stipulate any additional conditions or modify the existing ones, if in the interest of environment and the same shall be complied with.	Noted.
viii.	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.
ix.	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.
x.	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. These details were furnished to the MoEF&CC Regional Office, Bangalore, vide our letter no. KP/MoEF/PH-II/20 dated 2nd February, 2010. Financial Closure: 17.03.2009 Approval of the Project by GoAP: 04.08.2009 Start of land development work: 11.08.2009
xi.	Andhra Pradesh Pollution Control Board shall display a copy of the Clearance letter at the Regional Office, District Industries Centre and Collector's Office / Tehsildar's Office for 30 days.	Complied.
7.	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.
8.	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	Complied.

	(Protection) Act, 1972 etc., shall be obtained, as applicable by project proponents from the respective competent authorities.	Statutory clearances are obtained for storage of Diesel from Chief Controller of Explosives (CCE), Fire Department, Civil Aviation Department, and Forest Conservation Act.
9.	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 letters are available with the Andhra Pradesh 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 Bangalore.	Complied. Advertisement was given in Two Local Newspapers namely Deccan Chronicle dated 22.11.2009 and Andhra Jyothi dated 22.11.2009. A copy of the advertisement was sent to Regional Office, Bangalore of MOEF vide our Letter No.KP/MOEF/PH.II/08 dated 18.01.2009.
10.	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.	Noted.
11.	Any appeal against this Environmental Clearance shall lie with the National Environment Appellate Authority, if preferred, within a period of 30 days as prescribed under Section 11 of the National Environment Appellate Act, 1997.	Noted.
12.	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad / Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions /representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.	Complied.

13.	The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM, SO ₂ , NO _x (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the Company in the public domain.	<p>Complied.</p> <p>a) Periodic monitoring of various parameters is being carried out by an agency accredited by NABL and approved by MoEF&CC. The results of monitoring comply with the norms. Results of periodic monitoring are being regularly submitted to statutory authorities.</p> <p>b) EMP as per the EIA report is being implemented.</p> <p>c) Environmental Information is being displayed on the port website.</p> <p>d) Six monthly Environmental Monitoring Reports are being submitted to Ministry and APPCB. Same is enclosed as Annexure-I.</p> <p>e) Ambient Air Quality Parameters are being displayed at the main office.</p>
14.	The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored 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.	<p>Complied.</p> <p>Six Monthly compliance report of EC Conditions for the period Oct 2019 to March, 2020 was submitted to Regional Office of MoEF&CC and APPCB vide our letter dated.30.05.2020.</p>
15.	The environmental statement for each financial year ending 31 st 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 also 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 by e-mail.	<p>Complied.</p> <p>Report for the previous year (FY 2019-20) was submitted to the APPCB vide letter No. KPCL/MIS(A)-APPCB/EHS/282-2020 dated 28.09.2020.</p>
Specific Conditions vide MoEF&CC order F.No. 11-62/2009-IA.III (Pt) dated 16.03.2016		
i	Construction activity shall be carried out strictly according to the provision of CRZ notification, 2011. No construction work other than those permitted in coastal Regulation Zone Notification shall be carried out in Coastal regulation Zone area.	<p>Complied.</p>
ii	All the recommendations and conditions specified by AP Coastal Zone Management Authority (APCZMA) vide letter no.3160/Env/CZMA/2014 dated 14.08.2014 shall be complied with.	<p>Complied with.</p>

	Recommendations and Conditions of the APCZMA dated 14.08.2014.	
	1. The proposed constructions in the Deep Water Port at Krishnapatnam in SPSR Nellore District shall conform to norms prescribed in CRZ Notification, 2011 issued by the Ministry of Environment and Forests, Government of India	Noted
	2. Mining of sand, rock and other substrata material is strictly prohibited, except for the activities permitted under CRZ notification, 2011. No dressing or altering of sand dunes, hills, natural features within the area covered under Coastal regulation Zone. Approved stone quarries shall be identified for extraction of stones and boulders for the construction of roads.	Noted
	3. Harvesting or drawl of ground water within the CRZ area should not be resorted either for construction or during the operational phase of the port within the CRZ area.	Noted
	4. Green belt shall be developed all along the land boundary of the proposed project site to act as wind breaks. The treated waste water from the Sewage Treatment Plant shall be utilized for raising the green belt.	Complied
	5. Mangrove plantations existing in the Port area shall be maintained and protected. There is about 85 Ha of mangrove plantations existing in the port area. Suitable areas may be identified for planting the mangroves. Wherever, mangroves are planted in the vicinity (Private / Government lands), necessary protection shall be extended.	Complied.
	6. Shore protection measures shall be undertaken to prevent erosion of shoreline based on studies conducted by reputed national agency (INCOIS).	Complied a) From the INCOIS report for the period October 2008 to January, 2010, the coastline is found to be stable. b) Shoreline monitoring further carried out in-house also revealed that the coast line is unaffected except for seasonal variations. c) Though the shoreline is stable, still shore protection measures like green cover (casuarina plantation) along the beach is developed.

	7. Necessary measures shall be taken to prevent the pollution of waters in the creek and Buckingham Canal on account of construction of new structures.	Complied
	8. Neither dumping of solid waste in the creeks / BC Canal nor filling up of the creeks are permitted. The debris shall be transported and disposed at a designated disposal site authorized by APPCB.	Complied.
	9. There shall be no obstruction to ensure the free flow of water in both directions in the creeks and Buckingham Canal to prevent flooding of upper catchment during rainy season.	Noted
	10. The port management shall make fresh reference, in case the proposed operations extend beyond the designated area.	Noted
	11. All the conditions stipulated in the NOC issued through Letter No. 7401/CZMA/2012, dated 02.02.2013 shall be implemented. Full cooperation shall be extended to all inspecting authorities / organizations such as APPCB, CPCB and local Environment Protection organizations etc.	Noted and Complied.
	12. Necessary permission shall be obtained from Government / Director of Ports to develop the infrastructure facilities and copies of such permissions shall be submitted for records.	Noted.
	13. Permission from inland water transport (IWT) Wing of State irrigation Department shall be obtained to undertake new constructions and also for taking up any modifications of the existing structures on the Buckingham Canal.	Noted.
	14. Dredged material shall be utilized for reclamation of land purpose of the port hinterland area subject to the suitability of dredged spoils. The disposal of balance sediment material into sea be undertaken as per the EIA report.	Complied.
	15. The project proponent shall submit the compliance report to the Government before commissioning the port and related facilities	Noted.

	16. Full cooperation shall be extended to all inspecting authorities / organizations such as APPCB, CPCB and local Environment Protection organizations etc.	Noted.
iii	Automatic/online monitoring system (24x7 monitoring devices) for air pollution as well as water pollution in respect of flow measurement and relevant pollutants in the treatment system to be installed. The data to be made available to the respective SPCB and in the Company's website.	Complied. Three continuous AAQM stations are installed and commissioned in the port area and linked to APPCB web site. Analysis of treated wastewater from STP is carried out by NABL approved agency; reports are being submitted to APPCB. The environmental information is made available on KPCL website
iv	All the recommendations mentioned in rapid risk assessment report, disaster management plan and safety guidelines shall be implemented.	Noted.

Appendix - I

Krishnapatnam Port Company Limited



Environmental Monitoring Report for the Period April, 2020-September, 2020

CHAPTER – 1
INTRODUCTION

1.0 Introduction:

Krishnapatnam Port is located at Krishnapatnam in Muthukuru Mandal, “Sri Potti Sri Ramulu” Nellore District, Andhra Pradesh on the East Coast of India at Latitude 14⁰15’10” N and Longitude 80⁰ 08’ 05” E on the Northern bank of Khandaleru (Upputeru). Krishnapatnam Port is situated at about 180 Km North of Chennai (Madras) Port.

The Environmental Clearance (EC) was accorded for the Phase – I development of this Port by the MoEF, GoI vide Ir no. 10-22/2005-IA-III dated: 26th July, 2006 and the CFE was accorded by the APPCB vide Order No. APPCB/VJA/NLR/633/HO/2004/9 - 467 dt. 25.05.2004. The Phase - I facility was commissioned during the year 2009.

For the Phase II development of this Port, the Environmental Clearance has been accorded by the MoEF, GoI vide F. No. 11 – 62 / 2009 – IA.III dated: 13th November, 2009 and MoEF&CC extended vide Oder even No. dated 18.08.2015 & 16.04.2018 and amended by MoEF&CC vide order dt 16.3.2016. The CFE accorded by the APPCB vide Order No. 633/PCB/CFE/RO-NLR/HO/2010-390 dt. 08.05.2010 is extended vide APPCB Order dt 02.07.2015 and amended vide APPCB’s Orders dt. 14.03.2014, 02.07.2015, 10.02.2016, 04.01.2017 & 22.02.2018. The EC and CFE accorded for Phases I & II Development of Krishnapatnam Port caters to 17 berths and necessary infrastructure with a capacity to handle 72.3 MTPA of non-container cargo and 3.3 MTEUsPA of container cargo.

The CFO has been accorded by the APPCB vide Order No. APPCB/VSP/VJA/NLR/633/CFO/HO/2009-582 dt. 08.06.2009 and same is being periodically renewed. The APPCB has accorded latest CFO renewal Order, vide APPCB’s Order No. APPCB/VJA/NLR/11344/CFO/HO/2018 dt. 29.07.2018 & 30.08.2018 which is valid till 31st October, 2023. Further, it is amended for additional one berth and increased coal cargo capacity from 46.5 MTPA to 51 MTPA. As of now, 12 berths with necessary infrastructure with capacity to handle 68 MTPA of non-container cargo and 2.0 MTEUsPA of container cargo are commissioned and being operated.

The general Layout plan of the Krishnapatnam Port Phases I & II development is given in Figure–II.

The Environmental Management Plan (EMP) envisaged in the Environmental Impact Assessment (EIA) Report is being scrupulously implemented and augmented as needed. Monitoring of Environmental parameters viz., Ambient Air, Ambient Noise, Water Quality (Ground, Surface & Marine), Marine Ecology and Soil as envisaged is being undertaken regularly through an agency having NABL accreditation and approved by MoEF&CC. The results of monitoring comply with the statutory standards. Periodical Reports with results of

monitoring thereof are being regularly submitted regularly to the APPCB and the MoEF&CC, RO as stipulated in the EC/CFE/CFO accorded.

1.1 SCOPE OF WORK

The scope of the baseline studies include monitoring of the following environmental components

1. Ambient Air Quality
2. Marine Water
3. Marine Sediment
4. Noise Level Intensity
5. STP Inlet & Outlet
6. DG Set Emission Quality
7. Ground Water Quality Monitoring
8. Soil Quality

The parameters covered under the scope for each of the above attributes are given below:

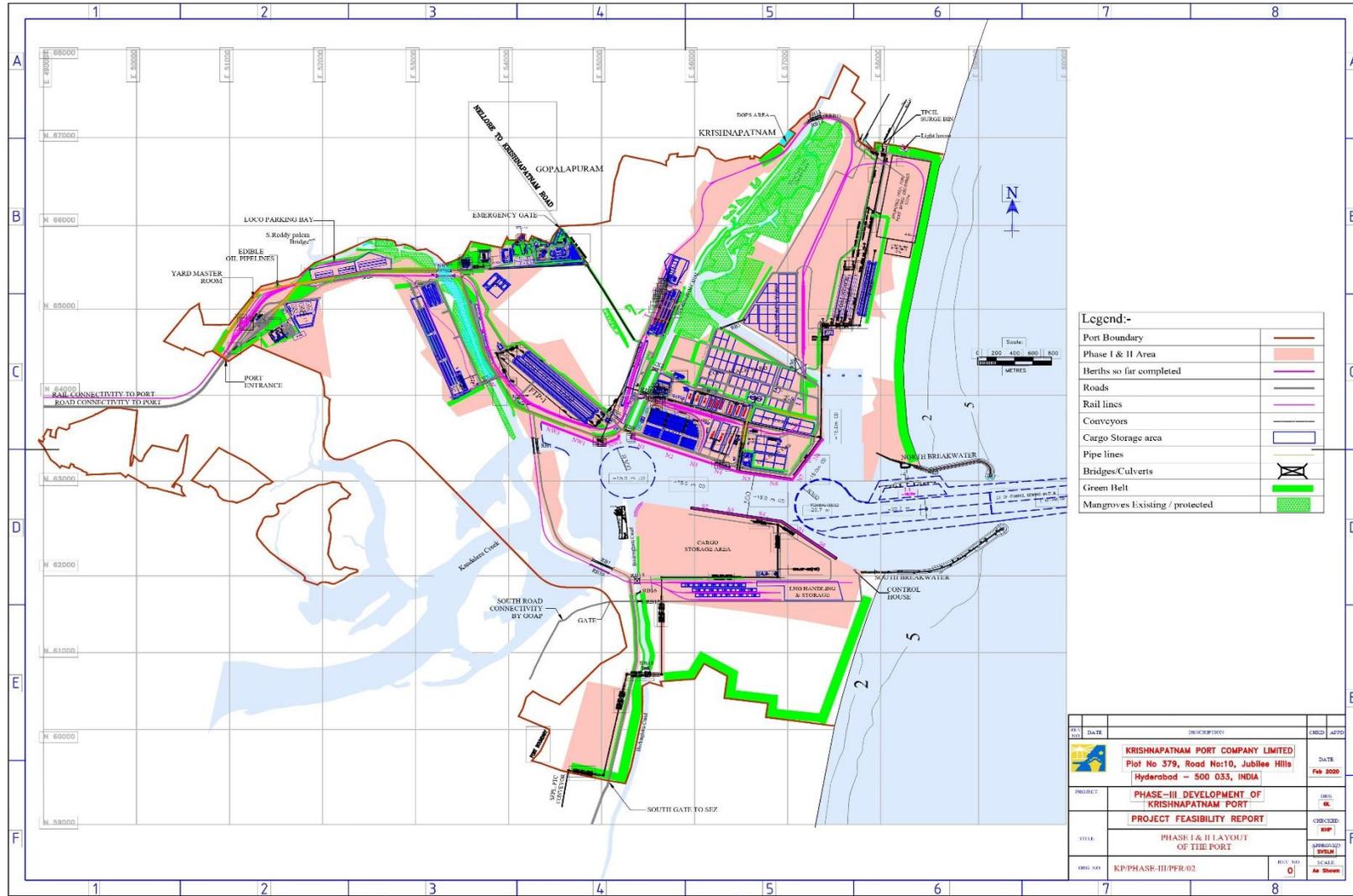
SCOPE OF WORK

S.No	Attribute	Scope	Frequency
1.	Ambient Air Quality	Sampling of ambient air at 07 stations for analyzing the following parameters: <ul style="list-style-type: none"> • PM10 • PM2.5 • SO2 • NO2 • NH₃ 	Monthly Once at each location
2.	Marine Water	Collected at four locations and analyzed the following parameters : <ul style="list-style-type: none"> • pH • Temperature • Salinity • Density • Turbidity • Total Dissolved solids • Total Suspended solids • Potassium • COD • BOD • Oil & Grease • D.O • Nitrates • Nitrites • Ammonia • Phosphates • Chlorides • Sodium 	Weekly Once at each location

		<ul style="list-style-type: none"> • Sulphates • Silicates • Reactive Silica • Total Phosphorus • Total Nitrogen • Primary Productivity • Chlorophyll • Phytoplankton • Zooplankton • Heavy Metals 	
3.	Marine Sediment	<p>Collected at four locations and analyzed for</p> <ul style="list-style-type: none"> • Sediment Compositions • pH • Nitrogen • Phosphorus • Potassium • Sodium • Benthos Communities • Heavy Metals 	Weekly Once at each location
4.	Noise Level Monitoring	<p>Collected at seven locations</p> <ul style="list-style-type: none"> • Day Leq in dB(A) • Night Leq in dB(A) 	Once in a month
5.	STP Inlet and Outlet	<ul style="list-style-type: none"> • pH • Total Solids • Total Suspended Solids • COD • BOD • Oil & Grease 	Once in a month
6.	DG Set Emission Quality	<ul style="list-style-type: none"> • PM • NOx • HC • CO 	Once in six months
7.	Ground Water Quality Monitoring	<p>Collected at Four locations</p> <ul style="list-style-type: none"> • pH • Electrical Conductivity • Total Dissolved solids • Total alkalinity • Chlorides • Sodium • Potassium • Fluorides • Nitrates 	Once in six months

		<ul style="list-style-type: none"> • Cyanide • Total Hardness • Salinity • Sulphates • COD • Mercury • Cadmium • Arsenic • Selenium • Iron • Lead • Zink • Chromium • Total Coliforms • Fecal coliforms 	
8.	Soil Quality Monitoring	<p>Collected at Four locations</p> <ul style="list-style-type: none"> • pH • EC • Texture • Available Nitrogen • Available Phosphorous • Available Potassium • Exchangeable Sodium • Exchangeable calcium • Exchangeable Magnesium • SAR • Water Soluble Chlorides • Organic Carbon • Lead • Cadmium • Copper • Zinc 	Once in six months

Figure:2



CHAPTER – 2
METHODOLOGY

2.0 METHODOLOGY

Methodologies adopted for sampling and analysis for each of the above parameters are detailed below

Table :1
Methods of monitoring and analysis for various parameters

S.No	Attributes	Measurement Technique		
1.	Ambient Air Quality	PM ₁₀	Respirable Dust Sampler (Gravimetric method)	IS-5182 (Part-XXIII)
		PM _{2.5}	Fine Particulate Sampler (Gravimetric method)	40 CFR USEPA
		Sulphur dioxide	Modified West and Gaeke	IS-5182 (Part-II)
		Oxides of Nitrogen	Jacob & Hochheiser	IS-5182 (Part-VI)
		NH ₃	Indophenol Blue Method	-
2.	Marine Water	APHA Methods 23 rd Edition, 2017		
3.	Marine Sediment	ASTM Method		
4.	STP Inlet and Outlet	APHA Methods 23 rd Edition, 2017		
5.	Noise Level Intensity	Digital Noise Level Meter – SL Lutron 4001		
6.	DG Set Emission Quality	IS : 11255 Measurement of Emission from Stationary Sources		
7.	Ground Water Quality	APHA Methods 23 rd Edition, 2017		
8.	Soil Quality	IS:2720 & methods of soil analysis, part-1, 2 nd edition, 1986 (American Society for Agronomy and Soil Science Society of America).		

CHAPTER – 3
ENVIRONMENTAL MONITORING STUDIES

3.0 ENVIRONMENTAL MONITORING STUDIES – April'20 to Sep'2020

S.No	ATTRIBUTE	SCOPE	STUDIES CARRIED OUT
1.	Ambient Air Quality	Collection of ambient air at Seven locations in and outside of port premises	Ambient Air samples collected at 7 locations for PM10, PM2.5, SO2, NO2 & NH3 (monthly once) for the period of 01.04.2020 to 30.09.2020.
2.	Marine Water and Surface Water Quality	Collection of Marine Water at six locations. <ul style="list-style-type: none"> • Port Entrance (Approach Channel) • Turning Circle • Coal Berth • Reclamation Area (Mutable) • Buckingham Canal • Khandaleru Creek 	Marine Water samples from Port Entrance, Turning Circle, Coal Berth and Reclamation Area are collection weekly once. Samples for Buckingham Canal and Khandaleru Creek are collected monthly once. All the samples are tested for Physical, Chemical and Microbiological parameters Collected for the period of 01.04.2020 to 30.09.2020.
3.	Marine Water Quality for Turbidity	Collection of Marine Water at seven locations. <ul style="list-style-type: none"> • Port Entrance (Approach Channel) • Turning Circle • Coal Berth • Reclamation Area (Mutable) • 14°19'26"N & 80°15'43"E • 14°16'52"N 	Marine Water samples from Port Entrance, Turning Circle, Coal Berth and Reclamation Area are collection weekly once. Deep Sea water Samples are collected monthly once. Collected for the period of 01.04.2020 to 30.09.2020.

		<p>&80°17'40"E</p> <ul style="list-style-type: none"> • 14°16'11"N & 80°17'40"E 	
4.	Marine Sediment	<p>Collected at</p> <ul style="list-style-type: none"> • Port Entrance (Approach Channel) • Turning Circle • Coal Berth • Reclamation Area (Mutable) 	<p>Collected at four locations and analyzed for the hereunder weekly once.</p> <ul style="list-style-type: none"> • Sediment Compositions • pH • Nitrogen • Phosphorus • Potassium • Sodium • Benthos Communities • Heavy Metals <p>Collected for the period of 01.04.2020 to 30.09.2020.</p>
5.	Noise Level Intensity	<p>Noise levels were noted at Seven locations inside and outside port premises.</p>	<p>Day and Night Noise levels were noted at</p> <ul style="list-style-type: none"> • Zero Point • Thamminapatnam • CVR Building • Gopalpuram • Chalivendram • Krishnapatnam • Light House Siding <p>Collected Noise Levels at seven locations for day and night periods once in the month from 01.04.2020 to 30.09.2020.</p>

6.	DG Set Emission Quality	Emission Quality was conducted to DG Sets of port premises	Emission Quality was conducted to DG Sets of port premises, ie PM, NOx, HC & CO (Six months once) for the period of 01.04.2020 to 30.09.2020.
7.	Ground Water Quality Monitoring	Collected at <ul style="list-style-type: none"> • Port Site • Krishnapatnam village • South side of the port • Gopalapuram village 	Ground Water samples from Port site, Krishnapatnam village, South side of the port, Gopalapuram village Bore wells water samples are collected half yearly once. All the samples are tested for Physical, Chemical and Microbiological parameters Collected for the period of 01.04.2020 to 30.09.2020.
8.	STP Inlet and Outlet	Inlet and Outlet samples are collected from STP at Port	STP Inlet and Outlet samples are collected monthly once. Collected for the period of 01.04.2020 to 30.09.2020.
9.	Soil Quality	Collection of Soil sample at Two locations. <ul style="list-style-type: none"> • Storage area towards west Buckingham canal • Storage area at Port 	Soil samples from Storage area towards west, Storage area at Port Area are collection half yearly once. All the samples are tested for Physical, Chemical parameters. Collected for the period of 01.04.2020 to 30.09.2020.

3.1 AMBIENT AIR QUALITY MONITORING

The ambient air quality was assessed through a network of 07 AAQM stations within 10 Km radius of project site (5 stations in buffer zone & 2 location inside plant area).

