

From: PRASAD KURIEN <prasad.kurien@vizhinjamport.in>
Sent: Wednesday, 27 May, 2020 04:32 PM
To: rosz.bng-mefcc@gov.in
Cc: Ssuresh.cpcb@nic.in; tvpmro@gmail.com; rosz.bng-mef@nic.in; Kushal.vashist@gov.in; zobangalore.cpcb@nic.in; MS KCZMA; Rajesh Kumar Jha; Hebin Chenthamarakshan; Jesse Benjamin Fullonton; Manoranjan Tripathy; MD & CEO
Subject: EP12.1/7/2013-14/Ker - Oct 2019 -Mar 2020
Attachments: EC_F. No. 11-1222011-IA.III-HYCR-Oct19-Mar 2020.pdf

Dear Sir/Madam

MoEF&CC had issued Environmental Clearance and CRZ Clearance (EC) on 3rd January 2014 to the proposed Vizhinjam International Multipurpose Deepwater Seaport at Vizhinjam in Thiruvananthapuram District of Kerala State. (EC No. F.No.11 - 122/2011 - IA. III).

Kindly find attached the Half yearly compliance report (HYCR) for the period from Oct 2019 to Mar 2020 for records and reference.

Acknowledgement on receipt of the email with contents is highly appreciated.

With best regards

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Prasad Kurien
General Manager-Environment
Vizhinjam International Seaport Limited
Thiruvananthapuram



Vizhinjam International Seaport Limited

(A Government of Kerala Undertaking)

VISL/2019-20/HYCR/GME/01/20

25 May 2020

To

The Additional Principal Chief Conservator of Forests (C),
Ministry of Environment Forest and Climate Change (MoEF&CC),
Regional Office (SZ), Kendriya Sadan,
4th Floor, E&F Wings, 17th Main Road,
Koramangala II Block, Bangalore-560034 (Karnataka)
rosz.bng-mefcc@nic.in; Ph: 080-25635901

Sub: Half Yearly Compliance Report (HYCR) of Environmental and CRZ Clearance for Vizhinjam International Multipurpose Deepwater Seaport for the period of **October 2019 to March 2020** – Reg.

Ref: 1) F.No.11-122/2011-IA.III dated 3rd January 2014
2) No.1285/A3/13/KCZMA/S&TD dated 24th August 2013

Dear Sir,

This has reference to the Environmental & CRZ Clearance (EC) issued on 3rd January 2014 (vide reference cited 1) by the Ministry of Environment, Forest & Climate Change (MoEF&CC) for the proposed Vizhinjam International Multipurpose Deepwater Seaport at Vizhinjam in Thiruvananthapuram District of Kerala State based on the recommendation of KCZMA (vide the reference cited 2).

The Compliance Report of the conditions stipulated in the references for the half yearly period from **October 2019 to March 2020** is enclosed herewith in soft copy for record and reference.

Yours Sincerely

For Vizhinjam International Seaport Ltd

Managing Director & CEO

Encl: As Stated Above

Copy to: (1) *The Director (Monitoring-IA II Division), Ministry of Environment, Forest & Climate Change, IndraParyavaranBhavan, JorBagh, New Delhi - 110003*
(2) *The Zonal Officer, Central Pollution Control Board (CPCB), Zonal Office, Bengluru – 560 010.*
(3) *The Member Secretary, Kerala State Pollution Control Board, Pattom P.O., Thiruvananthapuram – 695 004*
(4) *The Member Secretary, KCZMA, 4th Floor, KSRTC Bus Terminal, Thampanoor, Thiruvananthapuram – 695 001*
(5) *Shri. Rajesh Jha, MD& CEO Adani Vizhinjam Port Private Ltd. (AVPPL), Vipanchika Tower, Thycaud P.O., Thiruvananthapuram- 14*

Development of Vizhinjam International Deepwater Multipurpose Seaport

Environmental Clearance F. No. 11-122/2011-IA.III dated 3rd January 2014

Compliance Report for the Period October 2019 to March 2020

Project Concessionaire

Adani Vizhinjam Port Private Ltd. (AVPPL)

Project Authority

Government of Kerala (GoK)


Implementing Agency on behalf of GoK




**Vizhinjam International Seaport Limited
(VISL)**

(A GoK Undertaking)


May 2020

	Adani Vizhinjam Port Private Limited (AVPPL)	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Status of Conditions Stipulated in Environmental and CRZ Clearance		

Half Yearly Compliance Report (HYCR) on Conditions Stipulated in Environmental & CRZ Clearance (EC) F.No.11-122/2011-IA.III dated 03.01.2014 for the Period October 2019 to March 2020		
S. No.	Conditions	Compliance Status as on 31.03.2020
11.	Specific Conditions	
(i)	"Consent for Establishment" shall be obtained from Kerala 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.	<p>Complied</p> <p>Consent for Establishment (CTE) had been obtained from Kerala State Pollution Control Board (KSPCB) vide Consent No. PCB/HO/TVM/ICE/08/2015 dated 15.09.2015 valid up to 31.07.2018.</p> <p>The CTE was renewed vide Consent No. PCB/HO/TVM/ICE-R/02/2018 dated 19.07.2018 valid up to 31.07.2023.</p> <p>Copy of the renewed CTE was submitted to Ministry of Environment and Climate Change (MoEF&CC) with the Half Yearly Compliance Report (HYCR) for the period April 2018 to September 2018.</p>
(ii)	Project Proponent shall carry out intensive monitoring with regulatory reporting six monthly on shoreline changes to the Regional Office, MoEF.	<p>Being Complied</p> <p>Shoreline monitoring for a stretch of 40 km (20 km on both sides of the project site) is being done and reports are being regularly submitted to MoEF&CC as a part of the HYCR. Shoreline Monitoring Report for the period October 2019 to March 2020 is enclosed as Annexure I.</p> <p>L&T Infrastructure Engineering Ltd. (L&T IEL) had prepared Mathematical Modelling Reports based on Shoreline Monitoring data; which were vetted by National Institute of Ocean Technology (NIOT).</p> <p>Three mathematical modelling reports have been prepared by L&T IEL so far and submitted to MoEF&CC; as detailed below:</p> <ul style="list-style-type: none"> 1st Mathematical Modelling Report for the period February 2015 to February 2017; submitted along with the HYCR for the period April 2017 to September 2017 2nd Mathematical Modelling Report for the period March 2017 to February


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		<p>2018; submitted along with the HYCR for the period April 2018 to September 2018</p> <ul style="list-style-type: none"> 3rd Mathematical Modelling Report for the period March 2018 to February 2019; submitted along with the HYCR for the period April 2019 to September 2019 <p>These mathematical modelling reports have affirmed that the shoreline change is in line with prediction in the EIA study.</p> <p>In continuation with the same practise Adani Vizhinjam Port Pvt. Ltd. (AVPPL) have submitted the shoreline data from March 2019 to February 2020 to L&T IEL for mathematical modelling to assess the impact on shoreline under the guidance of NIOT. The Mathematical modelling report for the period March 2019 to February 2020 once vetted by NIOT will be submitted along with the next HYCR.</p>
(iii)	The capital dredged material (7.6 Mm ³) shall be utilized for reclamation of berths.	<p>Being Complied</p> <p>No dredging was carried out during the compliance period from October 2019 to March 2020. The dredged material till 31.03.2020 amounting to 2.90 Mm³ has been utilized for reclamation of 36 Ha area. The dredged material has been used for reclamation.</p>
(iv)	Additional fish landing centre shall be developed as part of the proposed Vizhinjam port for upliftment of fisheries sector.	<p>Being Complied</p> <p>The work for construction of the fish landing centre (Rs. 16.00 crores) and the fishery breakwater (Rs. 131.12 crores) has been initiated as part of the funded work component of the concession agreement with AVPPL.</p> <p>The EPC Contractor is finalising the design for the fishing berth and has mobilised the sub-contractor along with resources for construction of fishery harbour since</p>

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S. No.	Conditions	Compliance Status as on 31.03.2020
		<p>March 2017. Fishing boats docked in the proposed area need to be removed before the commencement of work.</p> <p>Government of Kerala (GoK) has initiated discussions with fishermen representatives for removal of the boats to facilitate construction work and these discussions are ongoing.</p>
(v)	The project shall be executed in such a manner that there is minimum disturbance to fishing activity.	<p>Being Complied</p> <p>Following is being practiced to ensure minimum disturbance to fishing activity:</p> <ul style="list-style-type: none"> • Works are planned in such a way that the movement of fishing boats is not hindered due to project construction. • Signboards have been placed for demarcation of construction area. • For mutual understanding of the developmental activities with the local fishing community an exclusive CSR team has been assigned, details are given in Annexure II. • Using the technological advancements (such as WhatsApp), the dedicated CSR team of AVPPL are in constant touch with the fishermen/fishing community members to facilitate the flow of various project related information/updates. • AVPPL CSR team also provides regular updates to the committee which has been formed by the local church representatives adjoining to the port area, who in turn pass on port project execution information to the fishermen. • Turbidity buoys at 3 locations identified by NIOT had been redeployed in the month of November 2019 and continuous monitoring was carried out to assess the real time turbidity. The turbidity details for the

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		<p>compliance period are given in Annexure I.</p> <ul style="list-style-type: none"> Marine Water Quality is being monitored regularly and results are submitted as part of the compliance reports. No abnormal results were observed during the monitoring period. (Refer Annexure III).  <p style="text-align: center;">Turbidity Buoy</p>
(vi)	<p>Steps would be taken to safeguard the interests of the fisheries sector as detailed in the Resettlement Action Plan (RAP), Corporate Social Responsibility (CSR) and in the Integrated Fishing Community Management (IFCMP), namely a component of Rs.7.1 crores as part of the compensation package for the fisheries sector, as livelihood restoration measures for mussel collectors, shore seine fishermen and others. Rs.41.30 crores as part of CSR activities in the fisheries sector under (i) water supply scheme (7.3crores) (ii) new fishing landing centre (16crores) (iii) adoption of existing fishing harbor (5crores) (iv) sea food park</p>	<p>Being Complied</p> <p>In consultation with the fishermen, enhanced livelihood compensation of Rs. 101.86 Crores was sanctioned by GoK, instead of Rs. 7.10 crores; as suggested earlier in the EIA stage. Till date an amount of Rs. 83.32 crores have been disbursed till 31.03.2020 for a total number of 2625 Livelihood Affected Persons (LAPs) whose verification was complete in all respects; this includes boat owners to whom kerosene is supplied free of cost as well during the port construction period. Verification of the documents of balance LAPs is in progress.</p> <p>The status of the CSR activities envisaged in the fisheries sector is as follows: Water supply: A Water Supply Scheme for the local community has been commissioned in April 2013 by VISL by expending an amount of Rs. 7.30 crores. For Operation & Maintenance (O&M) of</p>

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S. No.	Conditions	Compliance Status as on 31.03.2020
	(4crores) (iii) skill development centre (4crores) (iv) environmental sanitation (3crores) and (v) solid waste management (2crores).	<p>the same an amount of Rs. 5.28 crores have been spent till date. From 04.04.2019 onwards, O&M of the scheme is being done by Kerala Water Authority (KWA).</p> <p>Fish Landing centre: The work for construction of the fish landing centre (Rs. 16.00 crores) and the fishery breakwater (Rs. 131.12 crores) has been initiated as part of the funded work component of the concession agreement with AVPPL in the form of a new fishing harbour. AVPPL is unable to start the construction activities since the proposed site is blocked by fishermen with their fishing boats. The proposed area needs to be cleared for the commencement of works. GoK has initiated discussions with fishermen representatives for removal of the boats to facilitate construction work and discussions underway.</p> <p>Existing Fishing Harbour: Tender for modernization of the existing fishing harbour was invited by Harbour Engineering Department (HED) and work awarded. However, the works could not be initiated due to sectoral protests among different fishermen groups.</p> <p>Seafood Park: Procurement of land for seafood park (Rs. 26.00 crores) by VISL has been completed. Action for development of seafood park is being planned so as to commission the same along with the completion of the new fishing harbour.</p> <p>Skill Development: Additional Skill Acquisition Program (ASAP) is a GoK initiative aimed at imparting skill courses to students for improving their employability. No Objection Certificate (NoC) has been granted to ASAP to proceed with the construction of a Community Skill Park (CSP) in an area of</p>

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		<p>1.5 acres of land at Vizhinjam. It is a PPP project wherein 25000 sq. ft. building with facilities for students' hostel are being constructed by GoK under ASAP, whereas the operation of the centre with logistics and other high-end courses is vested with Adani Skill Development Centre. Preference is being given to local people based on skill and competency during the construction stage.</p> <p>Activities carried out by AVPPL as a part of CSR intervention for education, community health, sustainable livelihood development, community infrastructure development and other community engagement programmes, etc. for the period of October 2019 to March 2020 is given in Annexure II.</p>
(vii)	Rail connectivity shall be parallel to the harbour road on elevated structures at +4/5.00 m level without affecting the entry to the existing harbor.	<p>Will be Complied</p> <p>Konkan Railway Corporation Limited (KRCL) has been engaged as a consultant for turnkey execution of the project. Out of the total rail route length of 10.7 km, 9.0 km is planned to be passing through an underground tunnel to minimize the disturbance to the local population. Detailed Project Report (DPR) has been completed and submitted to Southern Railway for its approval. All the required clarifications have been provided to Southern Railways and the approval is expected shortly.</p>
(viii)	Compensation packages in accordance with the Central/State Government norms shall be given to all the authorized-cum-affected (having valid clearances as applicable) resort owners.	<p>Will be Complied</p> <p>Resort owners evicted have been compensated for land and not for the structures since they were in violation of CRZ notification. An area of 0.728 Ha has been acquired up to 31.03.2020 under negotiated purchase. Remaining land of 2.865 Ha to be acquired by Land Acquisition (LA) process for which notification has been published and action</p>

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		initiated by the District Collector Thiruvananthapuram.
(ix)	The port shall ensure that all ships under operation follow the MARPOL convention regarding discharge or spillage of any toxic, hazardous or polluting material like ballast water, oily water or sludge, sewage, garbage etc. The emission of NOx & SOx shall remain within permissible limits.	Will be Complied Currently project is under construction. This shall be complied during operational phase.
(x)	CSR activities shall cover villages within 10 km radius of the project.	Complied All CSR activities on livelihood development health, sanitation, education etc. are being implemented after receiving formal demands from social controlled institutions; government controlled institution and recognized platforms. As indicated in EIA report, during initial phase of development, CSR activities will be taken for Vizhinjam & nearby villages in 2 km radii. Considering the same during Phase I implementation of the project, CSR activities are presently carried out in 5 wards namely; Mulloor, Kottapuram, Vizhinjam, Harbour and Venganoor. An amount of Rs. 2.75 Crores has been spent for CSR activities mainly in the fields of education, community health, sustainable livelihood development, community infrastructure development, etc. during the compliance period. Details on CSR activities carried out by AVPPL during compliance period (October 2019 to March 2020) are enclosed as Annexure II .
(xi)	Oil Contingency Management Plan shall be put in place.	Will be Complied Work has been awarded to M/s. KITCO for developing a facility Level Oil Spill Disaster Contingency Plan (OSDCP) in line with the National Oil Spill-Disaster Contingency Plan (NOS-DCP) requirements. The Final

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		OSDCP for Vizhinjam Port was submitted to Indian Coast Guard (ICG) for vetting on 24.09.2019. The same had been scrutinised by the ICG and the observations were forwarded to AVPPL on 20.02.2020. The observations of ICG are being incorporated accordingly and the OSRP shall be resubmitted to ICG for approval.
(xii)	All the recommendations /conditions stipulated by Kerala Coastal Zone Management Authority (KCZMA) shall be complied with.	Complied We are complying with all the recommendations/conditions of KCZMA. Copies of the HYCRs are also being sent to KCZMA. Compliance to the recommendations/conditions of KCZMA for the period October 2019 to March 2020 is enclosed as Annexure IV .
(xiii)	The responses/ commitments made during public hearing shall be complied with in letter and spirit.	Complied We are complying with the responses/commitments made during public hearing (as applicable). Status of the same is being submitted regularly with HYCRs to all the authorities concerned. The compliance status of the commitments made during Public Hearing & actions on the same during the compliance period October 2019 to March 2020 is enclosed as Annexure V .
(xiv)	All the recommendation of the EMP shall be complied with in letter and spirit. All the mitigation measures submitted in the EIA report shall be prepared in a matrix format and the compliance for each mitigation plan shall be submitted to MoEF along with half yearly compliance report to MoEF-RO.	Being Complied Project is in construction stage. Out of the 5 identified EMP areas, work has started in Port Site (Building construction in back up yard), Road/Rail Corridor and in PAF (Project Annex Facility)). Recommendations of the Construction stage EMP for these areas are being implemented. Status of construction stage EMP in matrix format is enclosed as Annexure VI .
(xv)	The project proponent shall bring out a special tourism promotion package for the area in consultation with the	Being Complied The final Integrated Area Development Plan prepared through CEPT University, Ahmadabad in consultation with Town

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	State Government and implement the same along with the project.	Planning, Tourism, Industry and other line departments was reviewed by the expert committee constituted by GoK. The Master Plan will be forwarded to Joint Planning Committee (JPC) for further action.
(xvi)	The project proponent shall place on its website its response to the Public Hearing, and representations as presented to the EAC in the 128 th meeting held on 23 rd November 2013, for information of the general public.	Complied All the relevant details pertaining to EIA, ToR, EAC meetings, Public Hearing, etc. related to the project have been placed on VISL website http://www.vizhinjamport.in/eia-30-5-13.php
(xvii)	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.	Noted There will not be any withdrawal of groundwater in CRZ Area. In case of requirement of groundwater withdrawal outside CRZ area, specific prior permission will be obtained from State/Central Groundwater Board. A 3.00 MLD water supply scheme for the project had been commissioned with the source of water being Vellayani Lake whose raw water will be available for treatment. The net availability of treated water from this supply scheme is 2.49 MLD of potable water out of which 1.49 MLD of water shall be distributed to the local people as part of social welfare measures of VISL. The balance 1.0 MLD would be used for port related activities. However, at present, the entire treated water from the scheme is being utilised by the community. Due to this reason, the water for construction purposes for the port is being sourced from the open market/private suppliers. On an average about 37 KLD of water is being consumed

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		for construction related activities during the compliance period (October 2019 to March 2020).
(xviii)	The Hazardous waste generated shall be properly collected and handled as per the provision of Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008.	Complied Contractors working at site, under the EPC Contractor M/s. Howe Engineering Projects India Pvt. Ltd. (HEPIPL) have obtained separate consents from KSPCB for handling Hazardous Waste. During this compliance period (October 2019 to March 2020) 238 L of used oil had been generated and it has been stored as per Hazardous Waste Rules at site and will be disposed to authorized (CPCB/KSPCB) waste oil handlers.
(xix)	No hazardous chemicals shall be stored in the Coastal Regulation Zone area.	Complied No hazardous chemical is being stored in the CRZ area.
(xx)	The waste water generated from the activity shall be collected, treated and reused properly.	Complied Only batching plant wash/reject is generated from the construction activity presently. For the same, a settling tank is constructed and used for collection and recycling of all wash water generated. At present settled sludge is used for filling of low lying area.
(xxi)	Sewage Treatment facility should be provided in accordance with the CRZ Notification.	Will be Complied Provision for installing Sewage Treatment Plant (STP) facility of adequate capacity in phased manner is being planned and will be implemented in line to CRZ Notification along with the commissioning of the project in consultation with KSPCB. AVPPL had submitted relevant documents including Location Plan, Process, Design, Capacity, Layout and other details to KSPCB seeking approval from the board as per the CTE obtained for the project. KSPCB had conducted a site visit on 21.08.2019. During the site visit additional details were sought and the same were submitted to KSPCB. Thereafter, KPSCB

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		had called for a meeting and presentation on the proposed STP on 15.11.2019. KSPCB have suggested AVPPL to change the technology from MBBR to MBR. AVPPL is in the process of modifying the technical documents in line with KSPCB suggestion. Additionally, in order to arrive at the capacity of the STP, KSPCB is to obtain details of discharge of sewage in the two streams flowing through the project site; since there are no estimates on the flow rate of these two streams and considering that the STP would need to treat the wastewater/storm water and sewage flowing from the streams. AVPPL are awaiting details of the same from KSPCB.
(xxii)	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.	Being Complied No solid waste is being disposed in the CRZ area. As mentioned in the EIA, contractors working at the site have been made responsible for management of Solid Waste during construction stage. The contractors are complying with the provisions pertaining to management of Solid Waste and it is being properly collected, segregated and disposed in line to Solid Waste Management Rules 2016, as amended.
(xxiii)	Installation and operation of DG set if any shall comply with the guidelines of CPCB. Oil spills if any shall be properly collected and disposed as per the Rules. Project proponent shall install necessary oil spill mitigation measures.	Being Complied 15 DG sets are present at site; all 15 are in use. These are compliant to CPCB guidelines.
(xxiv)	No construction work other than those permitted in Coastal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.	Being Complied Construction of the project is being carried as per the approval obtained under CRZ Notification.

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(xxv)	The approach channel shall be properly demarcated with lighted buoys for safe navigation and adequate traffic control guidelines shall be framed.	Will be Complied The project is in construction phase and the same shall be complied during operational phase.
(xxvi)	The project proponent shall take up development of green belt in the project area, wherever possible. Adequate budget shall be provided in the Environment Management Plan for such development.	Will be Complied Greenbelt: Although a natural greenbelt exists, the greenbelt of adequate width with suitable species in consultation with forest department as identified in the EIA will be developed in all possible areas including cargo storage areas and along the boundary of the project area. A greenbelt development plan has been considered in the Master Plan and adequate budgetary provision has been kept for this purpose. Compensatory Afforestation: During the meeting with Hon'ble Minister dated 05.04.2017, it was decided that Forest Department shall identify land for compensatory afforestation in lieu of trees felled at port site areas; at the rate of 1:10. AVPPL, in collaboration with Forest department, have carried out compensatory afforestation of approximately 16,000 trees on 12.05 Ha land; as identified by social Forest Department in Sainik School, Trivandrum (at an aerial distance of 24 km from project site). The plantation is now at its Third Year.
(xxvii)	The fund earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes.	Being Complied An amount of 40 Crores has been kept solely for EMP implementation as per the commitment in the EIA; and this amount is not diverted for any other purpose. The EMP expenditure for the compliance period October 2019 to March 2020 is enclosed as Annexure VII . An amount of

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S. No.	Conditions	Compliance Status as on 31.03.2020
		Rs. 1.96 Crore has been utilized towards EMP implementation measures during compliance period October 2019 to March 2020.
(xxviii)	The project proponent shall set up an organizational mechanism/institutional structure for Environment, Health & Safety & CSR under the supervision of a General Manager as outlined in the EIA Report for effective implementation of the stipulated EHS safeguards & CSR activities.	Complied During construction phase an officer of VISL has been designated as Head (EHS & CSR) for effective implementation of the stipulated EHS safeguards & CSR activities. AVPPL has also appointed competent and qualified professional for effective implementation of EHS safeguards & CSR activities. In addition to the above, independent environment, health and safety consultants have been appointed as per concession agreement signed between GoK and AVPPL. It is also ensured that contractors executing the work also deploy qualified and competent EHS personnel for effective implementation of EMP measures. Organizational Structure for Environment, Health, and Safety & CSR for construction phase is enclosed as Annexure VIII .
(xxix)	Staff Colony should be located beyond CRZ area.	Will be Complied Port facility planning is done in such a way that staff colony will be located beyond CRZ area.
12.	General Conditions	
(i)	Construction of the proposed structures shall be undertaken meticulously conforming to the existing Central/Local rules and regulations including Coastal Regulation Zone Notification, 2011 & its amendments. All the construction designs/drawings relating to the proposed construction activities must have approvals of the	Complied All the construction activities are being carried out as per existing Central/Local rules. Necessary permissions under CRZ Notification 2011 & its amendments have been obtained. Further, necessary approvals from concerned Statutory Departments / Agencies have been obtained for the construction designs/drawings relating to the proposed construction as mentioned hereunder: • Consent to Establish (CTE) No. PCB/HO/TVM/ICE/08/2015 dated

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S. No.	Conditions	Compliance Status as on 31.03.2020
	concerned Statutory Departments / Agencies.	<p>15.09.2015 valid up to 31.07.2018 was renewed from State Pollution Control Board vide Consent No. PCB/HO/TVM/ICE-R/02/2018, dated 19.07.2018 valid up to 31/07/2023.</p> <ul style="list-style-type: none"> Airport Authority of India NOC vide NOC no AAI/SR/NOC/RHQ dated 7.12.2015 (Submitted along with the compliance report for the period October 2015 to March 2016). As per the exemption granted by Government of Kerala (GoK) G.O. No. 310/2015/LSGD dated 01/10/2015, AVPPL is not required to obtain any further building permits/permission to construct port related building within the port premises.
(ii)	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.	<p>Complied</p> <p>On an average 644 Nos. of workers were engaged in the port construction activities on a daily basis during the compliance period October 2019 to March 2020.</p> <p>Construction workers and Labours are housed in a labour camp near to the project site as well as nearby resorts. Labours are provided with all the necessary infrastructure facilities including water, electricity, fuel, sanitation, etc. and the details of the same were submitted in the compliance report for the period October 2018 to March 2019.</p>
(iii)	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	<p>Complied</p> <p>Mitigation measures are being followed while undertaking digging activities Marine Surface & Ground water quality is monitored on a monthly basis in line to Environment Monitoring Plan prescribed in EIA and analysis reports are enclosed as Annexure III. There are no significant</p>

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		changes observed in the water quality during the compliance period.
(iv)	<p>Borrow sites for each quarry sites for road construction material and dump sites must be identified keeping in view the following:</p> <p>(a) No excavation or dumping on private property is carried out without written consent of the owner.</p> <p>(b) No excavation or dumping shall be allowed on wetlands, forest areas or other ecologically valuable or sensitive locations.</p> <p>(c) Excavation work shall be done in close consultation with the Soil Conservation and Watershed Development Agencies working in the area, and</p> <p>(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.</p>	<p>Complied</p> <p>Quarry material is being obtained from approved quarry sites only.</p> <p>The road constructed so far include construction of electrical pits and laying of Hume Pipe along with retaining wall from chainage 0 to 520 m, bridge construction over lotus pond: Precast yard development, Piling and Road diversion works and excavation, sludge removal, sub-base and sub grade filling are in progress.</p> <p>Earth cutting generated from road corridor construction at present are dumped in truck terminal area.</p> <ul style="list-style-type: none"> No excavation has been carried out in private property. No excavation or dumping has been carried out in wetlands, forest area or other ecologically valuable or sensitive locations. Kerala State Remote Sensing and Environment Centre (KSREC) have studied the impact due to construction of port approach road. Recommendations of KSREC are being implemented and suitable mitigation measures as suggested in the KSREC report are being adopted during construction. No bituminous or hazardous material has been used.
(v)	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.	<p>Being Complied</p> <p>The construction material was obtained from approved quarries only.</p> <p>During the compliance period, AVPPL had obtained Environmental Clearance (EC) from the State Environmental Impact</p>


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		<p>Assessment Authority (SEIAA) for granite building stone quarry in Block No.29, Re-Survey No.120/10 in Manickal Village, Nedumangad Taluk, Thiruvananthapuram District, Kerala vide Order No. 1416/EC1/2019/SEIAA dated 27.02.2020 (Annexure IX). Subsequently Consent to Operate (CTO) has also been obtained from KSPCB vide Consent No. PCB/TVM-DO/ICO/NDD/QRY/29/2020 dated 16.03.2020 valid up to 26.02.2025 (Annexure X).</p> <p>In case of new quarries, necessary approvals will be obtained from the competent authority.</p>
(vi)	The project authorities shall make necessary arrangements for disposal of solid wastes and for the treatment of effluents by providing a proper wastewater treatment plant outside the CRZ area. The quality of treated effluents, solid wastes and noise level etc. must conform to the standards laid down by the competent authorities including the Central/State Pollution Control Board and the Union Ministry of Environment and Forests under the Environment (Protection) Act, 1986, whichever are more stringent.	<p>Being Complied</p> <ul style="list-style-type: none"> No solid waste is being disposed of in the CRZ area. Solid waste is handled as per the Solid Waste Management Rules, 2016 as amended. STP will be installed in phased manner along with the project in consultation with KSPCB. AVPPL had submitted relevant documents including Location Plan, Process, Design, Capacity, Layout and other details to KSPCB seeking approval from the board as per the CTE obtained for the project. KSPCB had conducted a site visit on 21.08.2019. During the site visit additional details were sought and the same were submitted to KSPCB. Thereafter, KSPCB had called for a meeting and presentation on the proposed STP on 15.11.2019. KSPCB have suggested AVPPL to change the technology from MBBR to MBR. AVPPL is in the process of modifying the technical documents in line with KSPCB suggestion. Additionally, in order to arrive at the capacity of the STP, KSPCB is to obtain


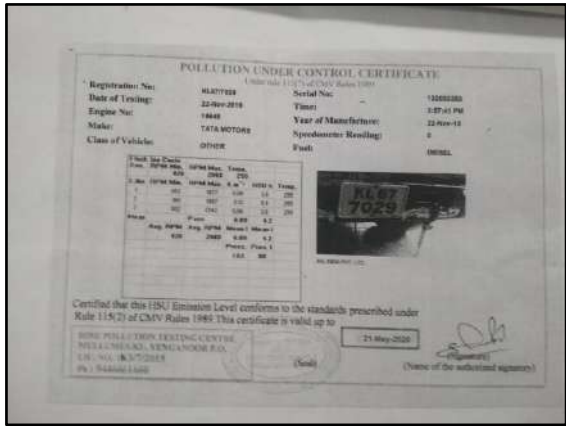
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Half Yearly Compliance Report (HYCR) on Conditions Stipulated in Environmental & CRZ Clearance (EC) F.No.11-122/2011-IA.III dated 03.01.2014 for the Period October 2019 to March 2020																																							
S. No.	Conditions	Compliance Status as on 31.03.2020																																					
		<p>details of discharge of sewage in the two streams flowing through the project site; since there are no estimates on the flow rate of these two streams and considering that the STP would need to treat the wastewater/storm water and sewage flowing from the streams. AVPPL are awaiting details of the same from KSPCB.</p> <ul style="list-style-type: none">Environment Monitoring is being carried out as per Environment Monitoring Plan prescribed in EIA by NABL and MoEF&CC accredited agency; M/s. Ashwamedh Engineers & Consultant. Summary of the Ambient Air Quality Monitoring (AAQM) for the duration from October 2019 to March 2020 at 5 monitoring locations is mentioned below. <table><tr><th>Parameter</th><th>Unit</th><th>Max</th><th>Min</th><th>Perm. Limit</th></tr><tr><td>PM₁₀</td><td>µg/m³</td><td>98</td><td>30</td><td>100</td></tr><tr><td>PM_{2.5}</td><td>µg/m³</td><td>46</td><td>9</td><td>60</td></tr><tr><td>SO₂</td><td>µg/m³</td><td>10.50</td><td>BDL</td><td>80</td></tr><tr><td>NO₂</td><td>µg/m³</td><td>19.80</td><td>BDL</td><td>80</td></tr><tr><td>CO</td><td>mg/m³</td><td>BDL</td><td>BDL</td><td>4</td></tr><tr><td>HC</td><td>ppm</td><td>BDL</td><td>BDL</td><td>--</td></tr></table> <ul style="list-style-type: none">Detailed Monitoring Reports for the period October 2019 to March 2020 is attached as Annexure III).All the monitored parameters were found within the prescribed limits.			Parameter	Unit	Max	Min	Perm. Limit	PM ₁₀	µg/m ³	98	30	100	PM _{2.5}	µg/m ³	46	9	60	SO ₂	µg/m ³	10.50	BDL	80	NO ₂	µg/m ³	19.80	BDL	80	CO	mg/m ³	BDL	BDL	4	HC	ppm	BDL	BDL	--
Parameter	Unit	Max	Min	Perm. Limit																																			
PM ₁₀	µg/m ³	98	30	100																																			
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SO ₂	µg/m ³	10.50	BDL	80																																			
NO ₂	µg/m ³	19.80	BDL	80																																			
CO	mg/m ³	BDL	BDL	4																																			
HC	ppm	BDL	BDL	--																																			
(vii)	The proponent shall obtain the requisite consents for discharge of effluents and emissions under the Water (Prevention and control of Pollution) Act, 1974 and the Air (Prevention and control of Pollution) Act, 1981 from the Kerala State Pollution Control	Will be Complied CTO under the Water (Prevention and control of Pollution) Act, 1974 and the Air (Prevention and control of Pollution) Act, 1981 will be obtained from KSPCB before commissioning of the project and copy of the CTO will be sent to Ministry on receipt.																																					

adani	Adani Vizhinjam Port Private Limited (AVPPL)	From : October 2019 To : March 2020
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	Board before commissioning of the project and a copy of each of these shall be sent to this Ministry.	
(viii)	Adequate precautions shall be taken during transportation of the construction material so that it does not affect the environment adversely.	<p>Complied</p> <p>Following precautionary measures are undertaken during transportation of the construction material as environment safeguard:</p> <ul style="list-style-type: none"> • Tarpaulin cover is being used during transportation of construction material • All vehicles coming into the site are under a speed restriction of 20 km/hr • Regular Water Sprinkling is done on the approach road by water tankers. • It is ensured that all vehicles entering the Port have a valid PUC certification • The dumpers have speed governors ensuring adherence to speed limit  <p>Water Sprinkling in Progress</p>

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		 <p>Tarpaulin Cover on Trucks</p>  <p>PUC Certificate</p>
(ix)	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 measures and other environmental protection activities.	<p>Noted</p> <p>During the Compliance period, NGT appointed committees reviewed the compliance conditions of EC on 05.03.2020 and 06.03.2020, with a site visit on 05.03.2020.</p> <p>However there was no visit by officers of Ministry/Regional Office at Bangalore during the compliance period.</p> <p>All necessary support was extended to the officials during the compliance review and site visit. The same will be extended in future also to all the officials of Ministry/Regional Office.</p>
(x)	Ministry of Environment & Forests or any other	Noted for Compliance

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	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.	
(xi)	The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied to the satisfaction of the Ministry.	Noted
(xii)	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 & Forests.	Noted and Will be Complied AVPPL is the concessionaire for implementing the project and operating it for the next 40 years, based on concession agreement signed between the GoK & AVPPL on 17.08.2015. As on date, there is no change in the project profile.
(xiii)	The project proponent 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 Concession agreement with AVPPL was signed on 17.08.2015. The layout of the port has been approved by GoK by letter No.308799/E1/15/F&PD dated 30.10.2015 (Submitted along with the Compliance Report of the period from October 2015 to March 2016). The preliminary construction activities commenced at site on 16.11.2015 followed by official inauguration on 05.12.2015. Financing agreement forming part of financial closure was submitted by the concessionaire on 13.05.2016.
(xiv)	Kerala State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Center and Collector's Office/Tehsildar's office for 30 days.	Noted This condition does not pertain to project proponent. However, it is learnt that KSPCB had complied with the same.
13.	These stipulations would be enforced among others under the provisions of Water	Noted for Compliance

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	(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 2006, including the amendments and rules made thereafter.	
14.	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.	<p>Complied</p> <p>All the construction activities are being carried out as per existing Central/local rules. Necessary permissions under CRZ Notification 2011 & its amendments have been obtained.</p> <p>Further, necessary approvals from concerned Statutory Departments / Agencies have been obtained for the construction designs/drawings relating to the proposed construction as mentioned hereunder:</p> <ul style="list-style-type: none"> • Consent to Establish (CTE) No. PCB/HO/TVM/ICE/08/2015 dated 15.09.2015 valid up to 31.07.2018 was renewed from State Pollution Control Board vide Consent No. PCB/HO/TVM/ICE-R/02/2018, dated 19.07.2018 valid up to 31.07.2023. • Airport Authority of India NOC vide NOC no AAI/SR/NOC/RHQ dated 7.12.2015 (Submitted along with the compliance report for the period October 2015 to March 2016). • As per the exemption granted by Government of Kerala (GoK) G.O. No. 310/2015/LSGD dated 01.10.2015, AVPPL is not required to obtain any further building permits/permission to construct port related building within the port premises.

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15.	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 Environment Clearance and copies of the clearance letters are available with the Kerala State Pollution Control Board and may also be seen on the website of the Ministry of Environment & Forest 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 Details regarding the advertisement published in local newspapers was intimated (with copy of advertisement) to the regional office of MoEF &CC, vide letter No. VISL/EC/MoEF/2013 dated 20.01.2014 (Submitted along with the Compliance Report of the period from October 2015 to March 2016). Copy of the Environment Clearance is available on VISL website at http://www.vizhinjamport.in/eia-30-5-13.php . The same is also uploaded on Adani Ports and Special Economic Zone (APSEZ) website at https://www.adaniports.com/Downloads
16.	This 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
17.	Any appeal against this clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.	Noted Three appeals challenging the EC granted to the project (two appeals filed at NGT, Southern Regional Bench, Chennai and one at NGT, Principal Bench, Delhi) and one original application (OA-filed at NGT, Principal Bench Delhi) indirectly challenging the CRZ Notification, 2011 were filed as per the NGT Act, 2010. The appeals filed at Chennai bench were later transferred to the Delhi bench. The Delhi Bench of NGT has upheld the Environment Clearance granted to the project vide its judgment dated 02.09.2016.

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18.	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad/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 The Environmental Clearance Letter was submitted to the concerned Panchayat, Zila Parishad / Municipal Corporation, Urban Local Body and the Local NGOs from whom representations were received vide letter No. VISL/EC/MoEF/2013 dated 29.01.2014. Copy of the Environment Clearance is available on VISL website at http://www.vizhinjamport.in/eia-30-5-13.php . The same is also uploaded on APSEZ website at https://www.adaniports.com/Downloads
19.	The proponent shall upload the status of compliance of the stipulated Clearance 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.	Complied The copy of the latest compliance report for the period April 2019 to September 2019 including the results of six monthly monitoring data (April 2019 to September 2019) has been uploaded on VISL website http://www.vizhinjamport.in and also on APSEZ website https://www.adaniports.com/Downloads . The HYCR for the period April 2019 to September 2019 has been submitted to the MoEF&CC, Regional Office (Bangalore), Zonal office of the CPCB (Bangalore), KSPCB & KCZMA vide email dated 29.11.2019 (a copy of the email is enclosed as Annexure XI). Environment Monitoring is being carried out as per the Environment Monitoring Plan prescribed in EIA by Ashwamedh Engineers & Consultant (NABL Accredited & MoEF&CC approved laboratory). Detailed Monitoring reports (Air, Water, Noise, Marine Water, and Sediment) are enclosed as Annexure III . Additionally, summary of monthly Environment monitoring results are also uploaded on

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		the APSEZ website https://www.adaniports.com/Downloads .
20.	The project proponent shall also submit six monthly reports on the status of compliance of the stipulated Clearance 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 reports on the status of compliance of the stipulated clearance conditions including results of monitored data are regularly submitted to all the concerned agencies.</p> <p>As per the MoEF&CC Notification dated 26.11.2018, wherein submission of Half Yearly Compliance Reports (HYCRs) by email/soft copy is declared acceptable, therefore the HYCR for the period April 2019 to September 2019 has been submitted to the MoEF&CC, Regional Office (Bangalore), Zonal office of the CPCB (Bangalore), KSPCB & KCZMA vide email dated 29.11.2019 (a copy of the email is enclosed as Annexure XI).</p>
21.	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 Kerala 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 Clearance conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail.	<p>Will be Complied</p> <p>The project is in construction phase. The same shall be complied post commissioning during operational phase.</p>

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Enclosures:

Annexure Number	Details of Annexure
Annexure I:	Shoreline Monitoring Report (October 2019 to March 2020)
Annexure II:	CSR Activities by AVPPL (October 2019 to March 2020)
Annexure III:	Environment Monitoring Report (October 2019 to March 2020)
Annexure IV:	Compliance of Conditions of KCZMA Recommendation for EC/CRZ Clearance
Annexure V:	Compliance of the Response/Commitments made during Public Hearing
Annexure VI:	Status of Environment Management Plan
Annexure VII:	EMP Expenditure (October 2019 to March 2020)
Annexure VIII:	Environment Health, Safety & CSR Organizational Structure
Annexure IX:	EC for Manickal Quarry
Annexure X:	CTO for Manickal Quarry
Annexure XI:	Submission Email of HYCR for the Period April 2019 to September 2019

Annexure I
Report on Shoreline Monitoring
(October 2019 to March 2020)

HALF YEARLY SHORELINE MONITORING REPORT

For the period October 2019 to March 2020

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Annexure A – Photo Documentation of CSP Locations

ABBREVIATIONS

<i>ADCP</i>	<i>Acoustic Doppler Current Profiler</i>
<i>APHA</i>	American Public Health Association Guidelines
<i>CES</i>	Coastal Erosion Stone
<i>AVPPL</i>	Adani Vizhinjam Port Pvt. Ltd.
<i>BDL</i>	Below Detectable Level
<i>C.M.</i>	Central Meridian
<i>CD</i>	Chart Datum
<i>cm</i>	Centimetre
<i>COG</i>	Course over ground
<i>dd mm.mmm</i>	Degrees minutes. Decimal minutes
<i>DGPS</i>	Differential Global Positioning System
<i>DTM</i>	Digital Terrain Model
<i>EC</i>	Environmental & CRZ Clearance
<i>EIL</i>	Engineer In Charge
<i>EEZ</i>	Exclusive Economic Zone
<i>GoI</i>	Government of India
<i>GoK</i>	Government of Kerala
<i>GPS</i>	Global Positioning System
<i>HSE</i>	Health, Safety & Environment
<i>HWM</i>	High Water Mark
<i>IHO</i>	International Hydrographic Organization
<i>INCOIS</i>	Indian National Centre for Ocean Information Services
<i>IS 1498</i>	Indian Standard for Classification and Identification of Soils for General Engineering Purposes
<i>IS 3025</i>	Indian Standard or Methods of Sampling and Test for Water and Waste water Part 1 - Sampling
<i>kHz</i>	Kilohertz
<i>Km</i>	Kilometre
<i>kPa</i>	Kilo Pascal
<i>LAT</i>	Lowest Astronomical Tide
<i>Lat</i>	Latitude
<i>LEO</i>	Littoral environmental observation
<i>Long</i>	Longitude
<i>m</i>	Metre
<i>MBES</i>	Multibeam Echo Sounder
<i>Mg/L</i>	Milligram per litre
<i>MoEF</i>	Ministry of Environment & Forests
<i>MoU</i>	Memorandum of Understanding

<i>MSL</i>	Mean Sea Level
<i>MV</i>	Motor Vessel
<i>NA</i>	Not Applicable
<i>NABL</i>	National Accreditation Board for Testing and Calibration Laboratories
<i>NHO</i>	Naval Hydrographic Organization
<i>NIOT</i>	National Institute of Ocean Technology
<i>nm</i>	Nautical mile
<i>NTU</i>	Nephelometric Turbidity Units
<i>PEP</i>	Project Execution Plan
<i>PVD</i>	Progressive vector diagram
<i>PPP</i>	Public Private Partnership
<i>ppt</i>	Parts per Thousand
<i>RTK</i>	Real Time Kinematics
<i>SAC</i>	Shankar And Co.
<i>SBES</i>	Single Beam Echo Sounder
<i>SoI</i>	Survey of India
<i>SOG</i>	Speed over ground
<i>SOW</i>	Scope of Work
<i>TEU</i>	Twenty Foot Equivalent Unit
<i>UNCLOS</i>	United Nations Convention on the Law of the Sea
<i>UTM</i>	Universal Transverse Mercator projection
<i>VISL</i>	Vizhinjam International Seaport Ltd.
<i>w.d.</i>	Water depth
<i>WGS84</i>	World Geodetic System 1984
<i>WMO</i>	World Meteorological Organisation

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DEFINITIONS

<i>Project Owner</i>	Vizhinjam International Seaport Ltd (VISL), Thiruvananthapuram
<i>Project Concessionaire</i>	Adani Vizhinjam Port Pvt. Ltd. (AVPPL), Thiruvananthapuram
<i>Advisor to VISL</i>	National Institute of Ocean Technology (NIOT), Chennai
<i>Survey Contractor</i>	Shankar And Co. (SAC), Navi Mumbai
<i>Survey Requirement</i>	Oceanographic & Bathymetric Survey for Shoreline Monitoring
<i>Chart Datum</i>	Chart datum is the level to which soundings on published charts are reduced, and above which tidal predictions and tidal levels are given in the Tide Table. All depths on charts are referred to this datum.
<i>Current Speed</i>	The speed at which a water body moves in the ocean. The speed is denoted in cm/s
<i>Rip Current</i>	A relatively strong, narrow current flowing outward from the beach through the surf zone
<i>Current Direction</i>	The direction towards which the currents are flowing. A westerly current implies that the currents are flowing from east to west
<i>LEO</i>	Littoral Environmental Observations
<i>Wave Peak period (Tp)</i>	The peak period gives the characteristic frequency of the arriving wave energy. This gives the period at which the spectrum has its highest value.
<i>Significant Wave Height (Hs)</i>	Significant wave height is the average peak-to-peak amplitude of the largest one third of the waves in a given field.
<i>Wave direction</i>	The direction from which the waves are coming. A westerly wave implies that the waves are moving from west to east.
<i>Wind Speed</i>	The speed at which the air moves with respect to the surface of earth. The speed is denoted in m/s
<i>Wind Direction</i>	Wind direction is an indicator of the direction that the wind is blowing from . A northerly wind is coming from the north and blowing towards the south
<i>Atmospheric pressure</i>	It is defined as the force per unit area exerted against a surface by the weight of the air above that surface. Atmospheric pressure is expressed in millibars (mb)
<i>Relative Humidity</i>	Relative humidity is defined as the ratio of the water vapor density (mass per unit volume) to the saturation water vapor density, usually expressed in percent
<i>Turbidity</i>	Turbidity is the cloudiness or haziness of a fluid caused by large numbers of individual particles that are generally invisible to the naked eye, similar to smoke in air.

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1 INTRODUCTION

Shankar And Co. was engaged by Adani Vizhinjam Port Pvt. Ltd. (AVPPL) to carry out Shoreline Monitoring – Oceanographic & Bathymetric Data Collection in the vicinity of the proposed site for the development of the Vizhinjam International Deepwater Multipurpose Seaport.

As part of the study, NIOT provided a wave rider buoy to be deployed off Mulloor and the data and watch & ward of the buoy was to be monitored by SAC.

Also, as part of the contract, turbidity measurements at three locations from three levels is to be monitored on a real time basis, for which turbidity measuring buoys were deployed in the month of November 2019.

This report provides the results of the data collected from October 2019 to March 2020.

All the co-ordinates in the reports and charts are referenced to WGS-84, UTM Projection, CM 75° East, Zone 43, Northern Hemisphere.

The study includes carrying out MetOcean observations (wave, meteorological parameters and tide) at one location, to measure current for 30 days each, at four locations, during 3 different seasons; summer (Mar-May), monsoon (June-Sep), and post monsoon (Oct-Feb), to measure in real-time turbidity from three levels and three locations, bathymetric survey of up to 20m contour in two seasons, cross-shore profiling (CSP) from 10m CD (4 CSP lines carried out up to a depth of 20m during the months of January, May, August and October) to 100m inland from the high water line along a stretch of 40 km, water & grab sampling, littoral environmental observation and river crossing survey. All these are to be carried out for a period of 3 years commencing June 2019.

A Google Earth image, showing the Multibeam survey area; locations of the observations, including the wave/current, tide and Automatic Weather Station (AWS) measurement location, is given in Figure 1-1.

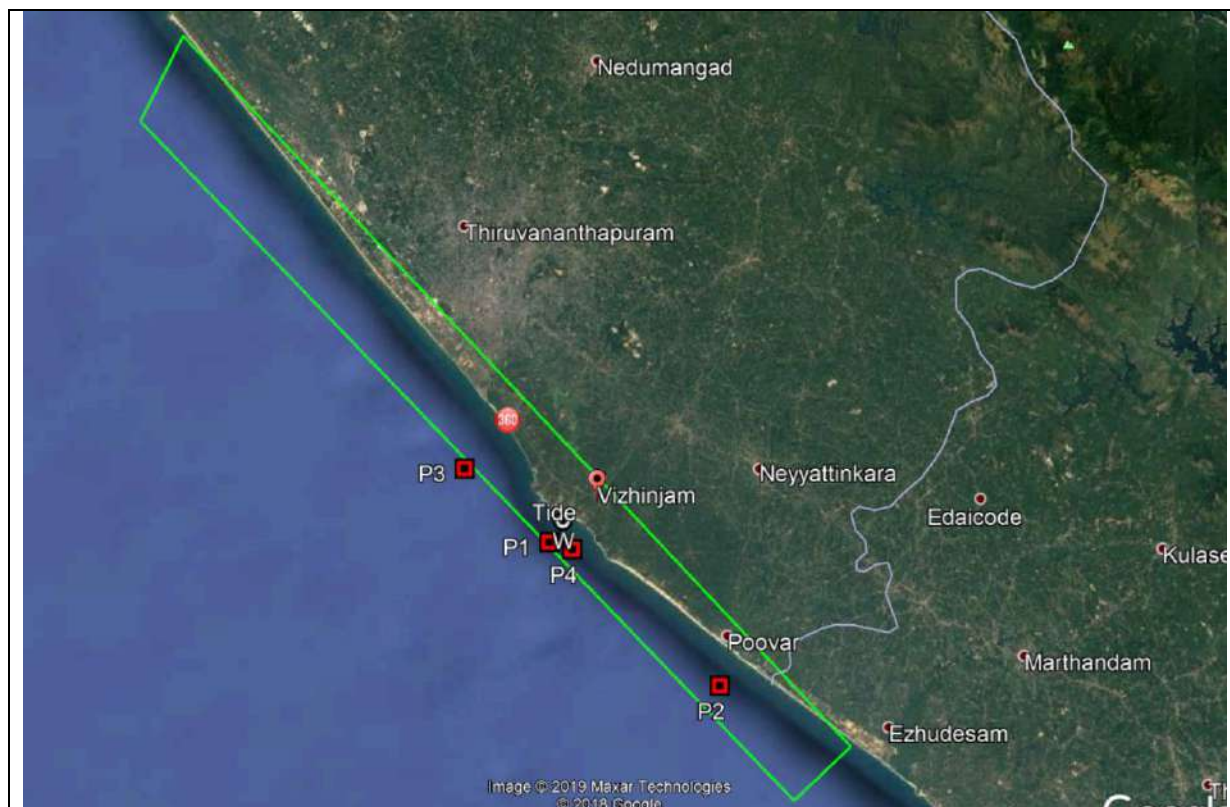


Figure 1-1: General Survey Location

P1, P2 and P3 correspond to Acoustic Doppler Current Profiler (ADCP) locations and P4 corresponds to both, ADCP and wave location.

The CSP lines, which coincide with the Littoral Environment Observation (LEO), beach sampling and photographic documentation, are indicated in Figure 1-2. The cross-shore profiles are named as CSP-01 to CSP-81. CSP-01 corresponds to the southernmost profile which lies to the south of the existing Vizhinjam Harbour and gradually increases progressing towards north for the entire 40 km stretch (20 km on either side of the port) with a 500 m interval between each CSP line, CSP-81 being the northernmost profile.


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Figure 1-2: CSP, LEO and Photographic Documentation Locations

2 SCOPE OF WORK

The survey scope of work as per the contract includes the following:

- To mobilise a suitable marine spread and a survey boat at site for carrying out the operations.
- To provide requisite personnel and equipment for undertaking of oceanographic measurements and study of shoreline.
- Monthly cross-shore beach profiling perpendicular to the shoreline for a 40 km stretch at intervals of 500m, using RTK or total station landward up to 100m from HTL or +2m of HTL and using shallow draft boats, sled or any other suitable techniques seaward down to 10m CD (4 CSP Lines carried out up to a depth of 20 m in the months of January, May, August and October).
- Monthly monitoring of littoral zone (at the CSP locations) to observe the littoral transport direction and alongshore current speed by means of appropriate drogue observations and visual observations.
- Monthly photographic documentation of geomorphological changes (at the CSP locations).
- Seasonal beach sediment sampling and analysis (at the CSP locations).
- Bathymetric survey twice in a year, i.e. just after the monsoon season and just prior to the commencement of the next monsoon to generate 0.5m contours (with bathymetric survey lines spaced at 25 m interval) in areas with depths to 20m CD using multi beam echo sounder.

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- Bathymetry/cross section survey for 500m length of rivers debouching in a 40 km stretch of the coast.
- Seabed sediment sampling and analysis in 80 sq. km with one sample per sq km.
- Collection and analysis of water samples at specified periods (seasonal) for total suspended solids (TSS) and turbidity from four specified locations.
- Current measurements (both magnitude and direction) using Acoustic Doppler Current Profiler (ADCP) at four locations, as marked in Figure 1-1, for the duration of full tidal cycle/30 days each during monsoon (June-Sep), post-monsoon (Oct-Feb) and summer (Mar-May).
- Wave observations using WRB Datwell DWG-G shall be carried out at one location as marked on the location map.
- Tide measurements using an automatic tide gauge close to the survey area to observe the tidal variations around the clock at 6-minute intervals or as specified to cover one full year. The tide gauge shall be connected to the nearest Survey of India Benchmark.
- Collection of wind speed & direction, atmospheric pressure, humidity, temperature at 1 location specified by the client/EIC (Engineer In Charge) by establishing an automatic weather station.
- Continuous monitoring of turbidity at 3 location (1 upstream & 2 downstream of dredging location) - Online meter (3 levels) to be installed on buoys and data to be displayed at system in office.
- Analysis and processing of the data and submission of periodic reports in soft & hard copies.

2.1 Location Coordinates

The location co-ordinates provided by the client for the current and wave observations are given below:

Table 2-1: Current / Wave locations

Location Co-ordinates			
WGS-84 Spheroid, UTM Projection, CM 75 East, Zone 43, North			
Name	Latitude	Longitude	Depth w.r.t CD (m)
ADCP - P1 (Vizhinjam)	08° 21' 55.4"N	76° 58' 51.6"E	22.1
ADCP- P2 (Poovar)	08° 17' 35.8"N	77° 04' 03.5"E	23.1
ADCP- P3 (Pachalloor)	08° 24' 08.6"N	76° 56' 16.1"E	21.9
ADCP/Wave - P4 (Mulloor)	08° 21' 42.3"N	76° 59' 33.9"E	22.9

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The current observations are to be carried out for 30 days in each of the seasons at the above locations. The location co-ordinates of the tide station are provided below:

Table 2-2: Tide station location coordinates

Tide Station Co-ordinates			
WGS-84 Spheroid, UTM Projection, CM 75 East, Zone 43, North			
Name	Latitude	Longitude	Height above CD (m)
Tide station	08° 22' 33.68"N	76° 59' 16.65"E	3.447

A Gill Metpack weather station with rain gauge was installed at the Ayur Bay Resort and the coordinates are provided in the table below:

Table 2-3: Weather station location coordinates

Weather Station Co-ordinates			
WGS-84 Spheroid, UTM Projection, CM 75 East, Zone 43, North			
Name	Latitude	Longitude	Height above CD (m)
Weather station (on top of Ayur Bay Resort)	08° 22' 13.53"N	77° 00' 08.78"E	28.456

Since the system was installed at a height of 28.456m above CD a correction factor was applied in the wind speed to reduce the data to 10m above MSL. The corrections were obtained from WMO manual supplied by NIOT. As per section 5.2.2 in the manual, 20% of the speed was deducted to derive the current speeds at 10m above MSL. The data provided is thus referenced to 10m above MSL.

2.2 Turbidity Monitoring

Turbidity buoys were deployed in the month of November 2019 to measure the water turbidity at three locations. The turbidity from three different depths, i.e. surface, mid-depth and bottom was measured. The location co-ordinates of the turbidity buoys are provided below:

Table 2-4: Turbidity buoy Locations

TURBIDITY BUOY LOCATIONS				
WGS-84, UTM Projection, CM 75° East, Zone 43, North				
Buoy No.	Easting	Northing	Latitude	Longitude
Turbidity Buoy-1	720497.55	923507.87	08° 20' 58.60" N	77° 00' 08.10' E
Turbidity Buoy-2	718843.20	925075.84	08° 21' 49.90" N	76° 59' 14.30' E
Turbidity Buoy-3	718784.75	926000.91	08° 22' 20.01" N	76° 59' 12.54' E

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2.3 Beach and Water Sampling

A total of 81 beach samples were collected in two seasons, as part of the contract. The samples were to be analyzed for grain size distribution as per IS 1498. The coordinates of the beach sampling locations are provided in the table below.

Table 2-5: Beach Sampling Locations

BEACH SAMPLING LOCATIONS		
WGS-84, UTM Projection, CM 75° East, Zone 43, North		
Location	Latitude	Longitude
BS-1	8° 16.0265' N	77° 7.9532' E
BS-2	8° 16.1775' N	77° 7.7195' E
BS-3	8° 16.3348' N	77° 7.4987' E
BS-4	8° 16.4955' N	77° 7.2778' E
BS-5	8° 16.6565' N	77° 7.0579' E
BS-6	8° 16.8176' N	77° 6.8379' E
BS-7	8° 16.9782' N	77° 6.6187' E
BS-8	8° 17.1382' N	77° 6.3980' E
BS-9	8° 17.2984' N	77° 6.1765' E
BS-10	8° 17.4586' N	77° 5.9566' E
BS-11	8° 17.6207' N	77° 5.7379' E
BS-12	8° 17.7276' N	77° 5.5946' E
BS-13	8° 17.8899' N	77° 5.3756' E
BS-14	8° 18.0524' N	77° 5.1568' E
BS-15	8° 18.2151' N	77° 4.9388' E
BS-16	8° 18.3603' N	77° 4.7165' E
BS-17	8° 18.5517' N	77° 4.5120' E
BS-18	8° 18.7213' N	77° 4.3003' E
BS-19	8° 18.8852' N	77° 4.0829' E
BS-20	8° 19.0488' N	77° 3.8659' E
BS-21	8° 19.2152' N	77° 3.6499' E
BS-22	8° 19.3848' N	77° 3.4369' E
BS-23	8° 19.5582' N	77° 3.2282' E
BS-24	8° 19.7318' N	77° 3.0196' E
BS-25	8° 19.9075' N	77° 2.8098' E
BS-26	8° 20.0796' N	77° 2.5989' E
BS-27	8° 20.2492' N	77° 2.3841' E
BS-28	8° 20.4130' N	77° 2.1703' E
BS-29	8° 20.5731' N	77° 1.9581' E

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BEACH SAMPLING LOCATIONS		
WGS-84, UTM Projection, CM 75° East, Zone 43, North		
BS-30	8° 20.7305' N	77° 1.7499' E
BS-31	8° 20.8951' N	77° 1.5274' E
BS-32	8° 21.0493' N	77° 1.2973' E
BS-33	8° 21.1815' N	77° 1.0911' E
BS-34	8° 21.3210' N	77° 0.8491' E
BS-35	8° 21.3974' N	77° 0.6359' E
BS-36	8° 21.6830' N	77° 0.4829' E
BS-37	8° 21.8799' N	77° 0.2980' E
BS-38	8° 22.1369' N	77° 0.1947' E
BS-39	8° 22.3420' N	76° 59.9895' E
BS-40	8° 22.5417' N	76° 59.7689' E
BS-41	8° 22.8201' N	76° 59.0753' E
BS-42	8° 23.0287' N	76° 58.7934' E
BS-43	8° 23.1727' N	76° 58.6741' E
BS-44	8° 23.3709' N	76° 58.5145' E
BS-45	8° 23.7061' N	76° 58.3743' E
BS-46	8° 23.8974' N	76° 58.3798' E
BS-47	8° 24.1304' N	76° 58.2814' E
BS-48	8° 24.4789' N	76° 58.1346' E
BS-49	8° 24.6320' N	76° 58.0289' E
BS-50	8° 24.8665' N	76° 57.8917' E
BS-51	8° 25.0976' N	76° 57.7474' E
BS-52	8° 25.3176' N	76° 57.5868' E
BS-53	8° 25.5653' N	76° 57.4562' E
BS-54	8° 25.7602' N	76° 57.2767' E
BS-55	8° 25.9643' N	76° 57.0963' E
BS-56	8° 26.1500' N	76° 56.9073' E
BS-57	8° 26.3461' N	76° 56.7308' E
BS-58	8° 26.5741' N	76° 56.5678' E
BS-59	8° 26.7782' N	76° 56.4051' E
BS-60	8° 26.9997' N	76° 56.2272' E
BS-61	8° 27.2030' N	76° 56.0492' E
BS-62	8° 27.4175' N	76° 55.8762' E
BS-63	8° 27.6142' N	76° 55.6937' E
BS-64	8° 27.8102' N	76° 55.5014' E
BS-65	8° 28.0132' N	76° 55.3255' E


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BEACH SAMPLING LOCATIONS		
WGS-84, UTM Projection, CM 75° East, Zone 43, North		
BS-66	8° 28.2159' N	76° 55.1437' E
BS-67	8° 28.4224' N	76° 54.9642' E
BS-68	8° 28.6228' N	76° 54.7840' E
BS-69	8° 28.8276' N	76° 54.6048' E
BS-70	8° 29.0316' N	76° 54.4243' E
BS-71	8° 29.1104' N	76° 54.3586' E
BS-72	8° 29.3118' N	76° 54.1755' E
BS-73	8° 29.5150' N	76° 53.9964' E
BS-74	8° 29.7202' N	76° 53.8181' E
BS-75	8° 29.9258' N	76° 53.6393' E
BS-76	8° 30.1345' N	76° 53.4652' E
BS-77	8° 30.3450' N	76° 53.2940' E
BS-78	8° 30.5558' N	76° 53.1226' E
BS-79	8° 30.7701' N	76° 52.9558' E
BS-80	8° 30.9840' N	76° 52.7867' E
BS-81	8° 31.1988' N	76° 52.6188' E

The water samples (132 from four locations) were collected in the month of February 2020 (Fair-weather period) and were analysed for TSS as per IS 3025, Part 17:1984 (reaffirmed 2012); Turbidity was analysed as per IS 3025, Part 10:1984 (reaffirmed 2012) technical specifications. The salinity was analysed as per American Public Health Association (APHA) guidelines. The location co-ordinates of water sampling locations are provided below:

Table 2-6: Water Sampling Locations

WATER SAMPLING LOCATIONS			
WGS-84, UTM Projection, CM 75° East, Zone 43, North			
Location	Water Depth (m)	Latitude	Longitude
L1 (Mulloor)	21.1	08° 21.923' N	76° 58.860' E
L2 (Proposed Dredge dumping)	23.2	08° 21.705' N	76° 59.565' E
L3 (Pachalloor)	27.4	08° 24.143' N	76° 56.268' E
L4 (Poovar)	23.0	08° 17.597' N	77° 04.058' E

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3 SURVEY CONTROL

3.1 Geodesy

The survey operations were conducted in the WGS 84 Spheroid, Universal Transverse Mercator Projection based on the geodetic parameters presented below. All co-ordinates quoted within this document are with reference to it.

Table 3-1: Geodetic Parameters

GEODETTIC PARAMETERS	
Satellite Datum	
Spheroid	WGS-84
Datum	WGS 84
Semi-Major Axis	6378137.000 m
Semi Minor Axis	6356752.314 m
Inverse Flattening	298.2572
Projection Parameters	
Grid Projection	Universal Transverse Mercator
Latitude of Origin of Projection	0° (Equator)
Longitude of Origin of Projection	75° E, Zone 43
Hemisphere	North
False Easting (metres)	500000
False Northing (metres)	0
Scale Factor on CM	0.9996
Units	Metres

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3.2 Survey Vessels

The following vessels were utilized for the survey operation:



Figure 3-1: Watch keeping vessel MFB Samuel

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Figure 3-2: Transit vessel MFB Sindhu Yatra Matha



Figure 3-3: Multibeam Survey boat MFB Bethel

3.3 Personnel

The following survey personnel from SAC/AVPPL were assigned to the project in the capacities listed in the table below.



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Table 3-2: Personnel

Shankar And Co.		
Name	Designation	Period
Saju Cherian	Project Manager	1 st Jun 2019 – 14 th Feb 2020
Vishtasp Mehta	Project Manager	14 th Feb 2020 – 31 st Mar 2020
Unnikrishnan K.U.	Party Chief / Surveyor	Duration of Project
Arun P.K.	Party Chief / Survey Engineer	Duration of Project
Harikrishnan P.	Land Surveyor	13 th Jul – 31 st Aug 2019, 5 th – 16 th Oct 2019
Vishnu Haridas	Land Surveyor	Duration of Project
Anoop George	Asst. Surveyor	7 th Nov 2019 – 31 th Mar 2020
Vaishak K.R.	Trainee Surveyor	10 th Feb to 31 th Mar 2020
Ravinder Mani	Survey Engineer	16 th – 27 th Sep 2019, 8 th – 16 th Nov 2019
Balaji Ravikumar	Survey Engineer	16 th – 19 th Sep 2019
Sanjeevanee Khaire	Data Processor (Navi Mumbai office)	Duration of Project
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Name	Designation	Period
Hebin C.	Manager - Environment	Duration of Project
Jesse Fullonton	Assistant Manager - Environment	Duration of Project

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4 SURVEY EQUIPMENT DETAILS

4.1 Wave Rider Buoy

The Datawell DWR (G) Wave Rider Buoy (WRB) was deployed by NIOT in collaboration with VISL and AVPPL, under a tripartite agreement and is being monitored and maintained by SAC. A Datawell DWR (G) was supplied and installed for the project. The WRB was programmed to measure all the wave parameters at half-hourly intervals. The data is transmitted on a real time basis via the HF antenna to the receiver set up at Ayur Bay resort.

The system consists of WRB with HF whip/LED flasher, GPS antenna, internal data logger, RX-D receiver with HF antenna and acquisition and post processing software w@ves21. The system has a GPS receiver mounted on a buoy along with HF radio for data transmission in real time. The system has an accuracy of 1 cm + 0.5% of vertical motion; resolution of 1cm and range of ± 30 m at the sampling rate of 1.28 Hz. The directional accuracy and resolution are 1.5° within the range of 0° to 360° .

The WRB is factory calibrated and Datawell does not recommend recalibration of the buoy.

4.1.1 Principles of wave measurement

The GPS wave buoy measurement principle bears a strong analogy with the Doppler-shift phenomenon of a car passing nearby, blowing its horn. The GPS system calculates the velocity of the buoy from changes in the frequency of GPS signals. The velocities are integrated with time to determine buoy displacement. In practice the GPS system uses signals from multiple satellites to determine three-dimensional buoy motion. A gravity sensitive accelerometer in the buoy measures wave height by means of vertical acceleration of the platform of the buoy.

4.1.2 Instrument Mooring

The mooring arrangement incorporates the following components between the sea bottom and the mooring eye underneath the buoy: a sinker or anchor weight, polypropylene rope, nylon covered galvanized steel cable (combination rope) and associated terminals, floats, rubber cords with associated terminals, swivels, ballast chain, anodes and shackles and cotter pins.

A schematic of the mooring of WRB is given below:

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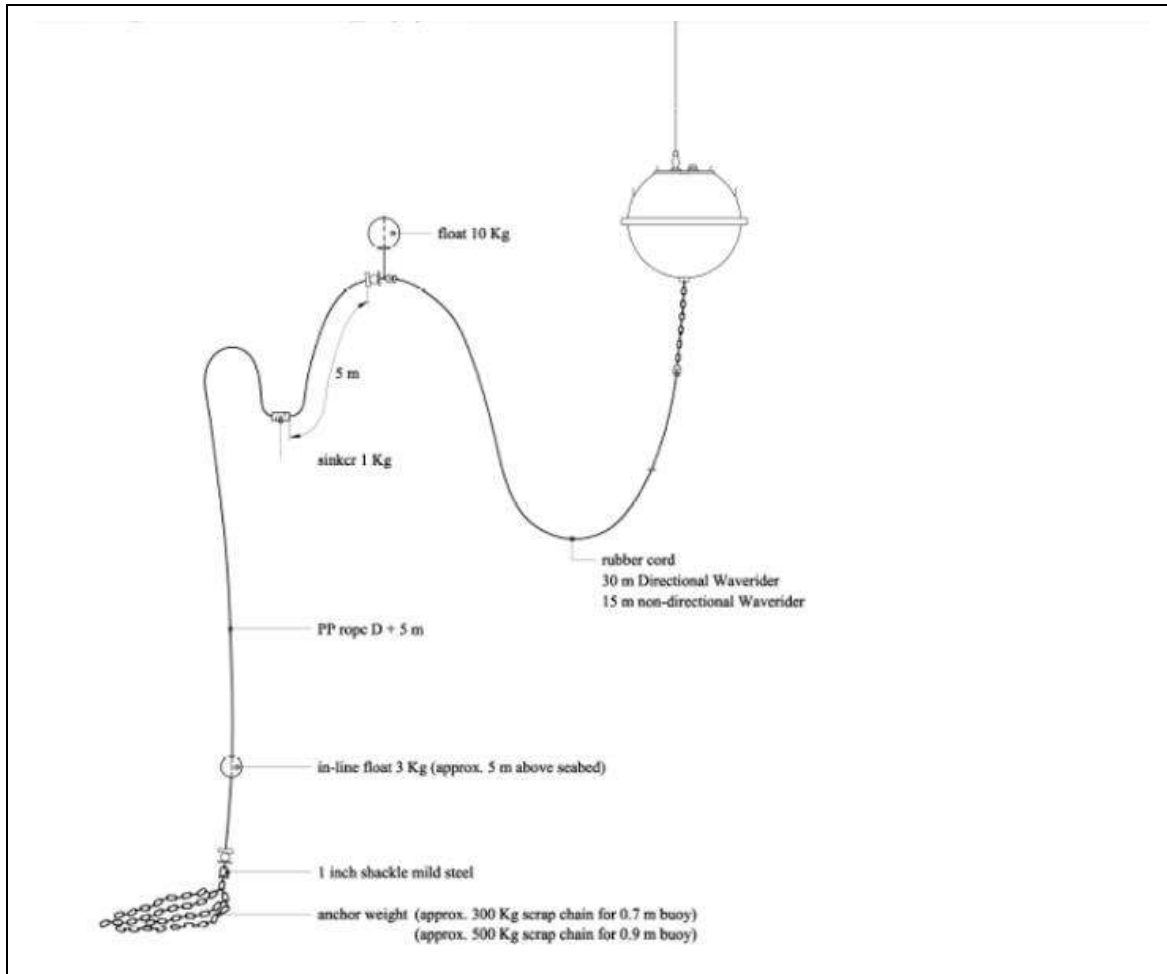


Figure 4-1: WRB Mooring Diagram

A highly elastic rubber cord is essential for high quality wave measurements. It allows the buoy to follow the wave motion, thus guaranteeing that the measured motion of the buoy is indeed the same as the desired motion. The buoy was deployed using single point mooring with free-floating method. The mooring design was configured as per the site conditions, followed by the mooring suggestions provided by the supplier. As frequent fishing activities were observed at the deployment location, one boat was anchored near the WRB without hindering the wave data measurements along with sufficient crew on board for around the clock watch-keeping.

A photograph of WRB deployed at the location is shown below:

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Figure 4-2: WRB deployed at site

4.2 Current Meter

4 Teledyne Workhorse Sentinel 600 KHz Acoustic Doppler Current Profilers (ADCP) were installed at locations P1, P2, P3 and P4, namely, Vizhinjam, Poovar, Pachalloor and Mulloor for different seasons. The current speed and direction were measured at intervals of every 10 minutes from surface to seabed at every 1m bin. Data from three various depths i.e. at the surface, mid-depth and bottom at each location are provided in the report. The following figure shows the ADCP installation in an upward looking mode.

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Figure 4-3: ADCP deployment at Vizhinjam by diver

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Figure 4-4: ADCP deployed at Mulloor

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Figure 4-5: ADCP deployed at Pachalloor

4.3 Automatic Tide Gauge

An EMCON Automatic Tide Gauge (ATG) was installed near the Coast Guard jetty, inside the fishing harbour for measuring the tides. The tide gauge is a capacitance-based instrument, measuring the water level due to change in capacitance on the surface of sensor. The sensor was installed on a 2.5m long pipe to ensure that the zero of sensor is always in water, irrespective of the phases of tide. This was levelled to the local benchmark, situated on top of the jetty. The tide station was programmed to measure the tide at 10-minute intervals throughout the duration of the project.