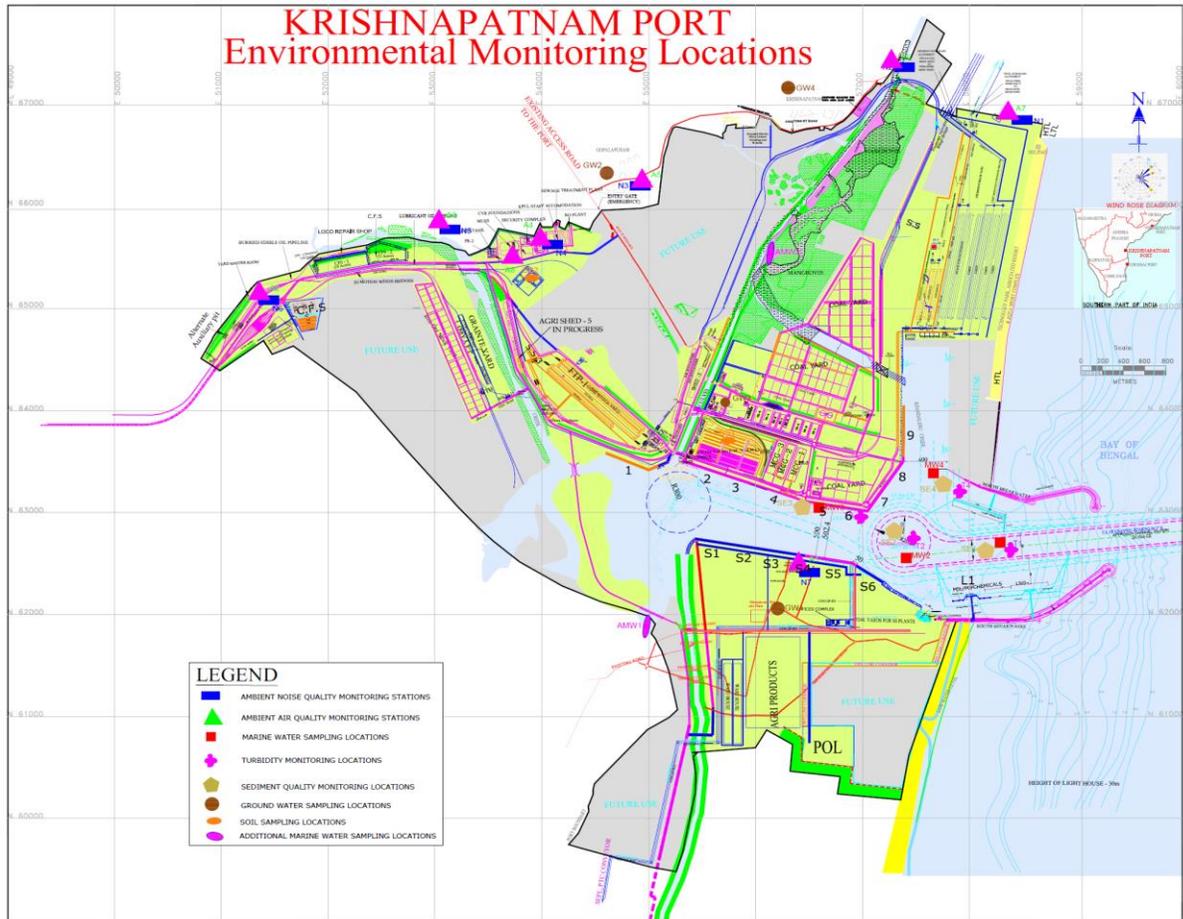
The locations of ambient air quality stations are shown in Figure – 3 is given below:

Table No: 2

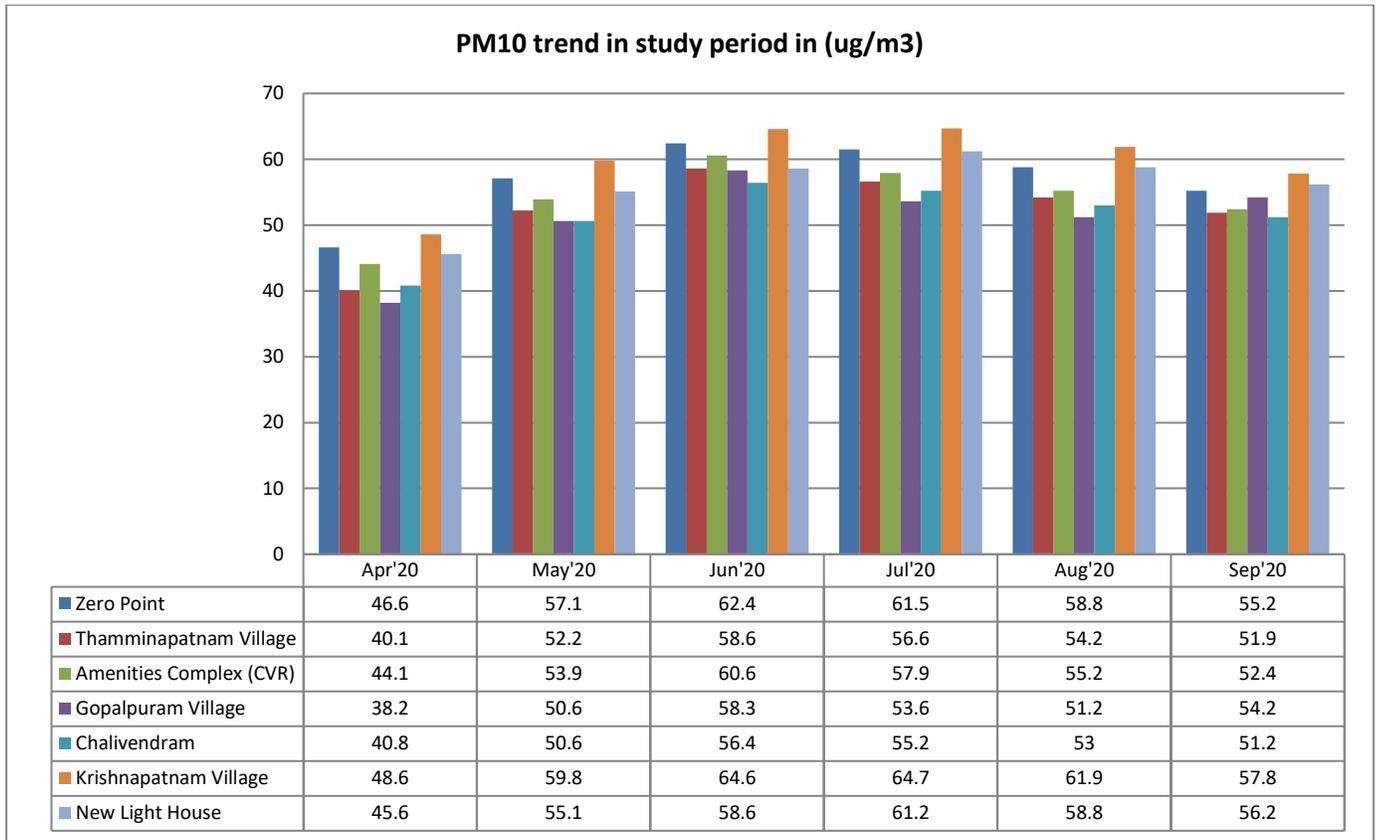
DETAILS OF AMBIENT AIR QUALITY MONITORING LOCATIONS

Station code	Location	Direction w.r.t. Project site	Environmental setting
A1	At Zero Point	W	Industrial
A2	At Thamminapatnam Village	S	Industrial
A3	At CVR Building	WNW	Residential
A4	At Gopalpuram Village	NW	Residential
A5	At Chalivendram	WNW	Residential
A6	At Krishnapatnam	NNW	Residential
A7	At Light House	SW	Residential

Figure 4- AMBIENT AIR SAMPLING STATIONS LOCATION MAP

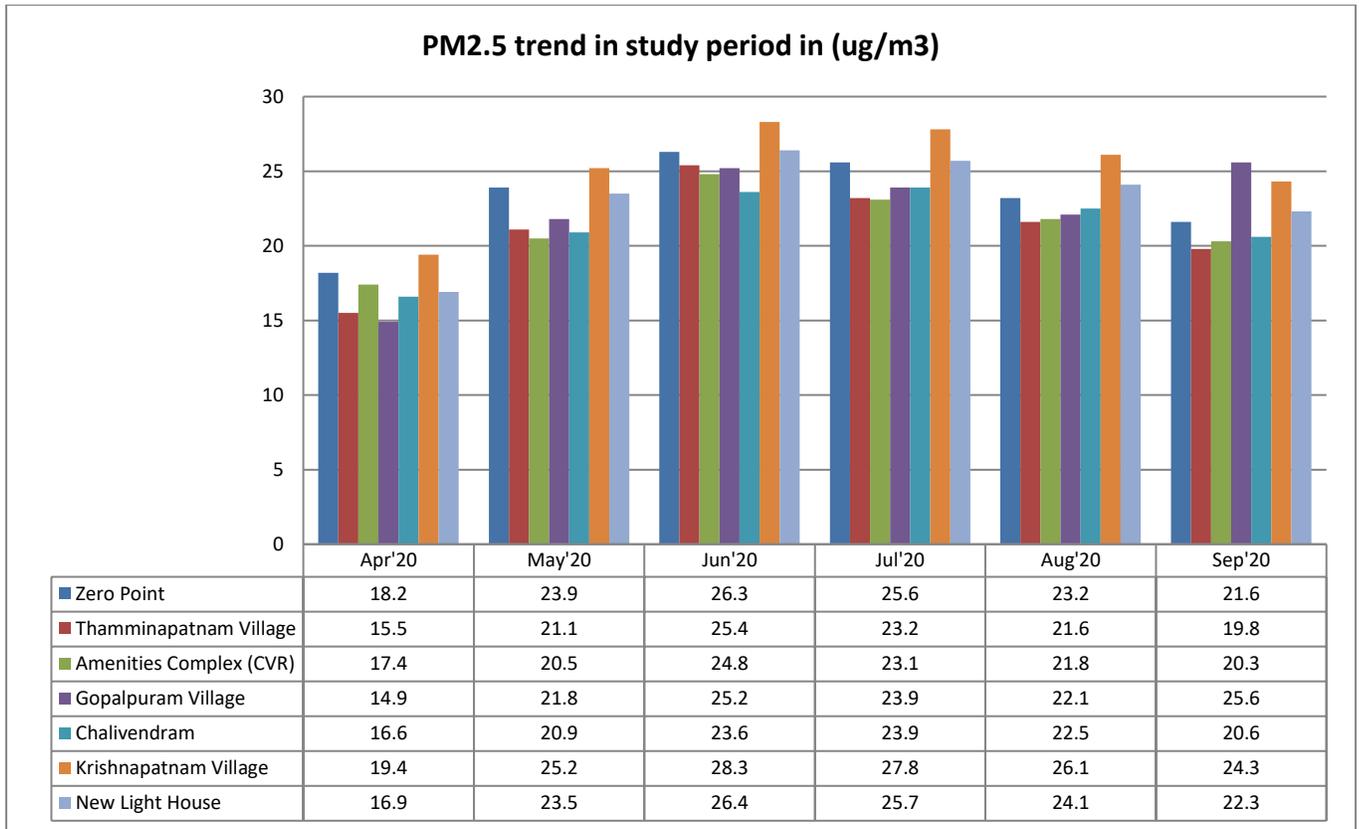


Summary of Analysis of Ambient Air Quality in the Study Area – PM10 for Apr'20 to Sep'20



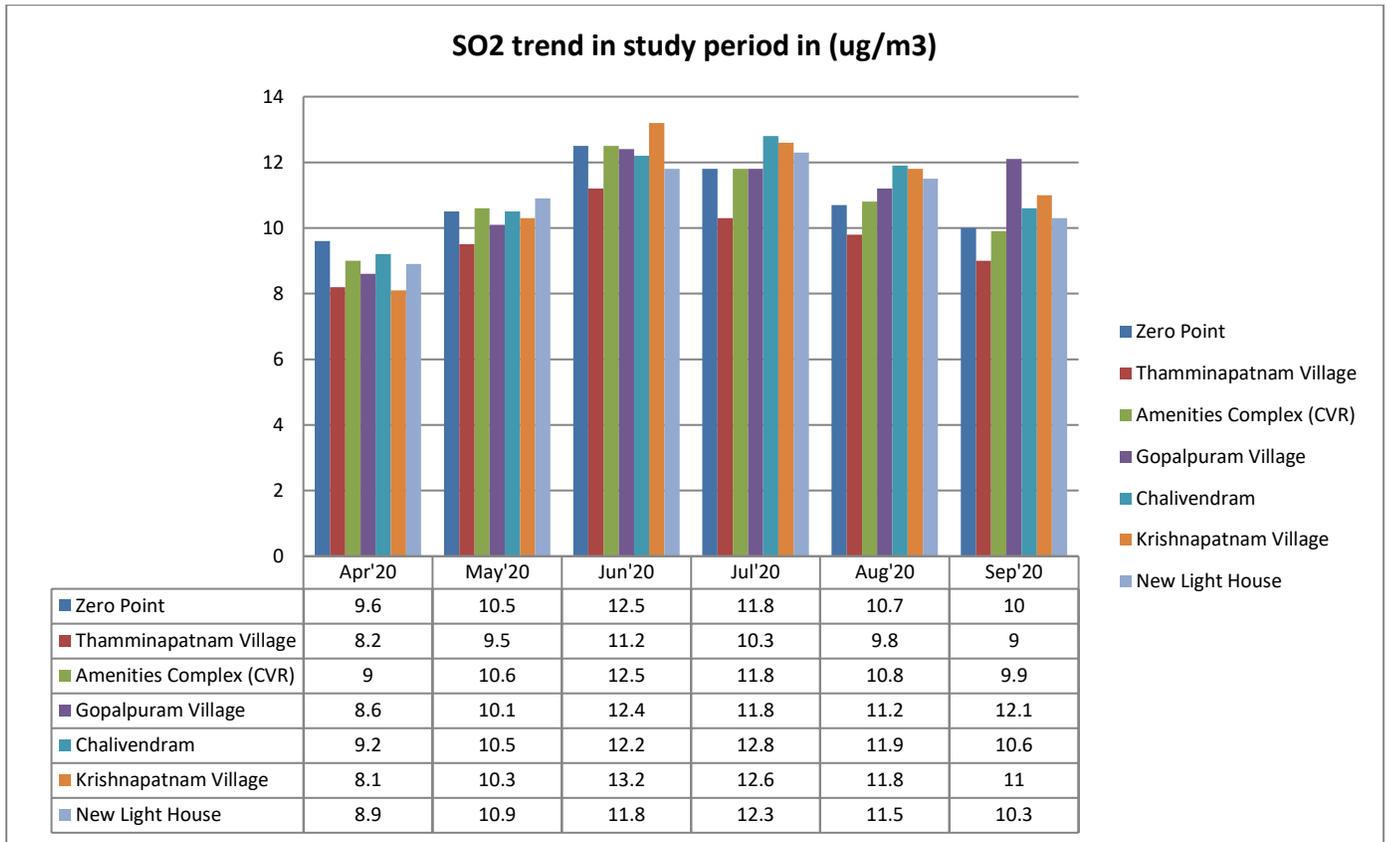
- ❖ *PM10 varied between 38.2 to 64.7 µg/m³ Minimum: Gopalapuram village*
- ❖ *Maximum: Krishnapatnam village, NAAQ Standard: 100µg/m³*

Summary of Analysis of Ambient Air Quality in the Study Area – PM2.5 for Apr'20 to Sep'20



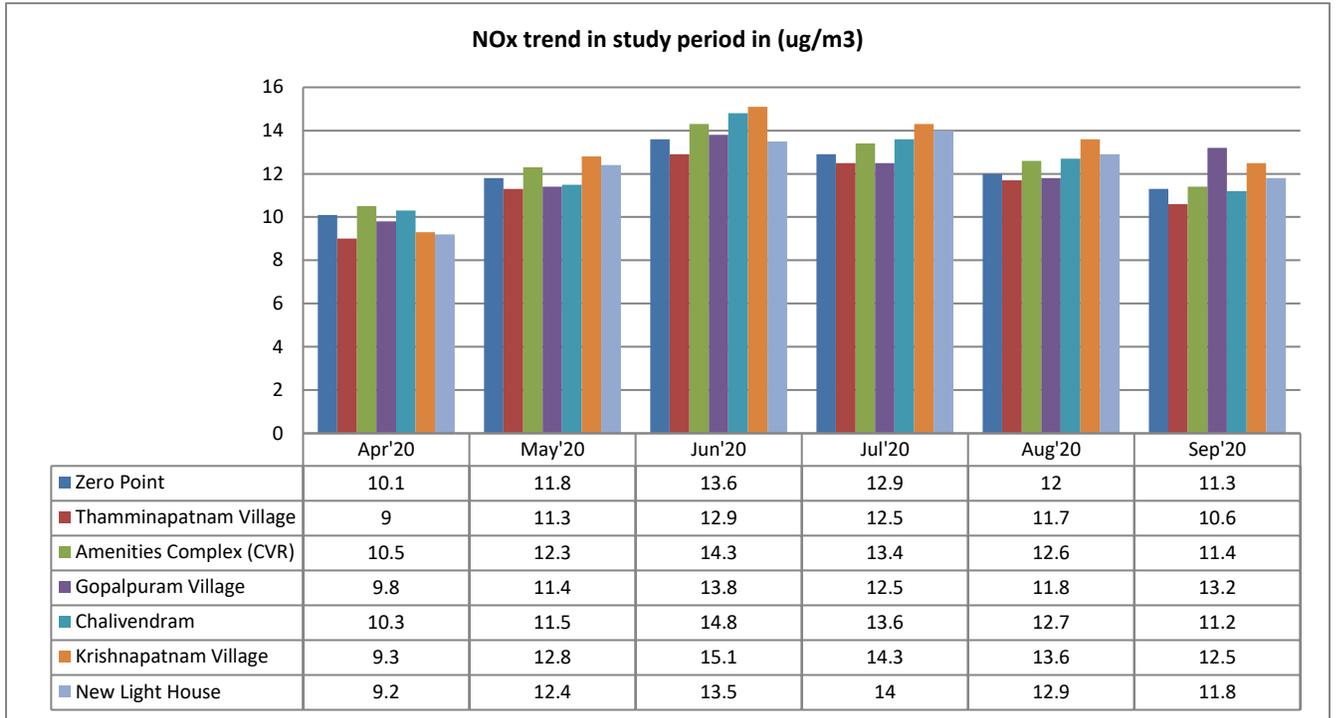
- ❖ *PM_{2.5} Varied between 14.9 to 28.3 µg/m³, Minimum: Gopalapuram village*
- ❖ *Maximum ; Krishnapatnam village , NAAQ Standard : 60 µg/m³*

Summary of Analysis of Ambient Air Quality in the Study Area – SO₂ for Apr'20 to Sep'20



- ❖ *SO₂ Varied between 8.1 to 13.2 ug/m³. Minimum : Krishnapatnam village*
- ❖ *Maximum : Krishnapatnam village, NAAQ Standard : 80 ug/m³*

Summary of Analysis of Ambient Air Quality in the Study Area – NOx for Apr'20 to Sep'20



- ❖ *NOx Varied between 9.0 to 15.1 µg/m³, Minimum : Thamminapatnam village*
- ❖ *Maximum : Krishnapatnam village, NAAQ Standards : 80 µg/m³*

4.3 AMBIENT NOISE LEVEL INTENSITY

Collection of ambient noise levels at six locations (5 locations at nearby villages & 1 location near plant). Spot noise levels were measured with a precalibrated Noise Level Meter – SL Lutron 4001 for day and night periods.

Table No-3

DETAILS OF NOISE MONITORING LOCATIONS

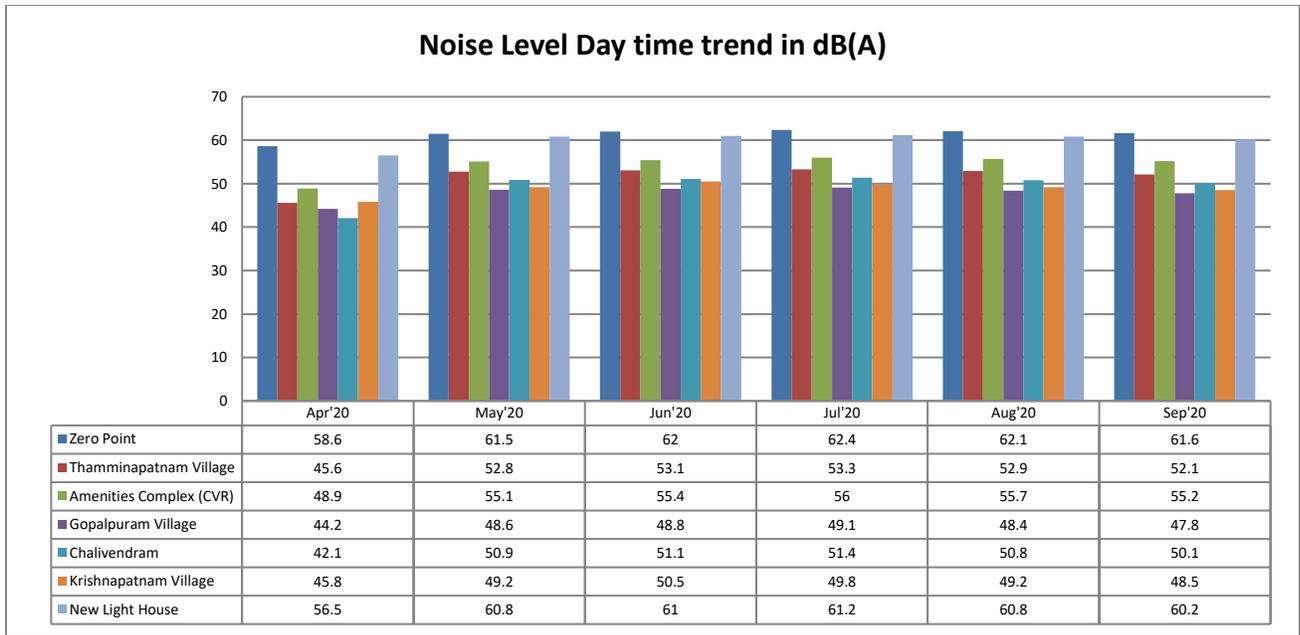
STATION CODE	LOCATIONS	DIRECTION w.r.t PROJECT SITE
N1	At Zero Point	W
N2	At Thamminapatnam Village	S
N3	At CVR Building	WNW
N4	At Gopalpuram Village	NW
N5	At Chalivendram	WNW
N6	At Krishnapatnam	NNW
N7	At Light House	SW

The noise monitoring locations are depicted in **Fig – 5**

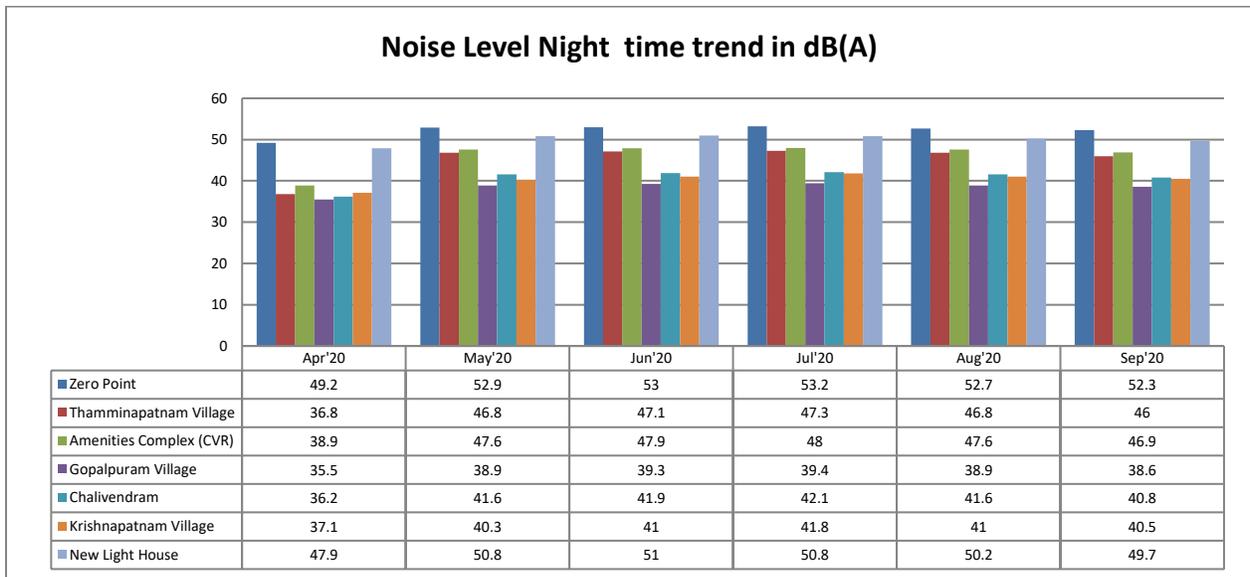
The noise levels monitored during the study period are given hereunder in form of Leq day, Leq night compared with CPCB Standards.