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A photograph of the tide gauge location is shown below:

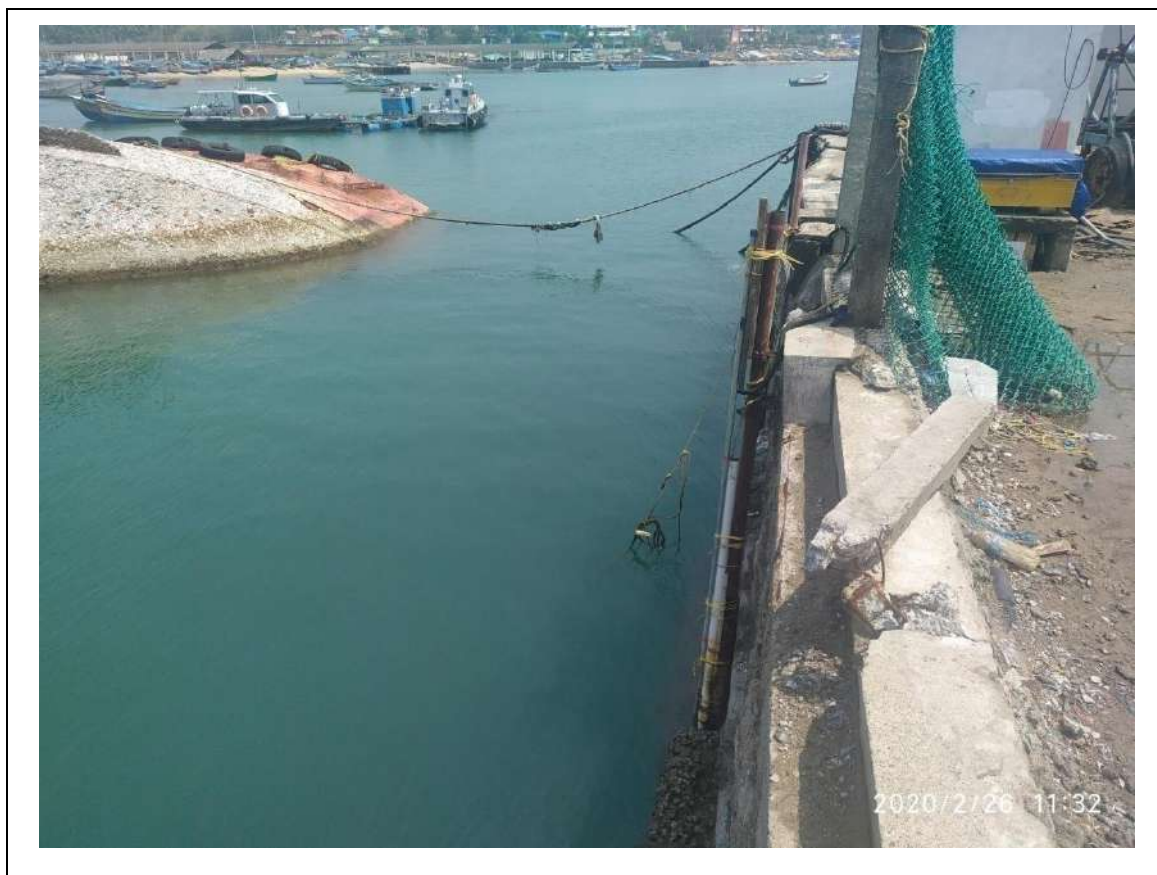


Figure 4-6: Tide Gauge

4.4 Automatic Weather Station (AWS)

A Gill Metpack Automatic Weather Station (AWS) was installed atop Ayur Bay Resort at Nellikunnu. The system measures wind speed/direction, atmospheric pressure, temperature, relative humidity and rainfall.

The system consists of the following:

- Sonic anemometer
- Relative humidity & temperature sensor
- Pressure sensor
- Rainfall Gauge
- Datalogger

The data is logged in a data logger installed at the receiving station at intervals of 10 minutes. The data is also transmitted from the data logger to a cloud based server for further processing and QC checks.

An image of automatic weather station is provided below:

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Figure 4-7: AWS on top of Ayur Bay Resort, Nellikunnu (Mulloor)

4.5 Real Time Kinematic (RTK) Survey

An RTK system was mobilized at site to carry out cross-shore profiling on the landward side. The system used was a Geomax Zenith 10/20 RTK system with base station and rover. A photograph of the system is provided below:



Figure 4-8: RTK System with base station and rover


4.6 Multibeam Echo Sounder System

A GeoAcoustics Geoswath Plus Multibeam Echo Sounder, operating at a frequency of 500 kHz, was used to delineate the topography of the seabed. The measured sound velocity and observed tide was fed into the system during data processing.

The swath bathymetry system was calibrated according to methods described in the manufacturer's manual. The swath transducer system was aligned with the roll/pitch/heave sensor. Great care was taken to mount the heads and pitch/roll/heave sensor as accurately as possible and the final calibration was carried out during sea trials prior to each survey. The calibration values obtained in the month of September 2019 are given below.

Table 4-1: MBES Calibration results

Parameter	Value	Comments
Latency	0.19s	Seapath 130 Positioning System with beacon corrections.
Port Roll	-0.08°	Seapath 130-H MRU accuracy 0.03° in roll

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Parameter	Value	Comments
Starboard Roll	0.25°	Seapath 130-H MRU accuracy 0.03° in roll
Pitch	0.00°	
Yaw	-3.80°	Accuracy better than 0.2°

The calibration values obtained in the month of December 2019 are as follows.

Parameter	Value	Comments
Latency	0.05s	Seapath 130 Positioning System with beacon corrections.
Port Roll	-0.15°	Seapath 130-H MRU accuracy 0.03° in roll
Starboard Roll	0.26°	Seapath 130-H MRU accuracy 0.03° in roll
Pitch	0.00°	
Yaw	-6.05°	Accuracy better than 0.2°


4.7 DGPS Positioning System

Vessel positioning was carried out by the Seapath 130 DGPS system which also provides the heading. Vessel track and offset positions were recorded digitally in the navigation software. The positioning system was interfaced to the navigation software as well as the digital data acquisition system. DGPS positioning accuracy of the moving vessel was better than $\pm 1\text{m}$.

The computed position of the vessel from the DGPS receiver was interfaced to the navigation computer system. Hypack navigation and data acquisition software was used to provide track guidance information to the survey crew and also output the position of the vessel to assist the helmsman in maintaining the selected track guidance line. The VDU displays the selected survey line, the position of the vessel in relation to that line and numerical data to assist the helmsman such as the along-line and off-line distances, vessel speed and course made good, gyro heading, distance and bearing to end of line and water depth. The position of each fix, together with other information such as fix numbers, depths, PDOP and along-line distances were logged to the hard drive.

4.7.1 DGPS Consistency Check

In order to determine the integrity and reliability of the positioning system, the system was checked for its consistency during mobilization.


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After installing the Seapath DGPS positioning system on board the vessel, two points were marked on the jetty. The DGPS antenna was set up on the jetty at these two points, designated as Point A and Point B.

Time was synchronized between Seapath/Hypack and the observer's watch, for which local time (GMT+5.30) was used. The Seapath 130 DGPS antenna positions were logged in the Hypack navigation software. The logged data was processed to derive the final positions of both the points.

The difference between the calculated distance and measured distance was found to be within the permissible accuracy limit. The details are provided below for selected few DGPS calibrations.

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	DGPS CONSISTENCY CHECK
---	-------------------------------

Job Number	P167-19	Project	AVPPL Shoreline Monitoring
Client	AVPPL	Vessel	MFB Bethel
Location	Vizhinjam Harbour	Date	20/09/2019

Nav Equipment	Primary		Secondary	
Item	Type	Serial Number	Type	Serial Number
GPS Receiver	Seapath 130	168	-	-
GPS Antenna	Seapath 130	168	-	-
GPS Demodulator	-	-	-	-

Offsets	X (m)	Y (m)	Z (m)
DGPS Antenna to CRP	0	0	0

1st set of Observations on Points A & B


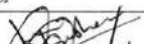
DGPS Observations on		Date: 20 September 2019		Time: 11:00 hrs
Observation Points	Number of Observations	Time of Observations	Average Easting WGS 84 Spheroid, CM	Average Northing WGS 84 Spheroid, CM
A	180	15 min	719292.15	926424.21
B	180	15 min	719299.65	926431.05
Comments:	Calculated distance between Point A and Point B			= 10.15 m
	Computed Bearing (T) between Point A and Point B			= 47.63°
	Measured distance (by tape) between Point A and Point B			= 10 m

2nd set of Observations on Points A & B

DGPS Observations on		Date:	Time:	
Observation Points	Number of Observations	Time of Observations	Average Easting WGS 84 Spheroid, CM	Average Northing WGS 84 Spheroid, CM
A	-	-	-	-
B	-	-	-	-
Comments:	Calculated distance between Point A and Point B			= mtrs
	Computed Bearing (T) between Point A and Point B			=
	Measured distance (by tape) between Point A and Point B			= mtrs.

Difference observed between 1st set and 2nd set of observations made on points A & B


Observation Points	Difference in Easting (δE)	Difference in Northing (δN)
A	-	-
B	-	-

Signed			
Position	Name	Signature	Date
Surveyor	Vishnu Haridas		20/09/2019
Party Chief	Unnikrishnan K U		20/09/2019

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	DGPS CONSISTENCY CHECK
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Job Number	P167-19	Project	AVPPL Shoreline Monitoring
Client	AVPPL	Vessel	MFB Bethel
Location	Vizhinjam Harbour	Date	13/12/2019

Nav Equipment	Primary	Secondary
Item	Type	Serial Number
GPS Receiver	Seapath 130	168
GPS Antenna	Seapath 130	168
GPS Demodulator	-	-

Offsets	X (m)	Y (m)	Z (m)
DGPS Antenna to CRP	0	0	0

1st set of Observations on Points A & B

DGPS Observations on		Date: 13 DECEMBER 2019	Time: 10:00 hrs
Observation Points	Number of Observations	Time of Observations	Average Easting WGS 84 Spheroid, CM
A	180	15 min	719388.41
B	180	15 min	719395.55

	Average Northing WGS 84 Spheroid, CM	
	926488.33	
	926495.49	

Comments:	Calculated distance between Point A and Point B = 10.11 m Computed Bearing (T) between Point A and Point B = 45.08° Measured distance (by tape) between Point A and Point B = 10 m
-----------	--

2nd set of Observations on Points A & B



DGPS Observations on		Date:	Time:
Observation Points	Number of Observations	Time of Observations	Average Easting WGS 84 Spheroid, CM
A	-	-	-
B	-	-	-

	Average Northing WGS 84 Spheroid, CM	
	-	
	-	

Comments:	Calculated distance between Point A and Point B = mtrs Computed Bearing (T) between Point A and Point B = Measured distance (by tape) between Point A and Point B = mtrs.
-----------	---

Difference observed between 1st set and 2nd set of observations made on points A & B

Observation Points	Difference in Easting (δE)	Difference in Northing (δN)
A	-	-
B	-	-

Signed			
Position	Name	Signature	Date
Surveyor	Vishnu Haridas		13/12/2019
Party Chief	Unnikrishnan K U		13/12/2019

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Figure 4-9: DGPS Consistency Checks on board M.F.B. Bethel

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4.7.2 Gyrocompass Calibration

The calculated heading of the vessel was compared with the recorded gyrocompass heading to derive a calculated-observed (C-O) value, which was entered into the navigation software before commencing the survey. The details are provided below for selected few gyro calibrations.

Job		AVPPL Shoreline Monitoring		Job No		P167-19	
Client		AVPPL		Vessel		MFB Bathel	
Location		Vizhinjam Fishing Jetty		Date		20-Sep-19	
Gyro S/N		130-168					
Quay heading(T)		Baseline length(m)		Gyro Name : SEAPATH		Quayside on:	
47.63		8.00		S/No. 130-168		Starboard	
Observations				Calculations			
Time	Gyro (true)	Bow	Stern	Calc. angle	Calculated Heading	True Quay Hdg	C-O
11:40:00	47.8	0.7	0.7	0.00	47.80	47.63	-0.17
11:40:10	47.8	0.7	0.7	0.00	47.80	47.63	-0.17
11:40:20	47.9	0.6	0.9	2.15	45.75	47.63	1.88
11:40:30	47.8	0.6	0.8	1.43	46.37	47.63	1.26
11:40:40	47.5	0.7	0.8	0.72	46.78	47.63	0.85
11:40:50	47.4	0.8	0.7	-0.72	48.12	47.63	-0.49
11:41:00	47.3	0.8	0.7	-0.72	48.02	47.63	-0.39
Average	47.84	0.70	0.76	0.41	47.23	47.63	0.40

Vizhinjam Fishing Jetty

Fore and Aft line

0.76m Stern rdg. 0.7m Bow rdg.

Baseline (8.0) mtrs Quay side

Note: Drawing not on scale only for representation purpose

Signed			
Designation	Name	Signature	Date
Surveyor	Vishnu Haridas		20-Sep-19
Party Chief	Unnikrishnan K U		20-Sep-19

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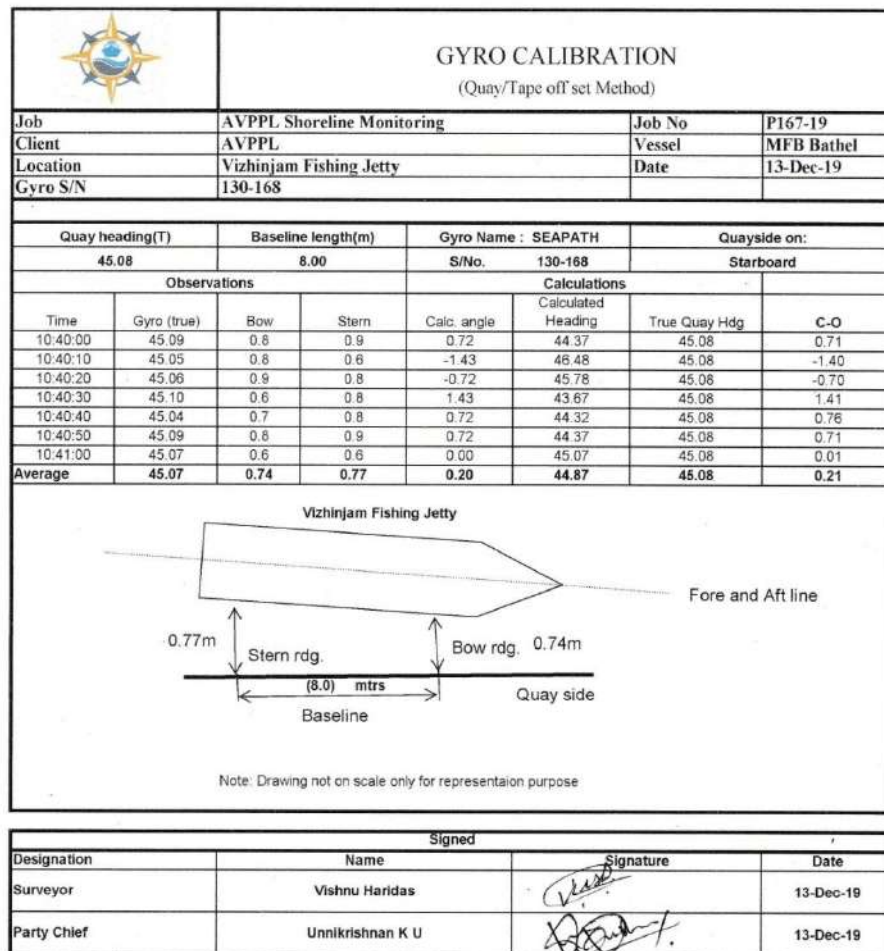


Figure 4-10: Gyrocompass Calibrations on board M.F.B. Bethel

4.8 Turbidity Monitoring

Optic sensors manufactured by Ponsel, France were used to measure the turbidity at all locations. The sensors are installed on a 6m buoy which houses a telemetry module. A battery which is charged by solar panels fitted on the buoy is used to power the system. The buoy is deployed on a two point mooring system as shown in the figure below.

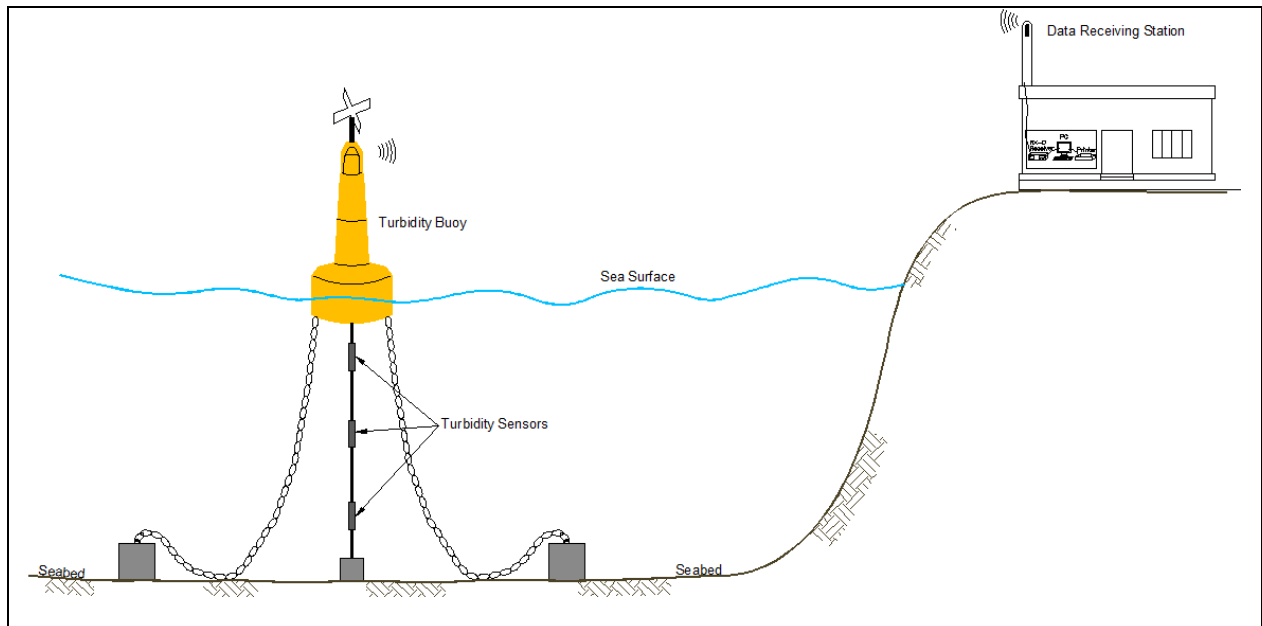


Figure 4-11: Turbidity buoy Mooring Diagram

The data from the turbidity buoys was transmitted and recorded on the server at an interval of every 10 minutes. A photograph of a turbidity buoy is shown in the figure below.



Figure 4-12: Turbidity Buoy-2

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5 SURVEY RESULTS

5.1 Tidal Measurements

The tides were observed near the Coast Guard jetty. The tide is referenced to the chart datum, the value of which was provided by VISL. The temporary benchmark (TBM) is marked on the wharf and is 3.447m above chart datum. An image of the TBM is provided below:



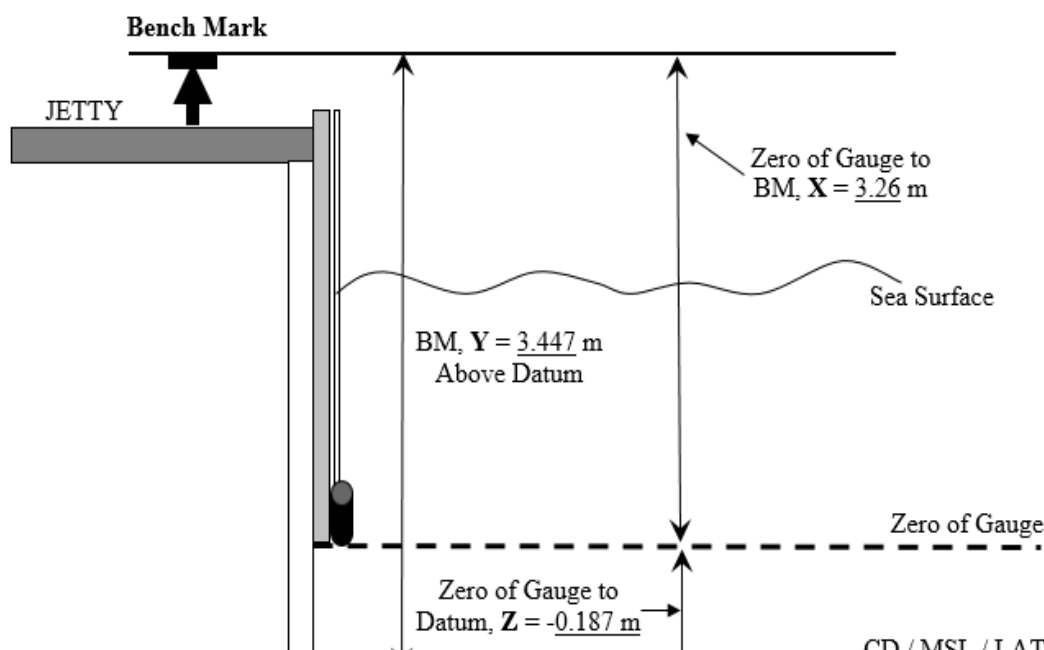
Figure 5-1: Location of TBM

The offset calculation of tide gauge based on the 'jetty top' value is given in the figure below:

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Job Number	P167-19	Project	Shoreline Monitoring at Vizhinjam
Client	Adani Vizhinjam Port Pvt. Ltd.		
Location	Vizhinjam	Installation Date	05/04/2020
Tide Gauge Sr. No.	1571/5/19	Party Chief	Unnikrishnan KU
Tide Gauge setup refers to:	<input checked="" type="checkbox"/> CD	<input type="checkbox"/> MSL	<input type="checkbox"/> LAT

Diagram



Bench Mark details:

Value of Bench Mark	3.447	Meters above the Chart Datum
Levelled By	Unnikrishnan K U	
Date	14/09/2018 (OSaS). Rechecked on 15/07/2019 by Shankar Surveys	

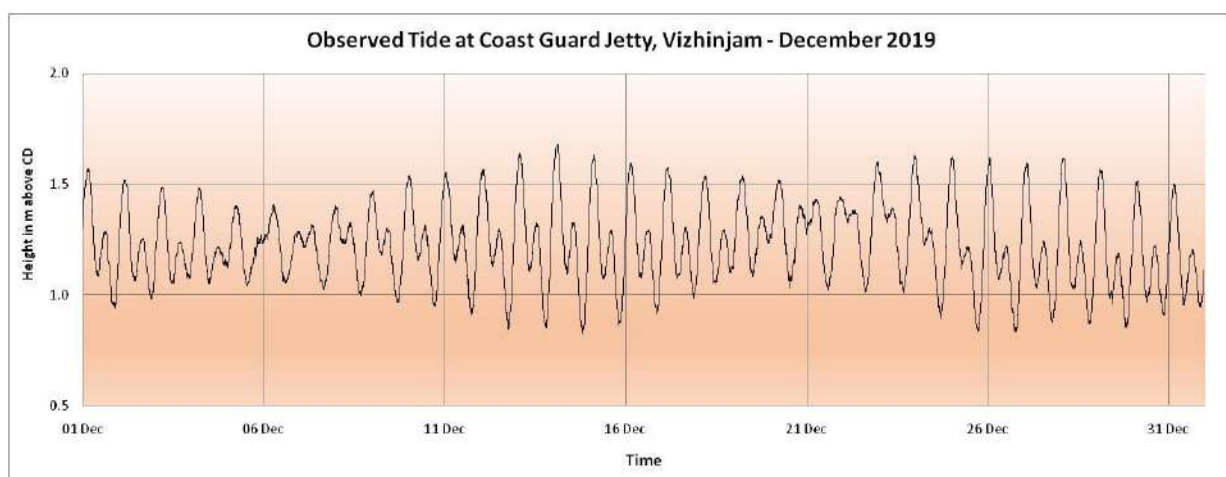
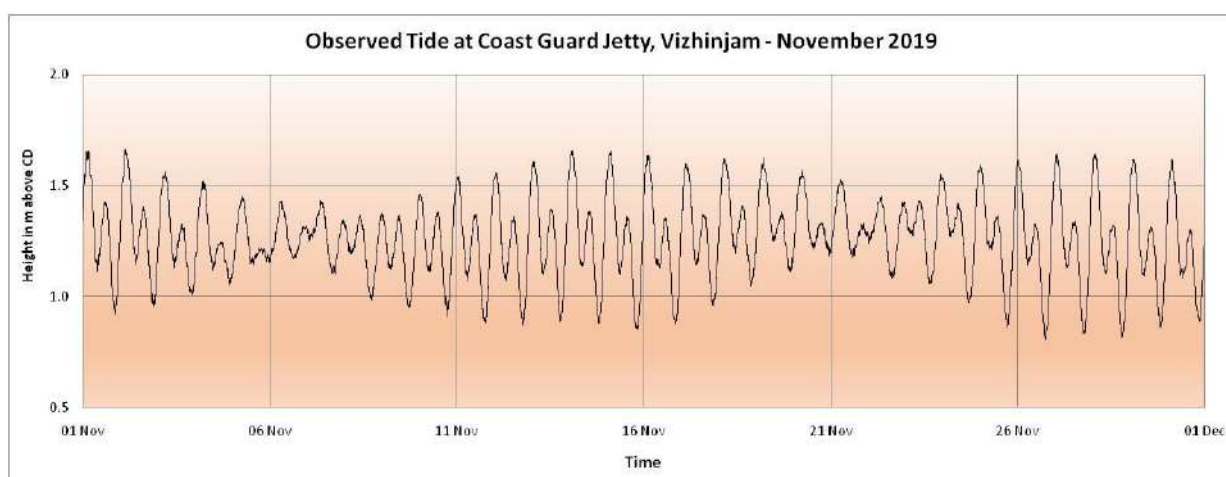
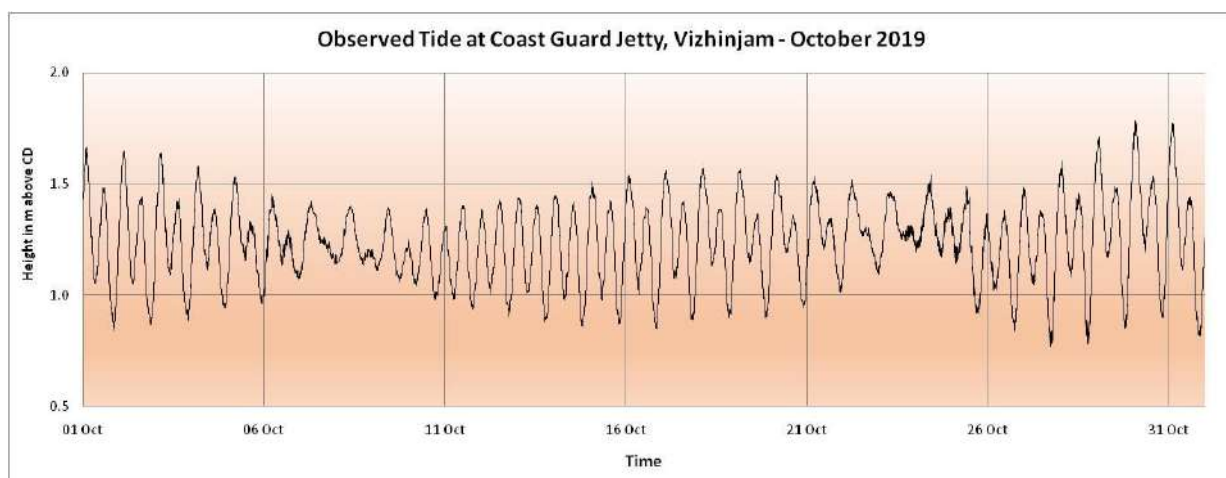
Calculations:

X, Length from Bench Mark to Zero of Tide Gauge	3.26 m
Y, Level of Bench Mark above Datum	3.447 m
Z, Tide Correction factor, Z=X - Y	-0.187 m

Figure 5-2: Schematic Diagram of Tide Gauge

The tides observed are mixed semi-diurnal in nature, with the maximum range being observed in the springs. The representation of tide data collected, in the form of graphs is placed below.

Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020



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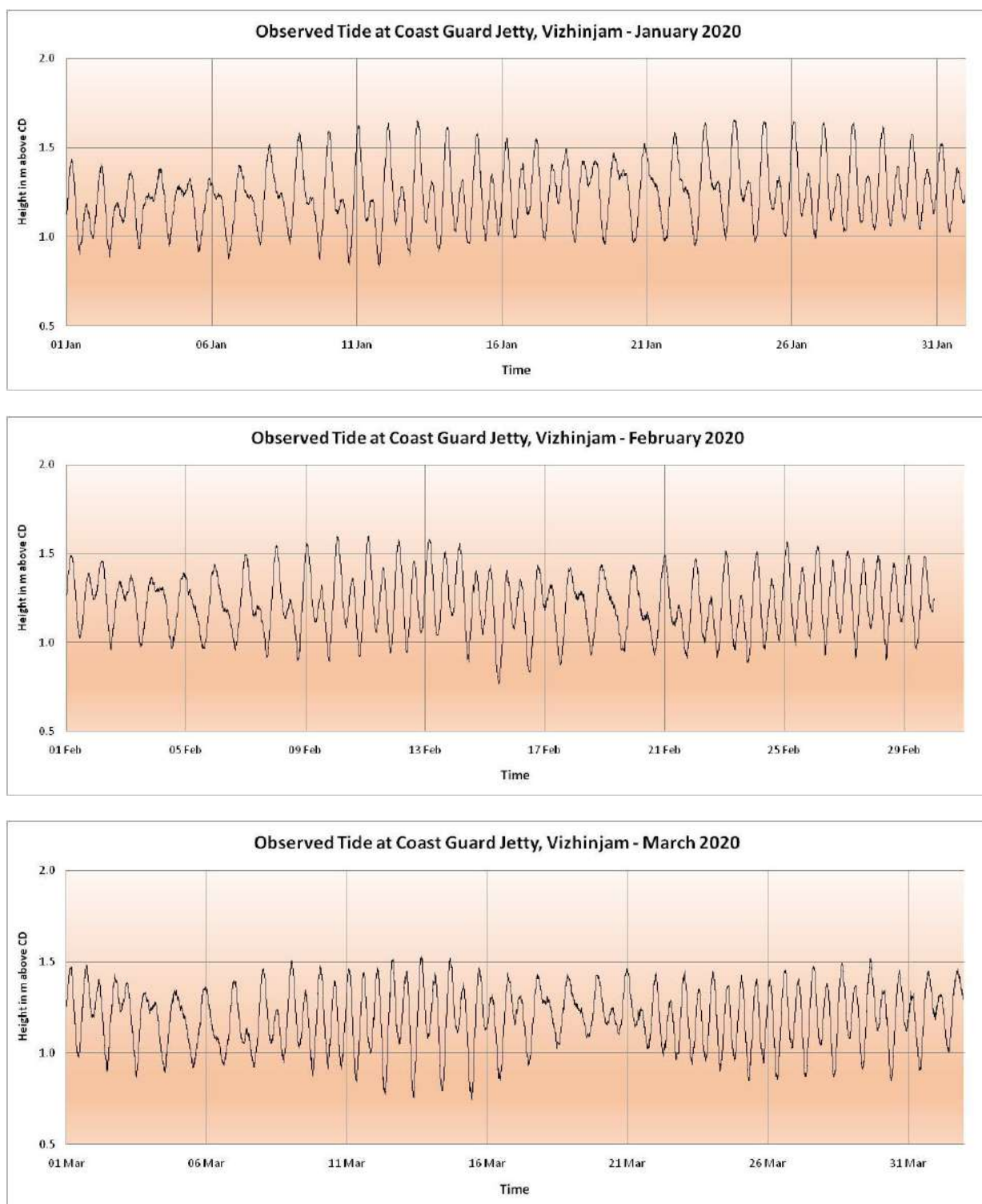


Figure 5-3: Time series of tide

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5.2 Wave Measurements

The data from the WRB (provided by NIOT) was downloaded and processed to produce the time series and rose diagram, which are provided below:

Refer to the following rose plots of significant height (Hs) v/s direction for the entire period from October 2019 to March 2020:

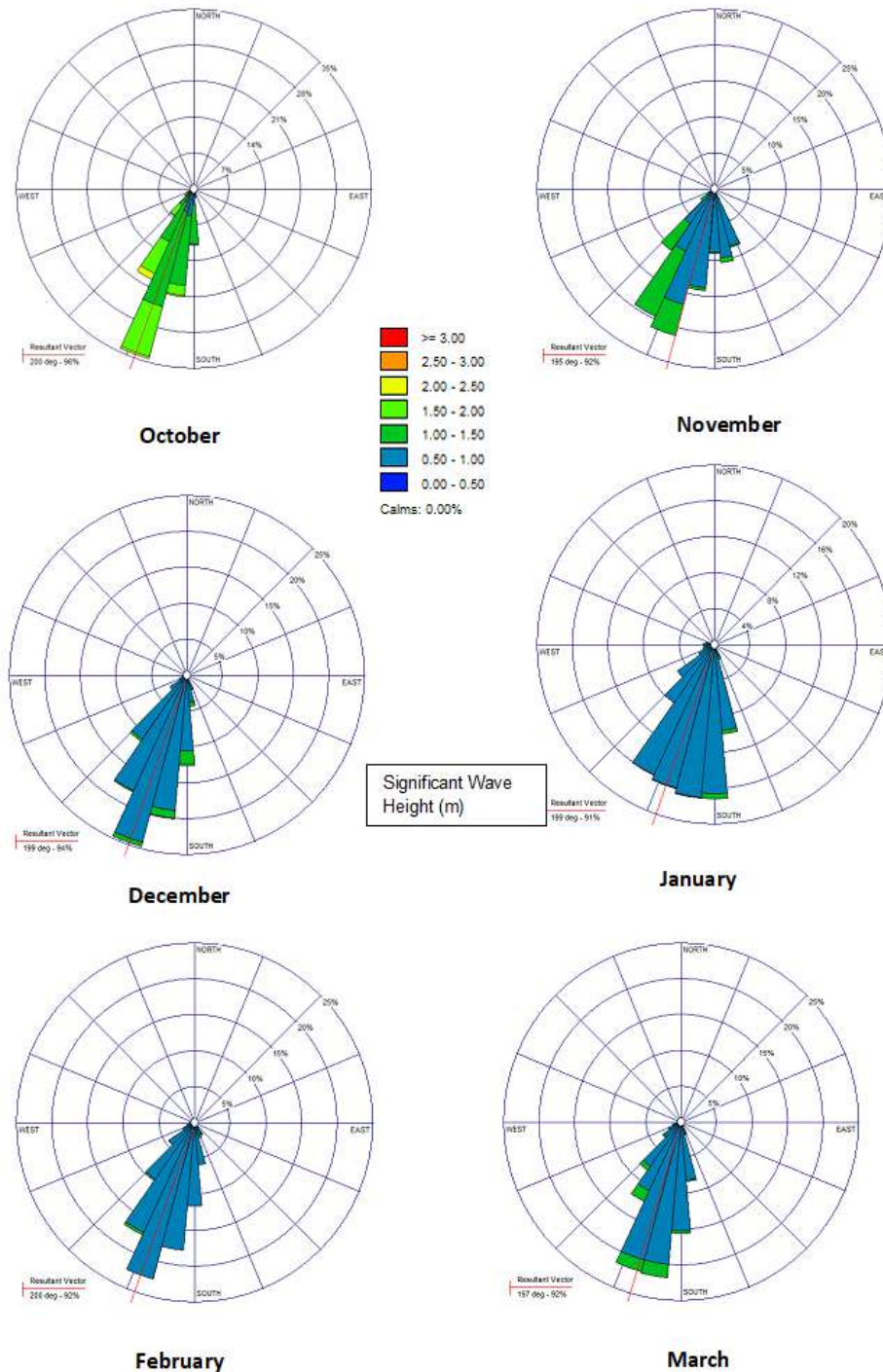


Figure 5-4: Wave Rose (Hs in metre v/s Direction)

adani	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020		

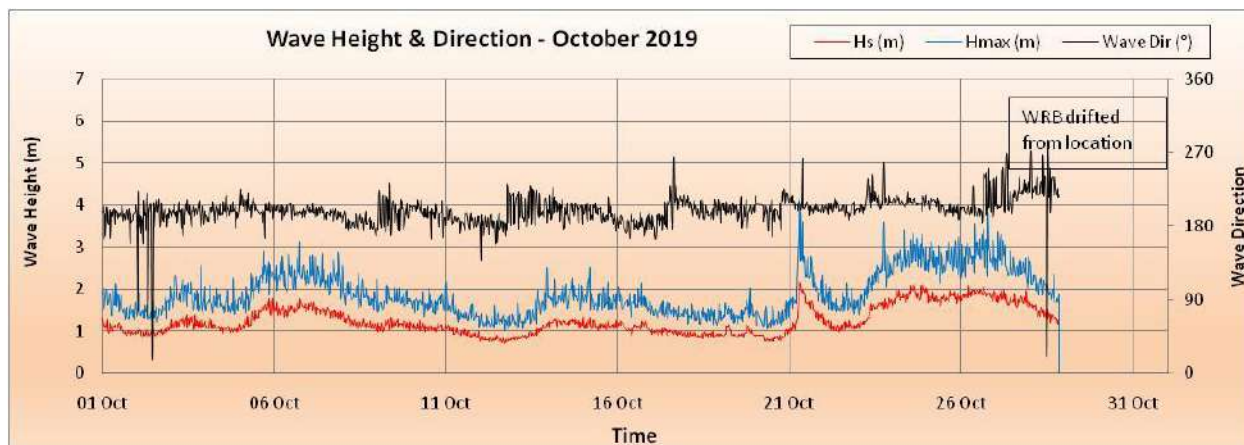
The following table provides the monthly maximum significant wave height (Hs) and wave period (Tp) observed during the seasons.