Location Code	Environmental Setting	CPCB norms Leq (Dba)	
		Day	Night
N1	Industrial	75	70
N2	Industrial	75	70
N3	Residential	55	45
N4	Residential	55	45
N5	Residential	55	45
N6	Residential	55	45
N7	Residential	55	45

Noise Level Data for the above locations are enclosed as Table - 4.5.1&4.5.2



- ❖ *Industrial Day time noise level varied between 45.6 to 62.4 dB(A)*
- ❖ *Residential Day time noise level varied between 42.1 to 51.4 dB(A)*
- ❖ *NAAQ Standard: Industrial -75 Db(A):Residential –55dB(A)*



- ❖ *Industrial Night time noise level varied between 36.8 to 53.2 dB(A)*
- ❖ *Residential Night time noise level varied between 35.5 to 42.1 db(A)*
- ❖ *NAAQ Standard: Industrial -70 Db(A) , Residential-45 dB(A)*

4.4 Marine Water and Surface Water Quality

4.4.1 Sampling Locations

Marine water sampling is carried out once in every week at Four sampling locations in the port. In addition to marine quality sampling, surface water quality sampling is also carried out at two locations in the creek once in every month. The marine water and surface water sampling locations are given in **Table-4** and **Figure-4**.

Table No- 4
MARINE WATER QUALITY AND
SURFACE WATER MONITORING LOCATIONS

Location Code	Location
Marine Water Quality Sampling Location	
MW1	Coal Berth
MW2	Turning Circle
MW3	Approach Channel
MW4	Reclamation Area (Mutable)
Surface Water Sampling Location	
SW1	Kandaluru Creek
SW2	Buckingham Canal

- Analysis results of the water samples collected from the above locations are enclosed

The methodology for sample collection and preservation techniques was followed as per the Standard Operating Procedures (SOP) mentioned in table hereunder:

Table No- 5
Standard Operating Procedures (SOP) For Water Sampling

Parameter	Sample Collection	Sample Size	Storage/ Preservation
pH	Grab sampling Plastic /glass container	50 ml	Refrigeration, can be stored for 7 days
Electrical Conductivity	Grab sampling Plastic /glass container	50 ml	Refrigeration, can be stored for 7 days
Total suspended solids	Grab sampling Plastic /glass container	100 ml	Refrigeration, can be stored for 7 days
Total Dissolved Solids	Grab sampling Plastic /glass container	100 ml	Refrigeration, can be stored for 7 days
BOD	Grab sampling Plastic /glass container	500 ml	Refrigeration, 48 hrs
Hardness	Grab sampling Plastic /glass container	100 ml	Add HNO ₃ to pH<2, refrigeration; 6 months
Chlorides	Grab sampling Plastic /glass container	50 ml	Not required; 28 days
Sulphates	Grab sampling Plastic /glass container	100 ml	Refrigeration; 28 days
Nitrates	Plastic containers	100 ml	Refrigeration; 48 hrs
Fluorides	Plastic containers only	100 ml	Not required; 28 days
Alkalinity	Plastic/ glass containers	100 ml	Refrigeration; 14 days
Ammonia	Plastic/ glass containers	100 ml	Add H ₂ SO ₄ to pH>2, refrigeration, 28 days
Heavy Metals (Ar, Cd, Mn, Cu, Fe, Zn, Pb etc.)	Plastic/ Glass rinse with 1+1 HNO ₃	500 ml	Filter, add HNO ₃ to pH>2; Grab sample; 6 months

Source: Standard Methods for the Examination of Water and Wastewater, Published By APHA, 27nd Edition,2017

The analytical techniques used for water analysis is given in the table hereunder:

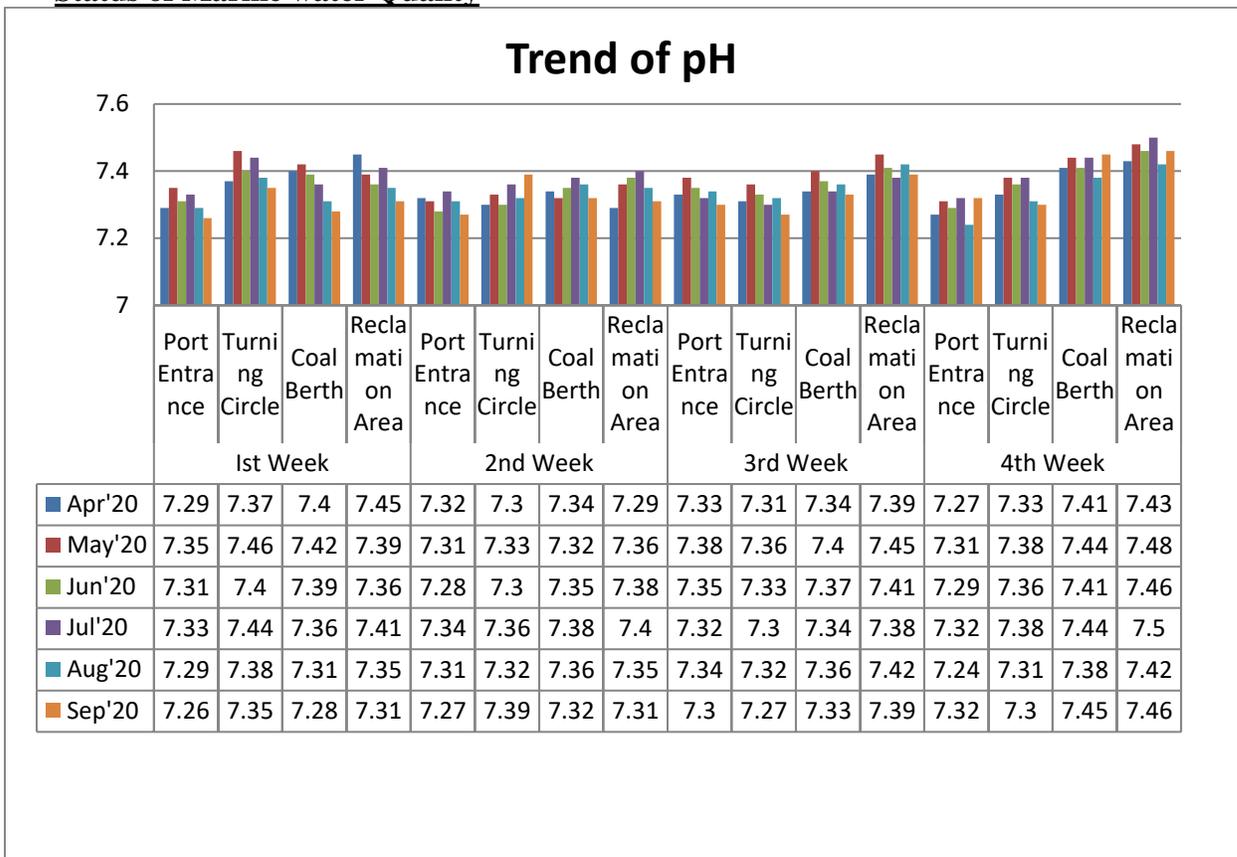
Table No- 6

Analytical Techniques for Water Analysis

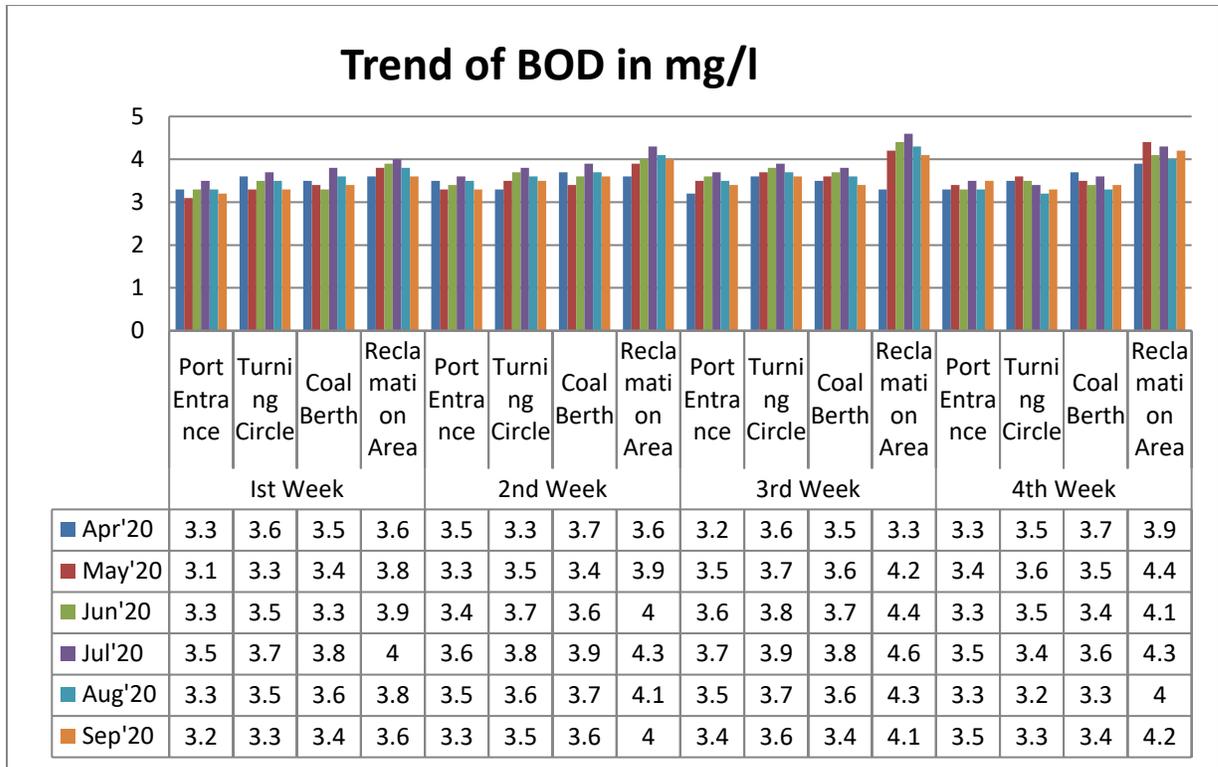
S.No	Parameter	Method
1.	pH	APHA, 4500-H+B, 23rd Ed., 2017
2.	Colour	APHA, 2120-C/2120-B, 23rd Ed., 2017
3.	Odour	APHA, 2150, 23rd Ed., 2017
4.	Temperature	APHA, 2550-A+B, 23rd Ed., 2017
5.	Oil & Grease	APHA, 5520-D, 23rd Ed., 2017
6.	Total Suspended Solids	APHA, 2540-D, 23rd Ed., 2017
7.	Total Dissolved Solids	APHA, 2540-C, 23rd Ed., 2017
8.	Total Residual Chlorine	APHA, 4500-Cl B, 23rd Ed., 2017
9.	Biochemical Oxygen Demand	APHA, 5210-B, 23rd Ed., 2017 4500-OC, 23rd Ed.,
10.	Chemical Oxygen Demand	APHA, 5220-B, 23rd Ed., 2017
11.	Free Ammonia	IS 3025
12.	Ammonical Nitrogen	APHA, 4500-NH ₃ B, 23rd Ed., 2017
13.	Total Kjeldhal Nitrogen	APHA, 4500-Norg B, 23rd Ed., 2017
14.	Zinc	APHA, 3111-B, 23rd Ed., 2017
15.	Lead	APHA, 3111-B, 23rd Ed., 2017
16.	Cadmium	APHA, 3111-B, 23rd Ed., 2017
17.	Mercury	APHA, 3112-B, 23rd Ed., 2017
18.	Arsenic	APHA, 3114-B, 23rd Ed., 2017
19.	Copper	APHA, 3111-B, 23rd Ed., 2017
20.	Nickel	APHA, 3111-B, 23rd Ed., 2017
21.	Cyanide	APHA, 4500-CNB, 23rd Ed., 20172
22.	Fluoride	APHA, 4500-FD, 23rd Ed., 2017 (SPANDS Methods)
23.	Phosphates	APHA, 4500-PD, 23rd Ed., 2017
24.	Sulphates	APHA, 4500-SO ₄ ²⁻ E, 23rd Ed., 2017
25.	Sulphide	APHA, 4500-S ²⁻ , 23rd Ed., 2017
26.	Manganese	APHA, 3111-B, 23rd Ed., 2017
27.	Iron	APHA, 3111-B, 23rd Ed., 2017
28.	Phenolic Compounds	APHA, 5530-B, 23rd Ed., 2017
29.	Bio Assay Test	IS 6582

Marine water samples have been collected in the port and the results of the same are shown below in **Table**.

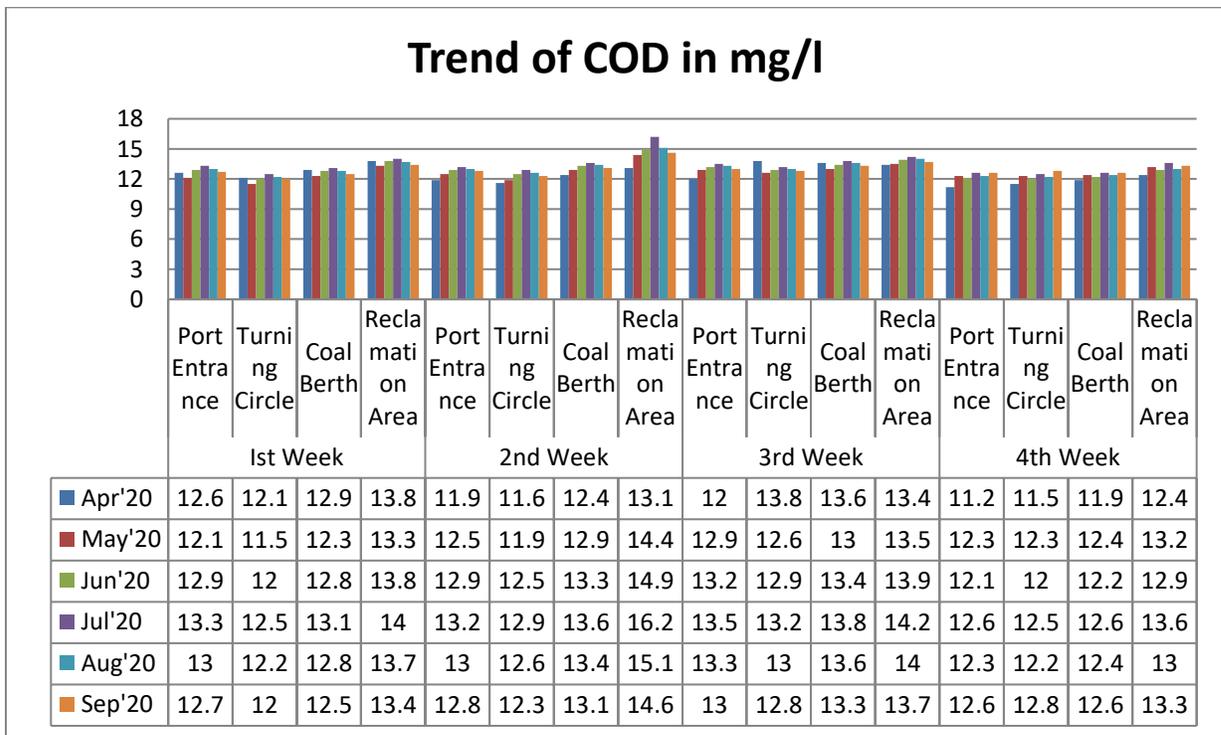
Status of Marine water Quality



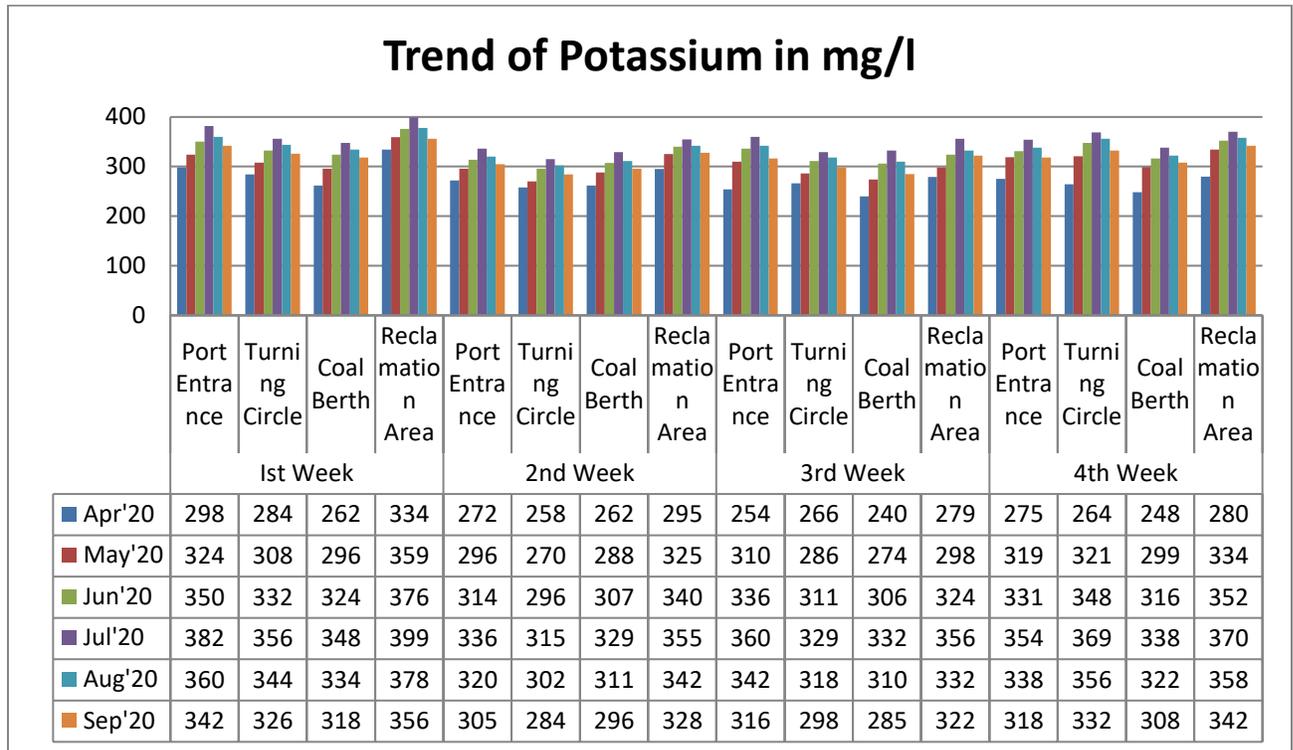
pH of Marine water varied between 7.24 to 7.50



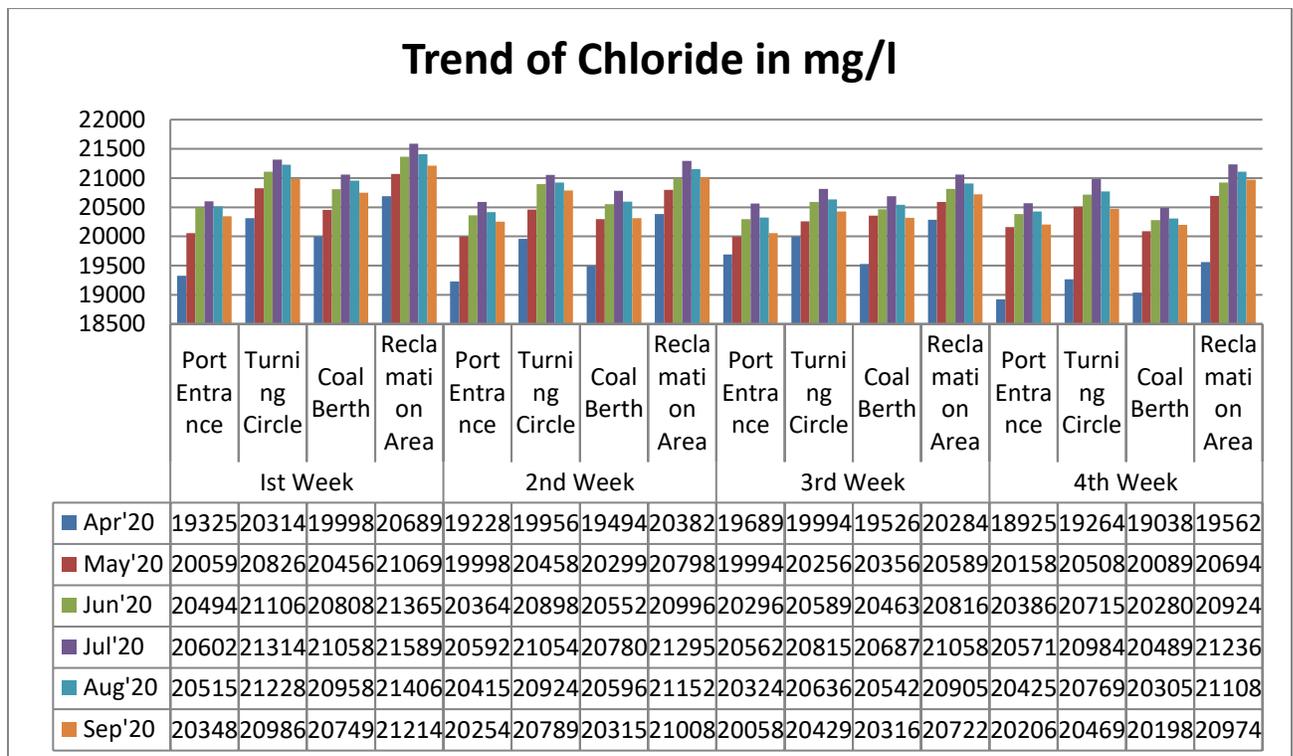
❖ BOD of Marine Water varied between 3.1 to 4.6 mg/l