Table 5-1: Monthly maximum Hs and Tp

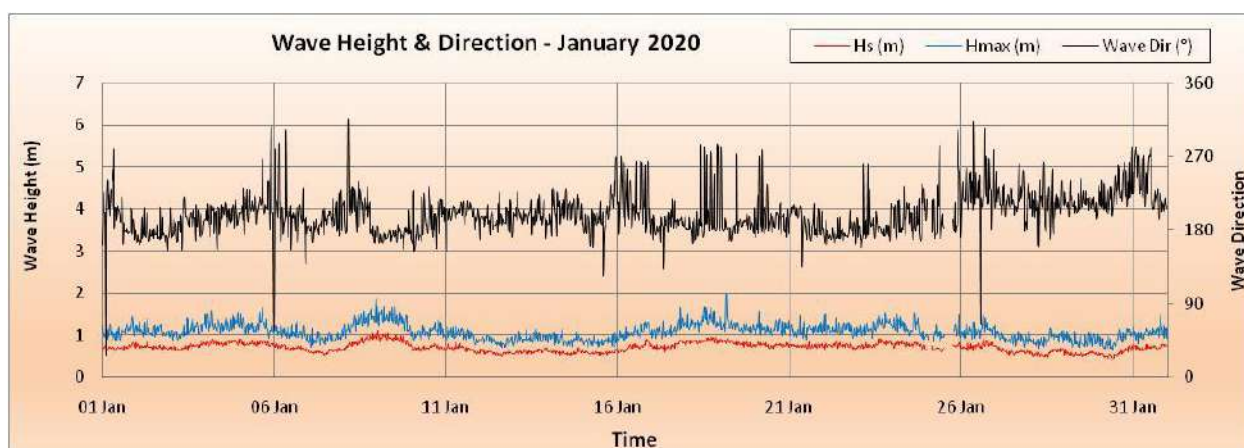
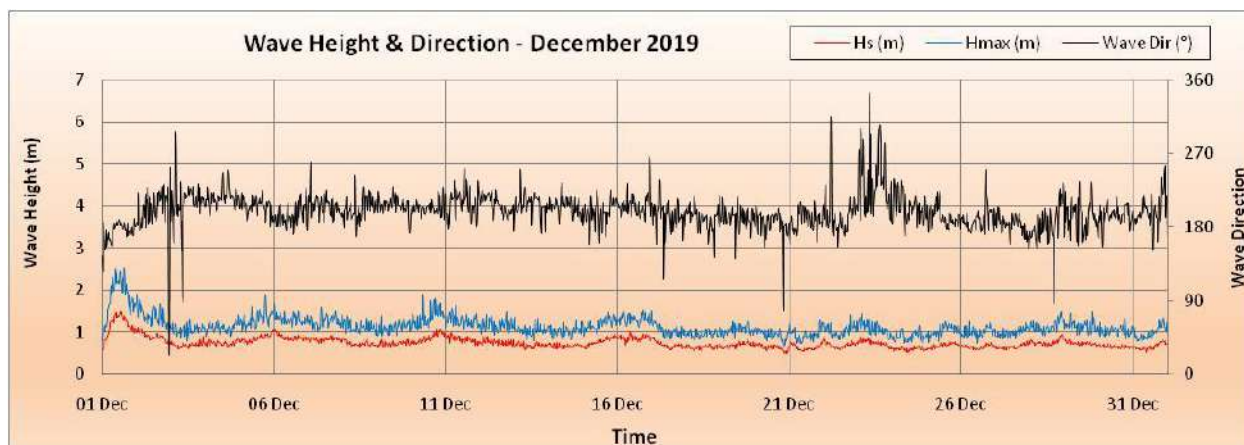
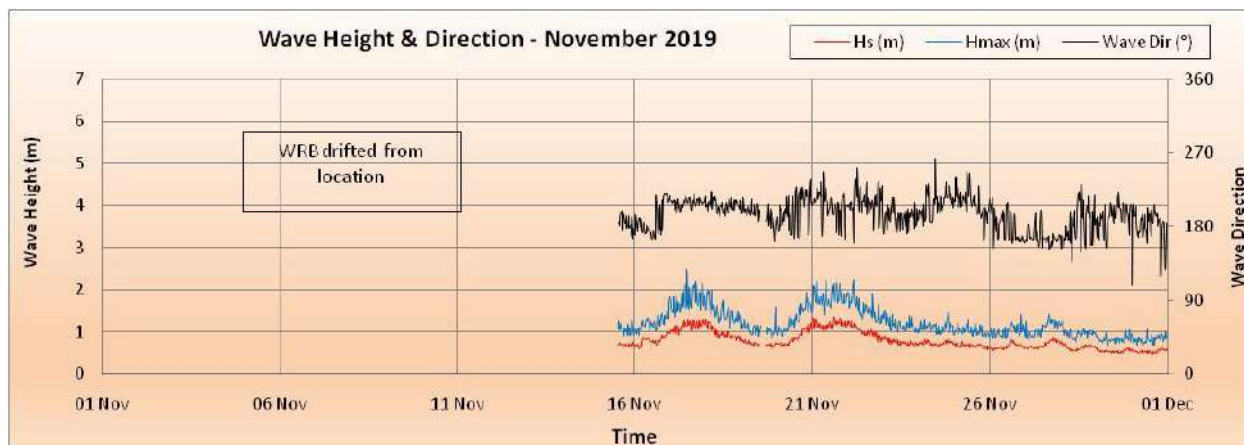
Significant wave height (Hs) in meters and wave period (Tp) in seconds			
Month	Hs (m)	Predominant Direction	Tp (sec)
October 2019	2.19	200	22.22
November 2019	1.36	195	16.67
December 2019	1.49	199	18.18
January 2020	1.11	199	18.18
February 2020	1.03	200	18.18
March 2020	1.30	197	20.00

The above table indicates that during the month of October, the significant wave height increased to more than 2m compared to other months.

The time series of wave data from October 2019 to March 2020 is shown below.



Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020



Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020

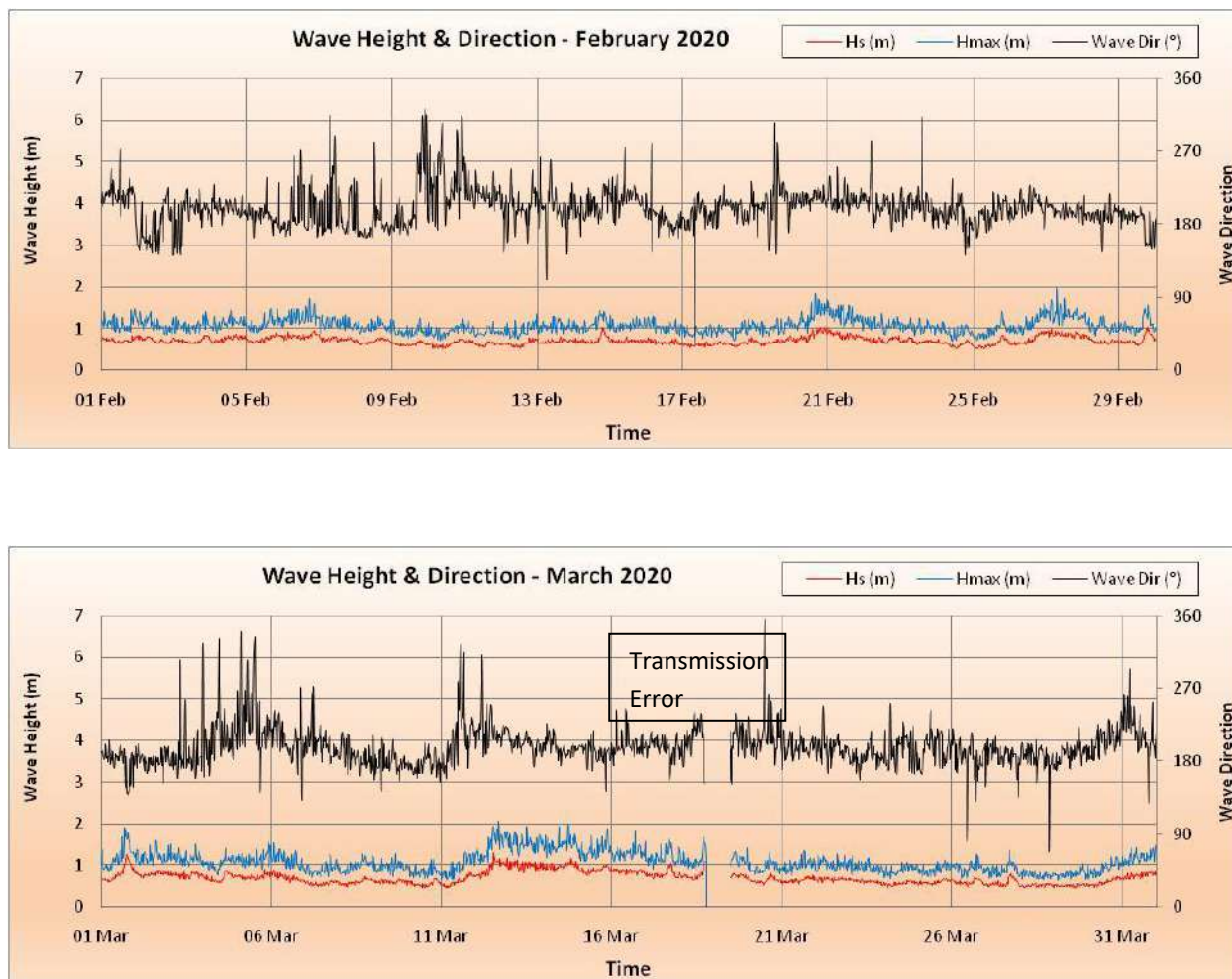


Figure 5-5: Time series of wave parameters

5.3 Current Measurements

Current meters were deployed at four locations during Monsoon and Post Monsoon 2019, to measure the speed and direction of the current at three different levels, i.e., surface, mid-depth and near bottom. The ADCPs were deployed for a period of 30 days to cover one lunar cycle.

The following table gives the deployment details of the ADCPs in the survey area for all the seasons.

Table 5-2: ADCP Mooring Locations

Location	Water Depth (m)	Period of Observation	Latitude	Longitude	Frequency
P1 (Vizhinjam)	22.1	11 th Jan – 12 th Feb 2020	08° 21' 55.4"N	76° 58' 51.6"E	600 kHz
P2 (Poovar)	23.1	12 th Jan – 12 th Feb 2020	08° 17' 35.8"N	77° 04' 03.5"E	600 kHz

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Location	Water Depth (m)	Period of Observation	Latitude	Longitude	Frequency
P3 (Pachalloor)	21.9	12 th Jan – 12 th Feb 2020	08° 24' 08.6"N	76° 56' 16.1"E	600 kHz
P4 (Mulloor)	22.9	11 th Jan – 12 th Feb 2020	08° 21' 42.3"N	76° 59' 33.9"E	600 kHz

The following table provides the maximum surface currents recorded at each location during the period from October 2019 to March 2020.

Table 5-3: Maximum speed of surface currents

Maximum Surface Current Speed in cm/s				
Season	Location P1 (Vizhinjam)	Location P2 (Poovar)	Location P3 (Pachalloor)	Location P4 (Mulloor)
Jan- Feb 2020	70.1	82.4	84.2	74.6

The current rose plots of surface current speed at Location 1 (Vizhinjam) are shown below.

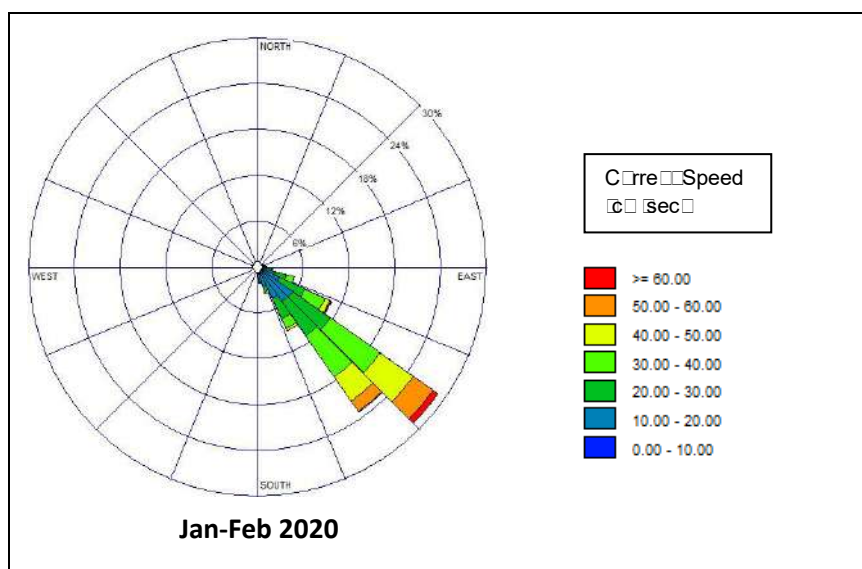


Figure 5-6: Rose Plot (surface speed in mm/sec) – P1 (Vizhinjam)

The rose plots reveal a flow parallel to the shore in all seasons. During the fair-weather period, the flow was predominantly towards the southeast.

The current rose plots of surface current speed at Location 2 (Poovar) are shown below.

Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020

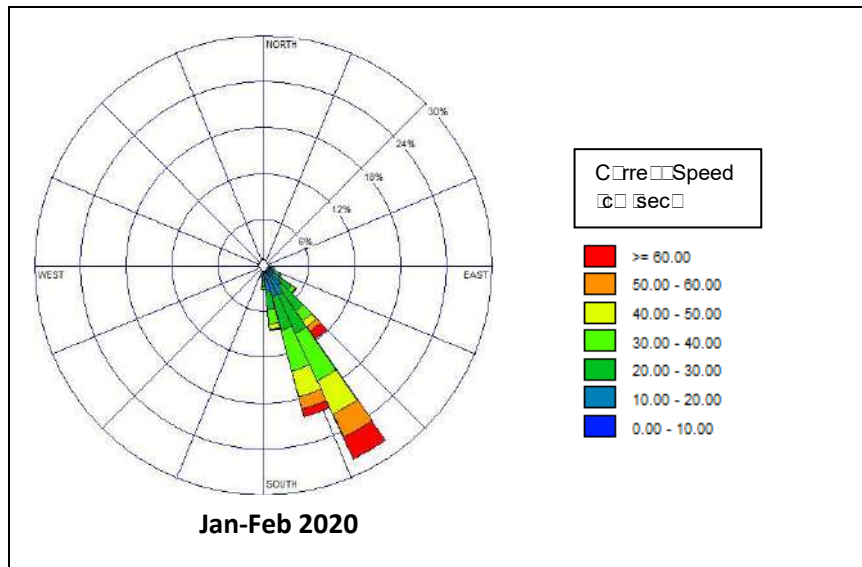


Figure 5-7: Rose Plot (surface speed in mm/sec) – P2 (Poovar)

The rose plots reveal a flow parallel to the shore in all seasons. During the fair-weather period, the flow was predominantly towards the southeast.

The current rose plots of surface current speed at Location 3 (Pachalloor) are shown below.

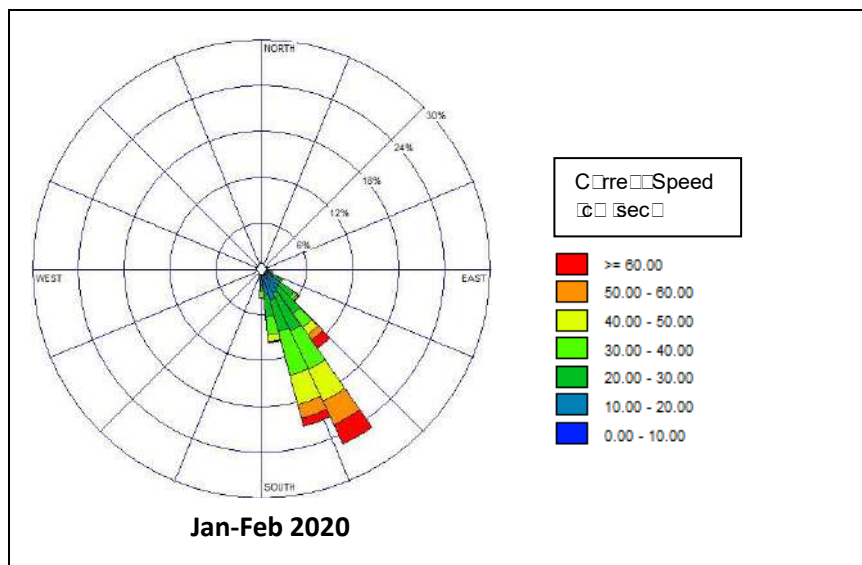


Figure 5-8: Rose Plot (surface speed in mm/sec) – P3 (Pachalloor)

The rose plots reveal a flow parallel to the shore in all seasons. During the fair-weather period, the flow was predominantly towards the southeast.

The current rose plots of surface current speed at Location 4 (Mulloor) are shown below.

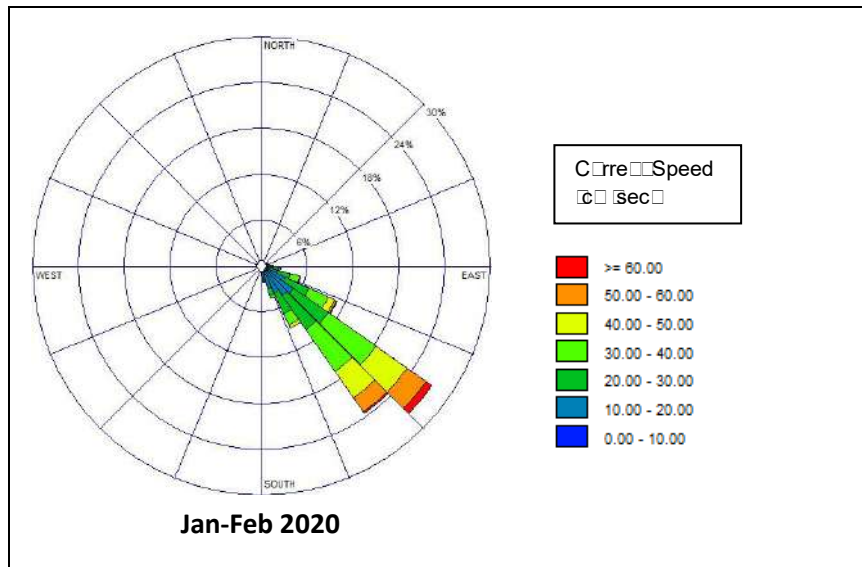


Figure 5-9: Rose Plot (surface speed in mm/sec) – P4 (Mulloor)

The rose plots reveal a flow parallel to the shore in all seasons. During the fair-weather period, the flow was predominantly towards the southeast.

5.4 Measurement of Meteorological Parameters

The automatic weather station was installed on the roof of Ayur Bay Resort. The wind data for all the months is compiled and presented in the form of rose plots below.

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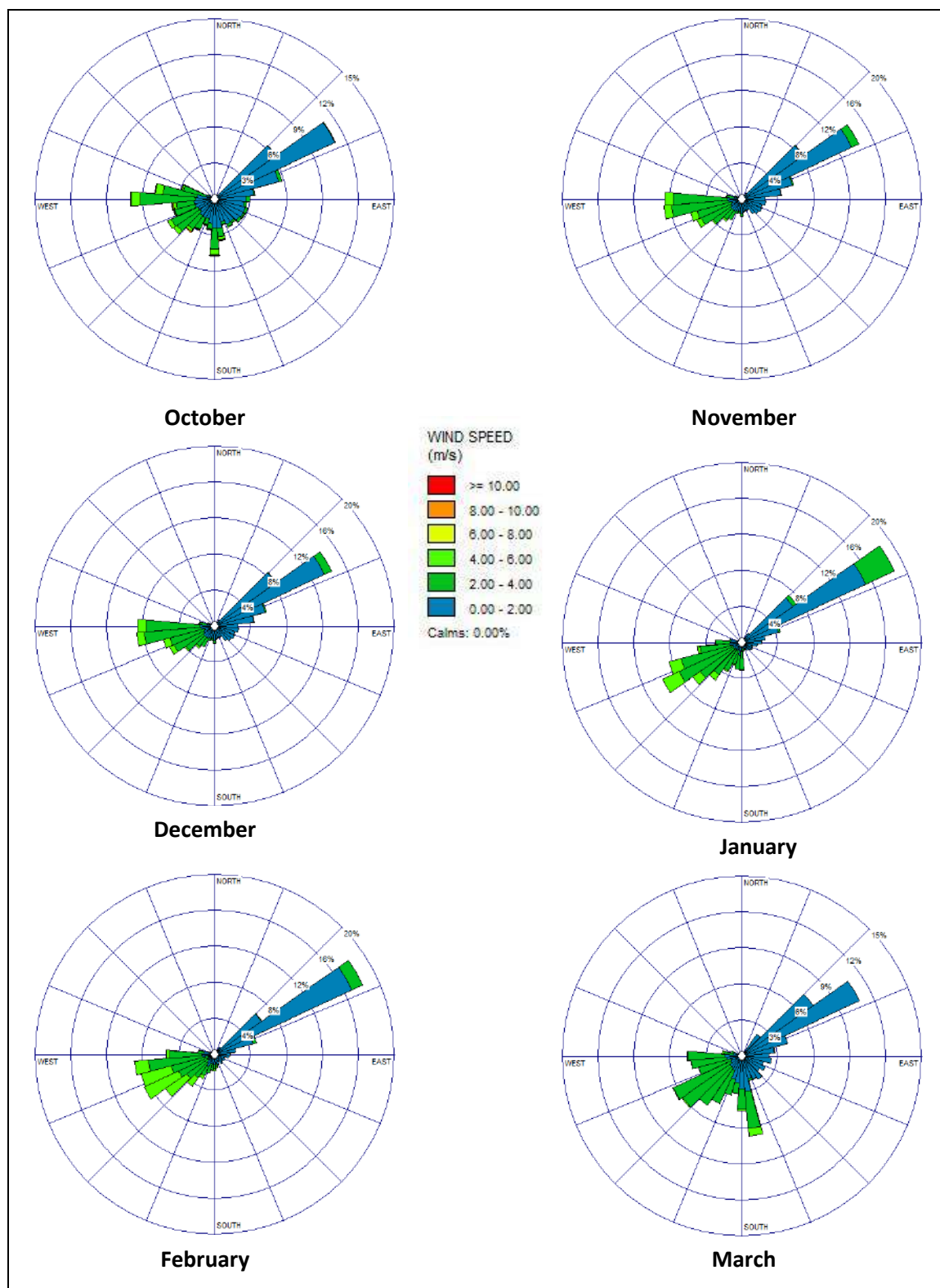


Figure 5-10: Wind rose (Speed in m/s vs direction)

adani	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
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The monthly maximum wind speed and predominant direction are provided in the tables below.

Table 5-4: Monthly maximum wind speed from seaside

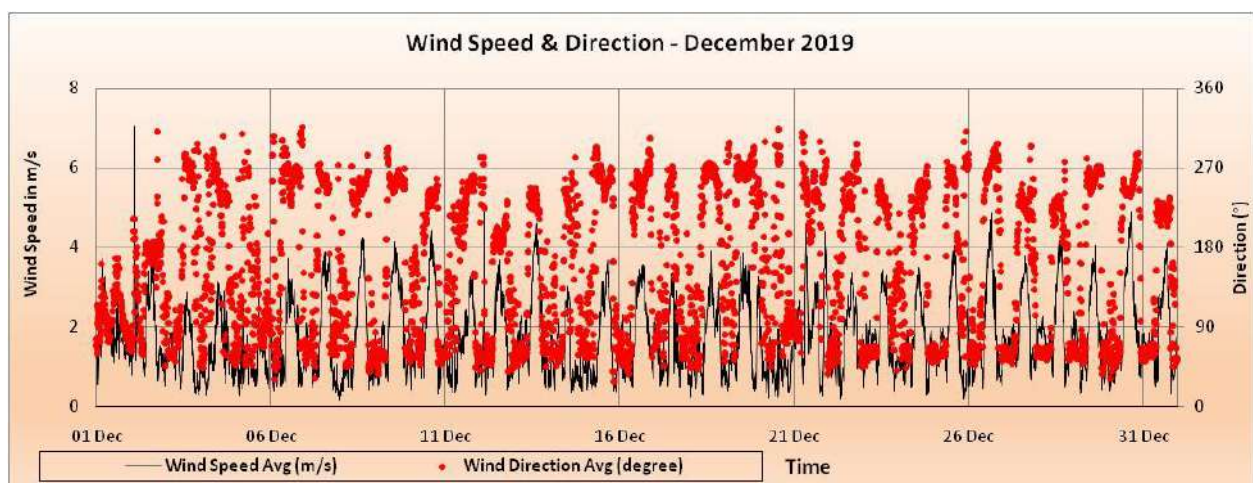
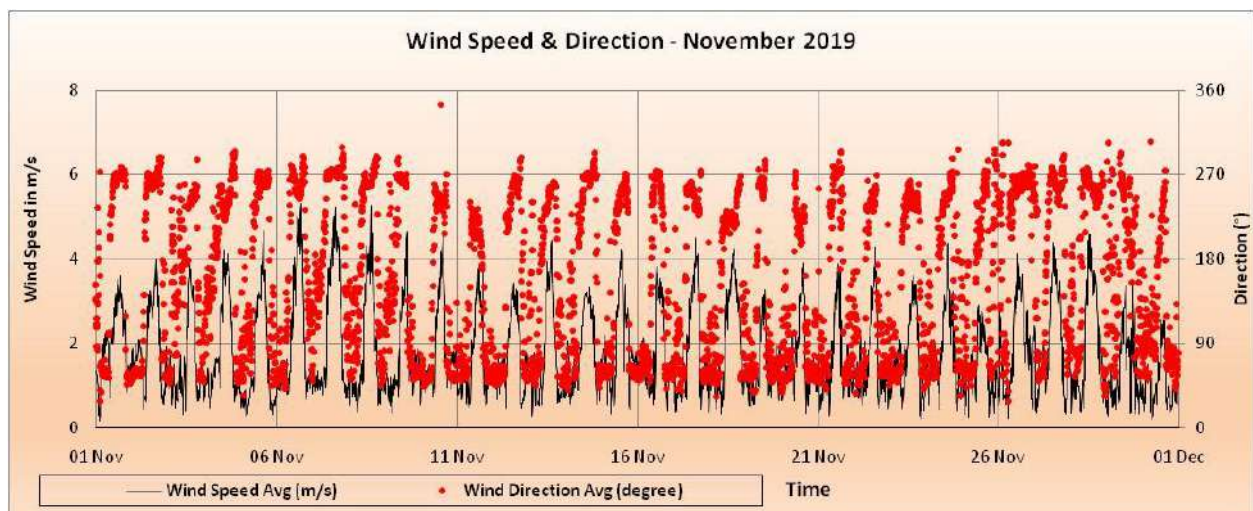
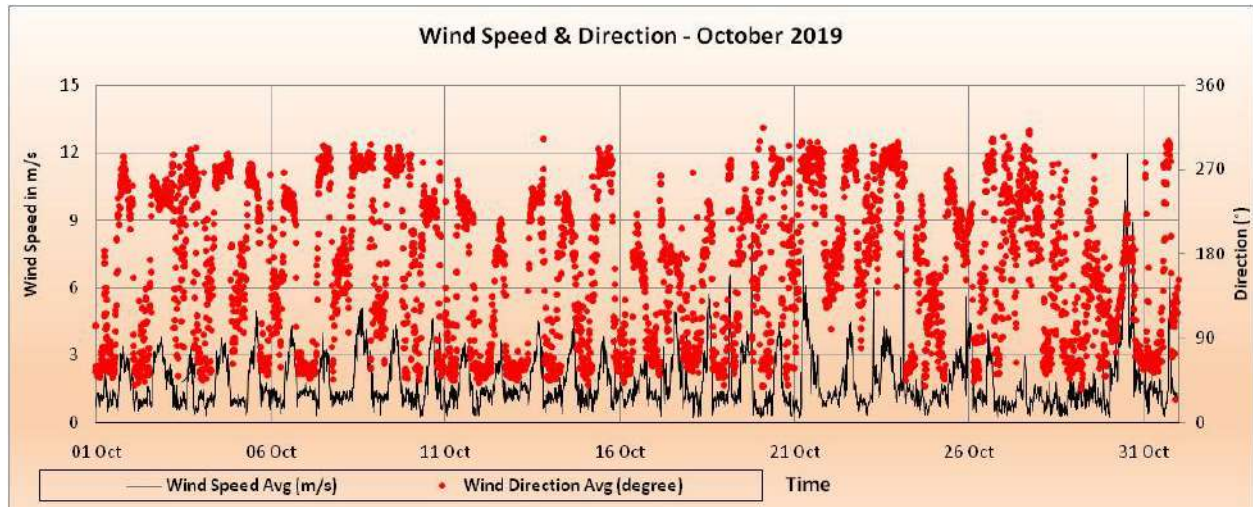
Month	Wind Speed (m/s)	Predominant Direction
October 2019	11.94	196.5
November 2019	5.31	246.8
December 2019	6.97	197.4
January 2020	5.29	257.5
February 2020	5.51	242.4
March 2020	4.92	226.5

Table 5-5: Monthly maximum wind speed from landside

Month	Wind Speed (m/s)	Predominant Direction
October 2019	9.77	58.5
November 2019	3.70	59.8
December 2019	4.00	60.4
January 2020	4.42	60.9
February 2020	5.51	54.6
March 2020	4.81	173.3

The time series of wind data from October 2019 to March 2020 is shown below.

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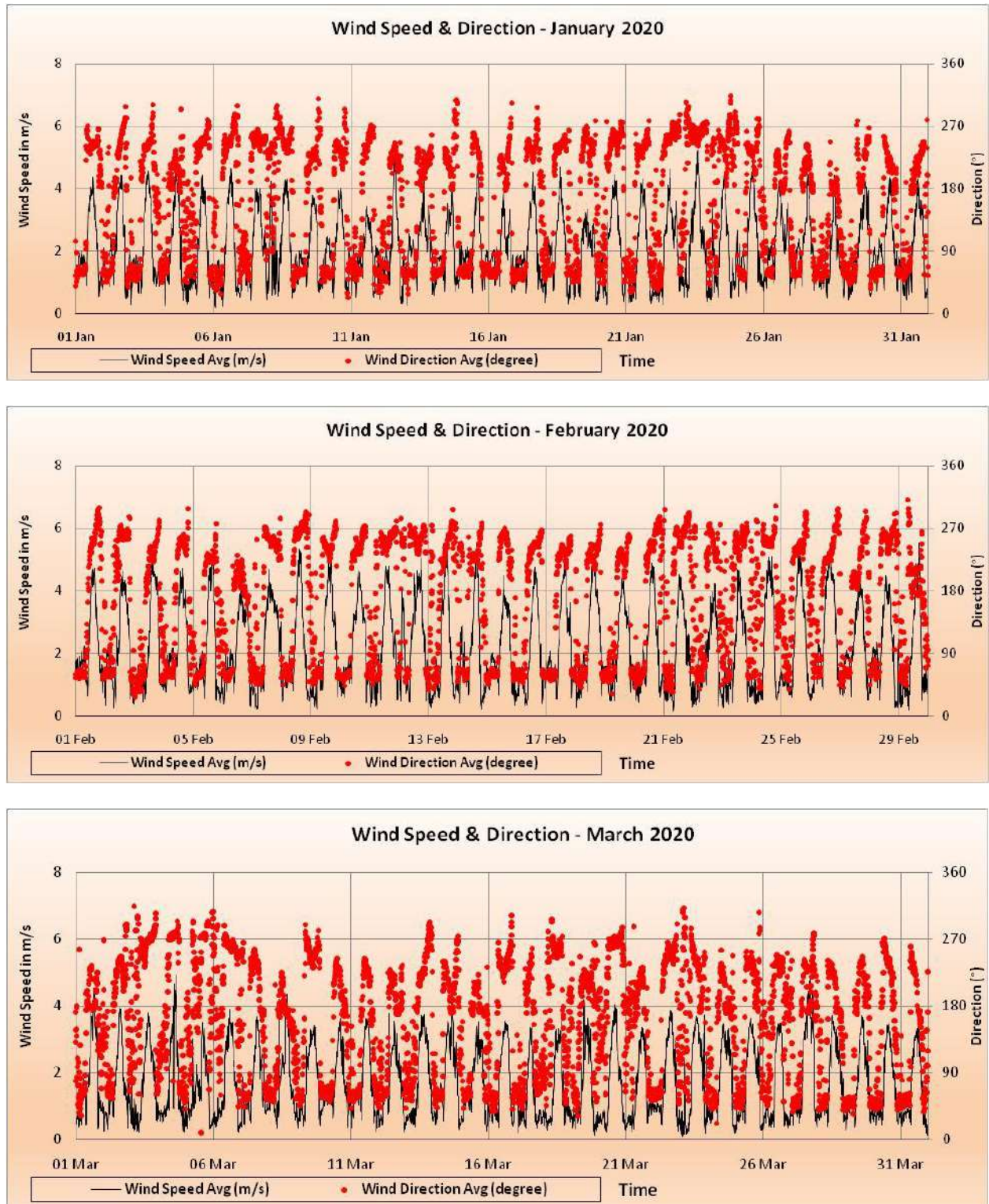


Figure 5-11: Time series of wind data

The percentage occurrence tables for atmospheric pressure, temperature and relative humidity for October 2019 to March 2020 are shown below.

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Table 5-6: Percentage distribution of Met parameters

Parameter	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Atm Pressure (mb)	Percentage of Occurrence					
<1000	0	0	0.09	0	0	0
1000 - 1004	9.02	5.79	1.67	0	0.62	0.34
1004 - 1008	79.41	78.96	68.72	44.9	37.77	60.6
> 1008	11.57	15.25	29.52	55.1	61.61	39.06
Total	100	100	100	100	100	100
Temperature (°C)	Percentage of Occurrence					
20-24	4.5	1.16	2.59	9.59	2.32	0
24-28	68.42	55.47	58.63	44.84	44.86	40.47
28-32	27.08	43.37	38.77	45.57	52.82	59.35
>32	0	0	0.00	0	0	0.18
Total	100	100	99.99	100	100	100
RH (%)	Percentage of Occurrence					
50-60	0	0	0.78	0	0.78	4.99
60-70	1.05	8.29	15.56	8.29	15.56	17.63
70-80	25.68	33.63	32.85	33.63	32.85	33.71
>80	73.27	58.09	50.81	58.09	50.81	43.67
Total	100	100	100	100	100	100

The histograms drawn for the parameters for October 2019 to March 2020 are shown below.

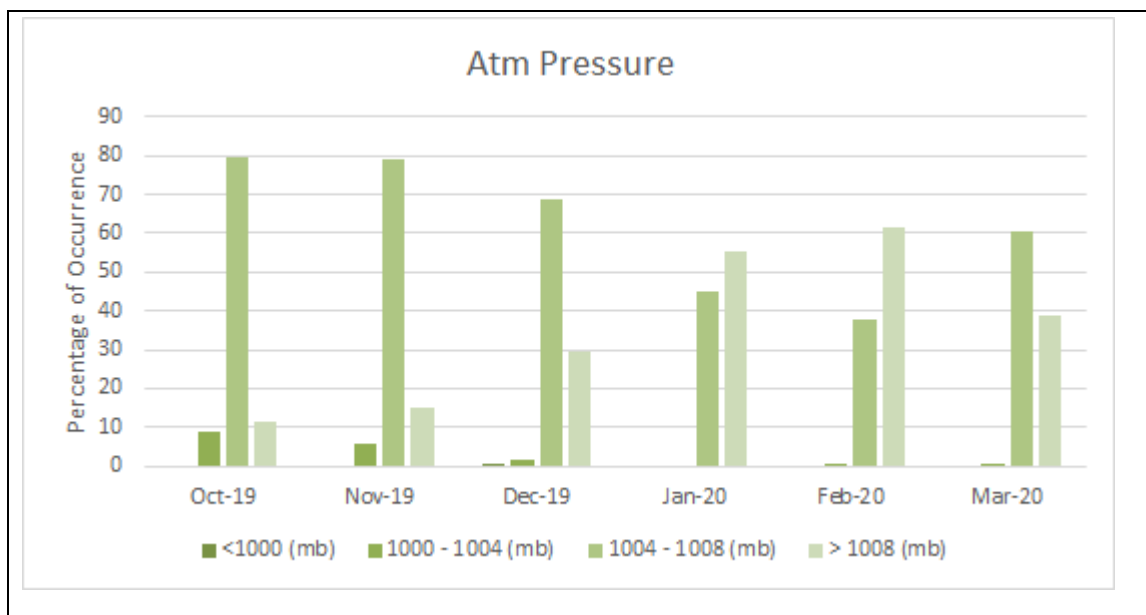


Figure 5-12: Histogram of atmospheric pressure (October 2019 – March 2020)

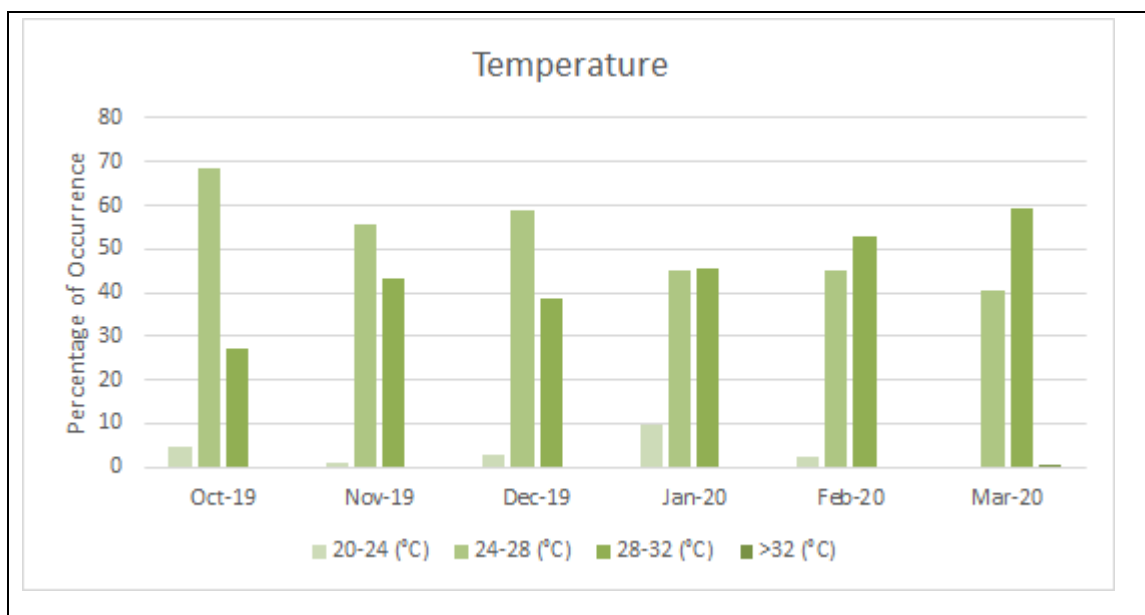
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Figure 5-13: Histogram of temperature (October 2019 – March 2020)

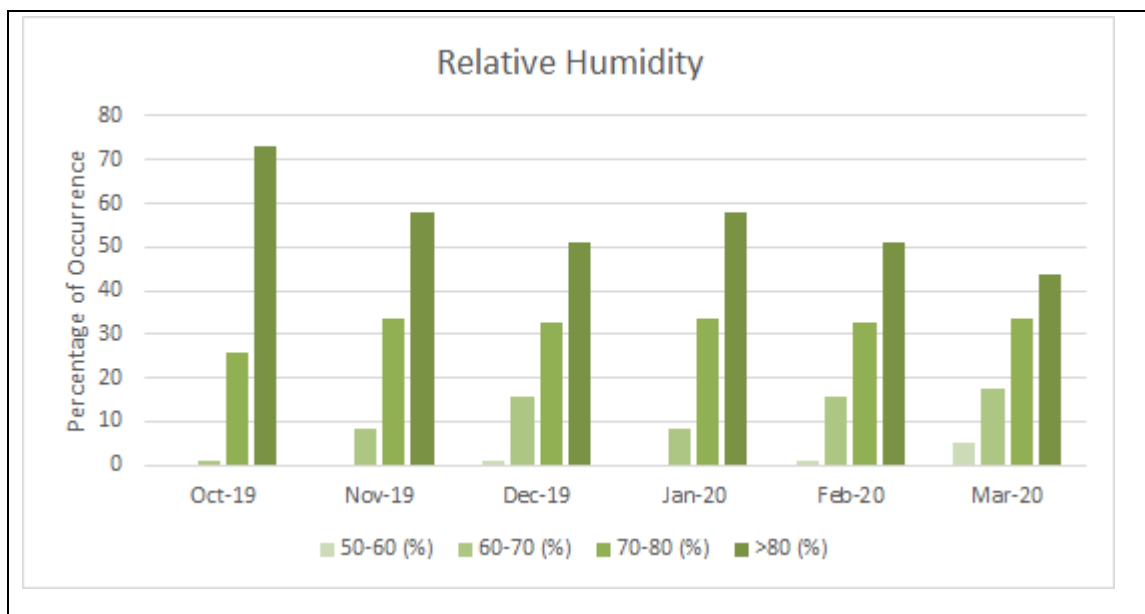


Figure 5-14: Histogram of relative humidity (October 2019 – March 2020)

The following table shows the amount of rainfall received during the entire period from October 2019 to March 2020.

Table 5-7: Cumulative rainfall

Month	Cumulative Rainfall (mm)
October 2019	391.2
November 2019	140.8
December 2019	48.0

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Month	Cumulative Rainfall (mm)
January 2020	45.4
February 2020	35.0
March 2020	19.4

The histogram of rainfall for the entire period is provided in the image below.

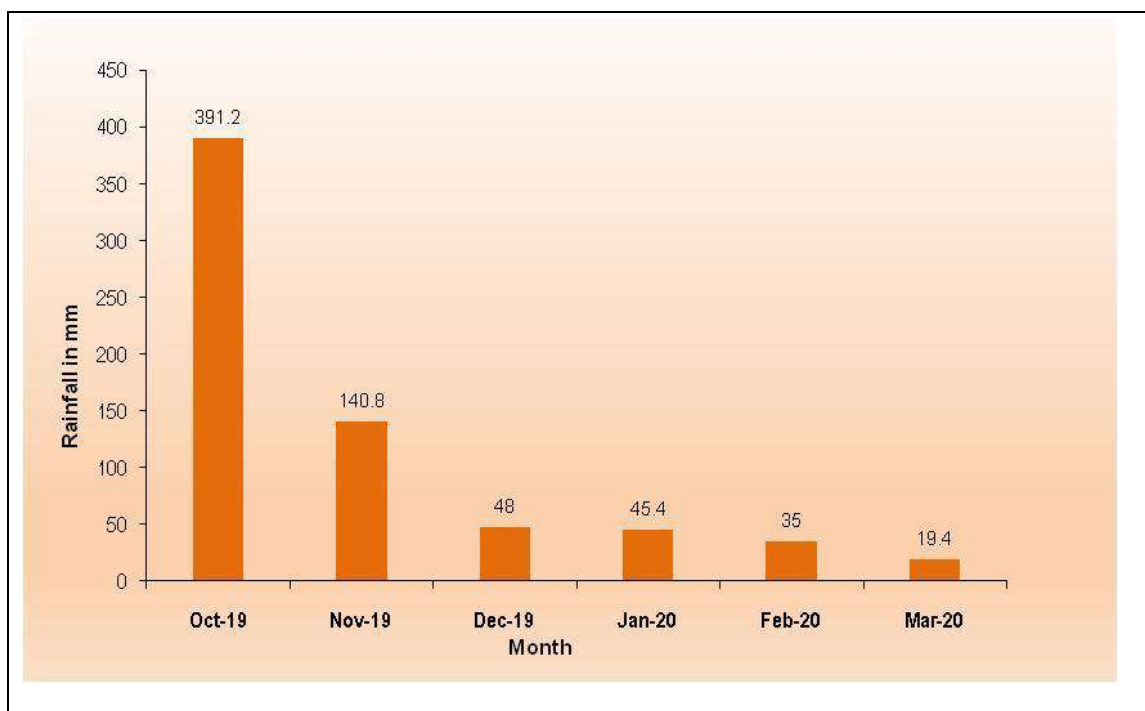


Figure 5-15: Histogram of cumulative rainfall

5.5 Littoral Environment Observations

The LEO was carried out at 81 locations in all the months, except for March 2020, as a result of the nation-wide lockdown being imposed due to the COVID-19 pandemic. The LEO plate was deployed at all the locations and the same was tracked for about five to ten minutes, as per the site conditions. The initial and final GPS positions were then used to calculate the SOG and COG. The estimated wave height, angle of wave, period and the stretch of breakers were also noted down in the log.

The along shore current followed a southerly trend in the monsoon period and a northward trend during the post monsoon period. The following table shows the maximum along shore current speed recorded in each month.


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Table 5-8: Monthly maximum along shore current

Month	Max Speed (cm/s) / Direction	Line No.	Location
October 2019	47.75 / north	CSP-16	Poovar Beach South
November 2019	120.50 / north	CSP-17	Poovar Beach South
December 2019	19.88 / north	CSP-78	ValiyaVeli
January 2020	41.56 / north	CSP-28	Pulluvila
February 2020	33.16 / north	CSP-26	Karumkulam
March 2020	19.50 / north	CSP-72	Vettucaud

5.6 Photographic Documentation

Photographic documentation was carried out for all the 81 locations, coinciding with the cross-shore profiling.

In the month of March 2020, the RTK survey activities were severely hampered as a result of restriction on personnel movement due to COVID-19. The photographs for the period from October 2019 to March 2020 are placed at **Annexure A**. As a common reference point, a flag was fixed at each of the cross-shore profiling alignments while taking the photograph. Using the RTK system, this point was staked during the photography. The photographs indicate the intensity of erosion in the monsoon and beach build up during the subsequent months.

5.7 Cross Shore Profiles

The cross-shore profiling for the period was carried out using RTK in the onshore region and a wide swath bathymetric system in the offshore region. During the survey period, due to breakers nearshore, the boat could not approach the shore.

The following table provides the identification of CSP vis-à-vis the local name:

Table 5-9: CSP Location names


CSP NO.	LANDMARK	LOCATION
CSP-01	CATHOLIC CRISMATIC PRAYER CENTER	EDAPPADU BEACH
CSP-02		
CSP-03		
CSP-04	ST. MARY'S CHURCH	VALLAVILAY
CSP-05		

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CSP NO.	LANDMARK	LOCATION
CSP-06		
CSP-07	ST. NICOLAS' CHURCH	NEERODY
CSP-08		
CSP-09		
CSP-10	SREE BHADRAKALI TEMPLE	POZHIYOOR
CSP-11		
CSP-12		
CSP-13	ST. MATHEW'S CHURCH	PARUTHIYOOR
CSP-14	CHURCH OF CHRIST	
CSP-15	POOVAR ISLAND RESORT	POOVAR BEACH SOUTH
CSP-16		
CSP-17		
CSP-18	POZHIKARA BEACH	POOVAR
CSP-19		
CSP-20	ST. ANTONY'S CHAPEL	POOVAR BEACH NORTH
CSP-21		
CSP-22	ST. ANTONY'S CHURCH	KARUMKULAM
CSP-23		
CSP-24		
CSP-25		
CSP-26		
CSP-27	GOTHAMBU ROAD	PULLUVILA
CSP-28		
CSP-29		
CSP-30		
CSP-31	ADIMALATHURA CATHOLIC CHURCH	ADIMALATHURA
CSP-32		
CSP-33		
CSP-34		
CSP-35	AZHIMALA TEMPLE	AZHIMALA
CSP-36	NAGAR BHAGAVATHY TEMPLE	MULLUR
CSP-37		
CSP-38	ADANI PORT RECLAMATION AREA	ADANI PORT OFFICE VIZHINJAM
CSP-39		
CSP-40		
CSP-41	VIZHINJAM LIGHT HOUSE	KOVALAM
CSP-42		
CSP-43		

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CSP NO.	LANDMARK	LOCATION
CSP-44		
CSP-45		
CSP-46		
CSP-47	SAMUDRA BEACH PARK	KOVALAM
CSP-48	MOSQUE	PANATHURA
CSP-49		
CSP-50	PANATHURA TEMPLE	PANATHURA
CSP-51		
CSP-52		
CSP-53	PUNTHURA FISH MARKET	PUNTHURA
CSP-54		
CSP-55		
CSP-56		
CSP-57		
CSP-58	BEEMA PALLY	BEEMA PALLY
CSP-59		
CSP-60		
CSP-61	CHERIYATHURA SPORTS GROUND	CHERIYATHURA
CSP-62		
CSP-63	VALIYATHURA BRIDGE	VALIYATHURA
CSP-64		
CSP-65		
CSP-66		
CSP-67		
CSP-68	SHANGUMUGHAM BEACH	SHANGUMUGHAM
CSP-69		
CSP-70	ST. PETER'S CHURCH	SHANGUMUGHAM
CSP-71		
CSP-72	VETTUCAUD CHURCH	VETTUCAUD
CSP-73		
CSP-74		
CSP-75	VELI CHILDRENS PARK	KOCHUVELI
CSP-76		
CSP-77		
CSP-78	ST. THOMAS' CHURCH	VALIYA VELI
CSP-79		
CSP-80	CHRISTIAN BROTHEREN CHURCH	THUMBA
CSP-81		

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5.8 Water Sampling

Water samples were collected from 4 locations, namely, L1 (Mulloor), L2 (Kovalam), L3 (Pachalloor) and L4 (Poovar) from three levels: surface, mid-depth and near bottom during two seasons. The parameters measured were Total Suspended Solids, Turbidity and Salinity at NABL accredited laboratory in Kochi (Standard^s Environmental & Analytical Laboratories, Accreditation and Approval: NABL as per ISO 17025:2005).

33 samples from each location were collected from 5th to 8th February 2020. The maximum values of Turbidity (NTU), Total Suspended Solids (mg/l) and Salinity (ppt) for each location are tabulated below.

Table 5-10: Summary of Turbidity, TSS and Salinity – Fair-weather period

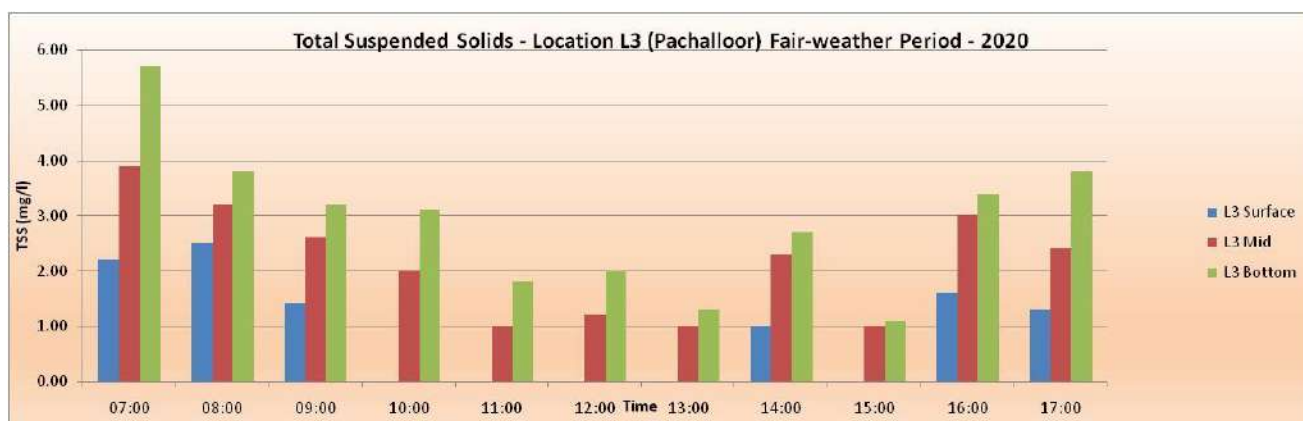
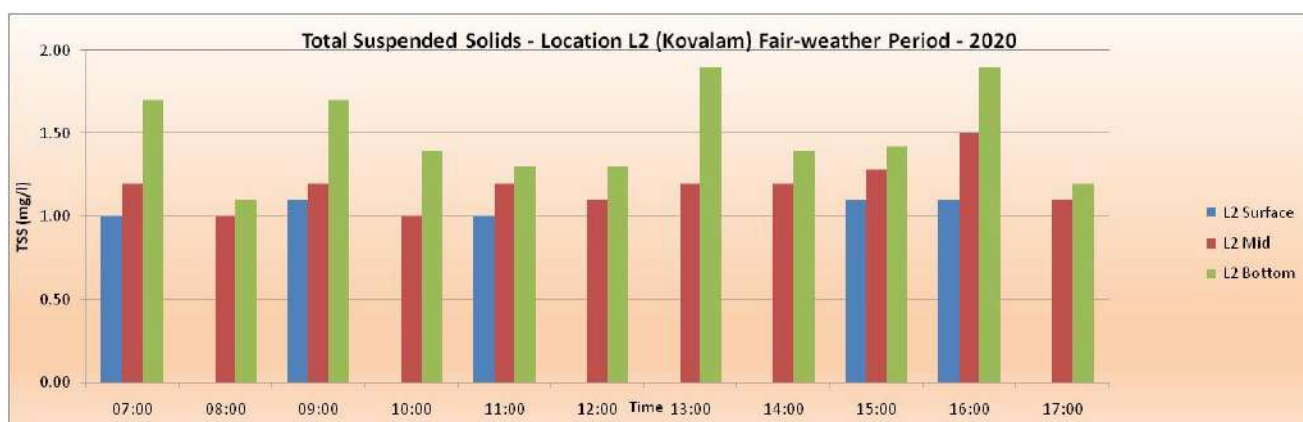
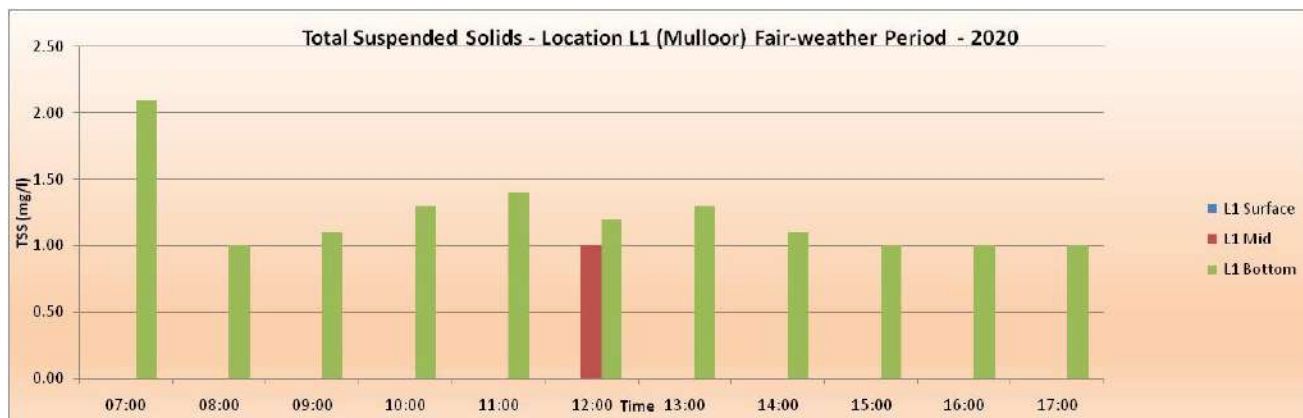
Location	Surface			Mid Depth			Near Bottom		
	Turbidity	TSS	Salinity	Turbidity	TSS	Salinity	Turbidity	TSS	Salinity
L1 (Mulloor)	0.7	BDL	34.1	1.0	1.0	35.1	0.4	2.1	35.6
L2 (Proposed Dredge dumping)	0.9	1.1	34.5	2.0	1.5	35.2	0.8	1.9	35.9
L3 (Pachalloor)	2.0	2.5	34.1	2.9	3.9	35.2	3.0	5.7	35.8
L4 (Poovar)	0.3	1.0	34.6	0.4	2.4	35.4	0.8	3.9	35.8

As can be observed from the above table, the maximum turbidity recorded was 3 NTU near the bottom of location L3. The maximum TSS were observed near the bottom of location L3 (5.7 mg/l). The maximum salinity recorded was 35.9 ppt near the bottom of location L2.

Note: At times, when the value of Total Suspended Solids dropped to less than 1mg/l, it was Below Detectable Level (BDL) and the exact value could not be measured accurately and thus the column is not shown.

The time series for Total Suspended Solids (in mg/l) for the above locations (Fair-weather period) are provided below.

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Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020

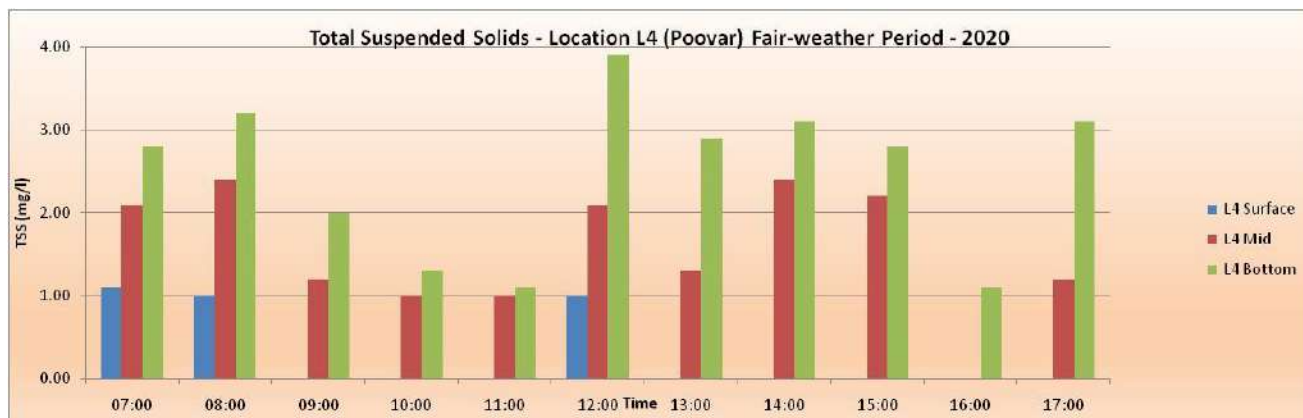
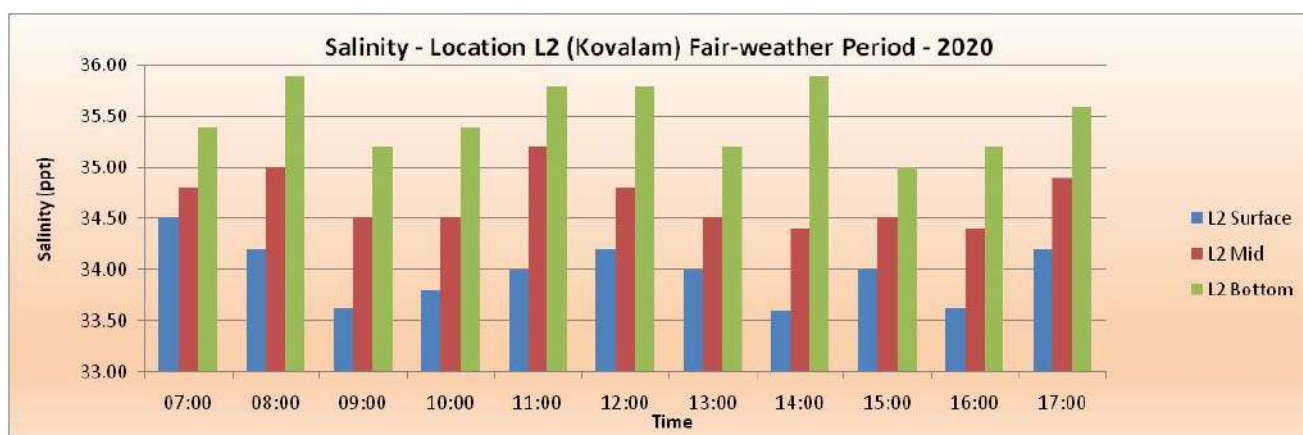
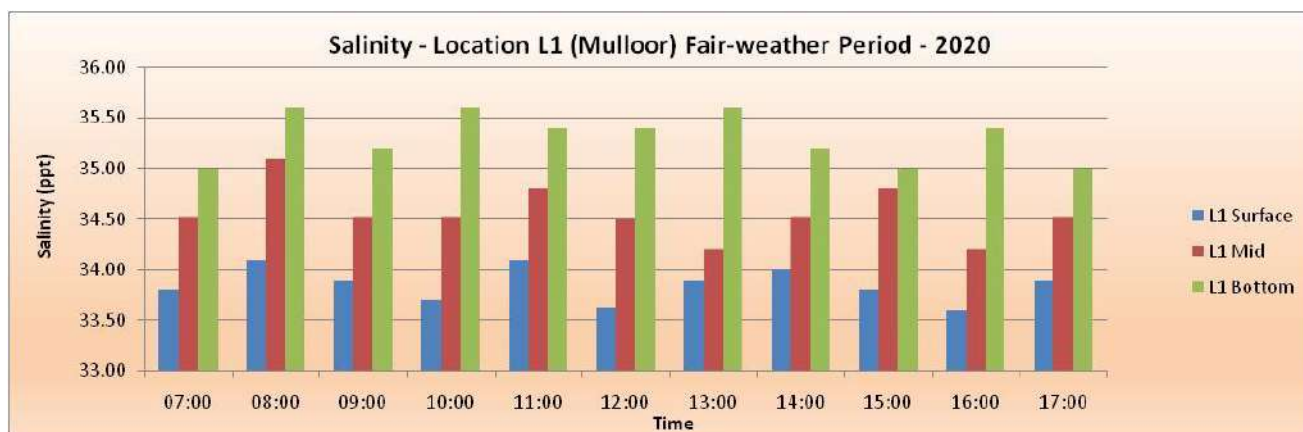


Figure 5-16: Time Series of TSS (Fair-weather period-2020)

The time series for salinity at all three levels for all the locations for the Fair-weather period -2020 is given as follows.



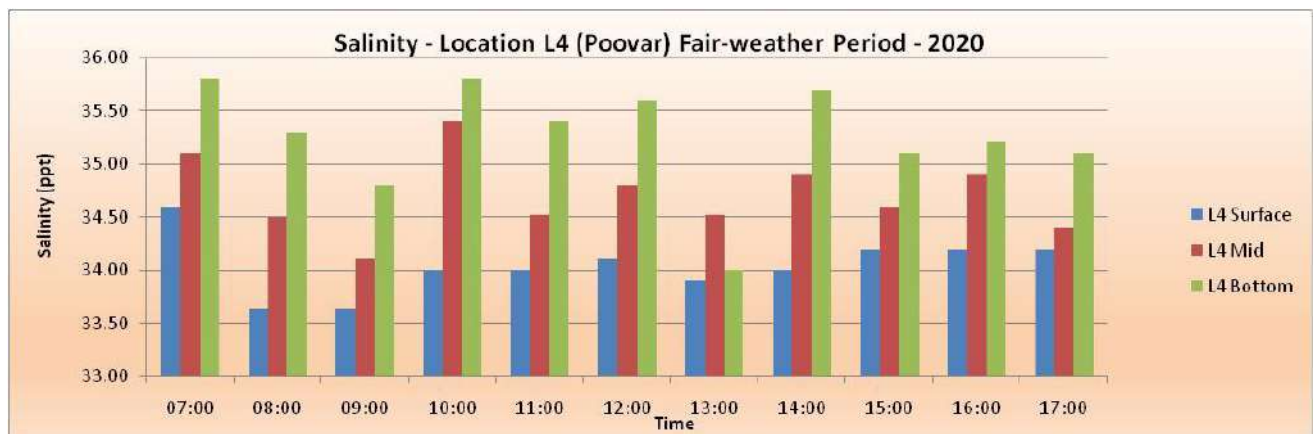
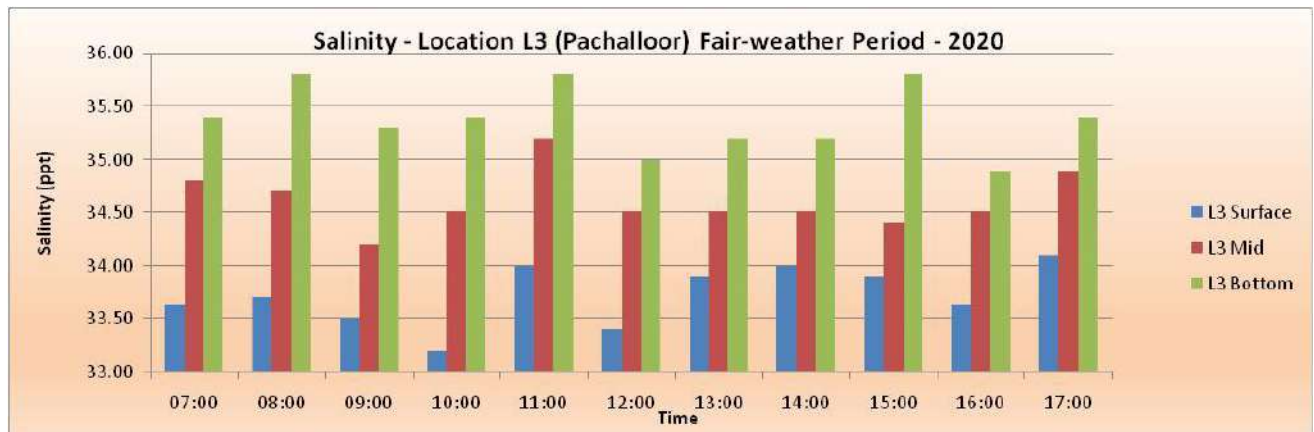
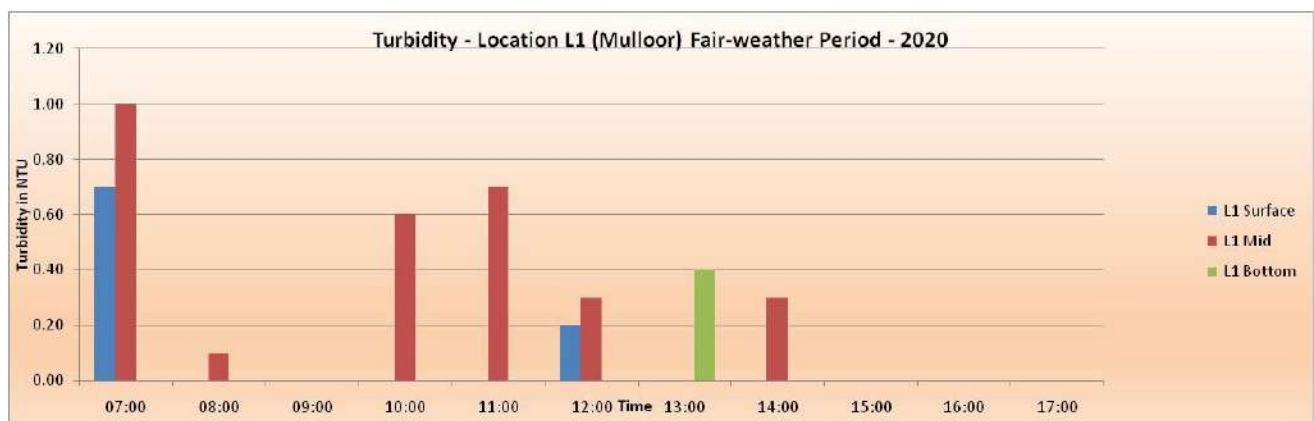


Figure 5-17: Time Series of salinity (Fair-weather period -2020)

The time series of turbidity at all levels for the locations for the fair-weather period - 2020 is shown below.



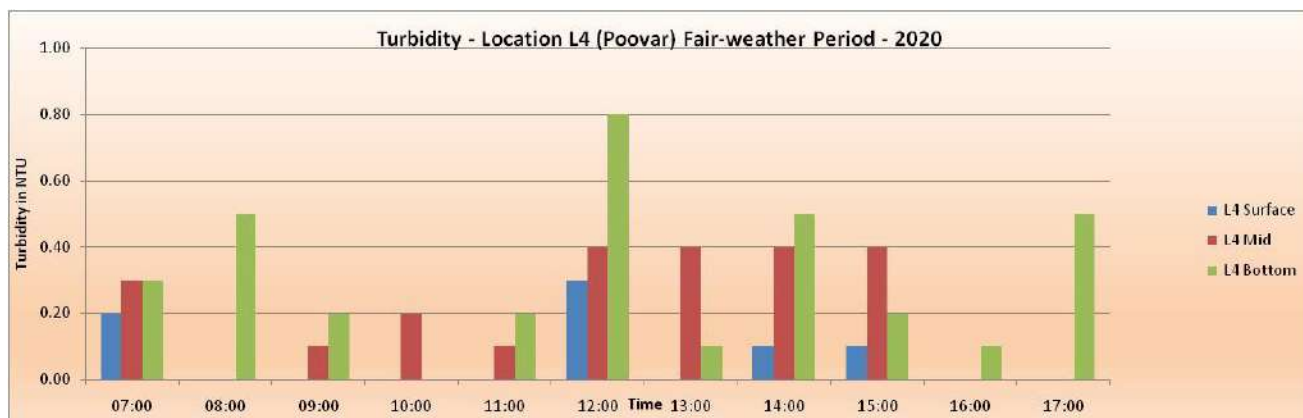
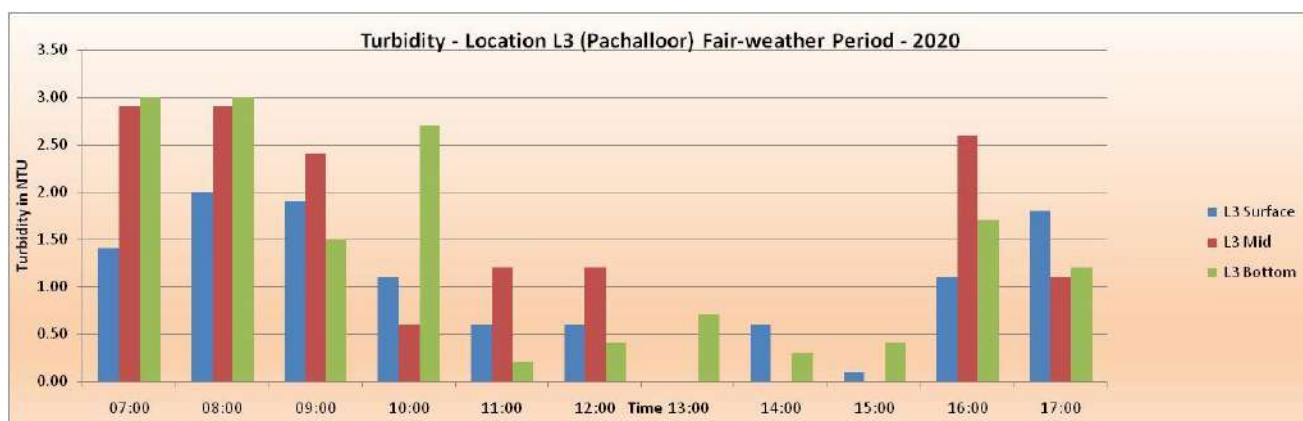
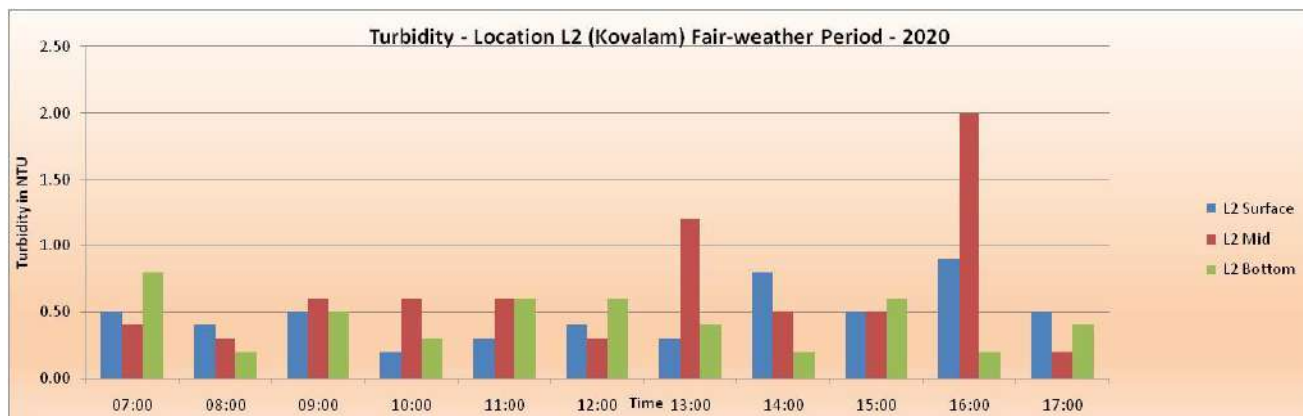



Figure 5-18: Time Series of Turbidity at water sampling locations (Fair-weather period -2020)

Note: At times, when the value of Turbidity dropped to less than 0.1 NTU, it was Below Detectable Level (BDL) and the exact value could not be measured accurately and thus the column is not shown.

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5.9 Beach Sampling

As part of the contract, 62 out of 81 beach samples were collected in the month of December 2019 from the corresponding CSP locations during the Post monsoon season. The samples are named from BS-01 to BS-81. 7 samples (BS-3, BS-4, BS-35, BS-49, BS-50, BS-51 and BS-52) could not be collected due to lack of beach.


The following table provides the D-50 value of the sediments collected along with the classification of samples.