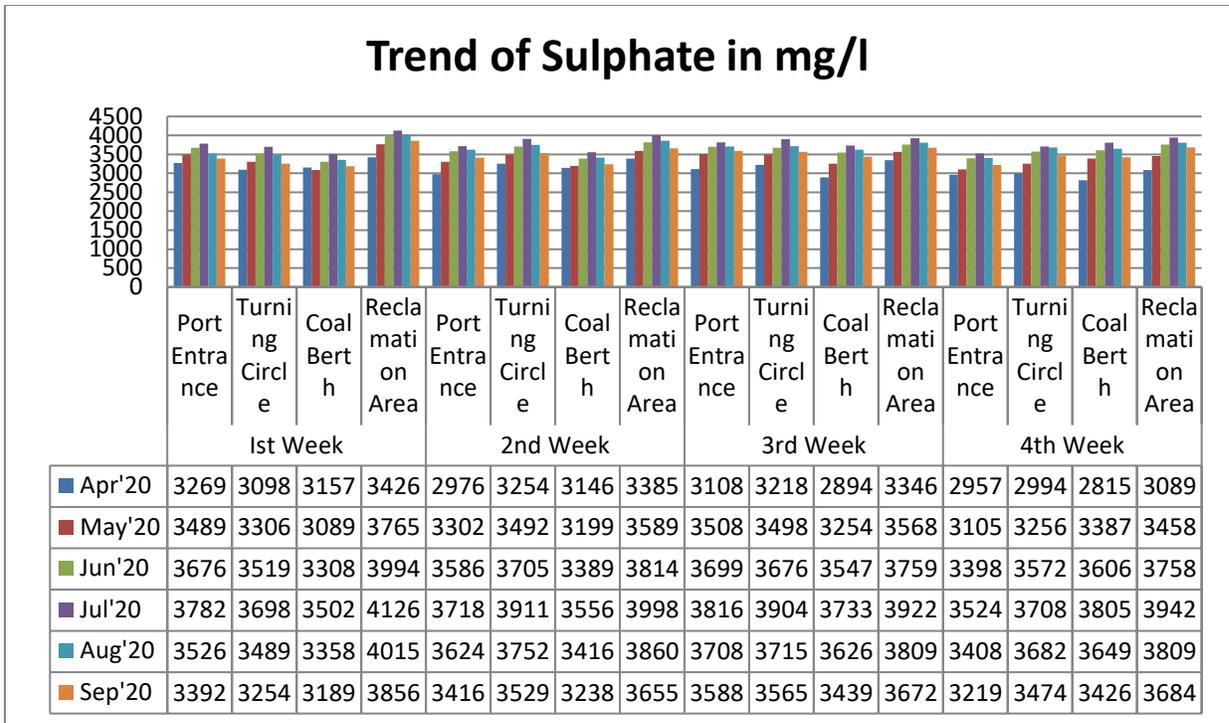
❖ COD of Marine Water varied between 11.2 to 16.2 mg/l



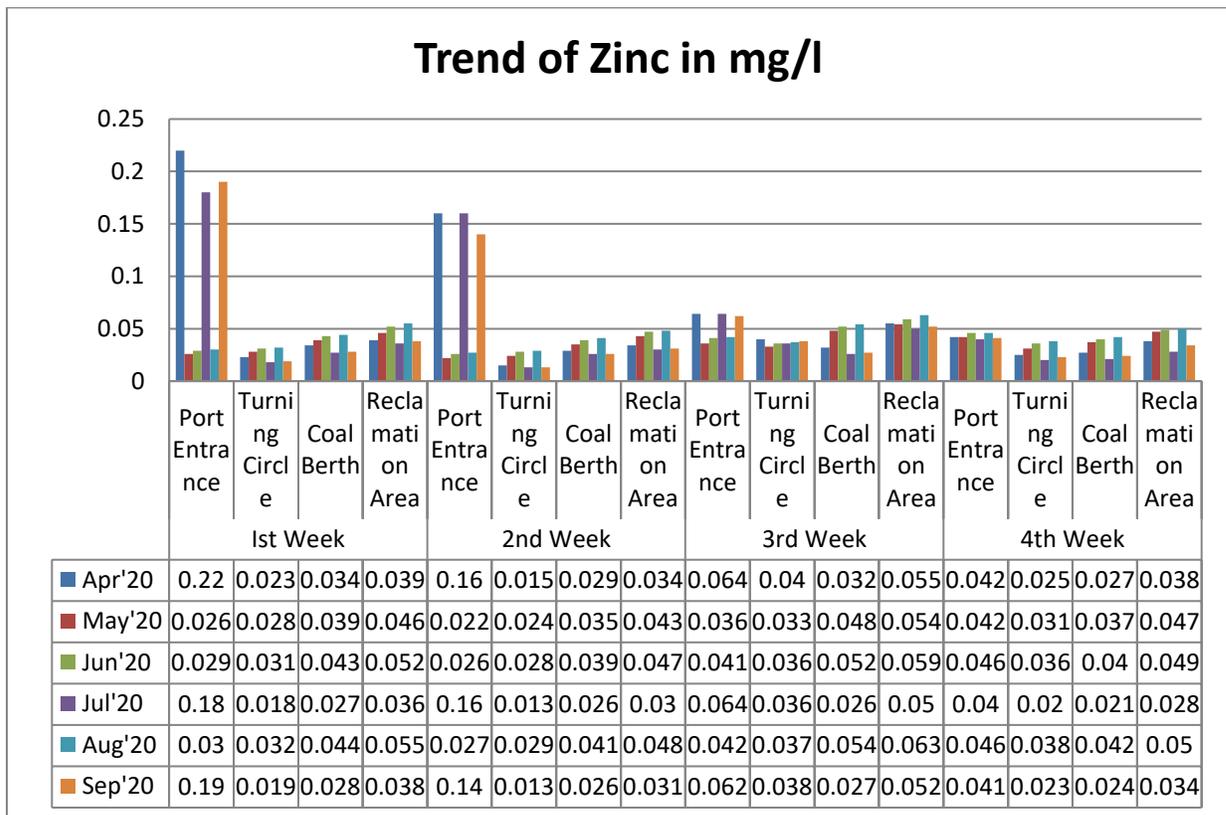
❖ Potassium Concentration in Marine water varied between 240 to 399 mg/l



❖ Chloride concentration in Marine water varied between 18925 to 21589 mg/l

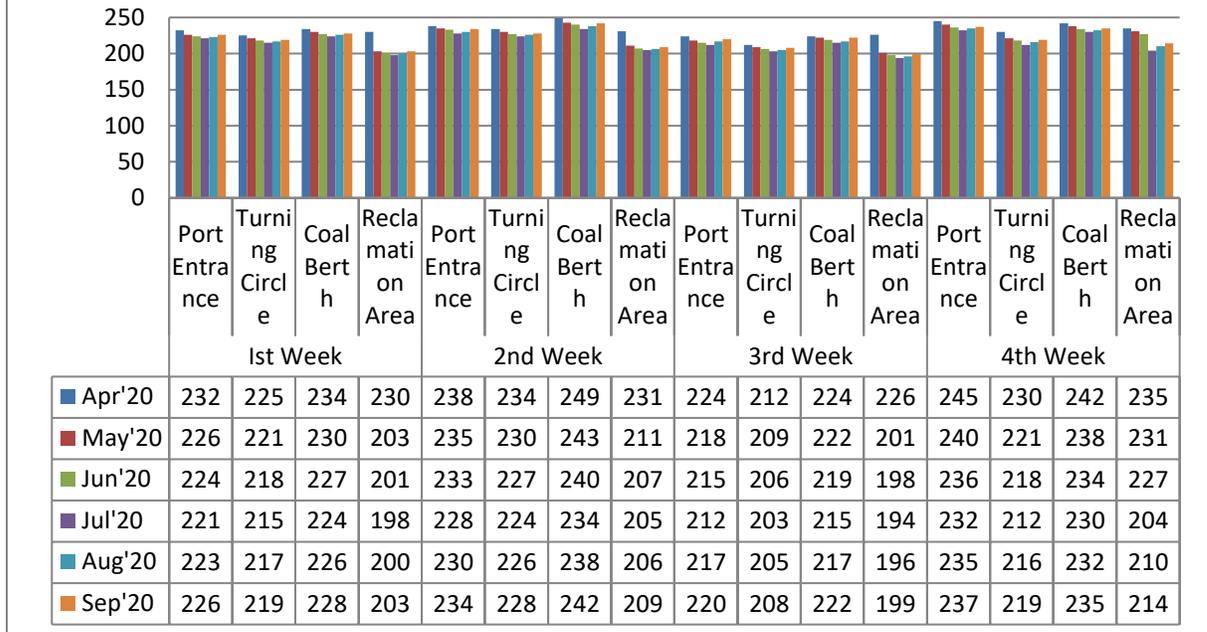


❖ Sulphate concentration in Marine water varied between 2815 to 4126 mg/l



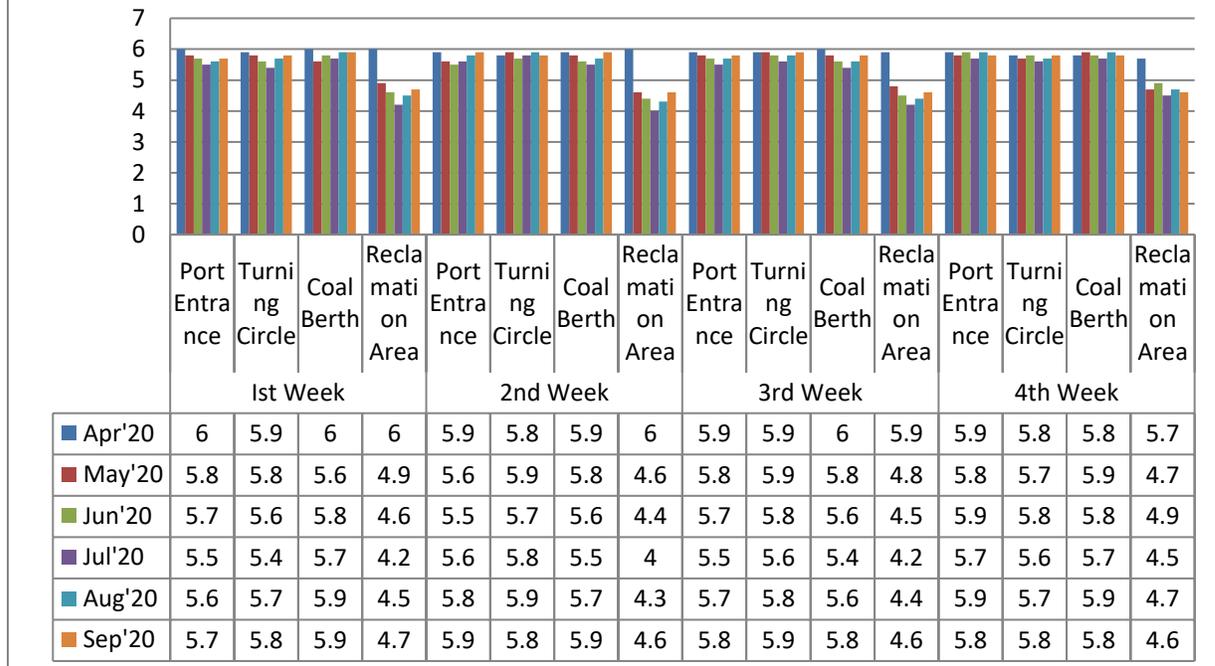
❖ Zinc concentration in Marine water varied between 0.013 to 0.220 mg/l

Trend of Phytoplankton in Nos/ml

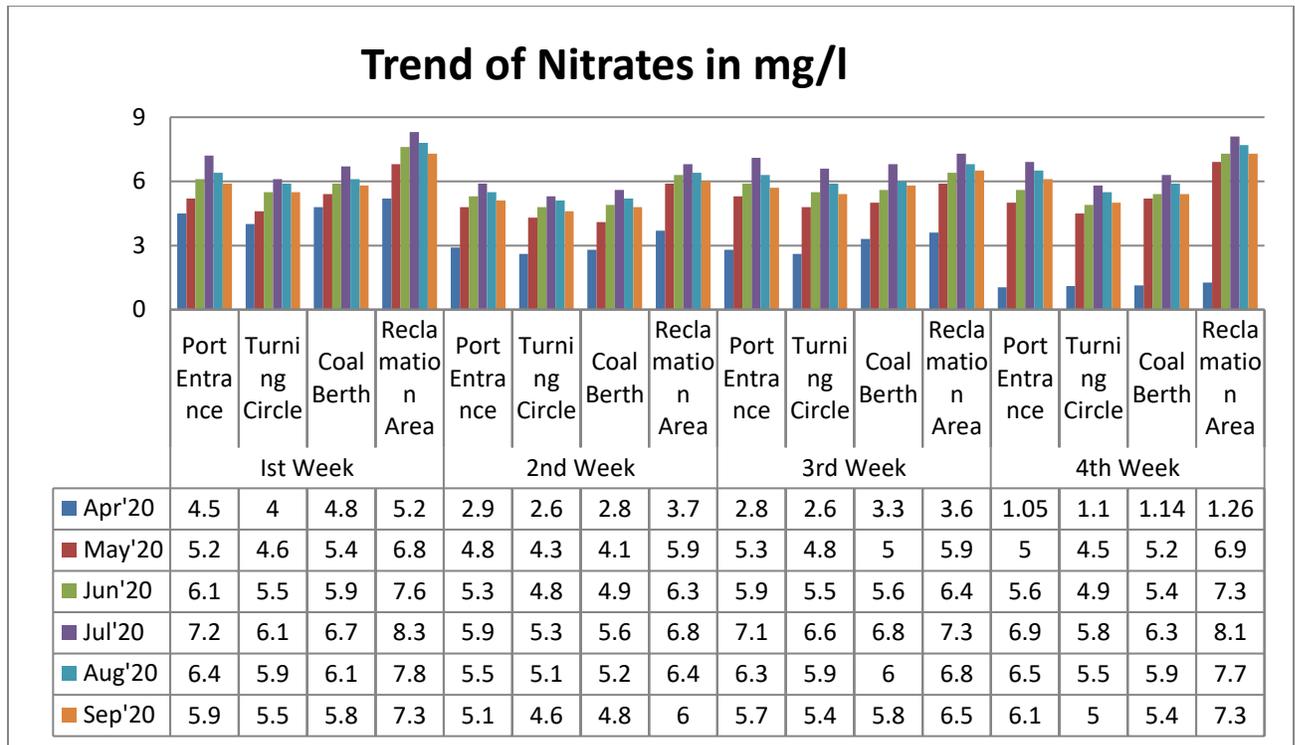


❖ Phytoplankton in Marine water varied between 194 to 249 No./ml

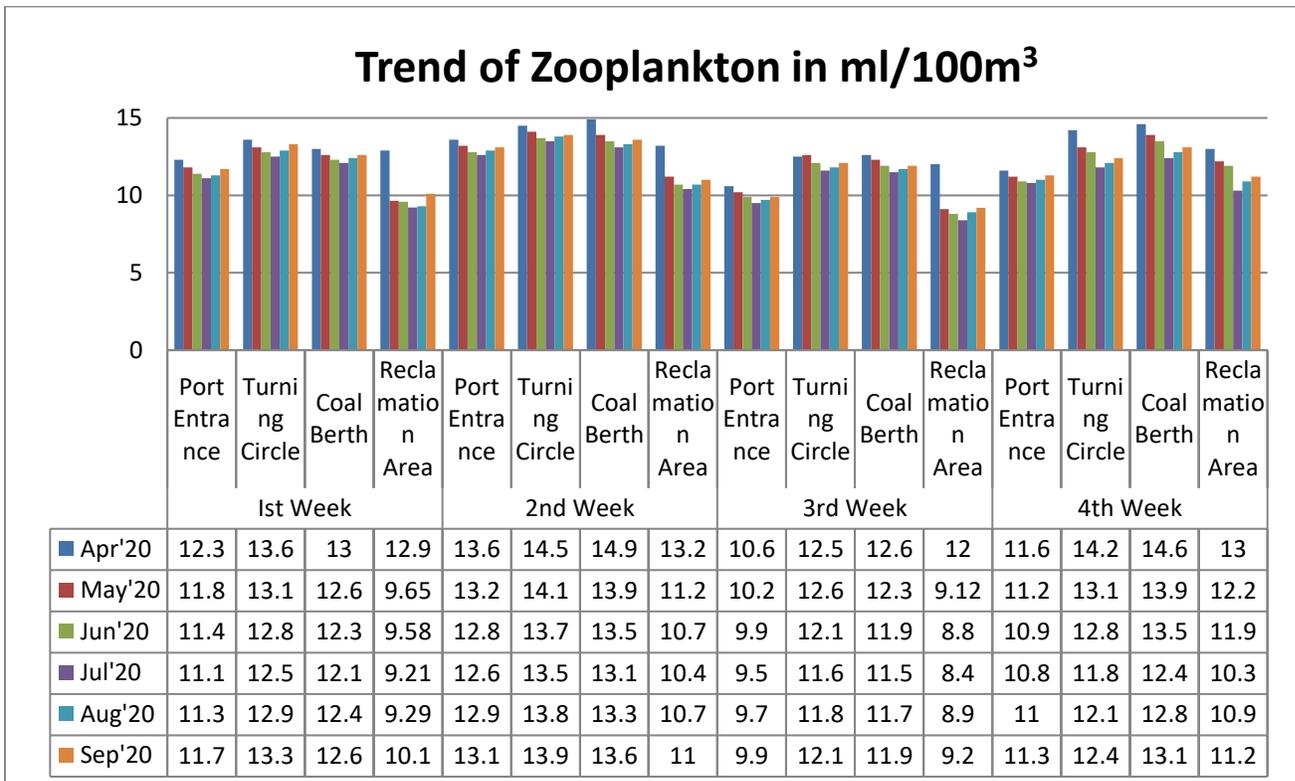
Trend of DO in mg/l



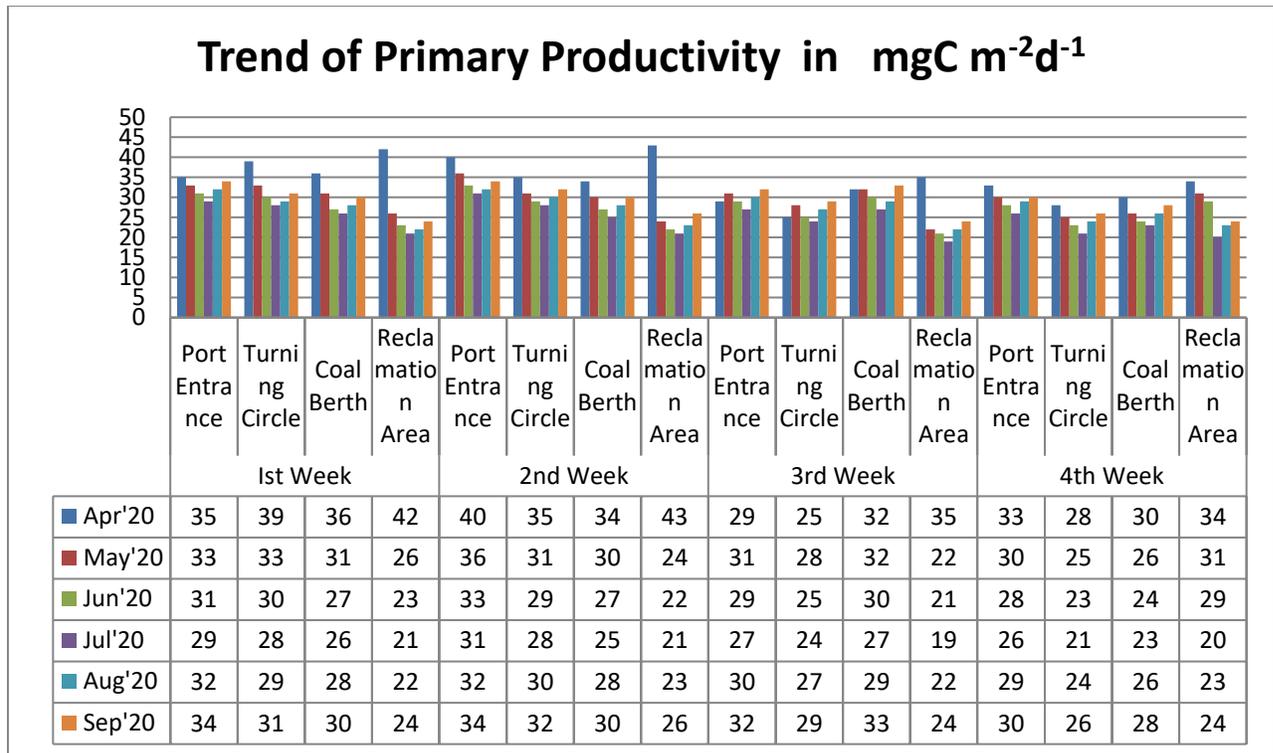
❖ DO in Marine water varied between 4.0 to 6.0 mg/l



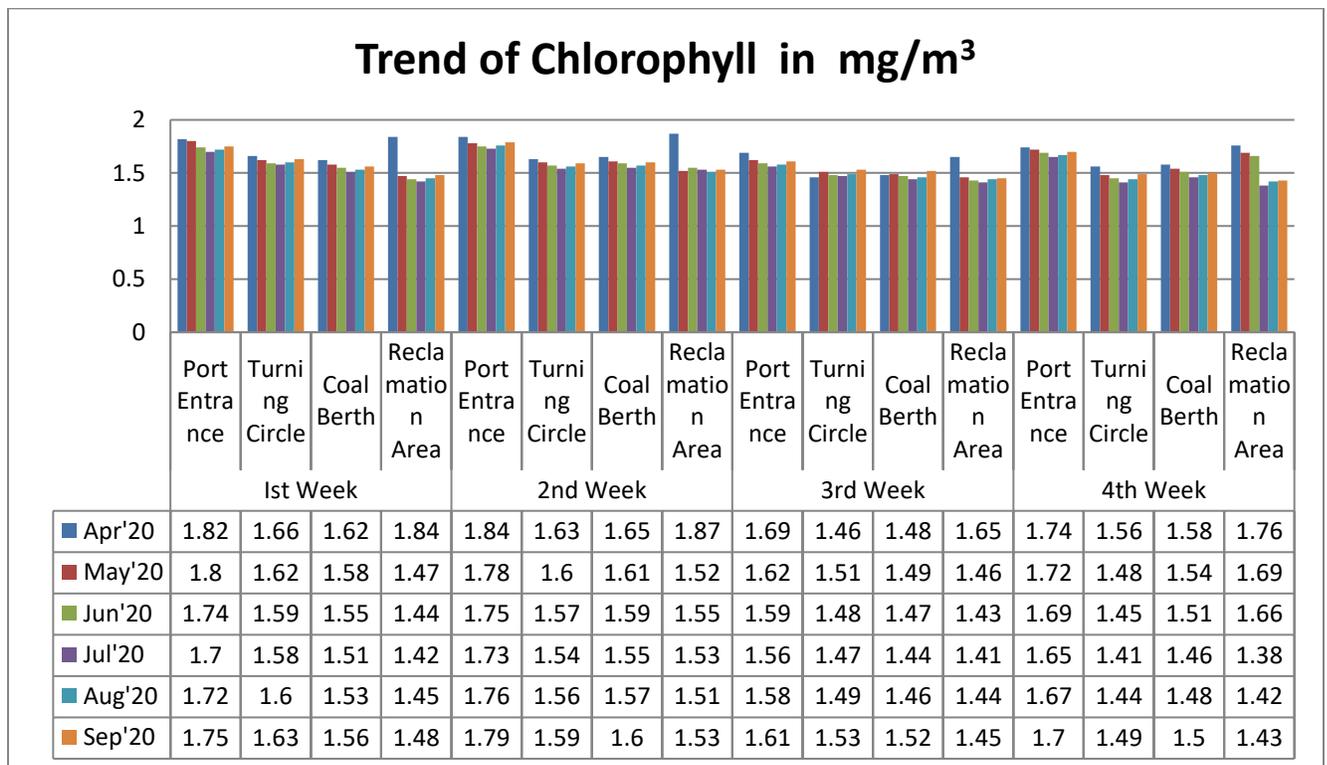
❖ Nitrates in Marine water varied between 1.05 to 8.3 mg/l



❖ Zoo plankton in Marine water varied between 8.4 to 14.9 ml/100m³



❖ Primary Productivity in Marine water varied between 19 to 43 $\text{mgC m}^{-2}\text{d}^{-1}$



❖ Chlorophyll in Marine water varied between 1.38 to 1.87 mg/m^3

Summary of Marine water quality results for six months of period Apr'20 – Sep'20

- pH - values are in the range 7.24 to 7.5
- BOD - values are in the range 3.1 to 4.6 mg/l
- COD - values are in the range 11.2 to 16.2 mg/l
- Potassium - values are in the range 240 to 399 mg/l
- Chloride - values are in the range 18925 to 21589 mg/l
- Sulphates - values are in the range 2815 to 4126 mg/l
- Zinc - values are in the range 0.013 to 0.220 mg/l
- Phytoplankton - values are in the range 194 to 249 No./ml
- DO - values are in the range 4.0 to 6.0 mg/l
- Nitrates - values are in the range 1.05 to 8.3 mg/l
- Zoo plankton - values are in the range 8.4 to 14.9 ml/100m³
- Primary productivity - values are in the range 19 to 43.0 mgC m⁻²d⁻¹
- Chlorophyll - values are in the range 1.38 to 1.87 mg/m³

4.5 Marine Water Turbidity

Marine water turbidity is carried out on one day every week at each of the four locations of Marine Water quality sampling (MT1, MT2 ,MT3 and MT4). Turbidity levels are monitored during Low Tide, Medium Tide and High Tide.