Table 5-11: Beach sample soil classification (Post monsoon 2019)

Sample Name	Gravel %	Sand %	Mud%	Total	D50 (mm)	Classification
BS-01	0	100	0	100	0.5799	Medium Sand
BS-02	0	100	0	100	0.5928	Medium Sand
BS-03	Not collected					
BS-04	Not collected					
BS-05	0	100	0	100	0.5089	Medium Sand
BS-06	0	100	0	100	0.5245	Medium Sand
BS-07	0	100	0	100	0.5022	Medium Sand
BS-08	0	100	0	100	0.5997	Medium Sand
BS-09	0	100	0	100	0.5882	Medium Sand
BS-10	0	100	0	100	0.5252	Medium Sand
BS-11	0	100	0	100	0.5756	Medium Sand
BS-12	0	100	0	100	0.4623	Medium Sand
BS-13	0	100	0	100	0.5663	Medium Sand
BS-14	0	100	0	100	0.4980	Medium Sand
BS-15	0	100	0	100	0.4601	Medium Sand
BS-16	0	100	0	100	0.5263	Medium Sand
BS-17	0	100	0	100	0.4830	Medium Sand
BS-18	0	100	0	100	0.4640	Medium Sand
BS-19	0	100	0	100	0.4547	Medium Sand
BS-20	0	100	0	100	0.4926	Medium Sand
BS-21	0	100	0	100	0.5067	Medium Sand
BS-22	0	100	0	100	0.3454	Fine Sand

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Sample Name	Gravel %	Sand %	Mud%	Total	D50 (mm)	Classification
BS-23	0	100	0	100	0.5632	Medium Sand
BS-24	0	100	0	100	0.4792	Medium Sand
BS-25	0	100	0	100	0.6146	Medium Sand
BS-26	0	100	0	100	0.5113	Medium Sand
BS-27	0	100	0	100	0.6083	Medium Sand
BS-28	0	100	0	100	0.4636	Medium Sand
BS-29	0	100	0	100	0.4296	Medium Sand
BS-30	0	100	0	100	0.5245	Medium Sand
BS-31	0	100	0	100	0.4887	Medium Sand
BS-32	0	100	0	100	0.3210	Fine Sand
BS-33	0	100	0	100	0.5085	Medium Sand
BS-34	0	100	0	100	0.2367	Fine Sand
BS-35	Not collected					
BS-36	0	100	0	100	0.4648	Medium Sand
BS-37	0	100	0	100	0.4261	Medium Sand
BS-38	0	100	0	100	0.6142	Medium Sand
BS-39	0	100	0	100	0.4103	Fine Sand
BS-40	0	100	0	100	0.5387	Medium Sand
BS-41	0	100	0	100	0.3385	Fine Sand
BS-42	0	100	0	100	0.2095	Fine Sand
BS-43	0	100	0	100	0.2974	Fine Sand
BS-44	0	100	0	100	0.2700	Fine Sand
BS-45	0	100	0	100	0.3140	Fine Sand
BS-46	0	100	0	100	0.2964	Fine Sand
BS-47	0	100	0	100	0.3473	Fine Sand
BS-48	0	100	0	100	0.2714	Fine Sand
BS-49	Not collected					
BS-50	Not collected					
BS-51	Not collected					
BS-52	Not collected					

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Sample Name	Gravel %	Sand %	Mud%	Total	D50 (mm)	Classification
BS-53	0	100	0	100	0.2856	Fine Sand
BS-54	0	100	0	100	0.3535	Fine Sand
BS-55	0	100	0	100	0.3902	Fine Sand
BS-56	0	100	0	100	0.4311	Medium Sand
BS-57	0	100	0	100	0.3947	Fine Sand
BS-58	0	100	0	100	0.4300	Medium Sand
BS-59	0	100	0	100	0.4300	Fine Sand
BS-60	0	100	0	100	0.3817	Fine Sand
BS-61	0	100	0	100	0.4191	Fine Sand
BS-62	0	100	0	100	0.3603	Fine Sand
BS-63	0	100	0	100	0.3739	Fine Sand
BS-64	0	100	0	100	0.3755	Fine Sand
BS-65	0	100	0	100	0.3743	Fine Sand
BS-66	0	100	0	100	0.3541	Fine Sand
BS-67	0	100	0	100	0.3788	Fine Sand
BS-68	0	100	0	100	0.4133	Fine Sand
BS-69	0	100	0	100	0.3540	Fine Sand
BS-70	0	100	0	100	0.3388	Fine Sand
BS-71	0	100	0	100	0.3724	Fine Sand
BS-72	0	100	0	100	0.3724	Fine Sand
BS-73	0	100	0	100	0.3680	Fine Sand
BS-74	0	100	0	100	0.3543	Fine Sand
BS-75	0	100	0	100	0.3689	Fine Sand
BS-76	0	100	0	100	0.3445	Fine Sand
BS-77	0	100	0	100	0.3595	Fine Sand
BS-78	0	100	0	100	0.3870	Fine Sand
BS-79	0	100	0	100	0.3945	Fine Sand
BS-80	0	100	0	100	0.4273	Medium Sand
BS-81	0	100	0	100	0.4436	Medium Sand

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The following graph shows the distribution of D50 value of the sediments collected in each location.

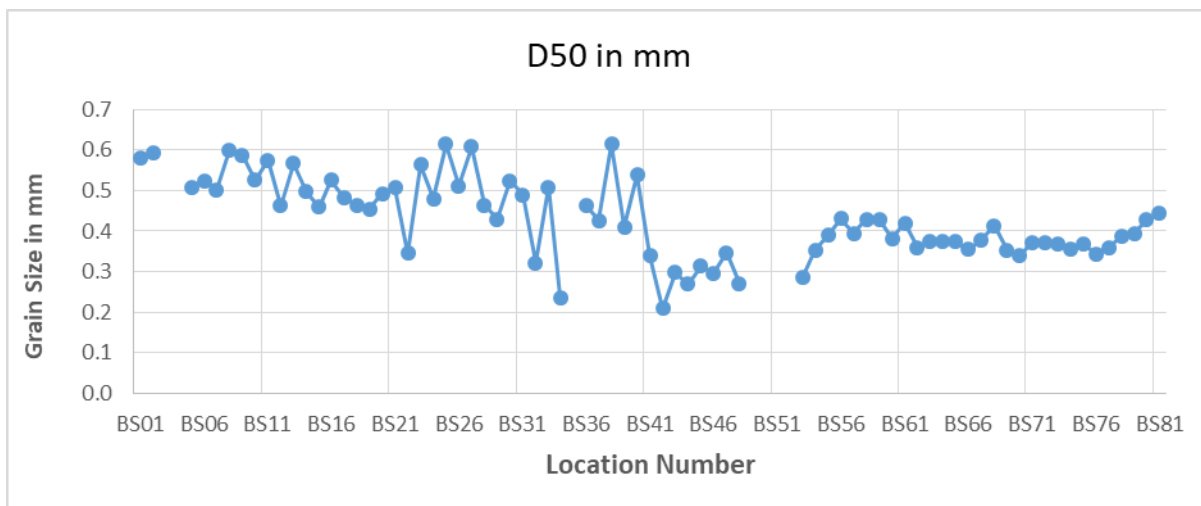


Figure 5-19: Distribution of D-50 value of sediments (Post monsoon 2019)

5.10 Turbidity Measurements

Turbidity is the cloudiness or haziness of a fluid caused by suspended solids that are usually invisible to the naked eye. It is generally expressed as Nephelometric Turbidity Units (NTU).

Nepheleisthe, Greek word for "cloud" and metric means "measure". Nephelometric, therefore, means "measuring cloudiness." All turbidity measurements detect the amount of light either transmitted through or scattered by the particles in a sample of water. Most nephelometers measure the scattered light at 90°(the light source and the detector are oriented at right angles to each other.) If more light is able to reach the detector it means that there are many small particles scattering the source beam. If less light reaches the detector it indicates less particles in the water, and hence less turbidity. The amount of light scattered is influenced by many aspects of the particles, like colour, shape, and reflectivity.

Turbidity monitoring buoys were deployed at three locations in the month of November 2019 and the turbidity was measured at three different depths i.e. surface, mid-depth and bottom.

A summary of the turbidity data (measured in NTU) recorded for the month of November 2019 is given below.

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Table 5-12: Summary of turbidity values in NTU (November 2019)

Location	Surface			Mid Depth			Near Bottom		
	Max	Min	Median	Max	Min	Median	Max	Min	Median
Turbidity Buoy-1	2.18	0.01	0.52	4.47	0.03	0.69	4.51	0.12	1.13
Turbidity Buoy -2	4.5	BDL	1.57	4.98	1.61	2.62	6.72	0.11	1.30
Turbidity Buoy -3	2.0	BDL	0.49	1.87	0.00	0.64	3.65	0.02	0.59

For the month of November 2019, the maximum turbidity recorded at Location 1 is 4.51 NTU (near bottom), whereas maximum turbidity recorded at Location 2 is 6.72 NTU (near bottom), and that of Location 3 is 3.65 NTU (near bottom).

A summary of the turbidity data (measured in NTU) recorded for the month of December 2019 is given below.

Table 5-13: Summary of turbidity values in NTU (December 2019)

Location	Surface			Mid Depth			Near Bottom		
	Max	Min	Median	Max	Min	Median	Max	Min	Median
Turbidity Buoy-1	3.99	0.13	0.96	6.78	0.32	2.52	8.12	0.38	5.36
Turbidity Buoy -2	4.44	0.11	0.88	6.95	0.86	1.95	9.85	1.89	6.09
Turbidity Buoy -3	4.53	BDL	0.89	5.47	0.01	1.88	8.00	0.23	2.38

For the month of December 2019, the maximum turbidity recorded at Location 1 is 8.12 NTU (near bottom), maximum turbidity recorded at Location 2 is 9.85 NTU (near bottom), and that of Location 3 is 8.00 NTU (near bottom).

A summary of the turbidity data (measured in NTU) recorded for the month of January 2020 is given below.

Table 5-14: Summary of turbidity values in NTU (January 2020)

Location	Surface			Mid Depth			Near Bottom		
	Max	Min	Median	Max	Min	Median	Max	Min	Median
Turbidity Buoy-1	7.66	BDL	1.57	10.16	0.24	4.81	8.12	2.01	5.37
Turbidity Buoy -2	10.13	0.02	0.61	8.28	1.84	3.90	10.2	4.27	5.58
Turbidity Buoy -3	6.21	0.15	1.70	8.97	1.64	3.90	11.2	1.87	6.87

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For the month of January 2020, the maximum turbidity recorded at Location 1 is 10.16 NTU (at mid depth), maximum turbidity recorded at Location 2 is 10.20 NTU (near bottom), and that of Location 3 is 11.28 NTU (near bottom).

A summary of the turbidity data (measured in NTU) recorded for the month of February 2020 is given below.

Table 5-15: Summary of turbidity values in NTU (February 2020)

Location	Surface			Mid Depth			Near Bottom		
	Max	Min	Median	Max	Min	Median	Max	Min	Median
Turbidity Buoy-1	4.71	BDL	1.12	7.88	0.58	2.12	10.21	0.47	3.79
Turbidity Buoy -2	3.14	BDL	0.39	10.22	1.02	3.27	10.51	1.48	5.11
Turbidity Buoy -3	1.75	BDL	0.41	8.48	0.89	4.04	14.6	1.66	6.38

For the month of February 2020, the maximum turbidity recorded at Location 1 is 10.21 NTU, maximum turbidity recorded at Location 2 is 10.51 NTU and that of Location 3 is 14.64 NTU, all near the bottom.

A summary of the turbidity data (measured in NTU) recorded for the month of March 2020 is given below.

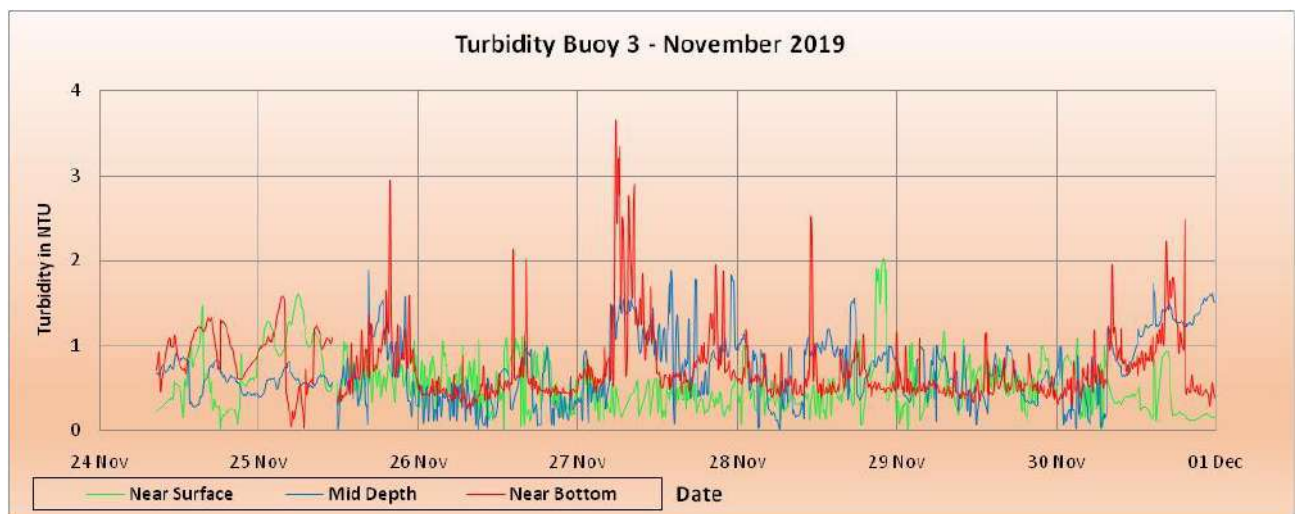
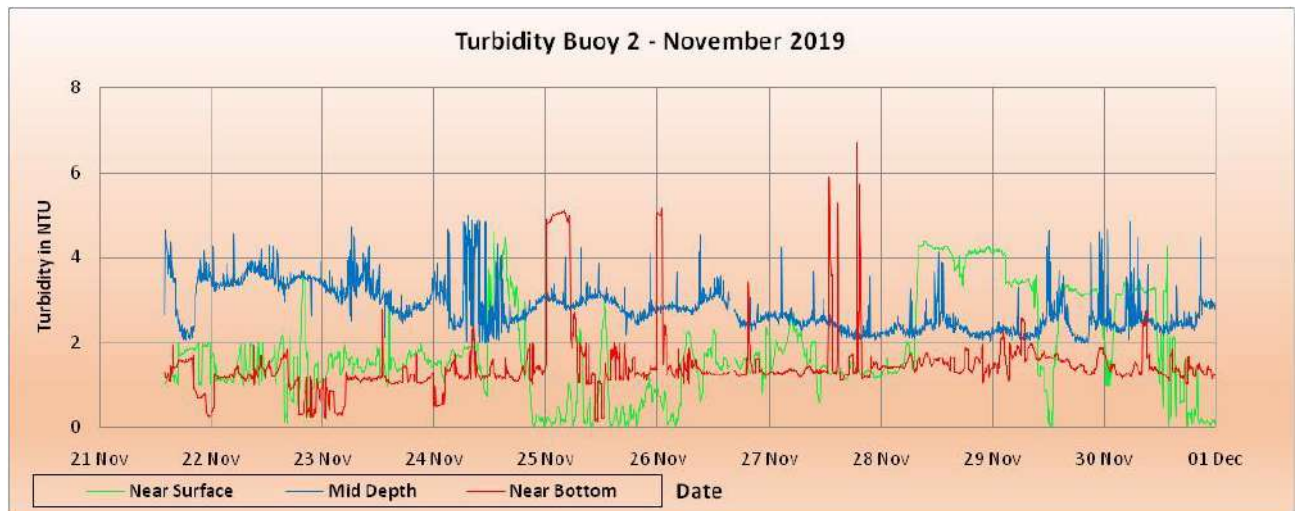
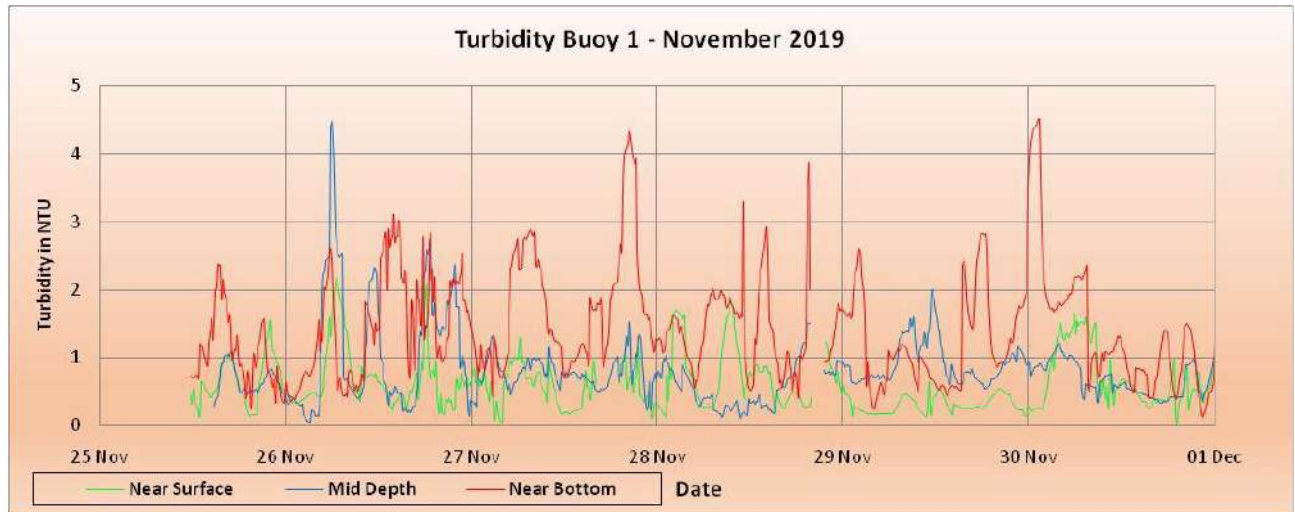
Table 5-16: Summary of turbidity values in NTU (March 2020)

Location	Surface			Mid Depth			Near Bottom		
	Max	Min	Median	Max	Min	Median	Max	Min	Median
Turbidity Buoy-1	4.62	BDL	0.75	5.40	0.13	1.55	9.98	0.89	2.26
Turbidity Buoy -2	2.73	0.01	0.93	5.70	0.95	1.75	11.18	1.68	2.74
Turbidity Buoy -3	3.02	0.29	0.96	10.79	0.46	1.94	12.78	0.69	3.02

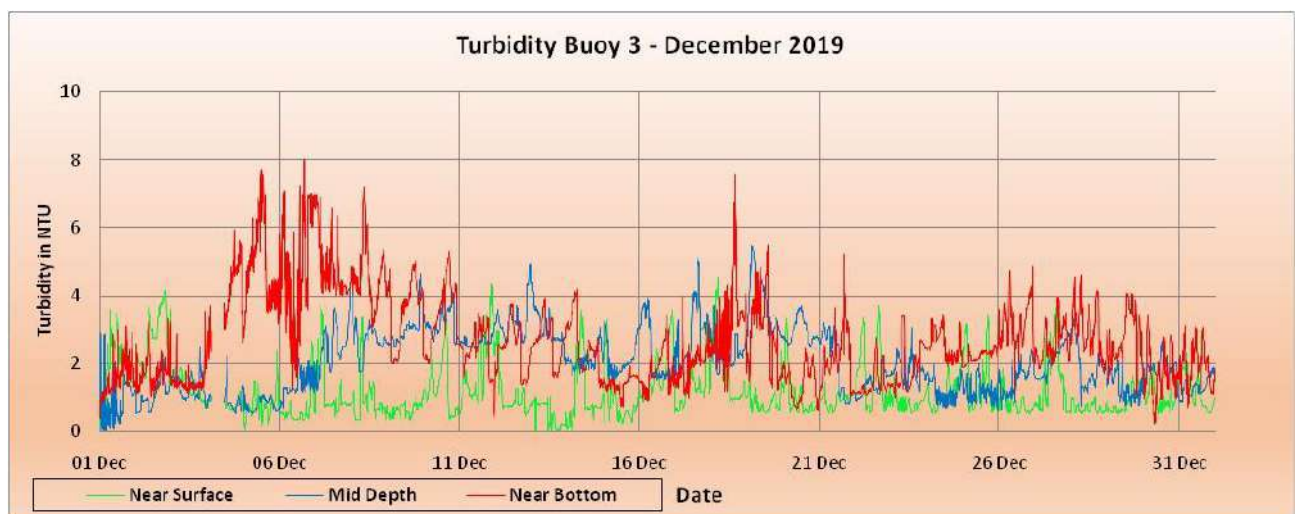
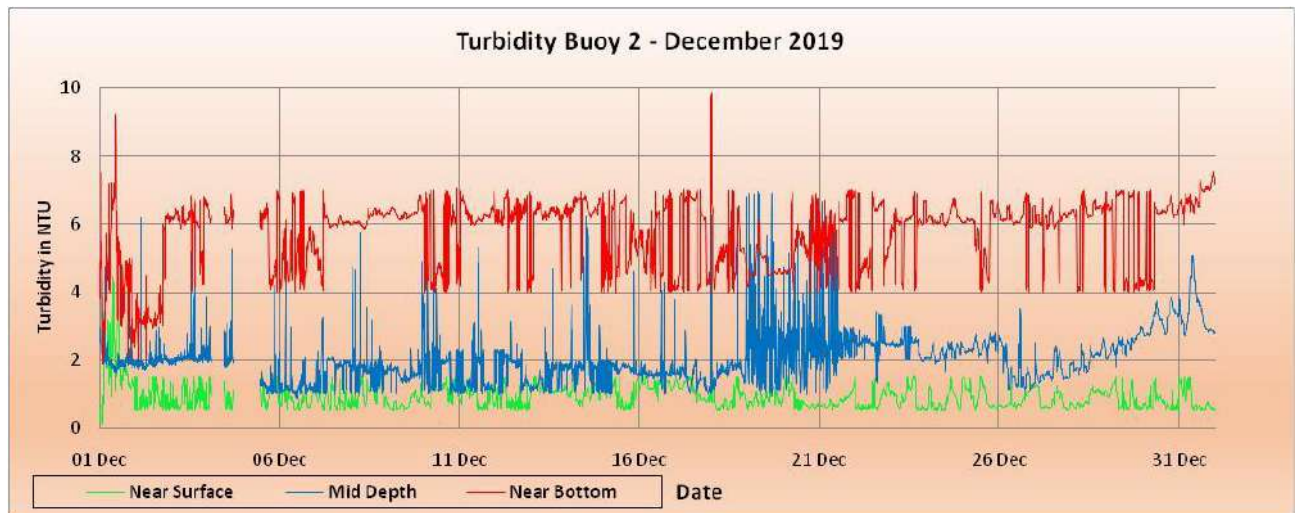
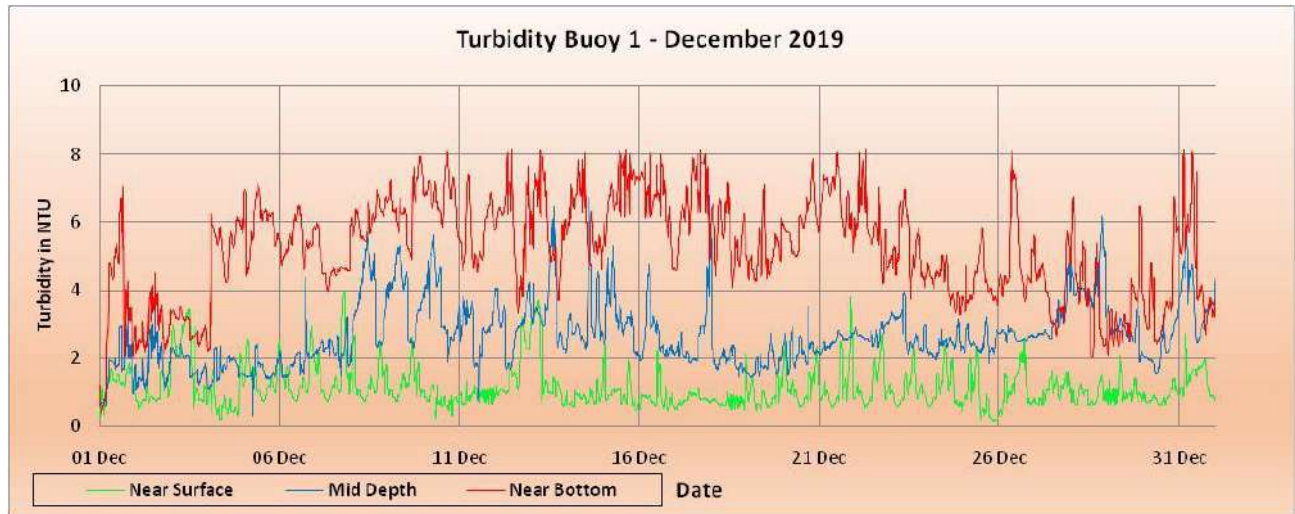
For the month of March 2020, the maximum turbidity recorded at Location 1 is 9.98 NTU, maximum turbidity recorded at Location 2 is 11.18 NTU and that of Location 3 is 12.78 NTU, all near the bottom.

The time series curves of turbidity measurements from November 2019 to March 2020 are shown below.

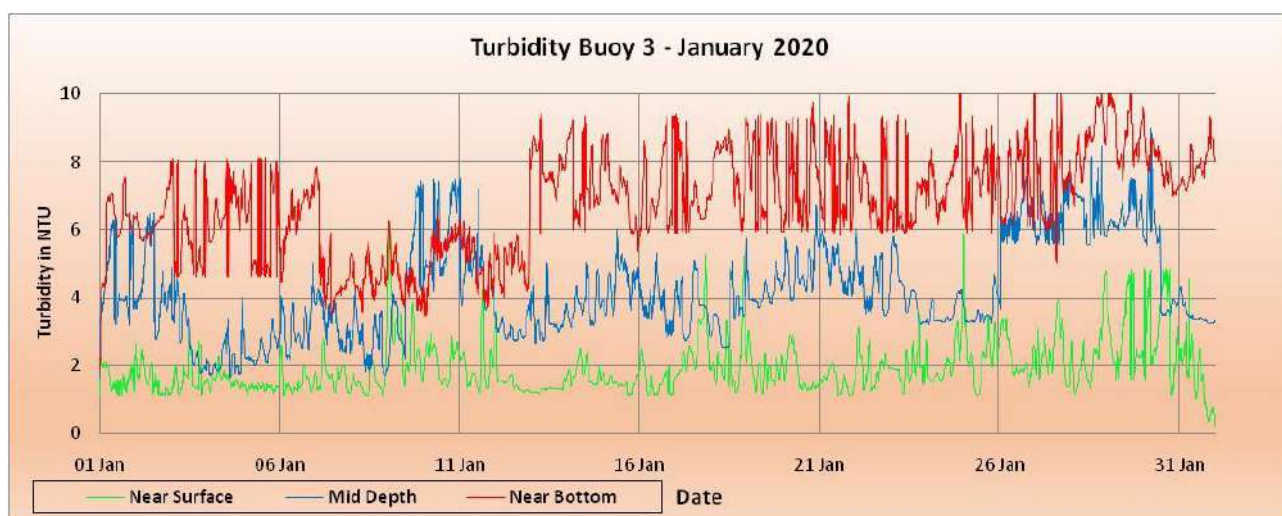
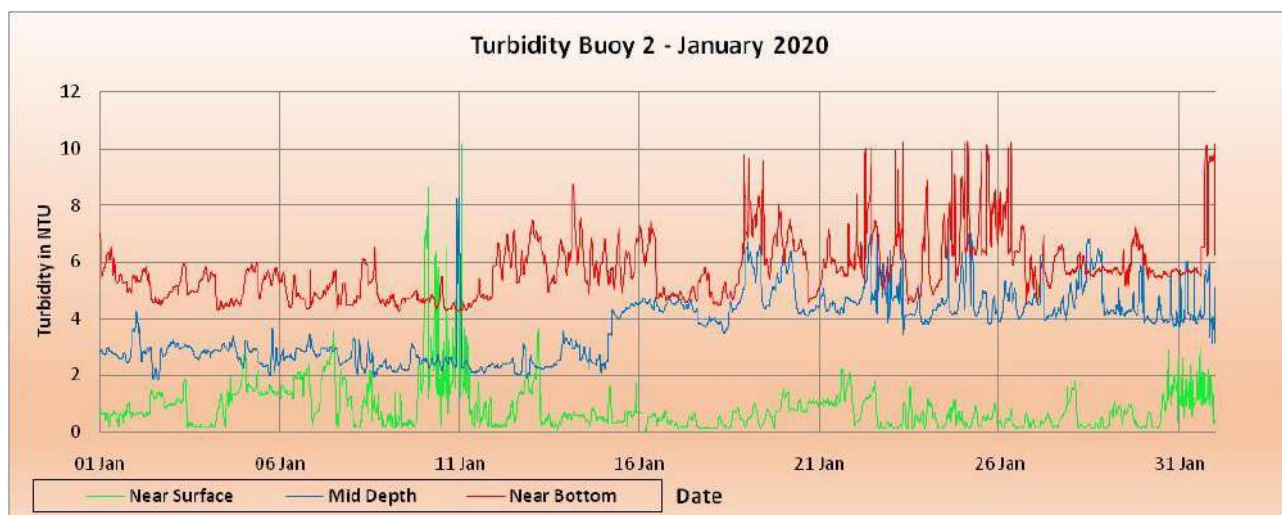
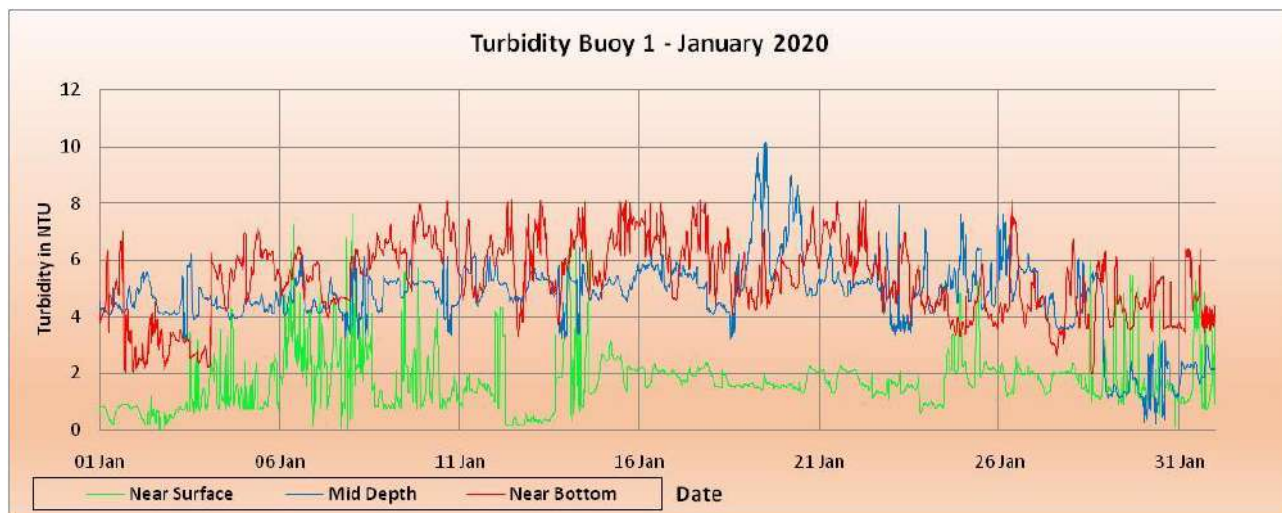
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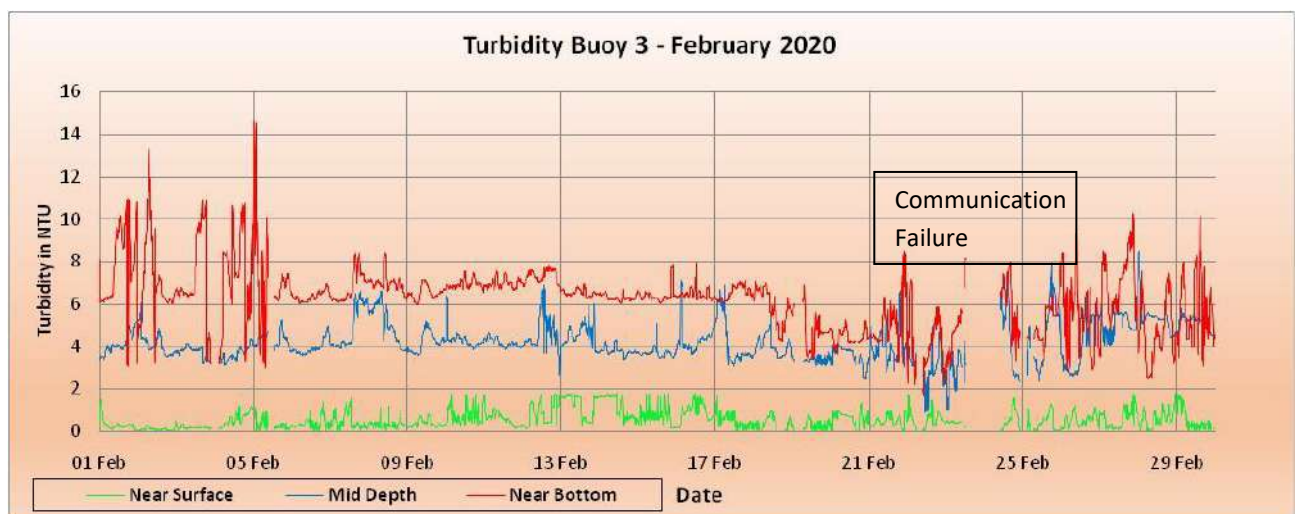
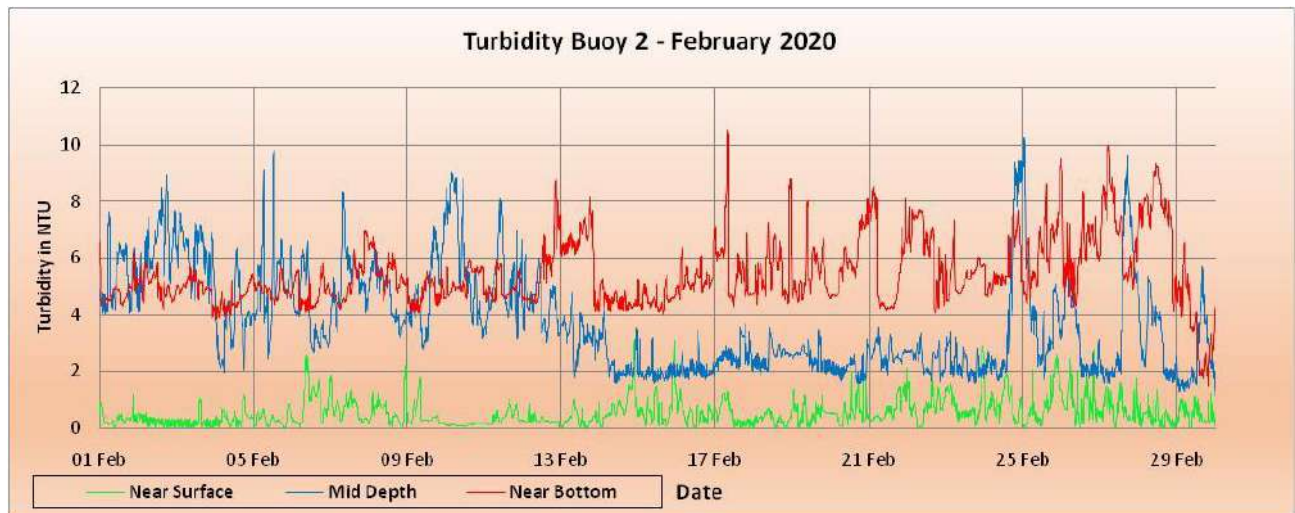
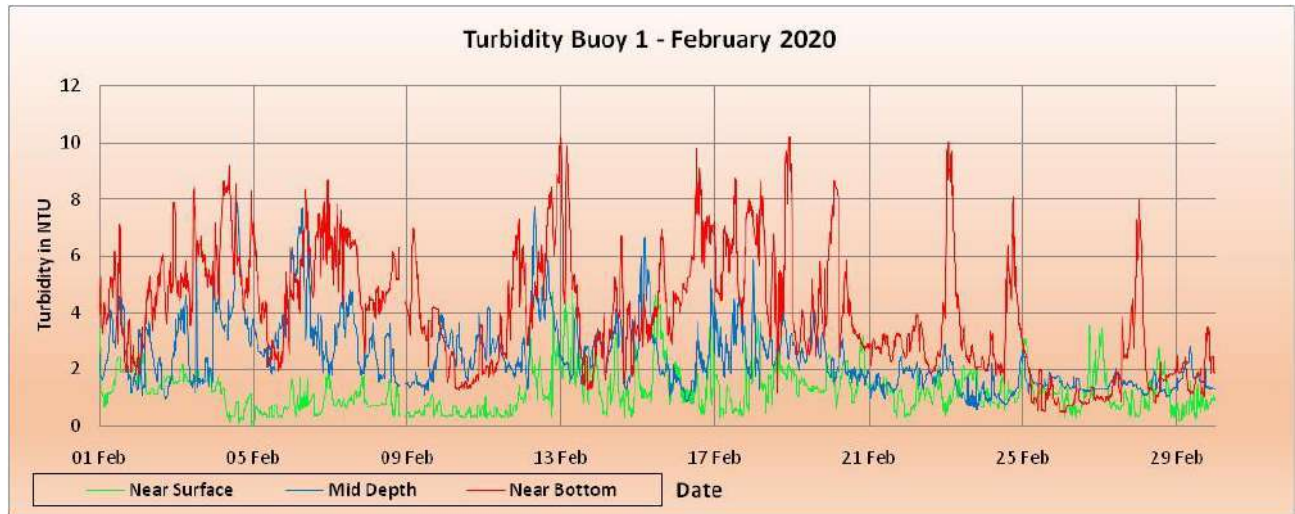
Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020



Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020



Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020



Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020

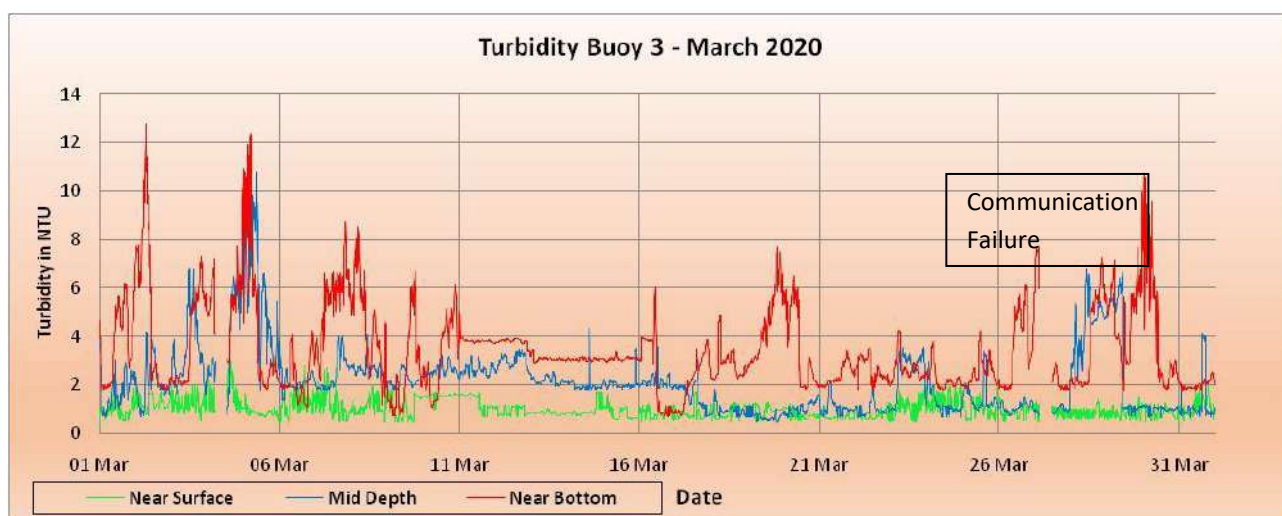
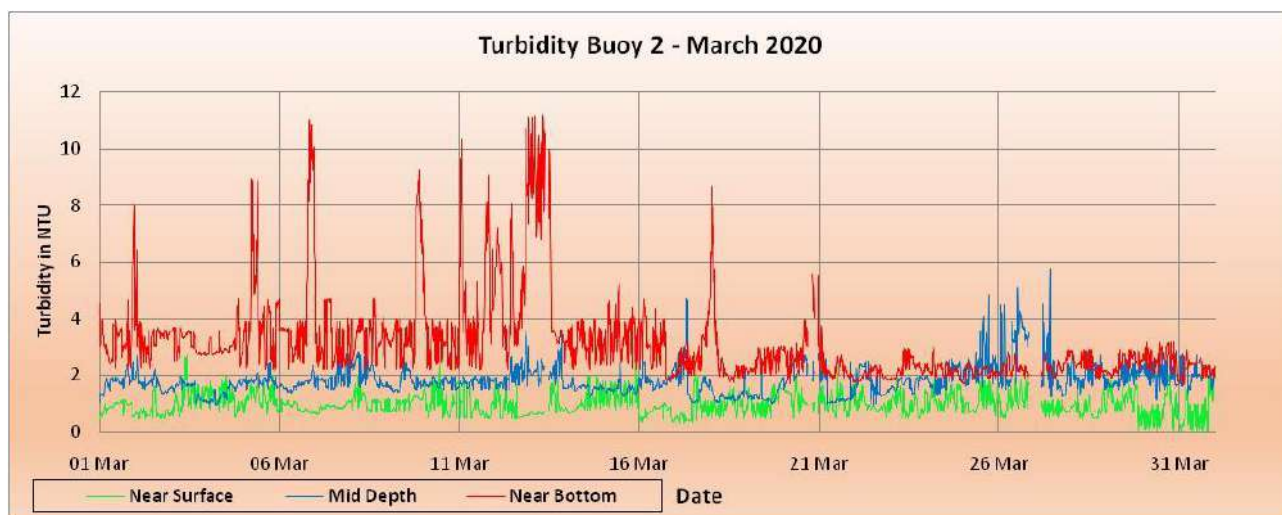
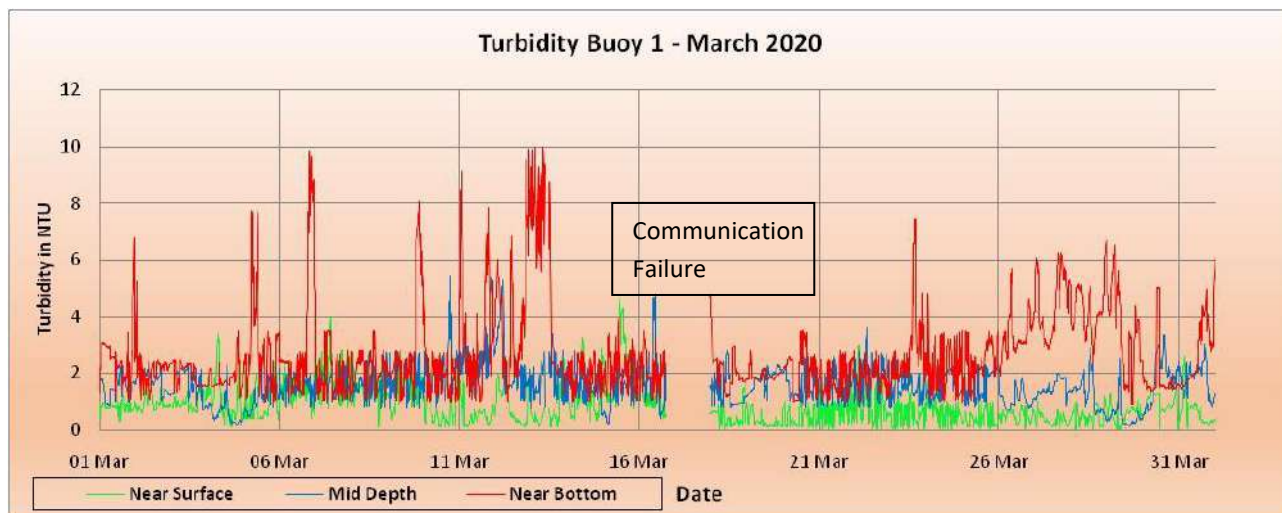


Figure 5-20: Time Series of Turbidity measurements

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5.11 Bathymetry

Survey Location

The following image shows the coverage of the area surveyed using multibeam echo sounder.

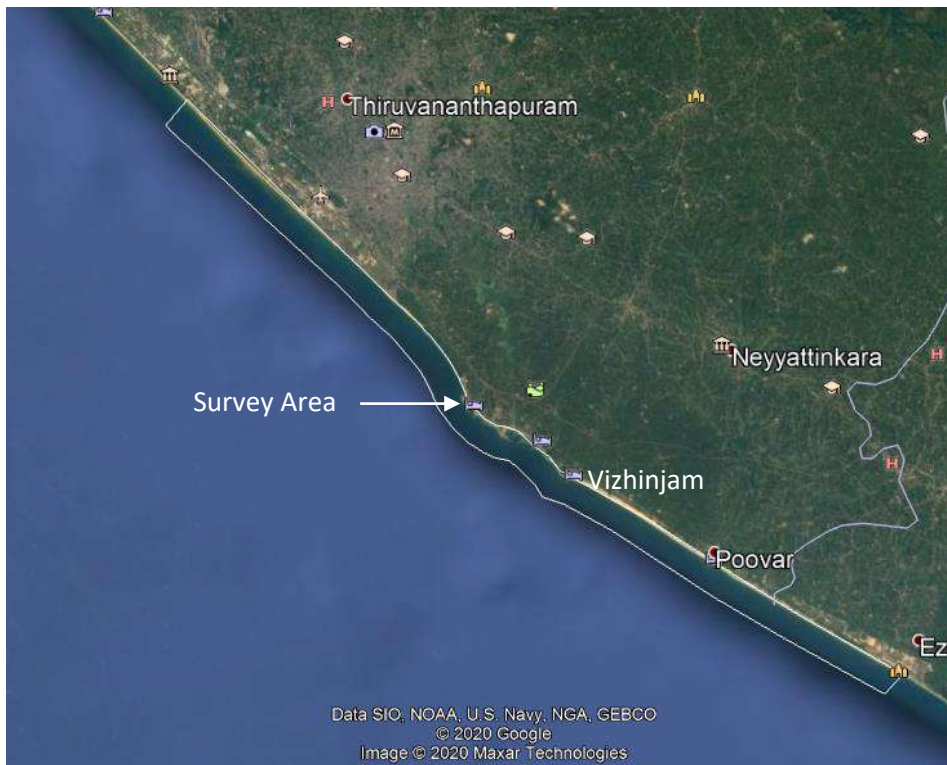


Figure 5-21: Bathymetry area coverage


Line Plan and Survey Methodology

The survey lines were planned at intervals of 25m parallel to the coast up to the depth of 20m. The vessel was positioned using a Seapath DGPS system which also provided the heading. The vessel track and offset positions were recorded digitally and the data from the multibeam echo sounder was logged digitally within the Hypack data acquisition software.

Prior to commencement of the survey, the DGPS and gyrocompass calibrations were carried out when the survey vessel was berthed at the Vizhinjam Fishing Jetty. The multibeam echo sounder was calibrated by conducting the patch test. The bathymetric data was reduced to Chart Datum (CD) by using the observed tides from the tide gauge installed at the Coast Guard Jetty.

Results

The bathymetric survey of the area about 40 km in length was carried out up to the 20m contour using a multibeam echo sounder.

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The maximum depth recorded by multibeam echo sounder is 25m below CD in the north-western part at location 713102.09 mE, 932745.63 mN. The seabed is seen to slope gently towards the southwest. The area to the southeast of Vizhinjam harbour has been dredged as a result of berth construction activities. In this area the depth increases rapidly from the 13m contour to the 20m contour towards the south with an average slope of about 1 in 30.6m.


6 WEATHER

The weather was conducive to the survey operations throughout the period from October 2019 to March 2020.

7 CONCLUSIONS


The following conclusions were made during this phase of the project:

1. Tide was mixed semi diurnal with a maximum range being observed during spring tide.
2. The significant wave heights were more than 2m during the month of October 2019 and less than 1.5m in the remaining months (November 2019 to March 2020) with winds blowing from south-westerly direction.
3. The current direction was predominantly from southeast in all locations, with surface currents showing more speed than those recorded at mid-depth and near the bottom.
4. The long-shore current speed was recorded in a southerly direction in the monsoon months and in a northerly direction after the monsoon.
5. The salinity was in the range of 33.7 to 36.3 ppt.
6. The Total Suspended Solids were less than 9 mg/l in all the locations.
7. The maximum turbidity recorded at the water sampling locations was 3 NTU near the bottom of Location L3 (Pachalloor) during the post monsoon period.
8. At the location of the turbidity buoys, the maximum turbidity recorded at Location 1 was 10.21 NTU near the bottom in the month of February 2020, maximum turbidity measured at Location 2 was 11.18 NTU near the bottom in the month of March 2020 and that recorded at Location 3 was 14.64 NTU near the bottom in the month of February 2020.
9. The beach samples consisted of medium to fine sand.
10. The seabed is seen to slope gently towards the southwest. The depth in the area south-southeast of the Vizhinjam harbour is seen to change rapidly from the 13m contour to the 20m contour as a result of dredging carried out for berth construction activities.

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Annexure A

Photo Documentation at CSP Locations – October 2019 to March 2020

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October 2019

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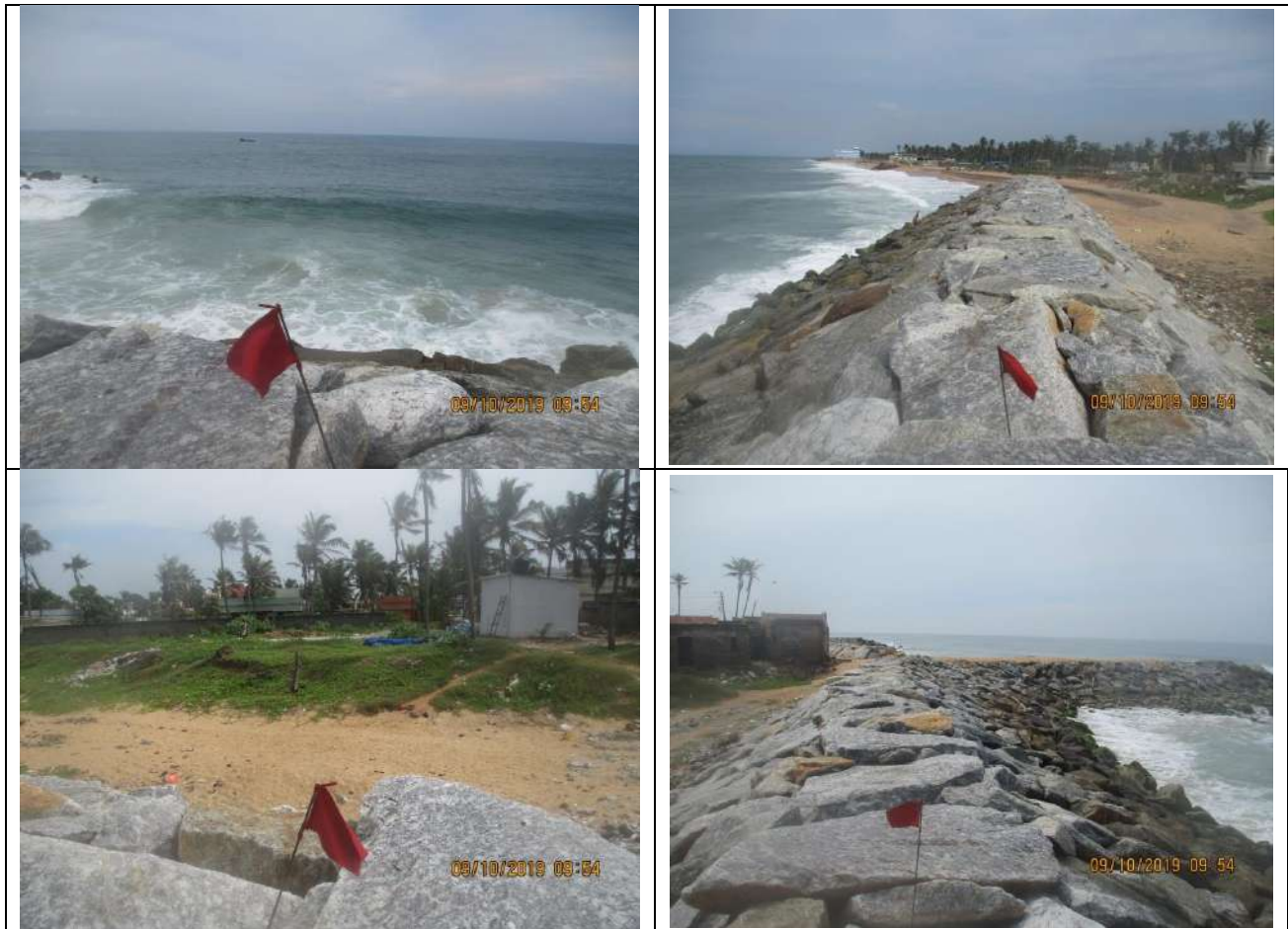


Figure 01- October CSP 01

**Vizhinjam International Deepwater Multipurpose Seaport
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Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020



Figure 03- October CSP 39

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

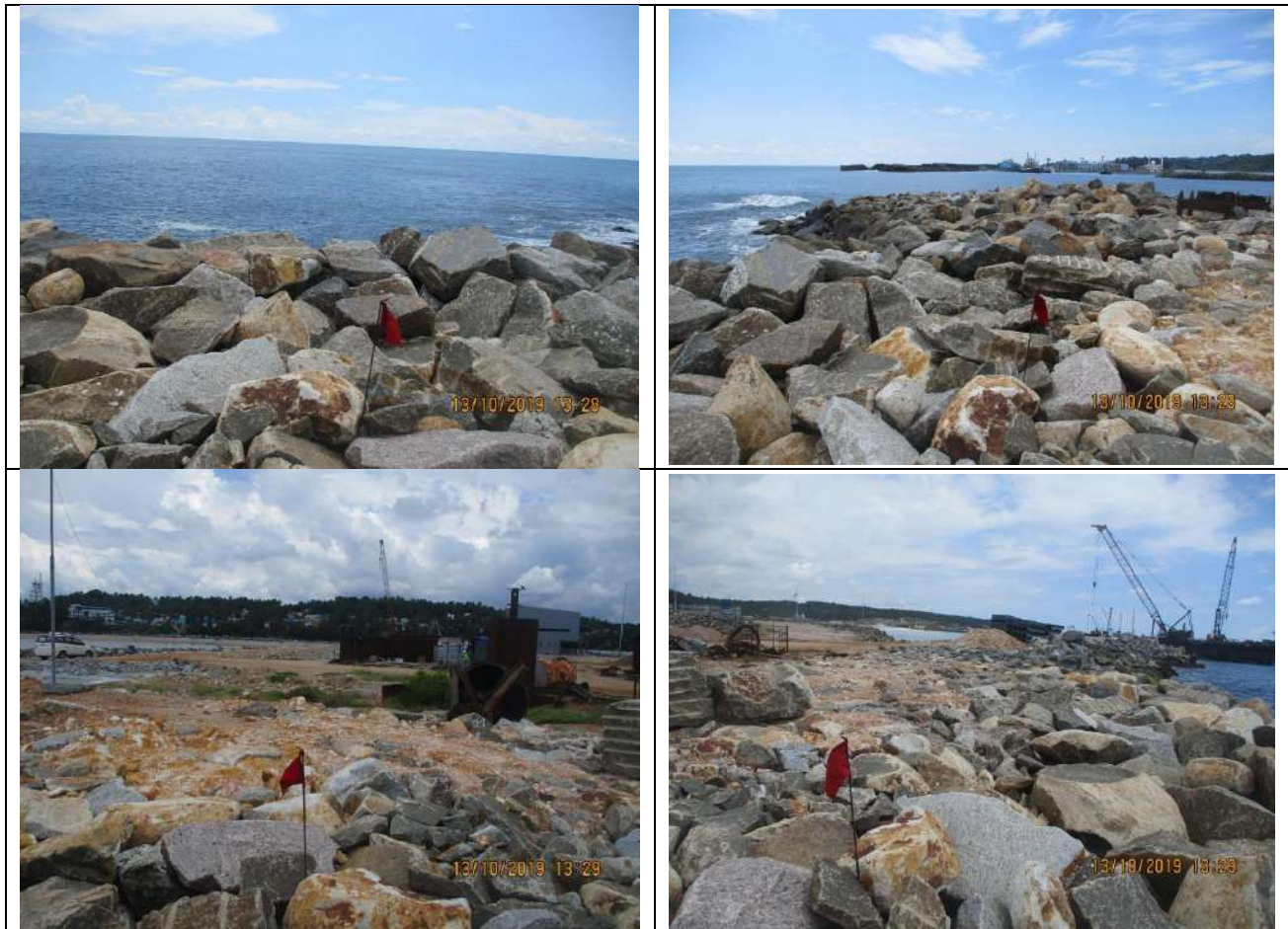


Figure 04- October CSP 40

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

Figure 05- October CSP 80

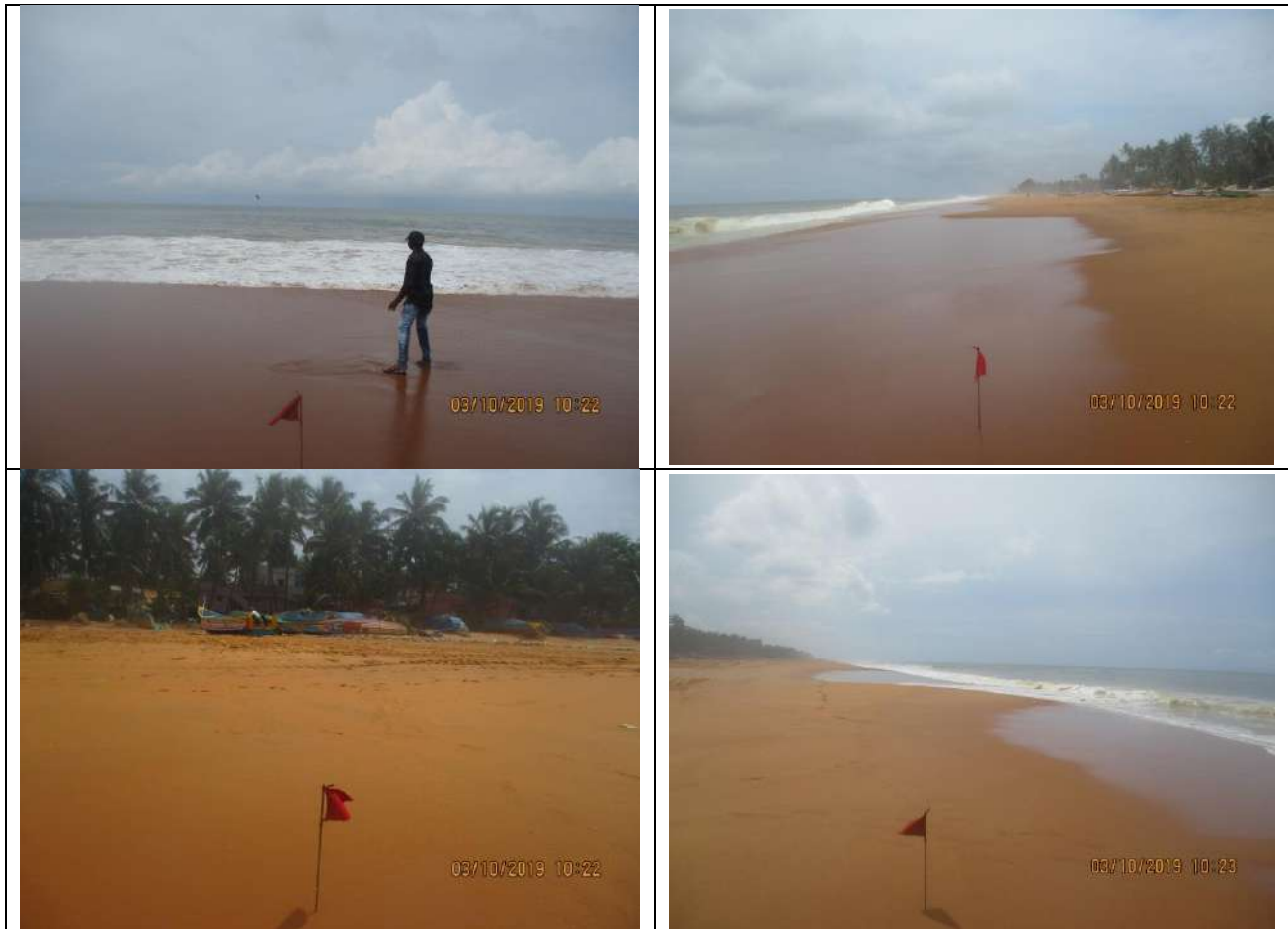

Vizhinjam International Deepwater Multipurpose Seaport
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Figure 06- October CSP 81

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020		

November 2019

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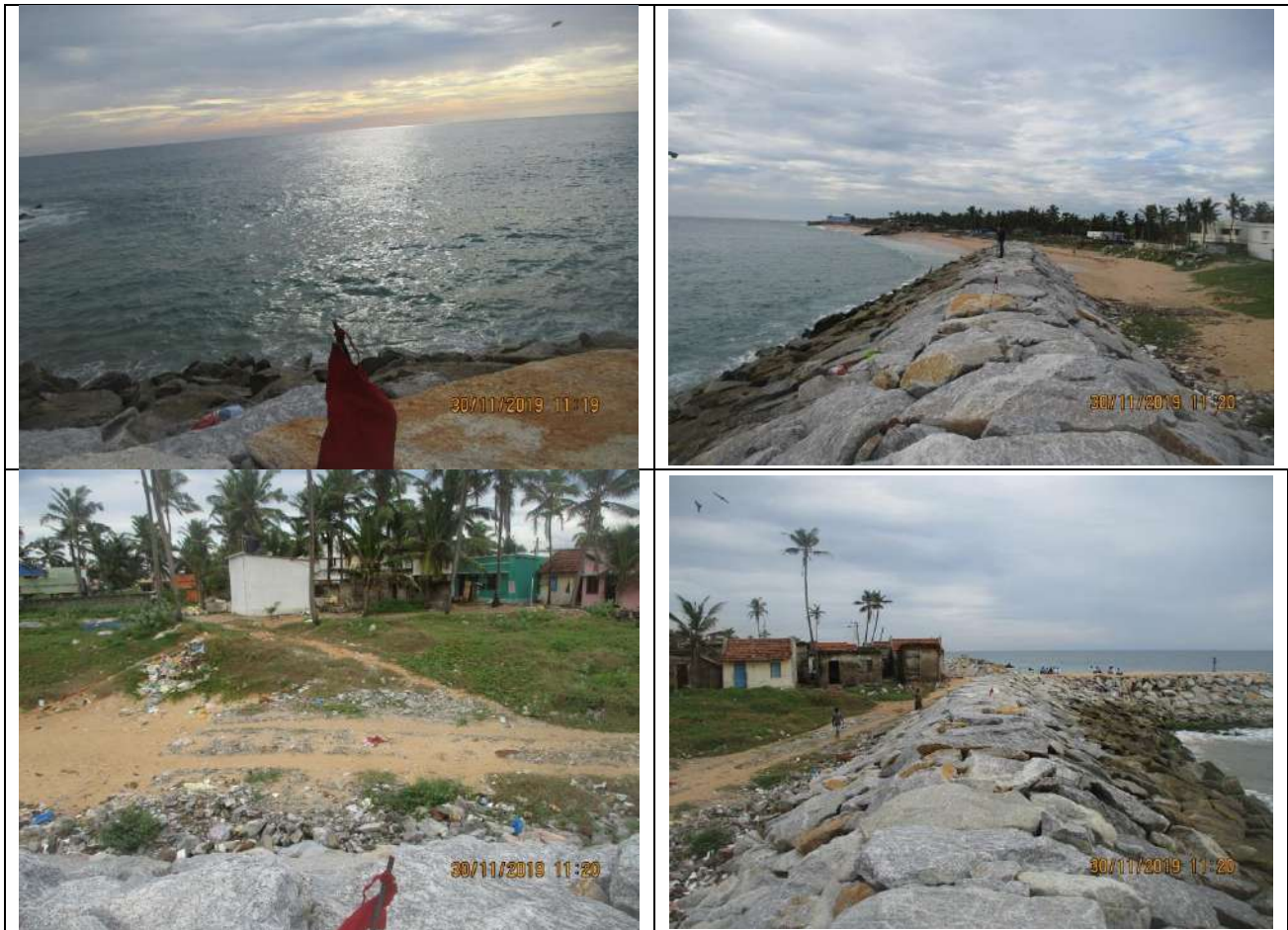