MARINE TURBIDITY MONITORING LOCATIONS

Sampling Code	Name of the Location
MT1	Coal Berth
MT2	Turning circle
MT3	Approach channel
MT4	Reclamation Area (Mutable)

4.5.1 Marine Deep Sea Turbidity

Marine water turbidity is carried out in the deep water i.e., at the dredged material disposal area on one day every month at three locations.

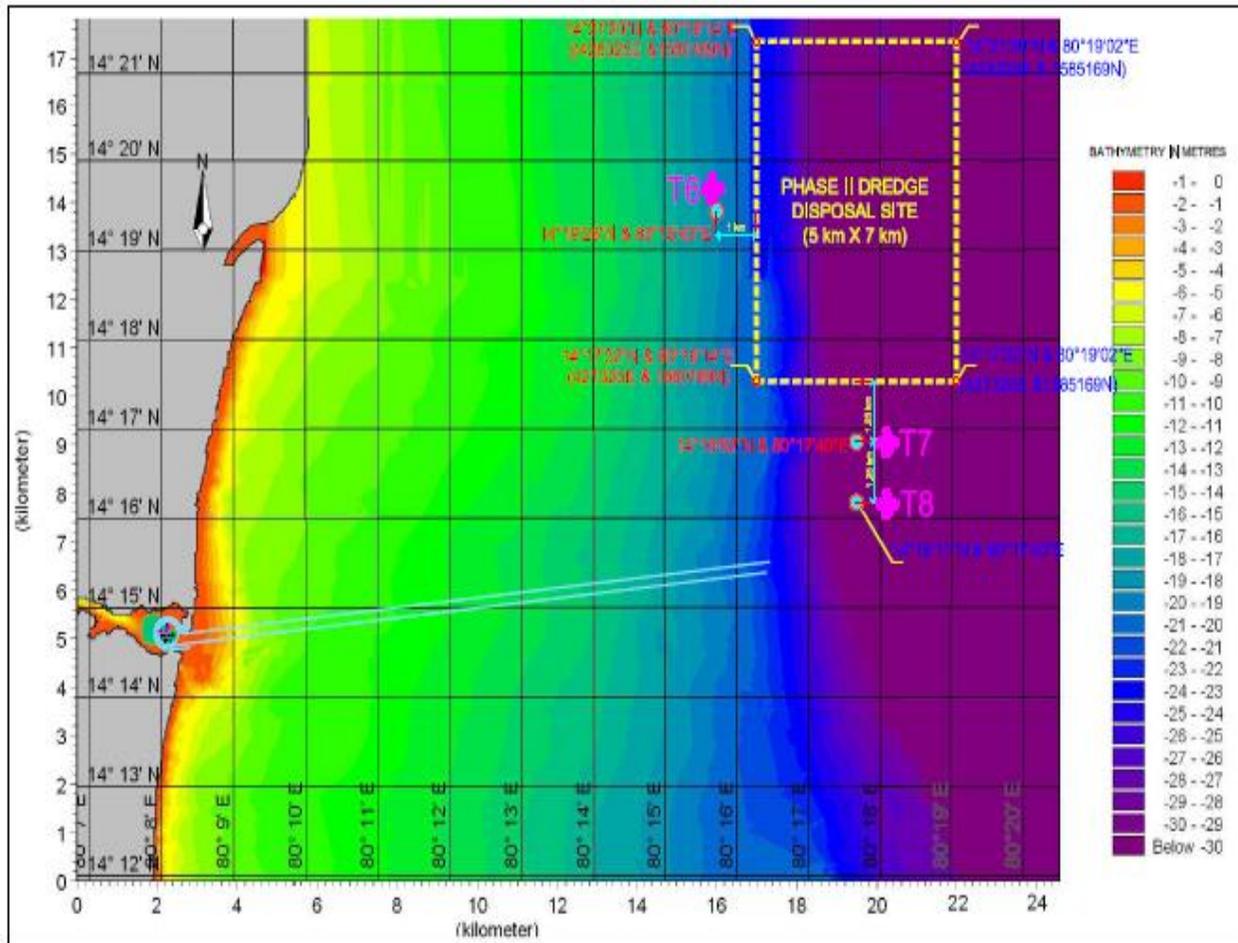
4.5.2 Sampling Locations

Turbidity levels are monitored during Low Tide, Medium Tide and High Tide. Monitoring locations listed below and **Figure–5**.

MARINE DEEP SEA TURBIDITY MONITORING LOCATIONS

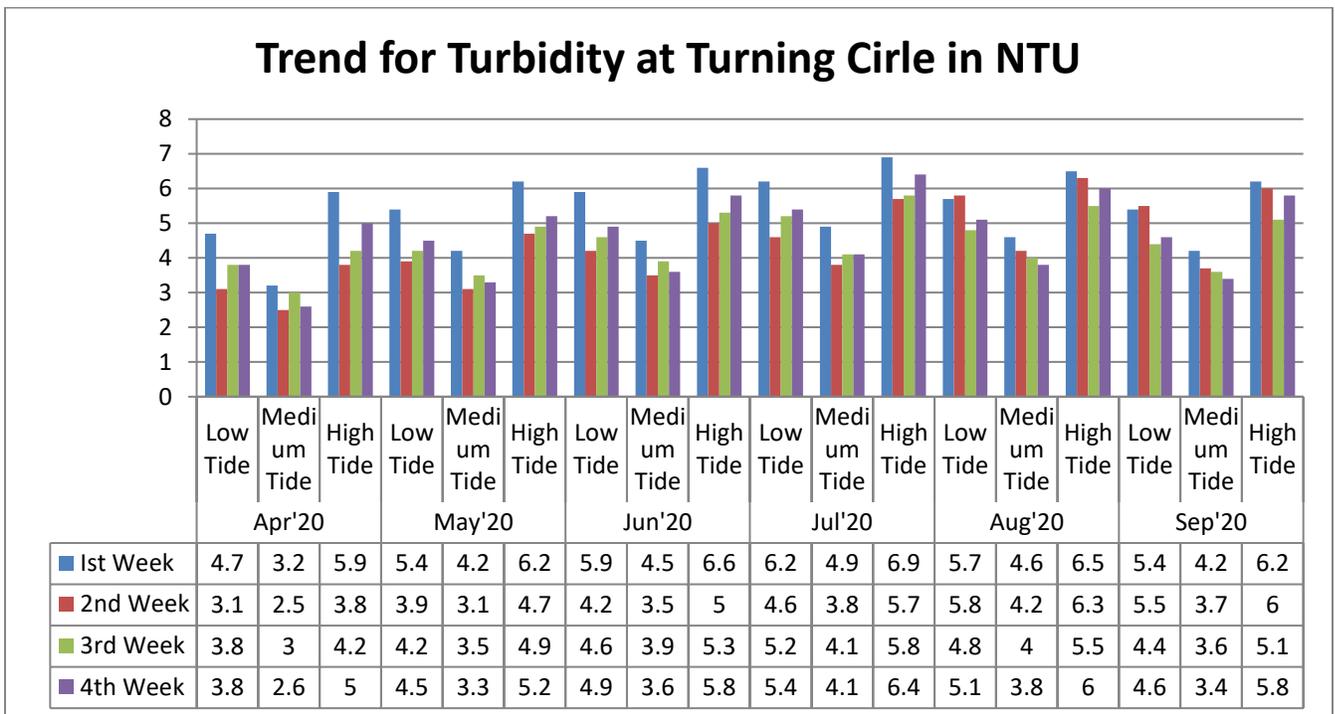
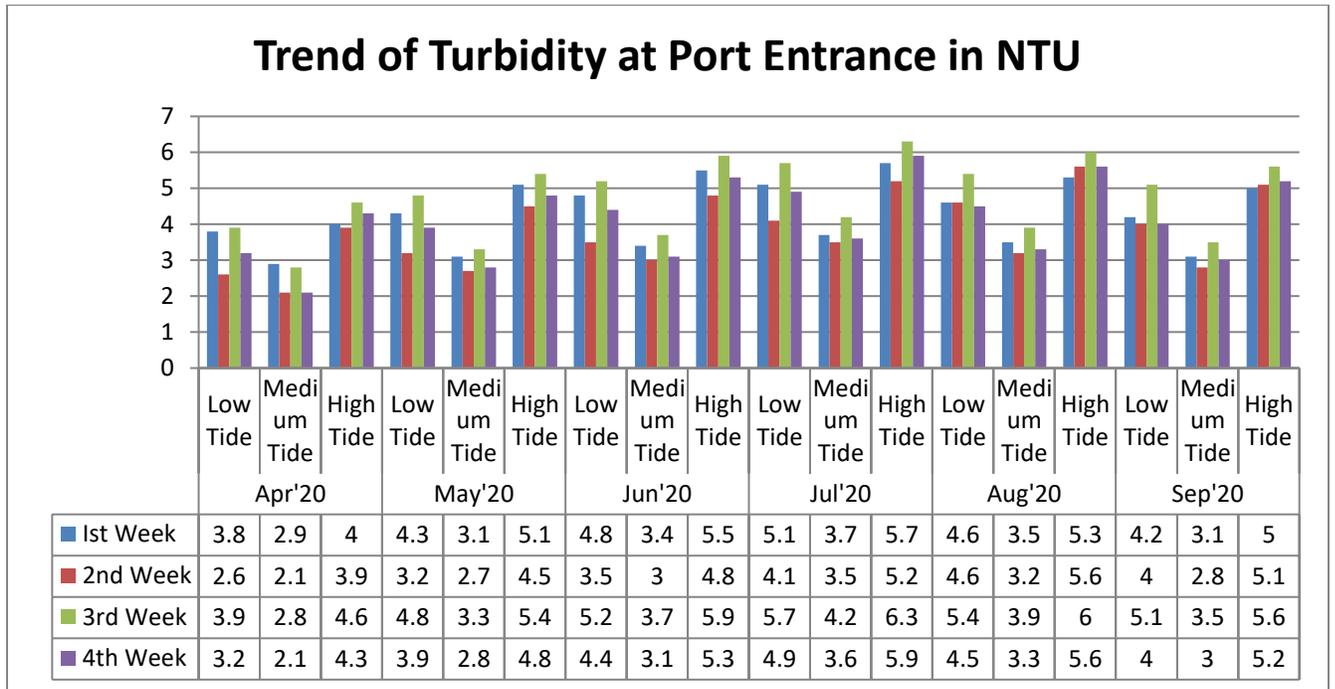
Location Code	Geographical Co-ordinates
DS1	14 ⁰ 19'26"N ; 80 ⁰ 15'43"E
DS2	14 ⁰ 16'52"N ; 80 ⁰ 17'40"E
DS3	14 ⁰ 16'11"N ; 80 ⁰ 17'40"E

FIGURE-4
KRISHNAPATNAM PORT DEEP SEA MONITORING LOCATIONS

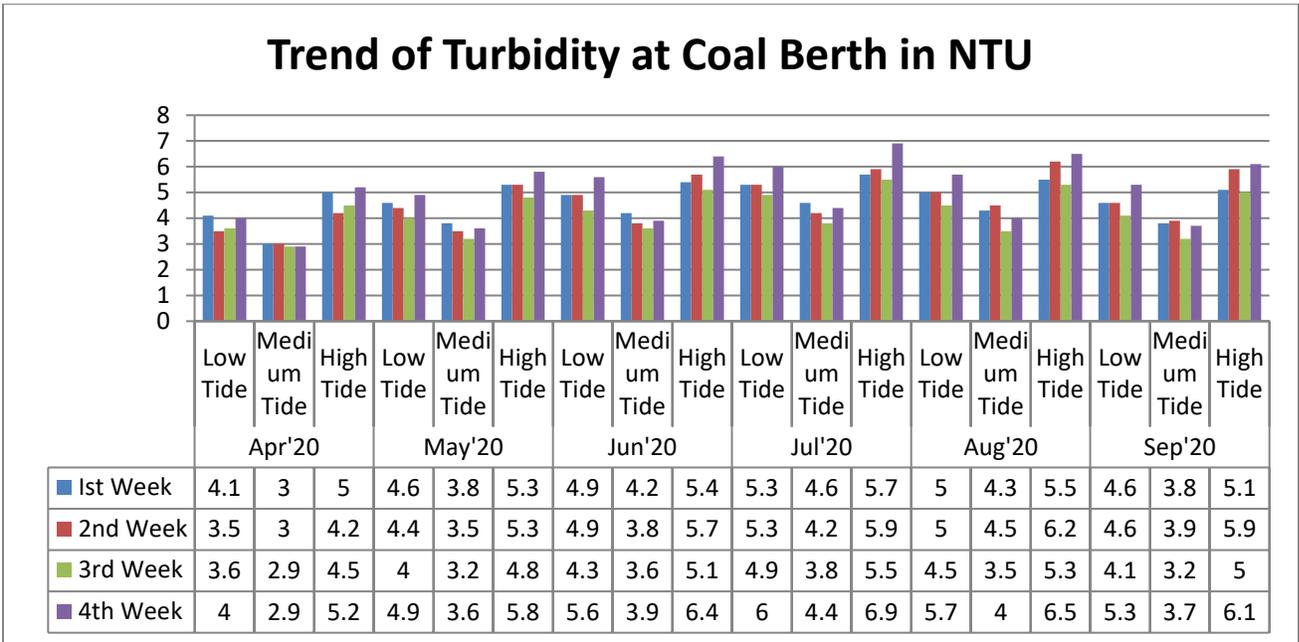


CODE	PARAMETERS	CO-ORDINATES OF MONITORING STATION
✚	Turbidity Monitoring	
T6		14°19'26"N & 80°15'43"E
T7		14°16'52"N & 80°17'40"E
T8		14°16'11"N & 80°17'40"E

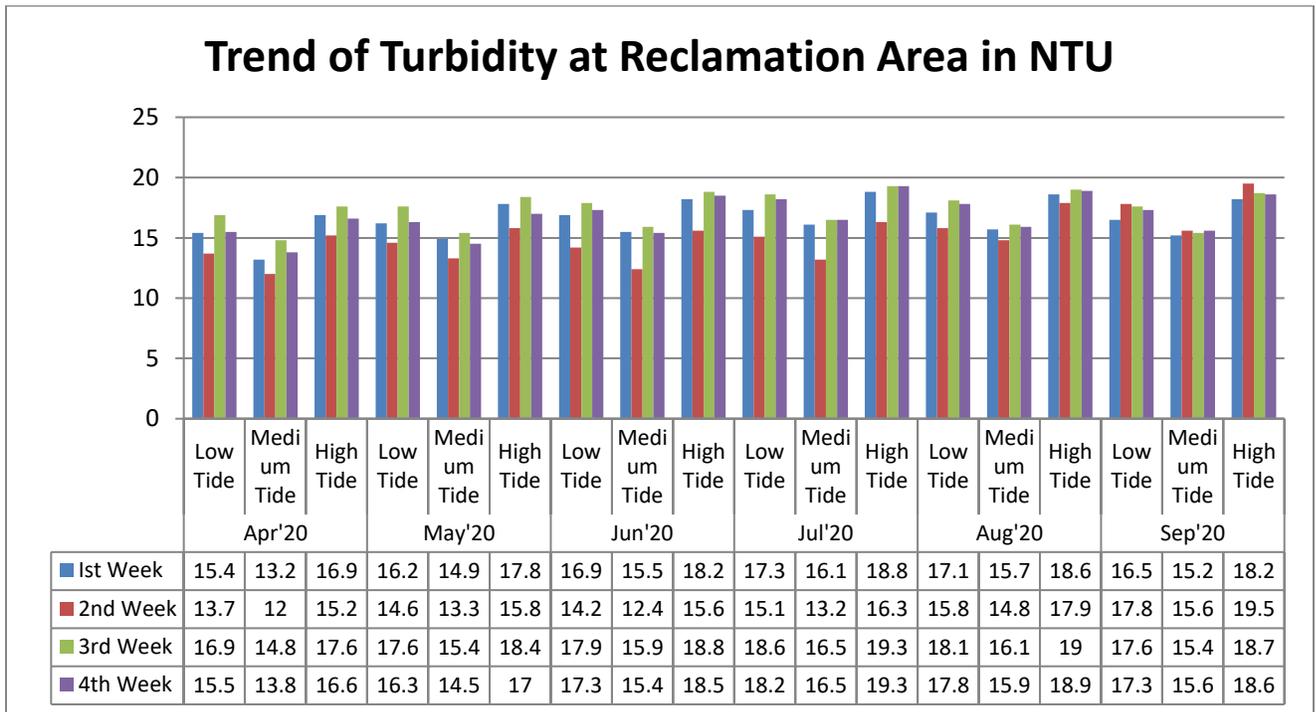
Status of Turbidity in Marine Water



Trend of Turbidity at Coal Berth in NTU



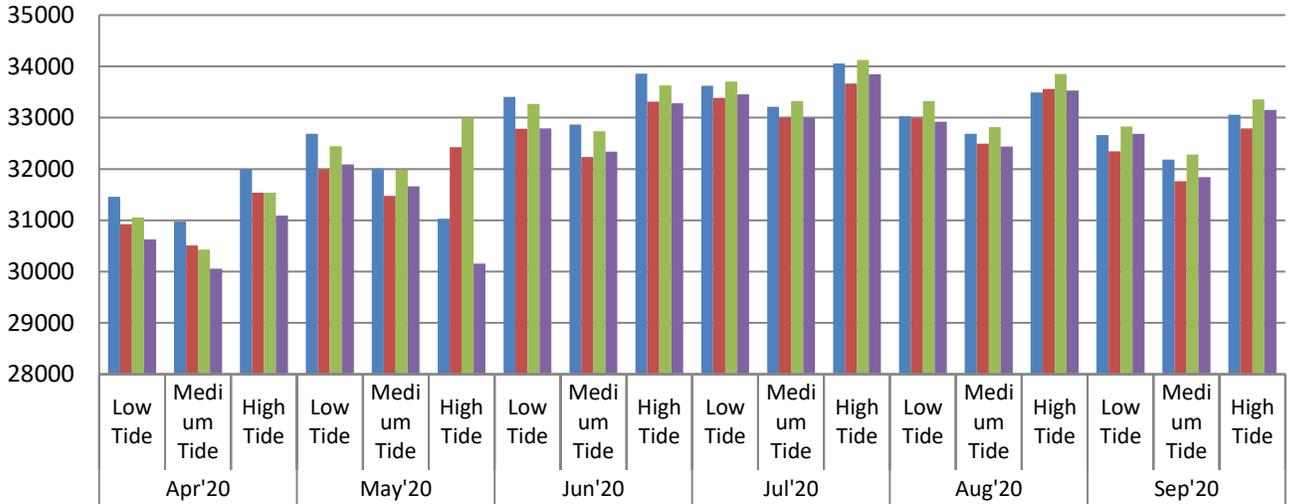
Trend of Turbidity at Reclamation Area in NTU



Summary of Turbidity: Coal berth varied between 2.9 TO 6.9NTU: Turning circle varied between 2.5 TO 6.9 NTU and Approach channel varied between 2.1 TO 6.3 NTU: Reclamation Area varied between 12.0 to 19.5 NTU

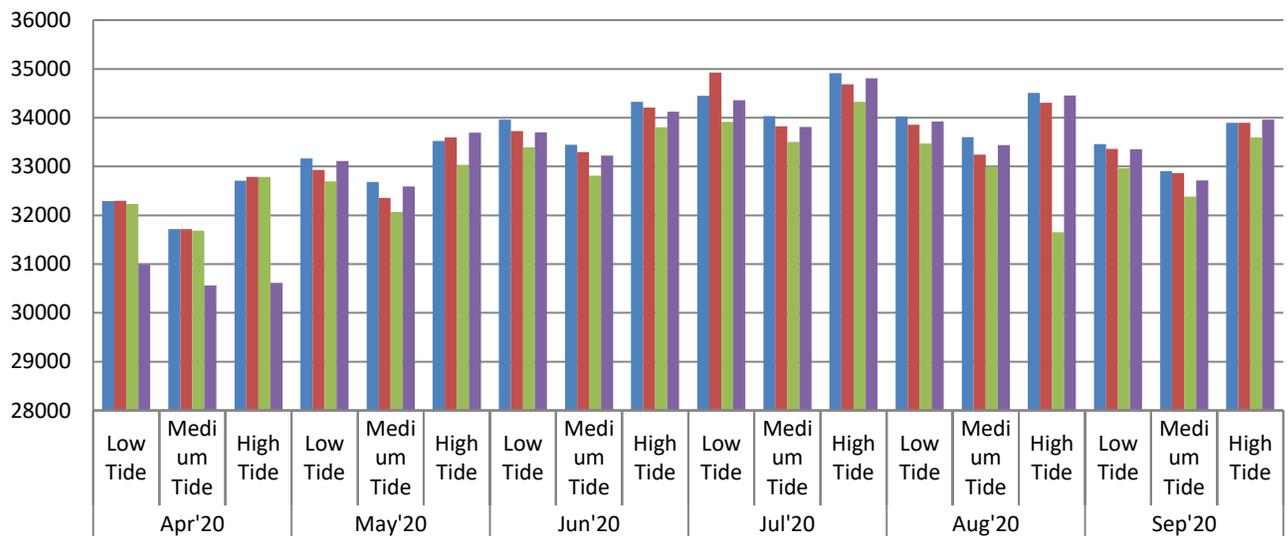
Status of Total Dissolved Solids in Marine Water

Trend of TDS at Port Entrance in mg/l

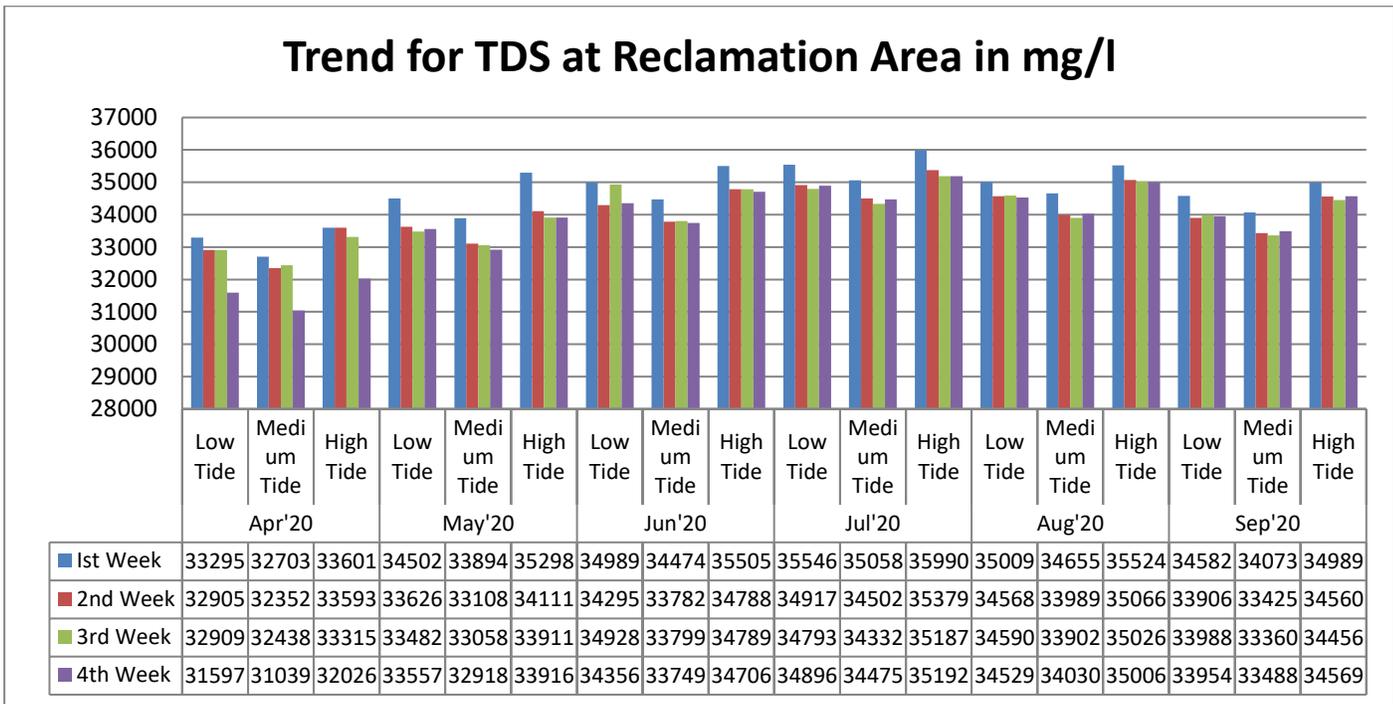
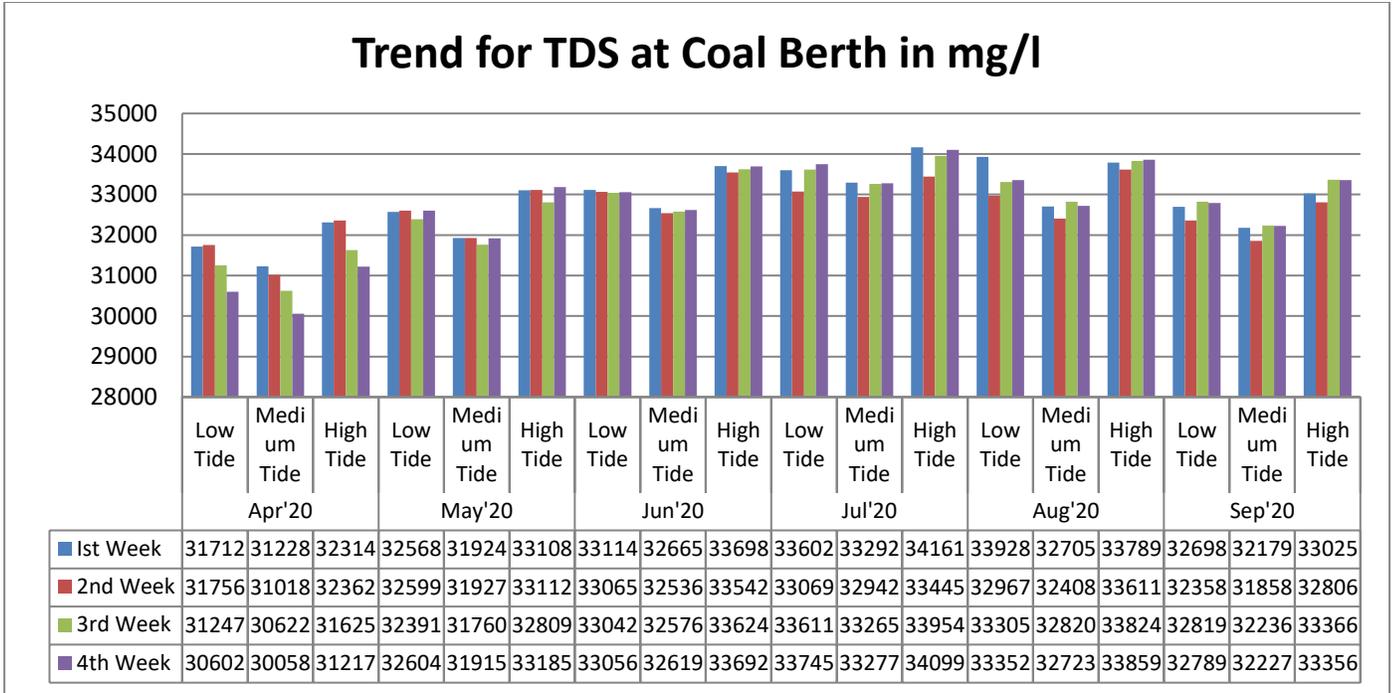


■ 1st Week	31458	30976	31989	32689	32009	31028	33406	32864	33855	33622	33214	34058	33025	32689	33494	32662	32185	33056
■ 2nd Week	30925	30511	31538	31989	31479	32428	32785	32234	33314	33386	32999	33663	32989	32496	33562	32345	31760	32789
■ 3rd Week	31056	30427	31541	32442	31985	32994	33269	32734	33626	33705	33323	34126	33324	32814	33852	32826	32284	33358
■ 4th Week	30624	30056	31092	32089	31660	30158	32789	32337	33281	33456	32998	33846	32924	32436	33527	32689	31845	33154

Trend of TDS at Turning Circle in mg/l



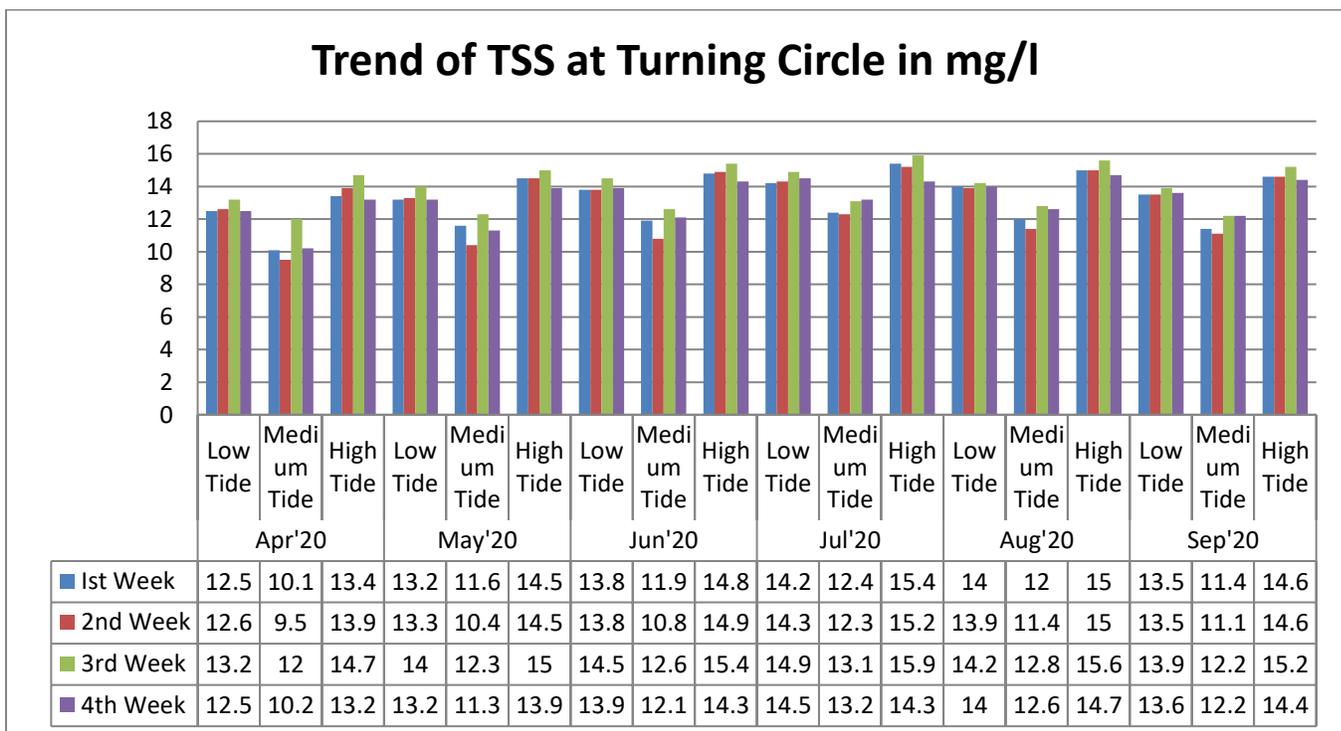
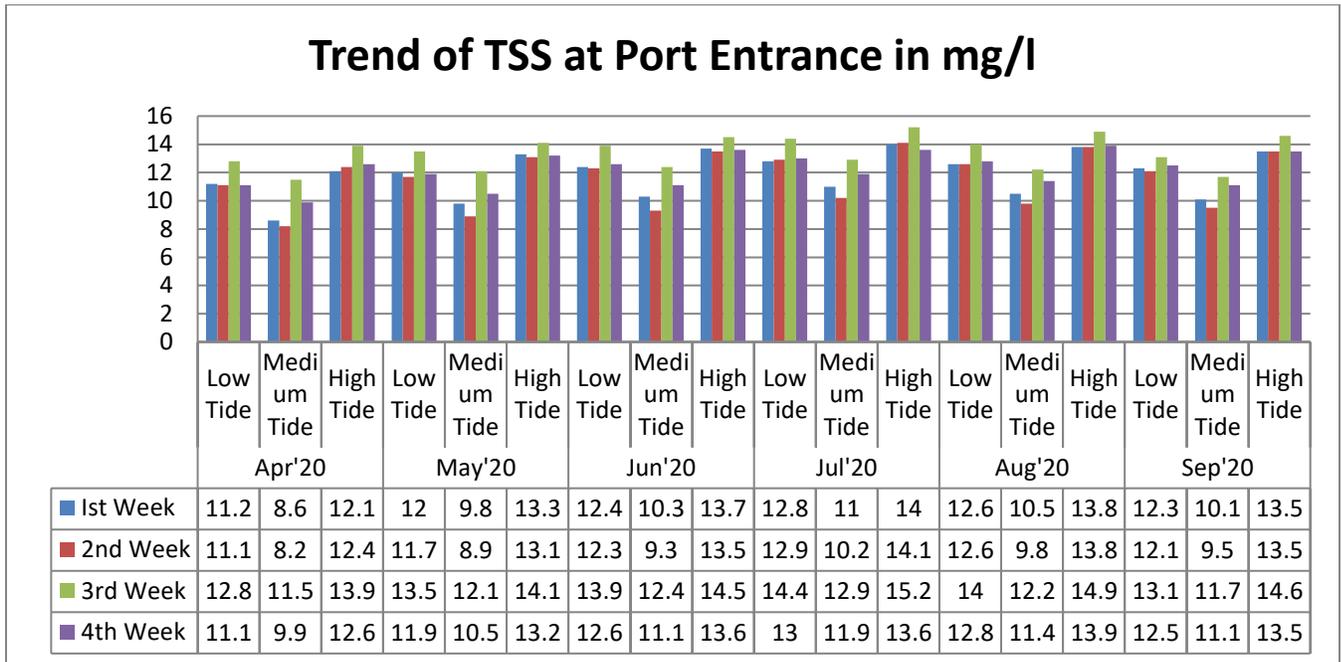
■ 1st Week	32289	31719	32708	33162	32682	33524	33963	33442	34325	34449	34031	34915	34025	33603	34506	33456	32904	33895
■ 2nd Week	32298	31720	32788	32928	32353	33592	33726	33295	34208	34928	33826	34684	33858	33245	34305	33362	32865	33896
■ 3rd Week	32229	31682	32788	32693	32071	33035	33395	32811	33806	33914	33504	34322	33468	32992	31654	32964	32381	33594
■ 4th Week	30989	30561	30614	33112	32589	33692	33698	33224	34121	34358	33813	34806	33924	33440	34456	33354	32713	33960



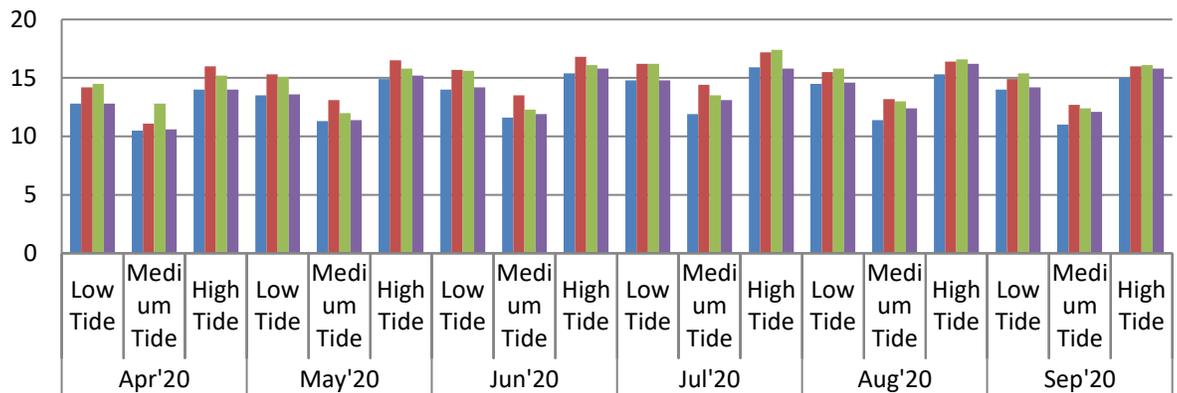
Summary of TDS of Marine water quality results

- ❖ **TDS** - Values are in the range of 30056 to 34126 mg/l at Port Entrance (Approach Channel).
- Values are in the range of 30561 to 34928 mg/l at Turning Circle
- Values are in the range of 30058 to 34161 mg/l at Coal Berth
- Values are in range of 31039 to 35990 at Reclamation Area

Status of Total Suspended Solids in Marine Water

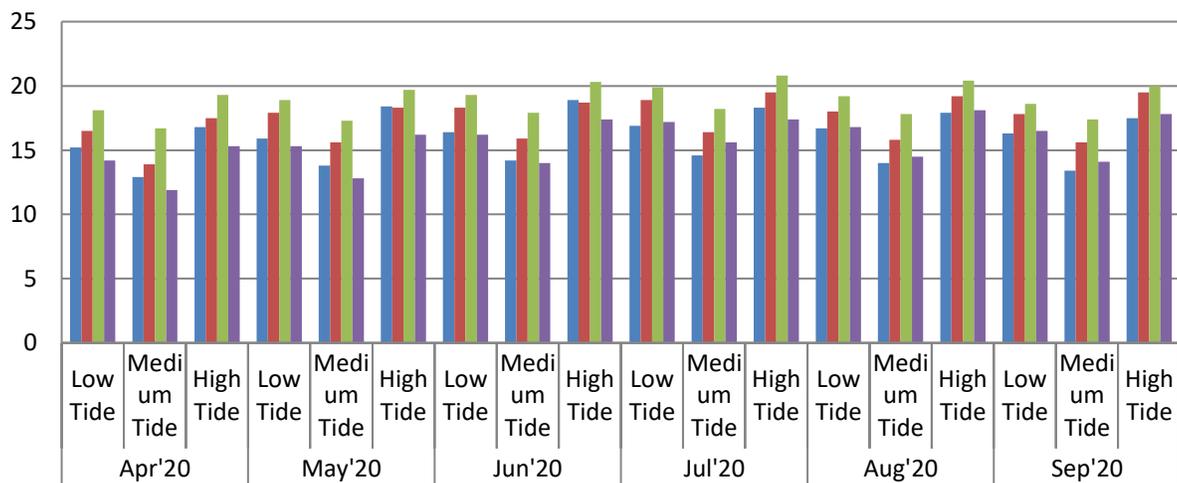


Trend for TSS at Coal Berth in mg/l



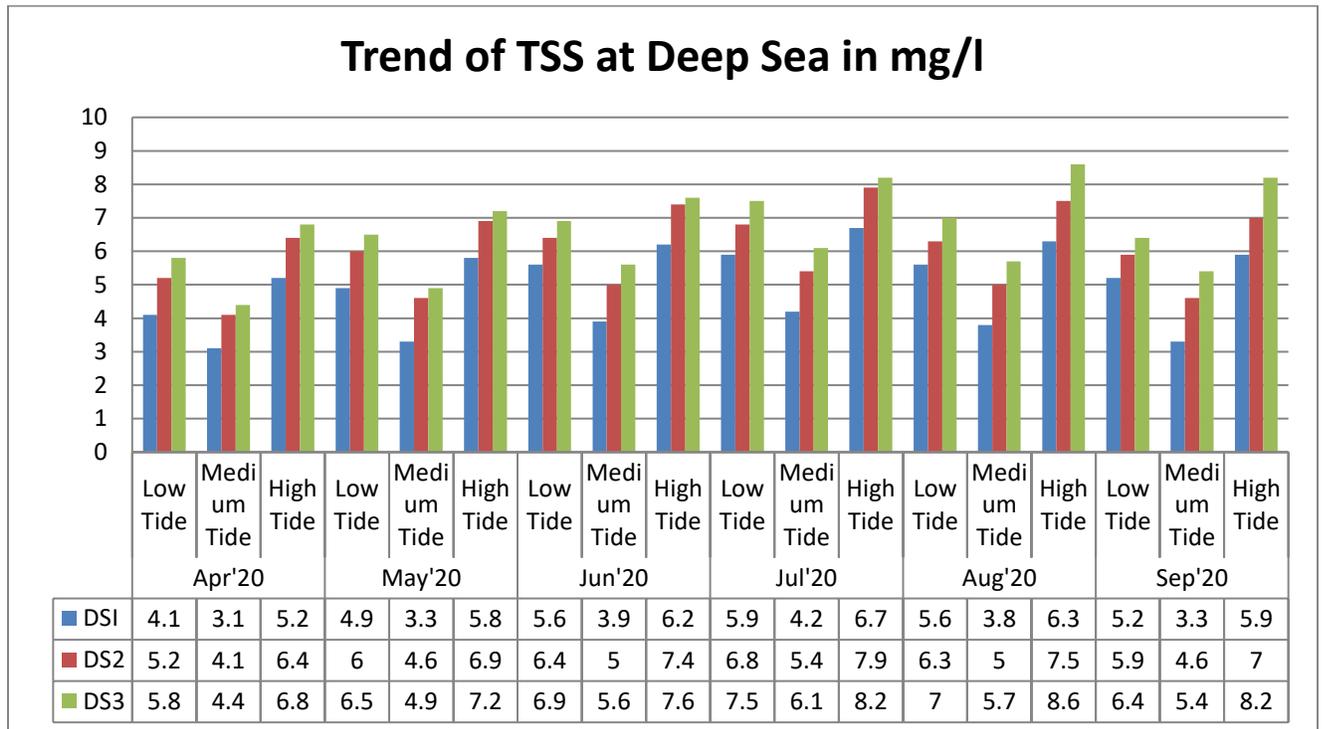
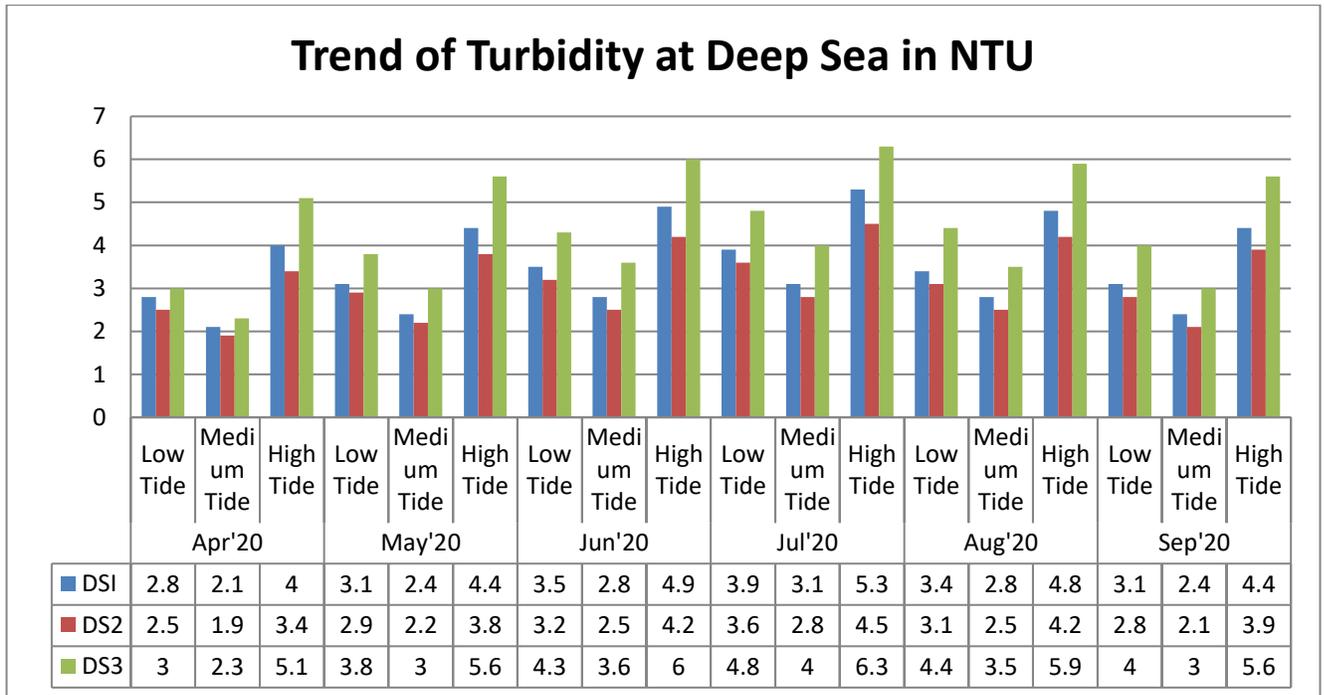
	Low Tide	Medium Tide	High Tide	Low Tide	Medium Tide	High Tide	Low Tide	Medium Tide	High Tide	Low Tide	Medium Tide	High Tide	Low Tide	Medium Tide	High Tide	Low Tide	Medium Tide	High Tide
	Apr'20			May'20			Jun'20			Jul'20			Aug'20			Sep'20		
Ist Week	12.8	10.5	14	13.5	11.3	14.9	14	11.6	15.4	14.8	11.9	15.9	14.5	11.4	15.3	14	11	15
2nd Week	14.2	11.1	16	15.3	13.1	16.5	15.7	13.5	16.8	16.2	14.4	17.2	15.5	13.2	16.4	14.9	12.7	16
3rd Week	14.5	12.8	15.2	15.1	12	15.8	15.6	12.3	16.1	16.2	13.5	17.4	15.8	13	16.6	15.4	12.4	16.1
4th Week	12.8	10.6	14	13.6	11.4	15.2	14.2	11.9	15.8	14.8	13.1	15.8	14.6	12.4	16.2	14.2	12.1	15.8

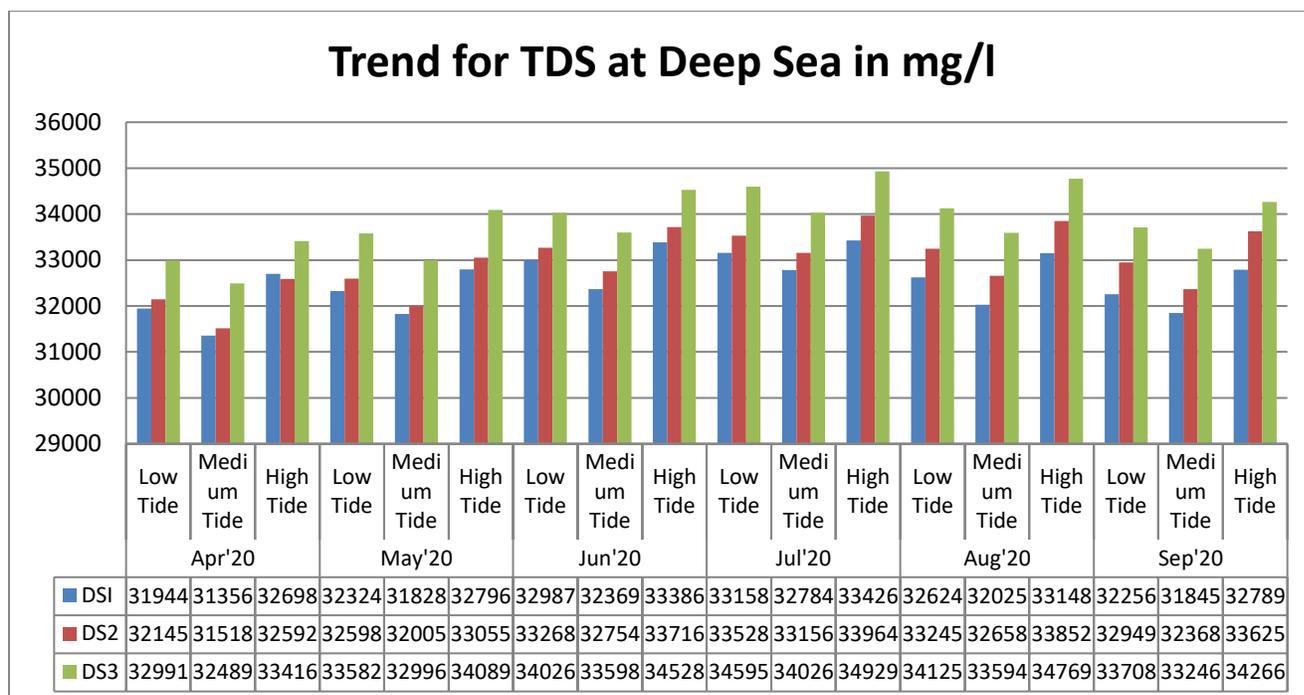
Trend for TSS at Reclamation Area in mg/l



	Low Tide	Medium Tide	High Tide	Low Tide	Medium Tide	High Tide	Low Tide	Medium Tide	High Tide	Low Tide	Medium Tide	High Tide	Low Tide	Medium Tide	High Tide	Low Tide	Medium Tide	High Tide
	Apr'20			May'20			Jun'20			Jul'20			Aug'20			Sep'20		
Ist Week	15.2	12.9	16.8	15.9	13.8	18.4	16.4	14.2	18.9	16.9	14.6	18.3	16.7	14	17.9	16.3	13.4	17.5
2nd Week	16.5	13.9	17.5	17.9	15.6	18.3	18.3	15.9	18.7	18.9	16.4	19.5	18	15.8	19.2	17.8	15.6	19.5
3rd Week	18.1	16.7	19.3	18.9	17.3	19.7	19.3	17.9	20.3	19.9	18.2	20.8	19.2	17.8	20.4	18.6	17.4	20
4th Week	14.2	11.9	15.3	15.3	12.8	16.2	16.2	14	17.4	17.2	15.6	17.4	16.8	14.5	18.1	16.5	14.1	17.8

Status of Deep Sea Water Quality





4.6 Marine Sediment Quality

4.6.1 Sampling Locations

The Marine sediment sampling is carried out once in every week at four locations in the port listed below.

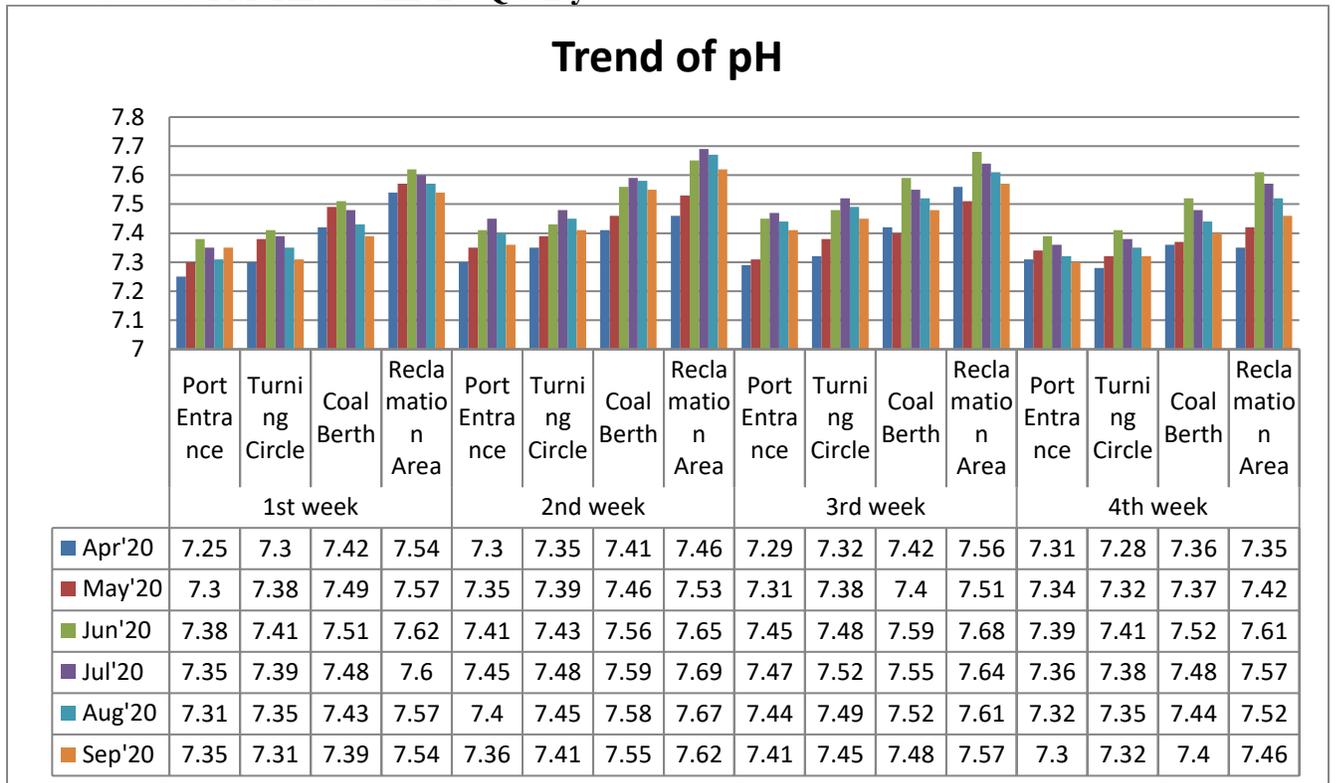
MARINE SEDIMENT MONITORING LOCATIONS

Sl.No	Location
1	Port Entrance
2	Turning Circle
3	Coal Berth
4	Reclamations Area

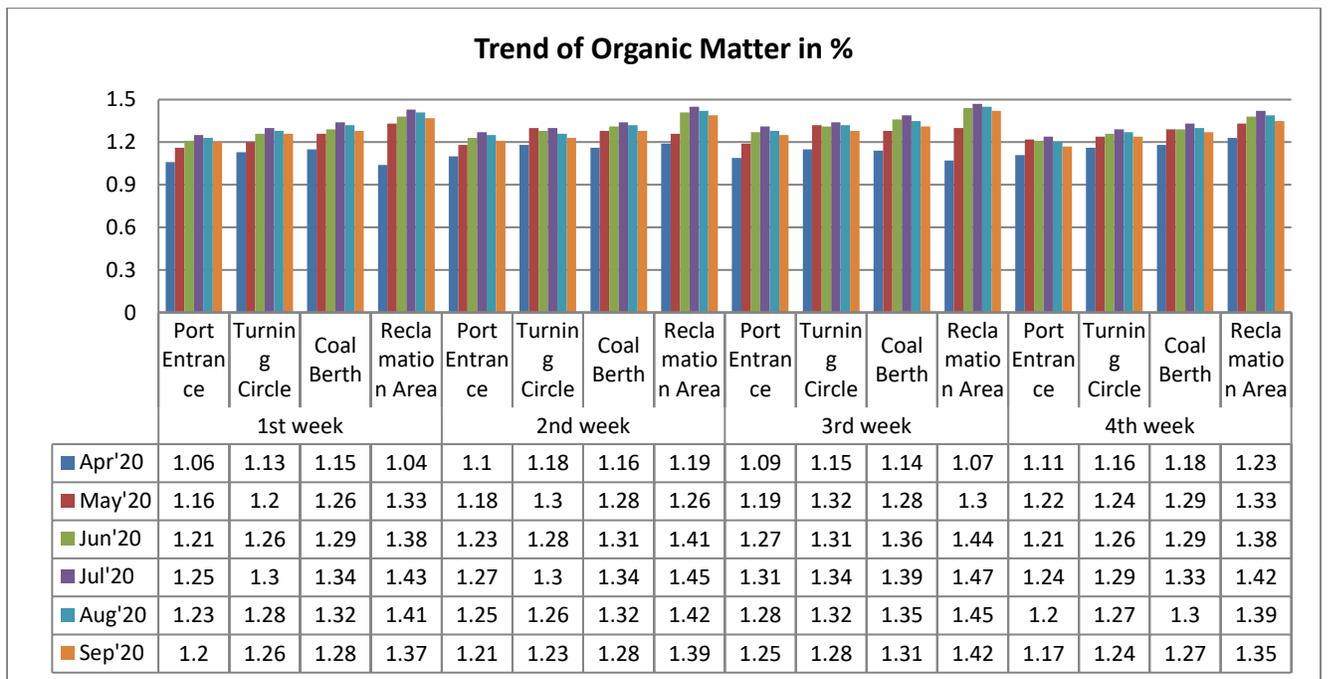
4.6.2 Method of Sampling

Marine sediment samples are collected using Van Veen Grab Sampler for analyzing Physical, Chemical and Biological parameters and presence of Heavy metals.

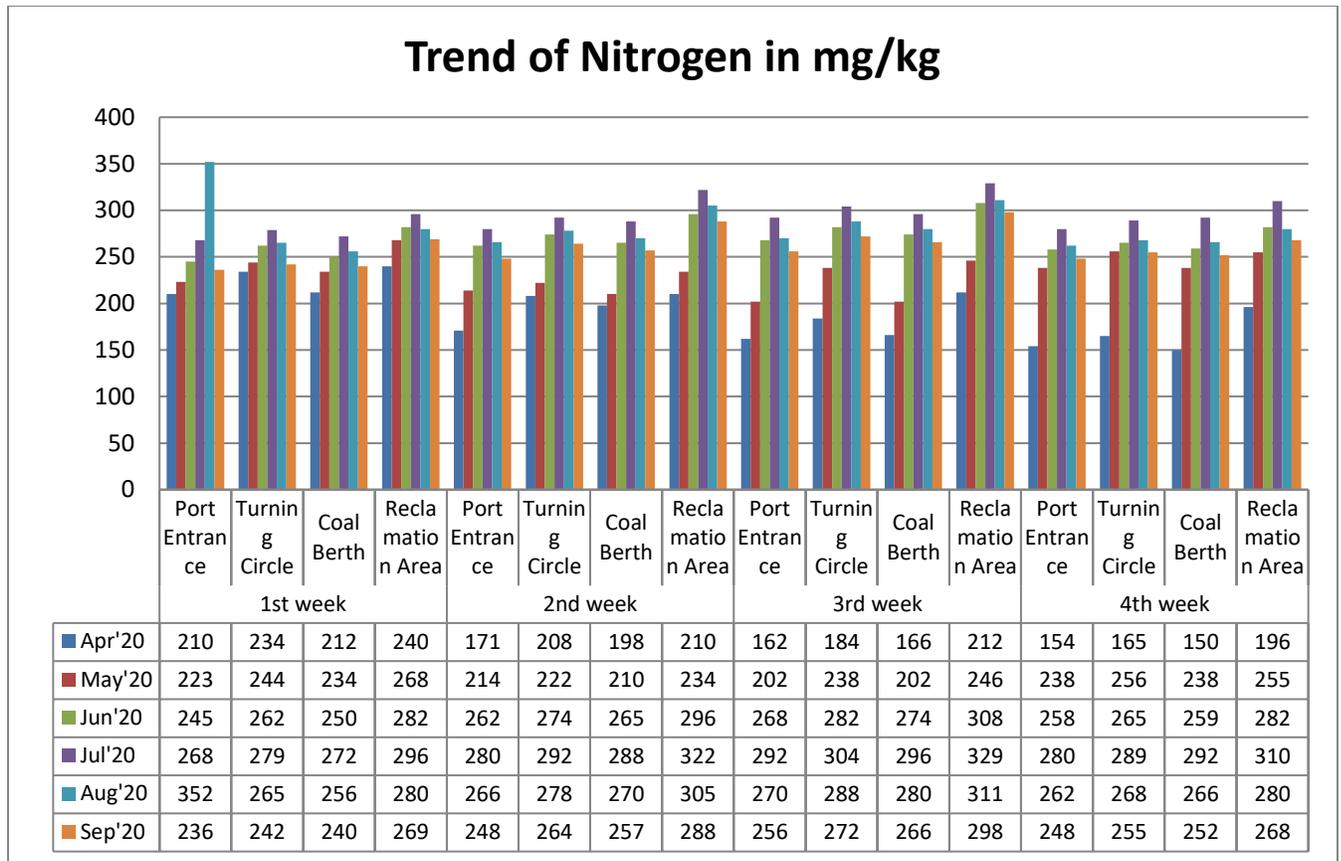
Status of Marine Sediments Quality



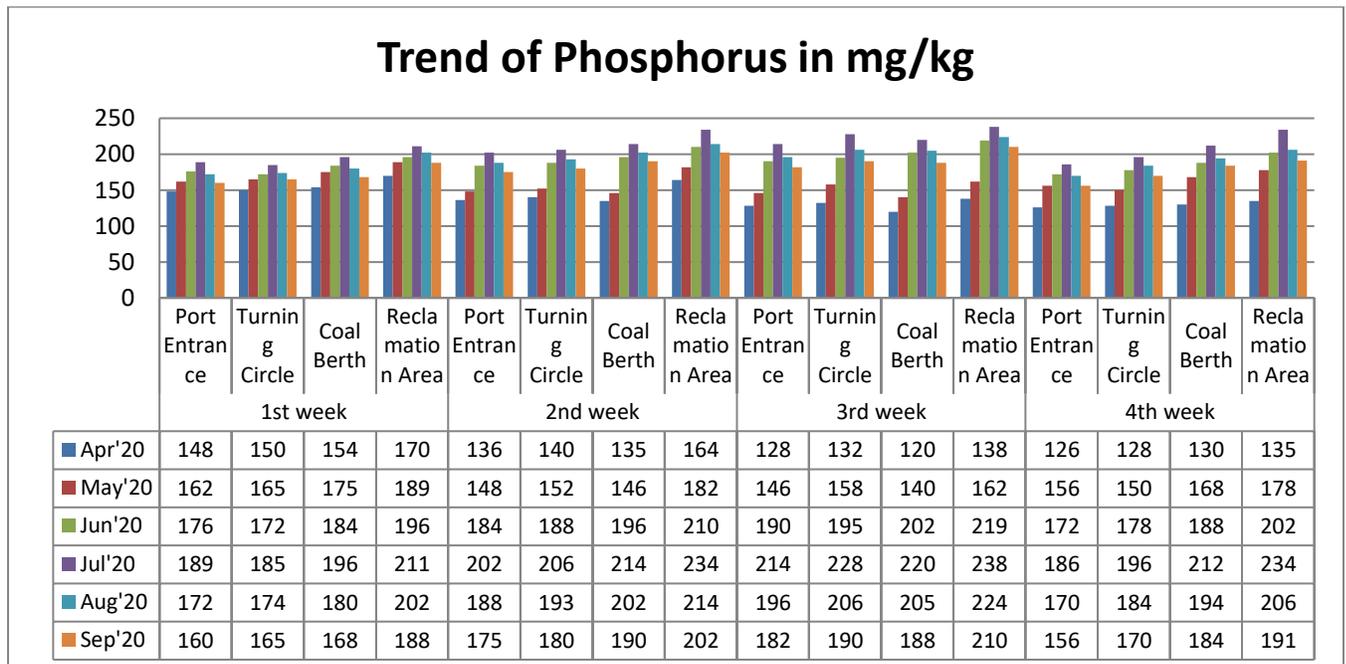
pH in Marine sediment varied between 7.25 to 7.69



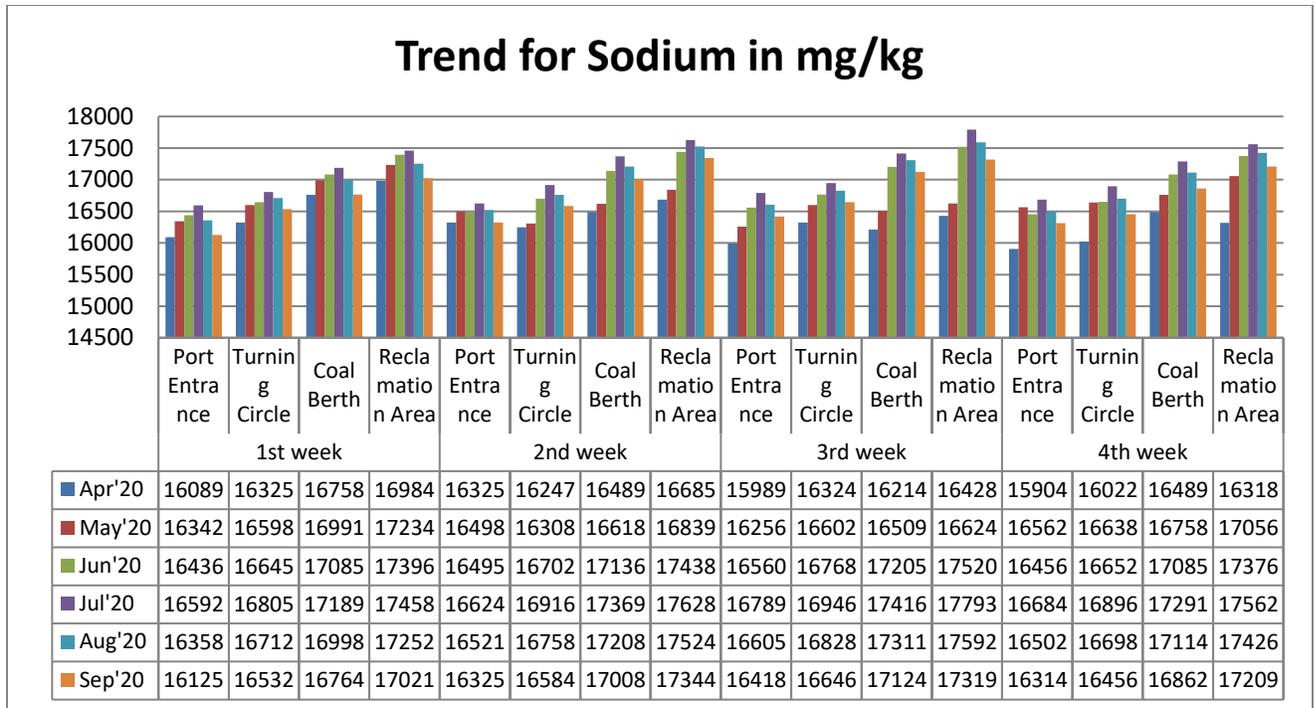
Organic Matter in Marine sediment varied between 1.04 to 1.47 %



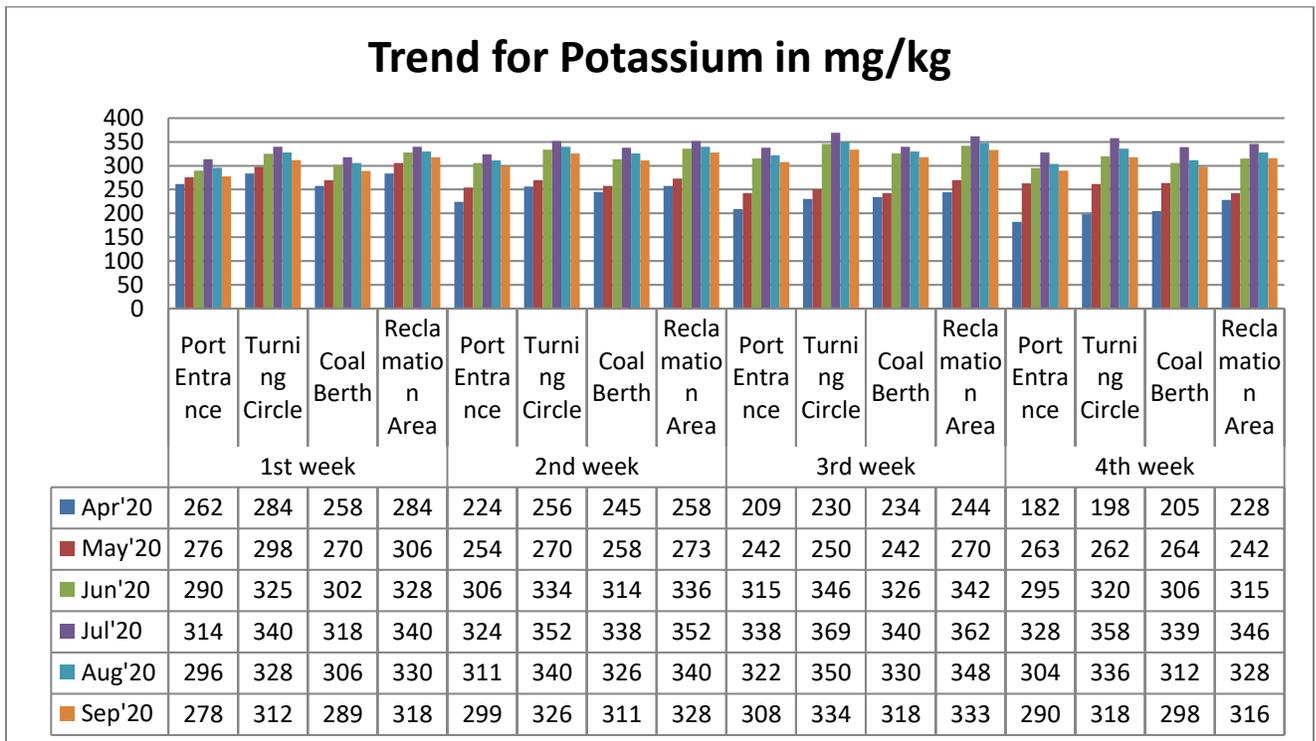
Nitrogen in Marine sediment varied between 150 to 352 mg/kg



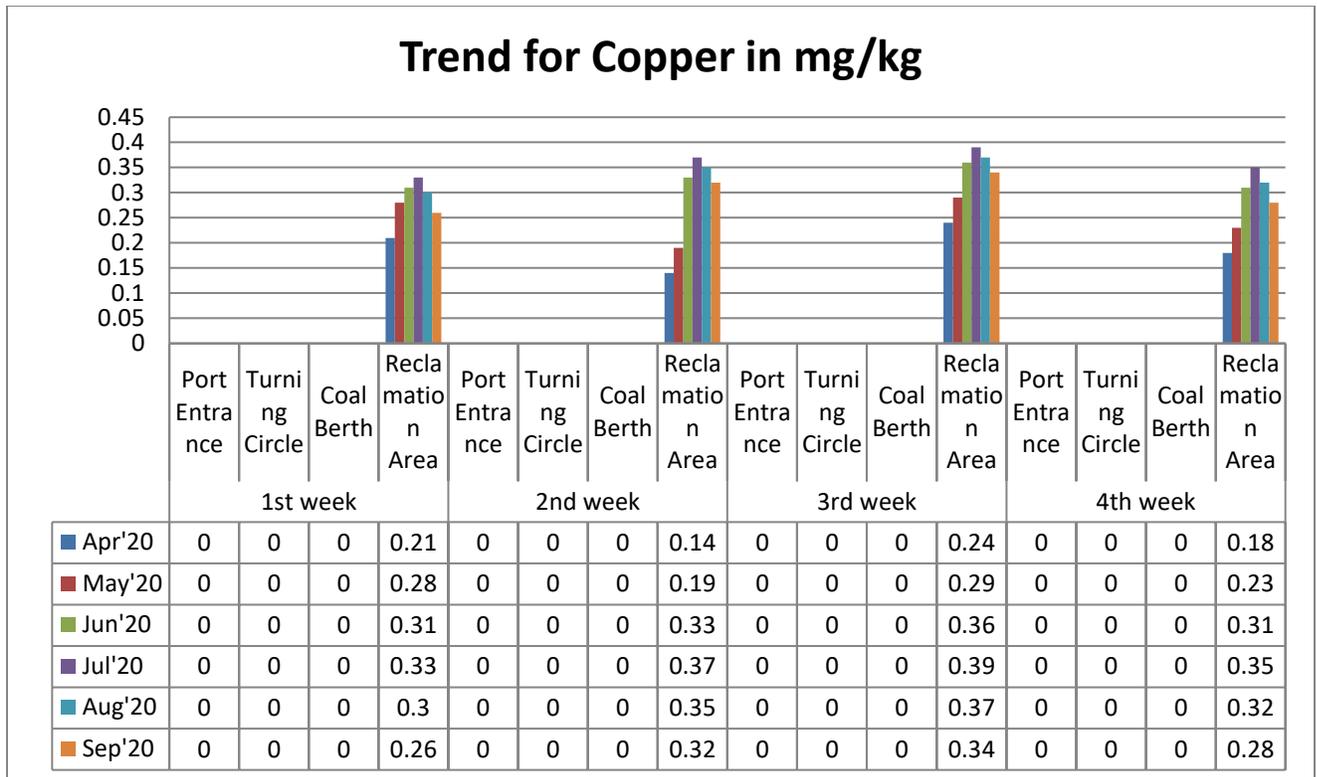
Phosphorous in Marine sediment varied between 120 to 238 mg/kg



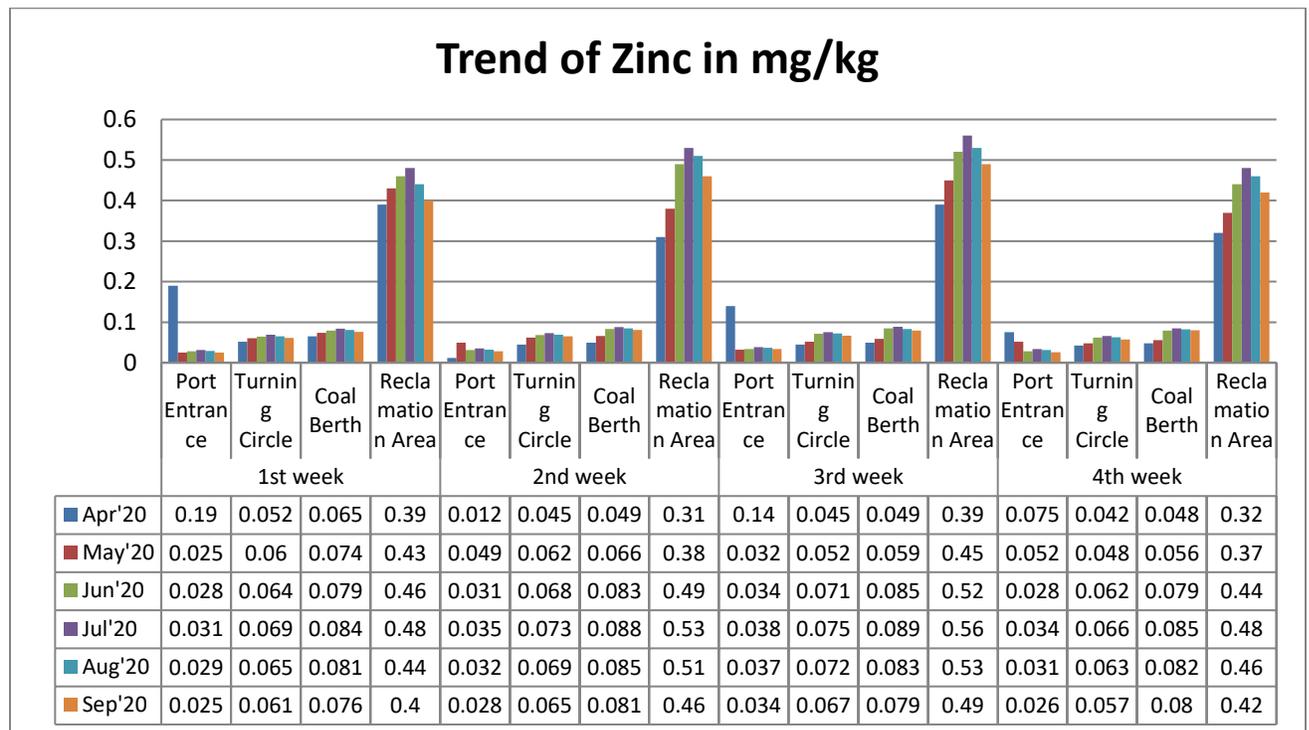
Sodium in Marine sediment varied between 15904 to 17793 mg/kg



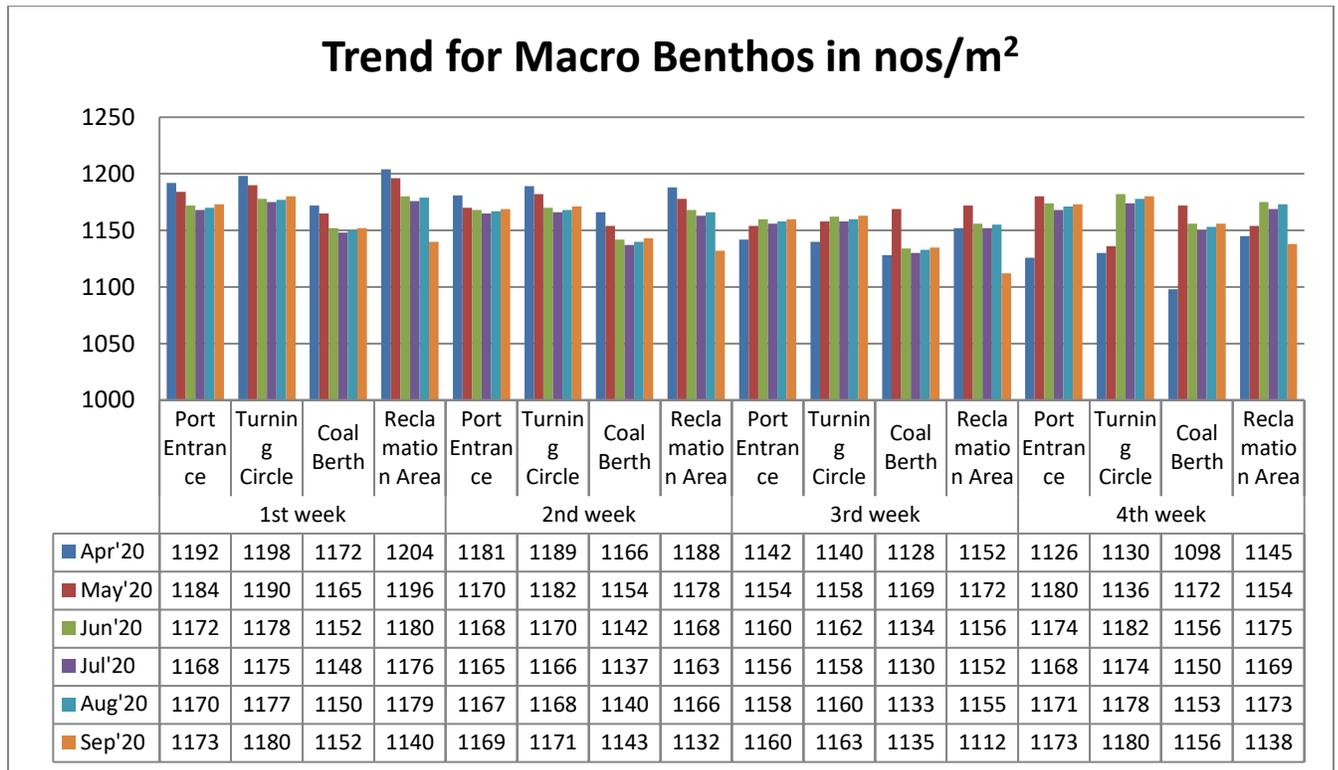
Potassium in Marine sediment varied between 182 to 369 mg/kg



Copper in Marine Sediment varied between 0.14 to 0.39 mg/kg. At Port Entrance, Turning circle & Coal berth, the result found to be <0.01



Zinc in Marine sediment varied between 0.012 to 0.56 mg/kg



Macro Benthos in Marine Sediment varied between 1098 to 1204 nos/m²

Summary of marine sediments quality results for Six months of Apr'20 - Sep'20

- Organic matter - value are in the range 1.04 to 1.47 %
- Nitrogen -value are in the range 150 to 352 mg/kg
- Phosphorous - value are in the range 120 to 238 mg/kg
- Sodium - value are in the range 15904 to 17793 mg/kg
- Potassium - value are in the range 182 to 369 mg/kg
- Copper - value are in the range 0.14 to 0.39 mg/kg
- Zinc -value are in the range 0.012 to 0.56 mg/kg
- Macro Benthos - value are in the range 1098 to 1204 nos/m²

4.7 GROUND WATER QUALITY

4.7.1 Sampling Locations

Ground Water sampling is carried out once in six months at four locations in and around the Port. The Ground water sampling locations are listed below.

GROUND WATER QUALITY MONITORING LOCATIONS

Location Code	Location
GW1	Port Site
GW2	South Side of the Port
GW3	Gopalapuram Village
GW4	Krishnapatnam Village

TEST REPORT OF GROUND WATER SAMPLES

S. No.	Parameter	Unit	Port Site (Bore Well)	Krishnapatnam Village	South Side of the Port	Gopalpuram Village	IS: 10500-2012 Specification
1.	pH	--	7.32	7.58	7.70	7.45	6.5 – 8.5
2	Electrical Conductivity	µmhos	1626	969	1536	1059	-
3	TDS	mg/l	1026	601	968	669	500
4	Total Alkalinity as CaCO ₃	mg/l	274	214	369	205	200
5	Chlorides as Cl ⁻	mg/l	432	198	362	303	250
6	Sodium	mg/l	174	92.6	189	105	-
7	Potassium	mg/l	46	18	42	21	
8	Fluorides as F ⁻	mg/l	0.66	0.51	0.78	0.48	1.0
9	Nitrates as NO ₃ ⁻	mg/l	7.05	6.84	5.31	5.36	45
10	Cyanide as CN	mg/l	< 0.01	< 0.01	< 0.01	< 0.01	0.05
11	Total Hardness as CaCO ₃	mg/l	148	90.2	124	103	200
12	Salinity	ppt	0.078	0.035	0.065	0.054	
13	Sulphates as SO ₄ ⁻²	mg/l	126	69.2	79.4	89.9	200
14	COD	mg/l	< 10.0	< 10.0	< 10.0	< 10.0	
15	Mercury as Hg	mg/l	< 0.001	< 0.001	< 0.001	< 0.001	0.001
16	Cadmium as Cd	mg/l	< 0.001	< 0.001	< 0.001	< 0.001	0.003
17	Arsenic as As	mg/l	< 0.01	< 0.01	< 0.01	< 0.01	0.01
18	Selenium	mg/l	< 0.05	< 0.05	< 0.05	< 0.05	
19	Iron as Fe	mg/l	0.08	0.09	0.16	0.08	0.3
20	Lead as Pb	mg/l	< 0.01	< 0.01	< 0.01	< 0.01	0.01
21	Zinc as Zn	mg/l	0.12	0.06	0.09	0.14	5.0
22	Chromium as Cr ⁶⁺	mg/l	< 0.01	< 0.01	< 0.01	< 0.01	0.05
23	Total Coliforms	CFU/ml	Not Detected	Not Detected	Not Detected	Not Detected	Shall not be detected in 100ml
24	Fecal Coliforms	CFU/ml	Not Detected	Not Detected	Not Detected	Not Detected	Shall not be detected in 100ml

Note: . All the above parameters have been tested as per APHA 23rd Edition, 2017.

4.8 SOIL QUALITY

For studying soil profile of the region, sampling locations are selected to assess the existing soil characteristics in and around the port area representing various land use conditions.

4.8.1 Sampling Locations

A total two number of samples collected from the sampling sites. The details of the soil sampling locations are given below.

The soil samples are collected and analyzed once in six months.

SOIL QUALITY MONITORING LOCATIONS

Location Code	Name of the Location
S1	Storage area towards west Buckingham Canal
S2	Storage Area at Port

TEST REPORT OF SOIL SAMPLES

S. NO.	PARAMETER	UNIT	S1	S2
1.	pH(1:5)	--	7.38	7.43
2.	EC(1:5)	µmhos	696	722
3.	Texture			
	a. Sand	%	75.9	74.6
	b. Silt	%	13.2	14.2
	c. Clay	%	10.9	11.2
4	Available Nitrogen	kg/ha	236	251
5	Available Phosphorus	kg/ha	13	15
6	Available Potassium	kg/ha	510	526
7	Exchangeable Sodium	mg/kg	201	212
8	Exchangeable Calcium	mg/kg	132	165
9	Exchangeable Magnesium	mg/kg	36	44
10	SAR (SAR)	-	1.6	1.9
11	Water Soluble Chlorides	mg/kg	162	174
12	Organic Carbon	%	0.41	0.49
13	Lead	mg/kg	7.9	6.4
14	Cadmium	mg/kg	0.17	0.14
15	Copper	mg/kg	6.9	7.2
16	Zinc	mg/kg	7.3	7.9

4.9 STP INLET AND OUTLET ANALYSIS**TEST REPORT OF STP INLET**

S.No	Parameter	Unit	Apr'20	May'20	Jun'20	Jul'20	Aug'20	Sep'20
1	pH	-	6.80	6.86	6.92	7.03	6.89	6.99
2	Total Solids	mg/l	1866	1977	2051	2125	2025	2174
3	Total Dissolved Solids	mg/l	1692	1789	1855	1921	1811	1946
4	Total Suspended Solids	mg/l	174	188	196	204	214	228
5	COD	mg/l	262	256	268	289	272	286
6	BOD 3day 27°C	mg/l	101	98.2	102	106	101	104
7	Oil & Grease	mg/l	5.2	4.9	5.3	5.5	5.2	5.4

TEST REPORT OF STP OUTLET

S.No	Parameter	Unit	Apr'20	May'20	Jun'20	Jul'20	Aug'20	Sep'20
1	pH	-	7.15	7.10	7.21	7.24	7.16	7.26
2	Total Solids	mg/l	1023	1100	1154	1225	1176	1255
3	Total Dissolved Solids	mg/l	985	1054	1100	1172	1148	1210
4	Total Suspended Solids	mg/l	38	46	54	53	28	45
5	COD	mg/l	71.8	82.1	90.6	96.3	82.4	90.6
6	BOD 3day 27°C	mg/l	21.2	24.6	28.5	28.2	26.8	27.0
7	Oil & Grease	mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

5.0 STACK EMISSION MONITORING

Sampling of Flue gas emissions of DG Sets was done and their emissions were determined. The Detailed report has been enclosed here.

S. No	DG Capacity (kVA)	Location	S. No	DG Capacity (kVA)	Location
1	380	Admin building	14	250	Dredger
2	250	SS-2	15	250	MCG
3	320	Admin Block	16	250	Garage
4	82.5	Sea Shell	17	250	CG-1
5	250	Dredger	18	500	CT Yard
6	250	South Port	19	250	CT Yard
7	125	CV Block	20	125	DSS1
8	250	R Block	21	160	Batching Plant
9	160	SSI	22	160	NPS
10	125	MUSS	23	100	KPCT Scanner
11	320	South Port	24	500	CT Yard
12	250	Batching Plant	25	125	DSS14
13	250	TTT			

EMISSION RATE

S.NO.	PARAMETER	UNIT	METHOD	RESULT				
				1	2	3	4	5
1.	Particulate Matter – PM	g/kw-hr	IS:11255-P-1	0.11	0.13	0.12	0.12	0.11
2.	Oxides of Nitrogen – NOx	g/kw-hr	IS:11255-P-2	1.27	1.60	1.28	1.15	0.68
3.	Carbon Monoxide – CO	g/kw-hr	IS:11255-P-7	0.58	0.69	0.60	0.49	0.34
4.	Hydrocarbons - HC	g/kw-hr	IS:11255	0.21	0.11	0.13	0.14	0.10

S.NO.	PARAMETER	UNIT	METHOD	RESULT				
				6	7	8	9	10
1.	Particulate Matter – PM	g/kw-hr	IS:11255-P-1	0.14	0.13	0.14	0.08	0.12
2.	Oxides of Nitrogen – NOx	g/kw-hr	IS:11255-P-2	1.08	1.14	1.32	1.27	1.14
3.	Carbon Monoxide – CO	g/kw-hr	IS:11255-P-7	0.50	0.42	0.66	0.52	0.38
4.	Hydrocarbons - HC	g/kw-hr	IS:11255	0.12	0.10	0.18	0.09	0.10

S.NO.	PARAMETER	UNIT	METHOD	RESULT				
				11	12	13	14	15
1.	Particulate Matter – PM	g/kw-hr	IS:11255-P-1	0.16	0.14	0.13	0.10	0.12
2.	Oxides of Nitrogen – NOx	g/kw-hr	IS:11255-P-2	1.15	1.25	1.29	1.16	1.20
3.	Carbon Monoxide – CO	g/kw-hr	IS:11255-P-7	0.54	0.47	0.52	0.47	0.44
4.	Hydrocarbons - HC	g/kw-hr	IS:11255	0.07	0.12	0.08	0.13	0.15

S.NO.	PARAMETER	UNIT	METHOD	RESULT				
				16	17	18	19	20
1.	Particulate Matter – PM	g/kw-hr	IS:11255-P-1	0.13	0.14	0.14	0.10	0.08
2.	Oxides of Nitrogen – NOx	g/kw-hr	IS:11255-P-2	1.56	1.18	1.43	1.24	1.14
3.	Carbon Monoxide – CO	g/kw-hr	IS:11255-P-7	0.54	0.47	0.55	0.42	0.55
4.	Hydrocarbons - HC	g/kw-hr	IS:11255	0.09	0.11	0.13	0.07	0.08

S.NO.	PARAMETER	UNIT	METHOD	RESULT				
				21	22	23	24	25
1.	Particulate Matter – PM	g/kw-hr	IS:11255-P-1	0.11	0.10	0.16	0.12	0.15
2.	Oxides of Nitrogen – NOx	g/kw-hr	IS:11255-P-2	1.38	1.21	1.29	1.63	1.34
3.	Carbon Monoxide – CO	g/kw-hr	IS:11255-P-7	0.50	0.47	0.52	0.48	0.55
4.	Hydrocarbons - HC	g/kw-hr	IS:11255	0.08	0.09	0.14	0.10	0.06