Figure 01- November CSP 01

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

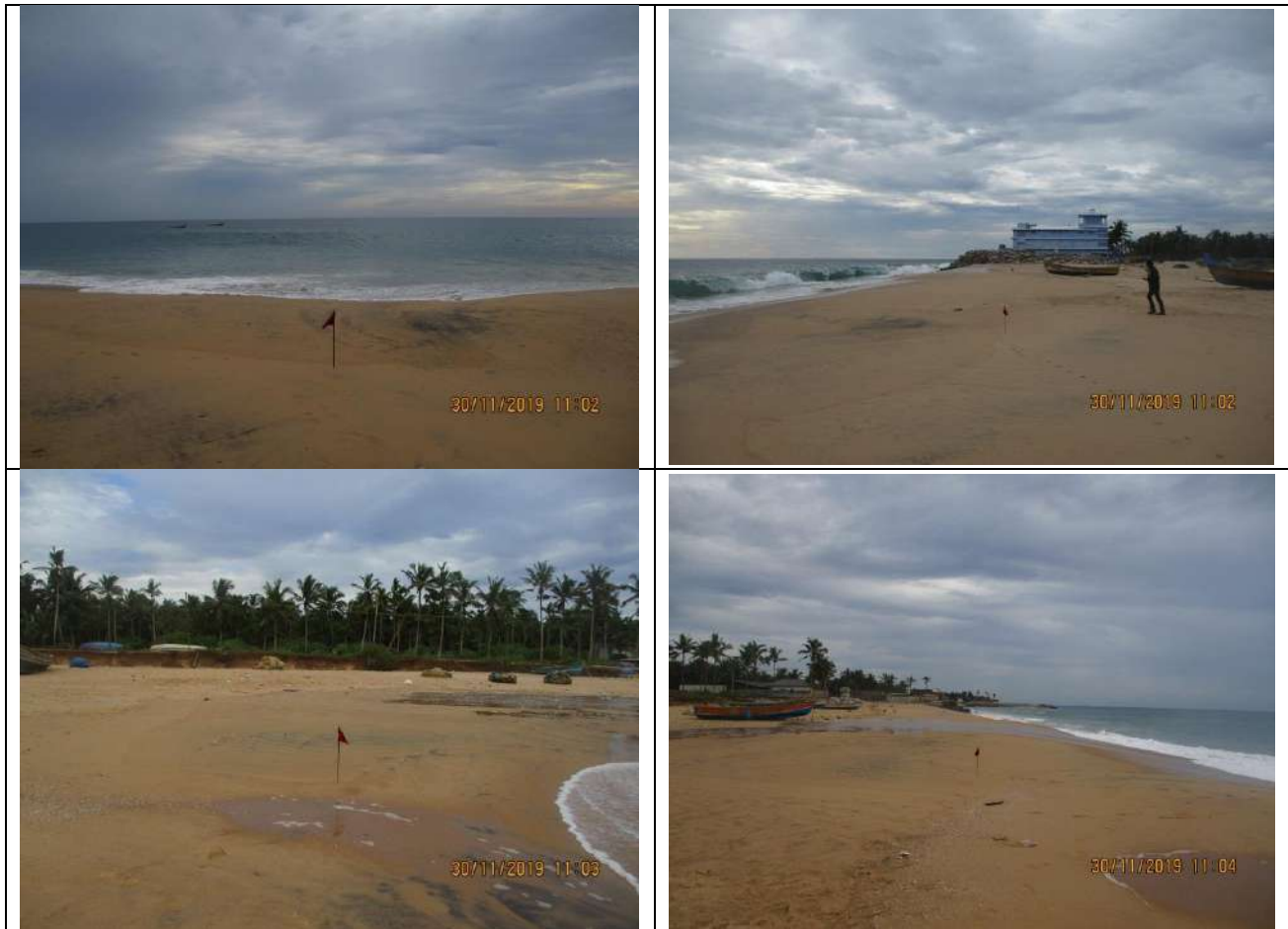


Figure 02- November CSP 02

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020



Figure 03- November CSP 39

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020



Figure 04- November CSP 40


**Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020**



Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020



Figure 06- November CSP 81

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020		

December 2019

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

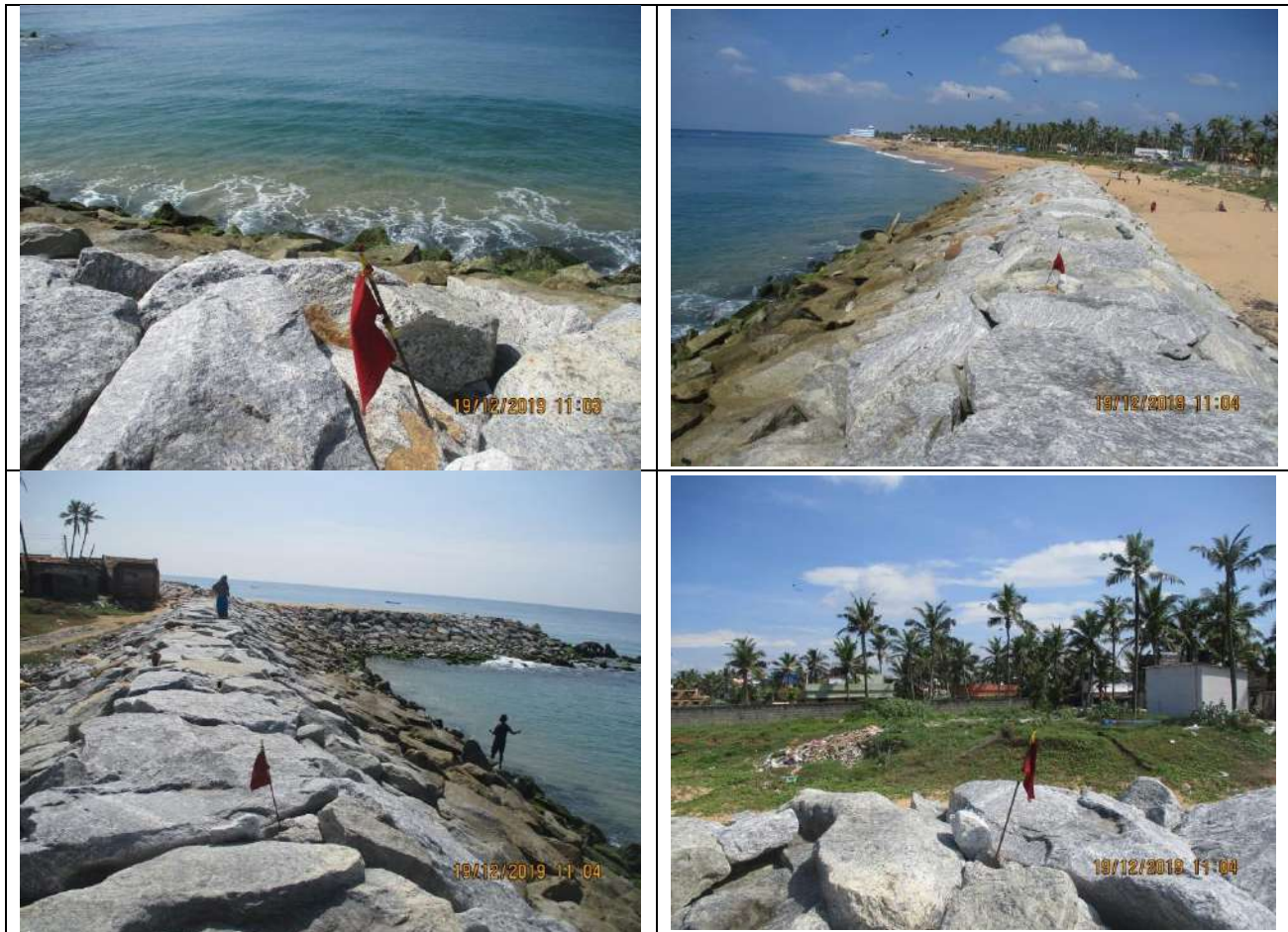


Figure 01- December CSP 01

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

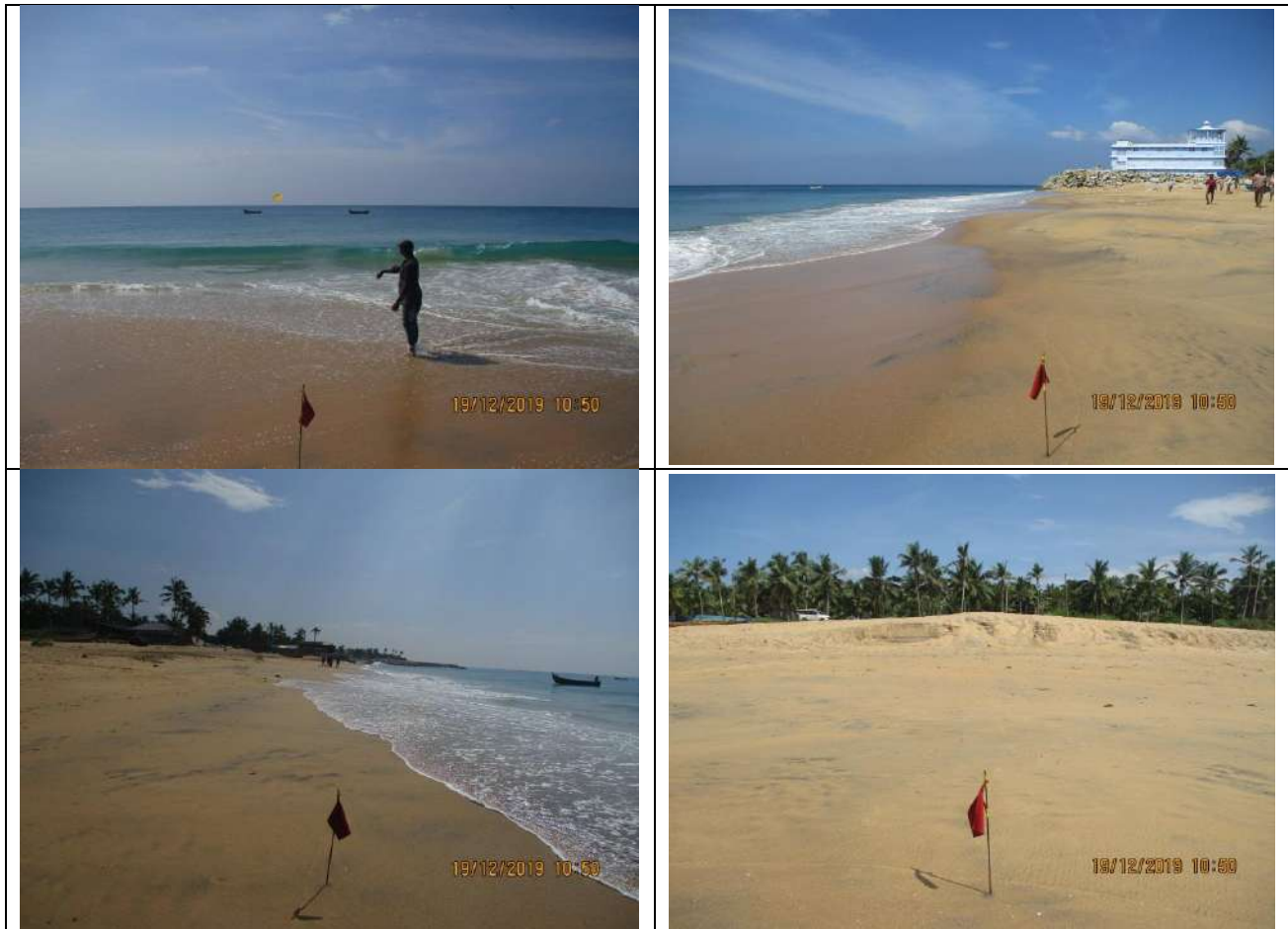


Figure 02- December CSP 02

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

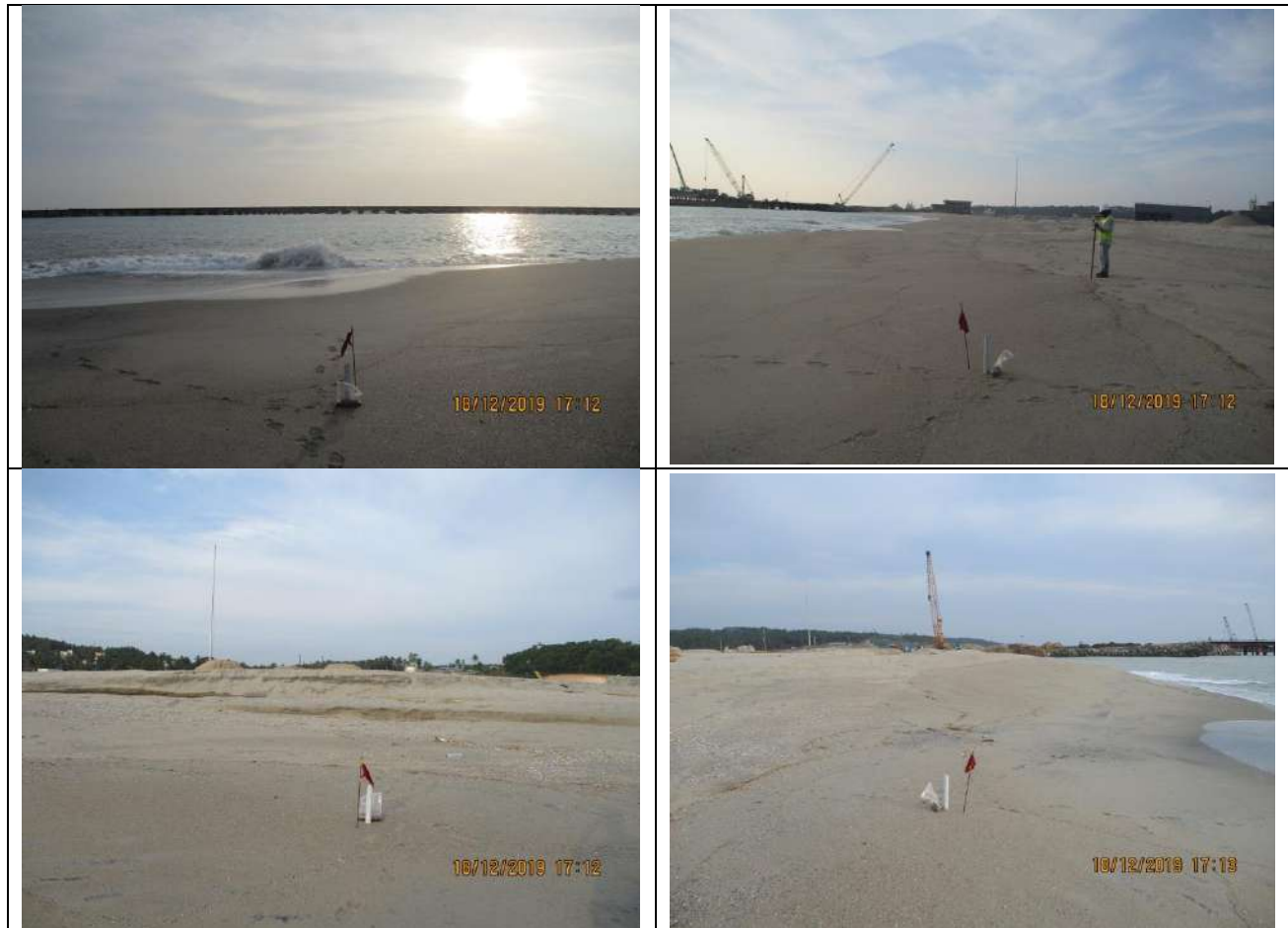


Figure 03- December CSP 39

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

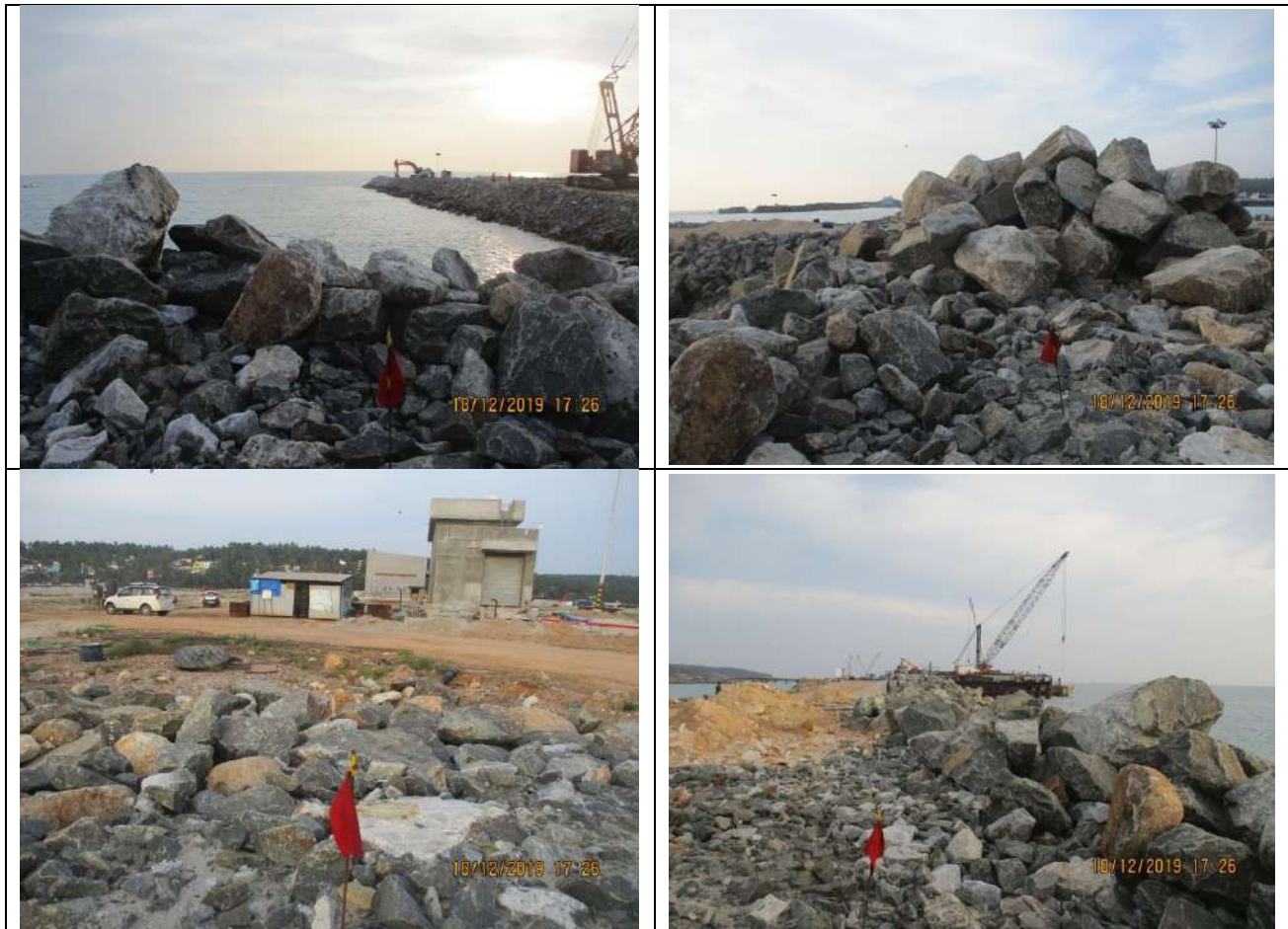


Figure 04- December CSP 40

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020



Figure 05- December CSP 80

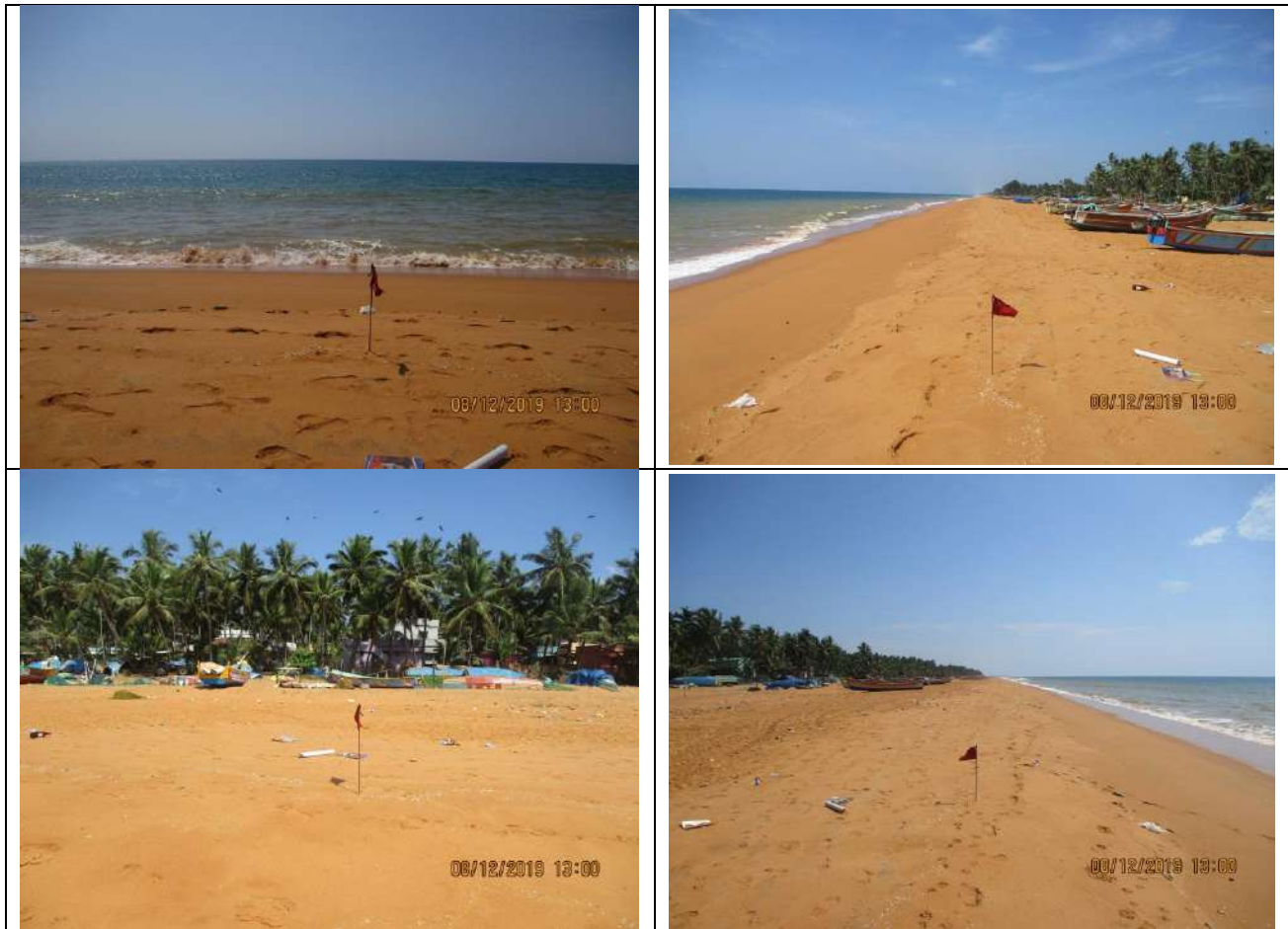

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

Figure 06- December CSP 81

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020		

January 2020

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

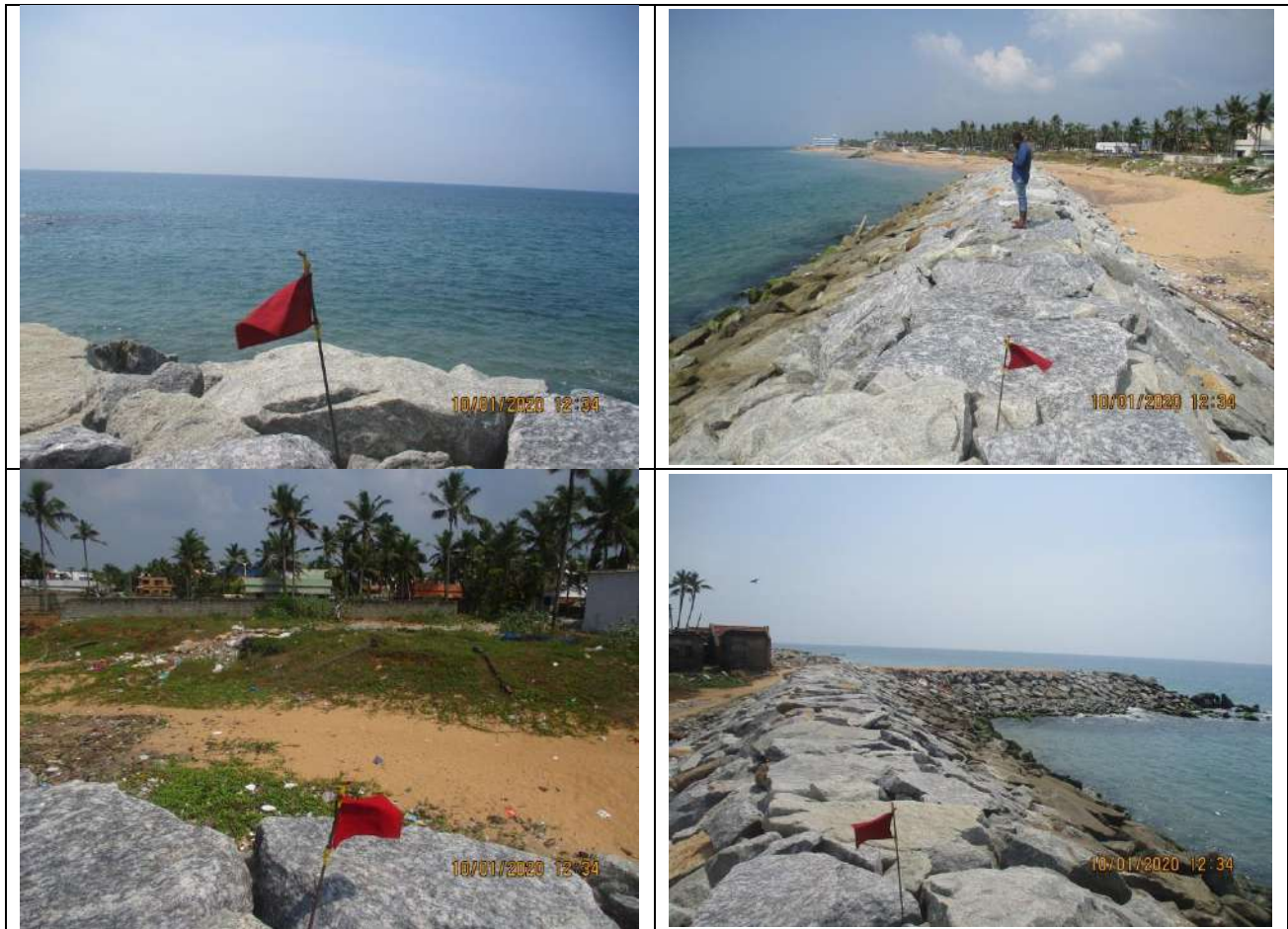


Figure 01- January CSP 01

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020



Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020



Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

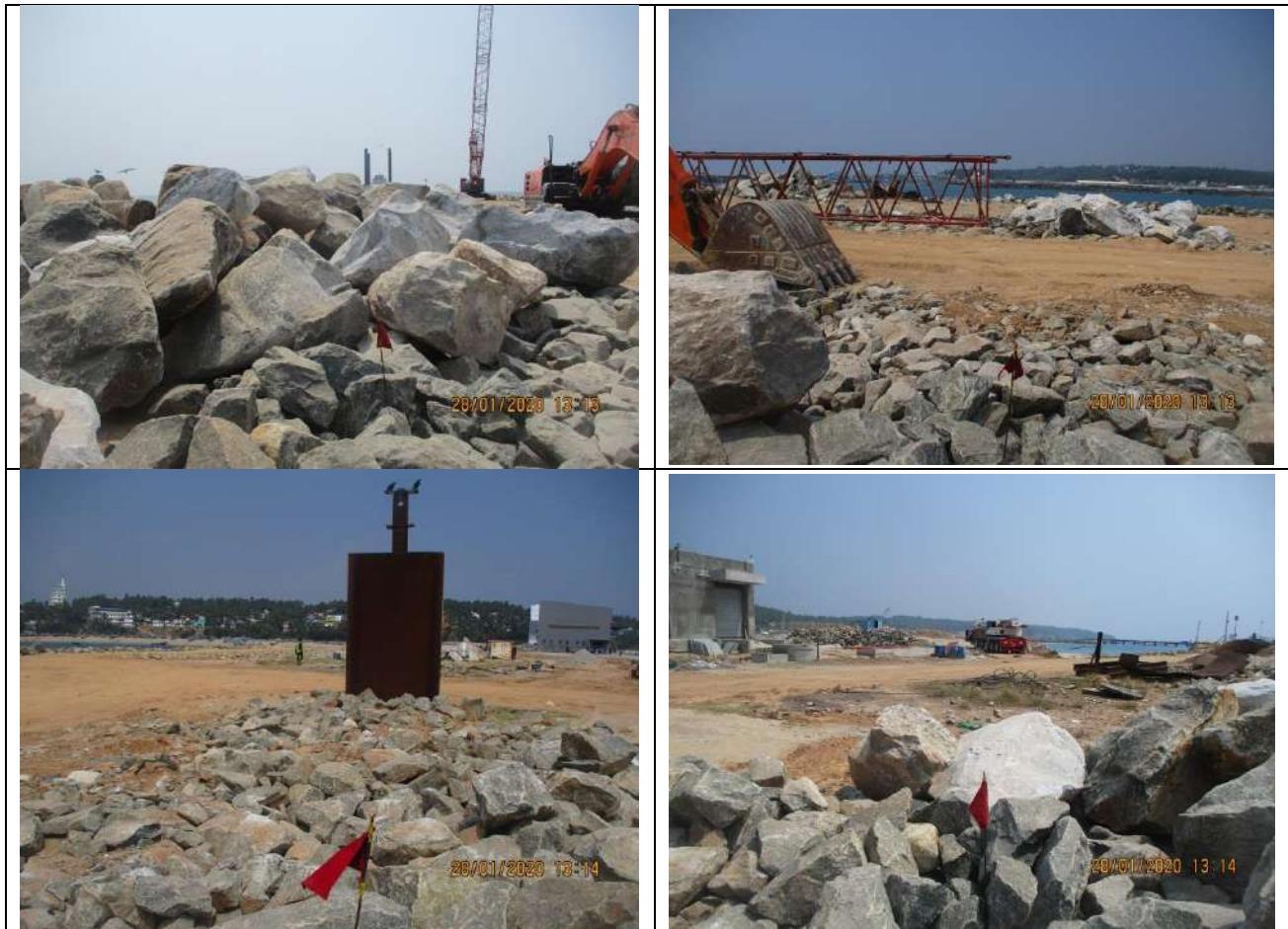


Figure 04- January CSP 40

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020




Figure 05- January CSP 80

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020



Figure 06- January CSP 81

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
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February 2020

**Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020**



Figure 01- February CSP 01

**Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020**



Figure 02- February CSP 02

**Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020**



Figure 03- February CSP 39

**Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020**



Figure 04- February CSP 40

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020


**Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020**

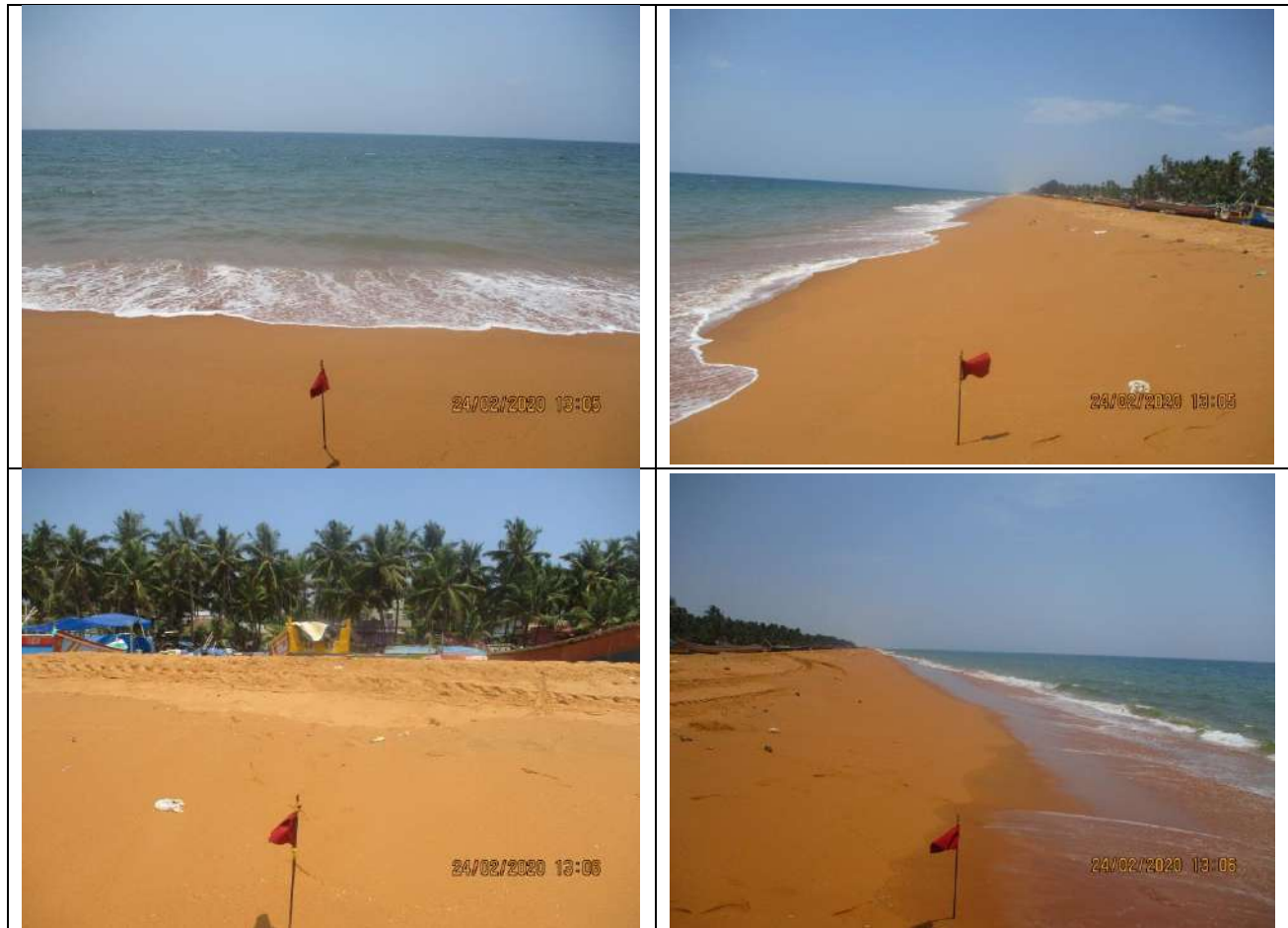



Figure 06- February CSP 81

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Shoreline Monitoring Report from October 2019 to March 2020		

March 2020

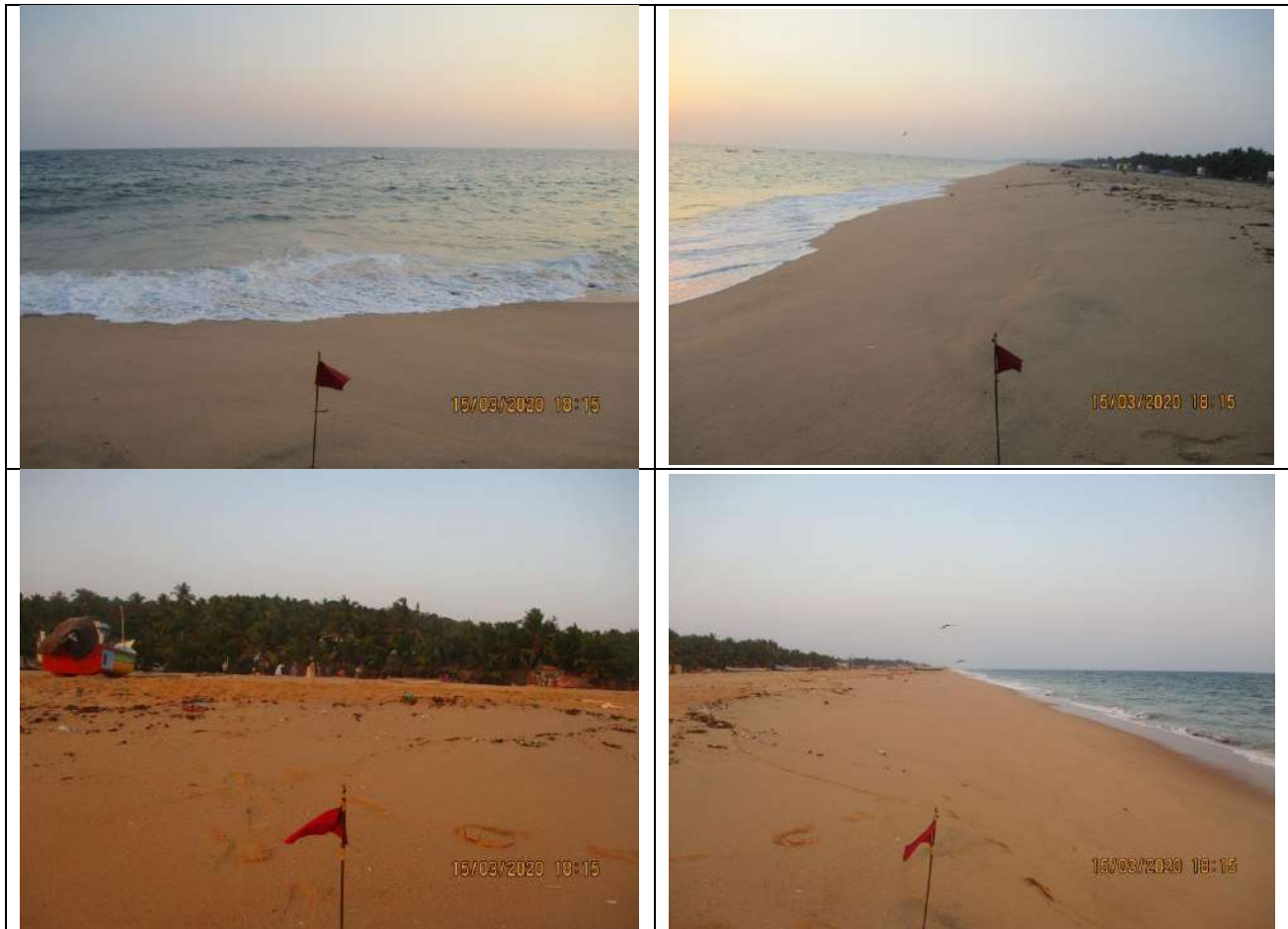
Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

Figure 01- March CSP 21

**Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020**



Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

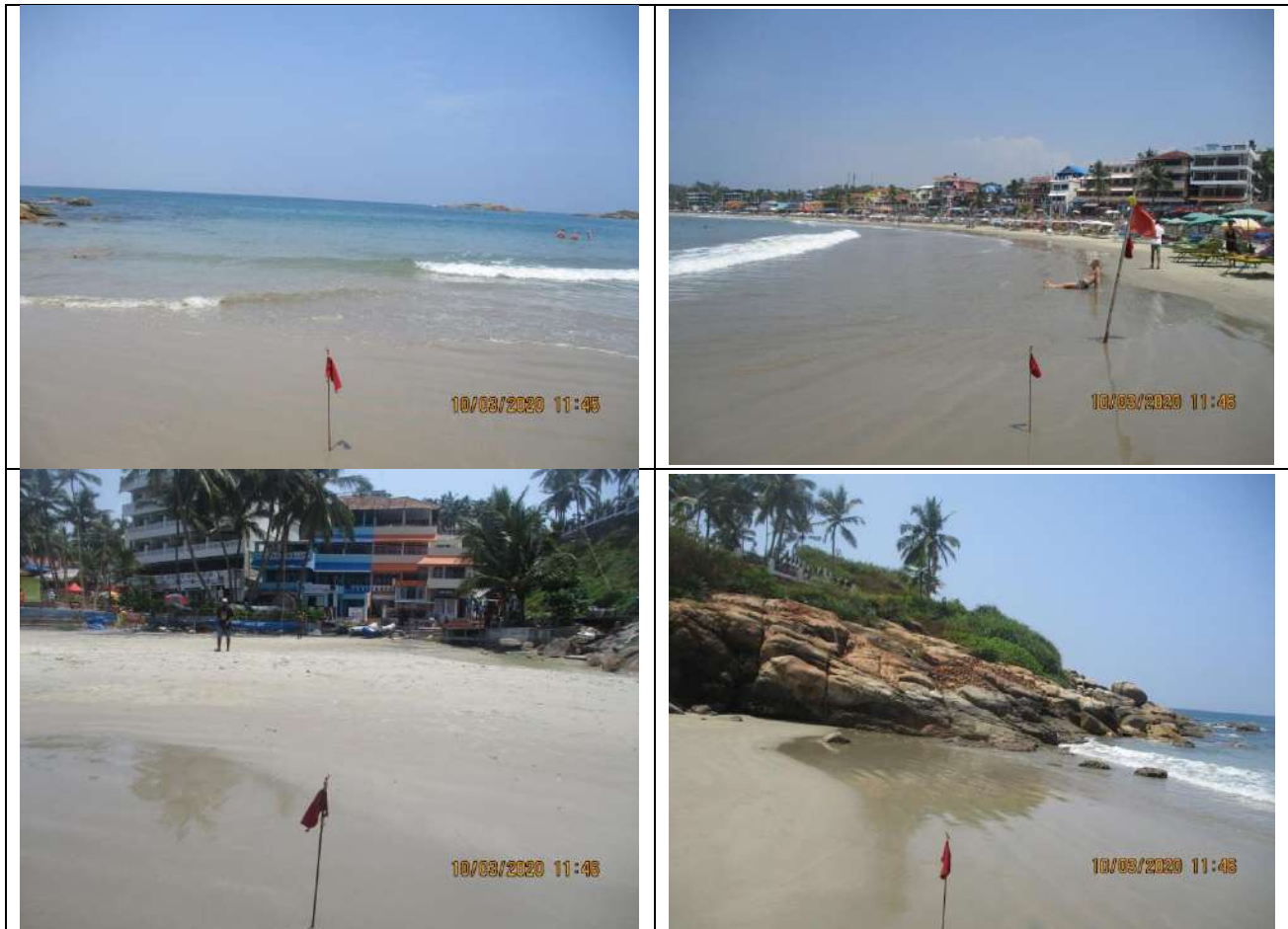


Figure 03- March CSP 42

Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020

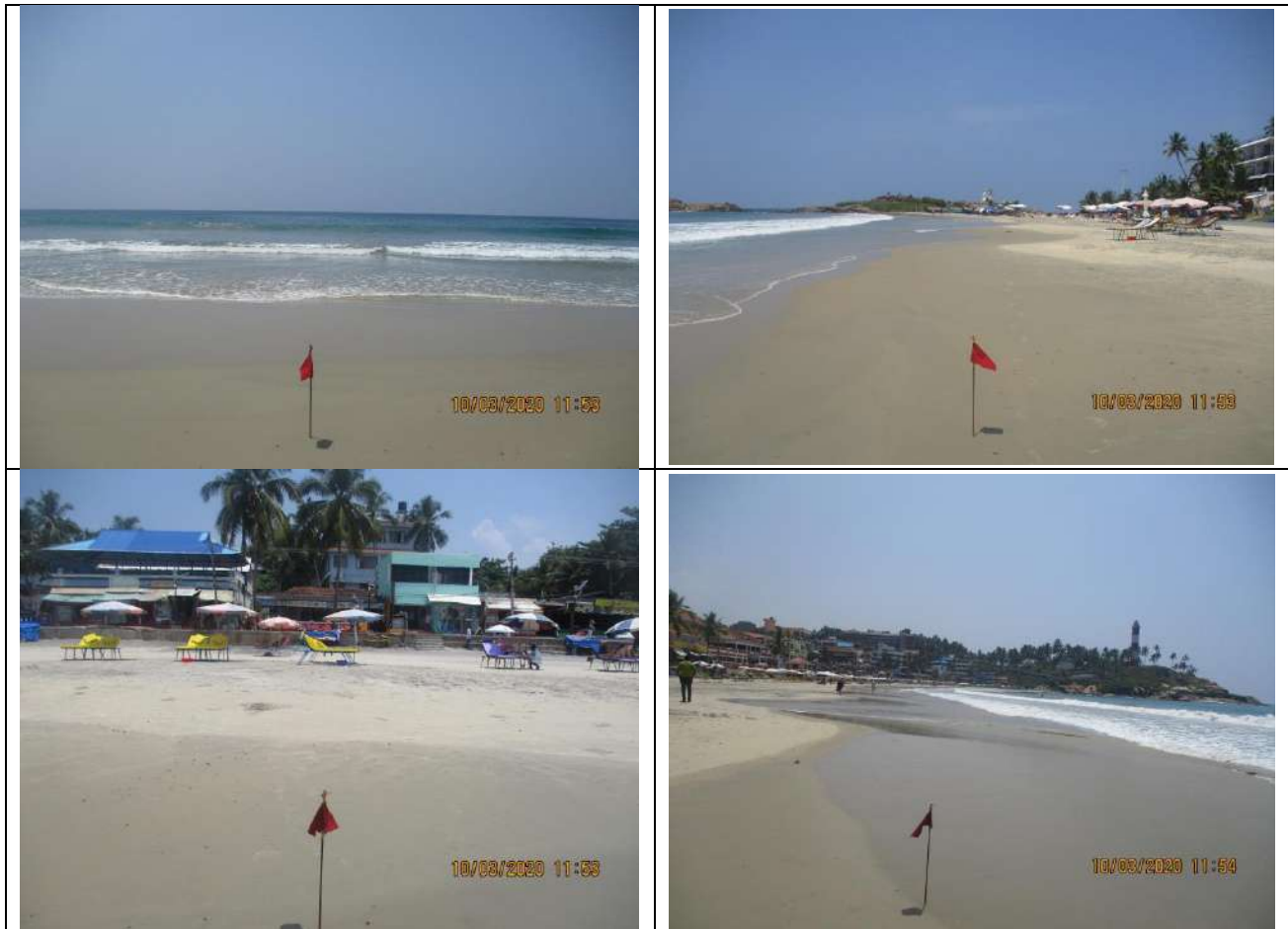


Figure 04- March CSP 43

**Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020**



Vizhinjam International Deepwater Multipurpose Seaport
Shoreline Monitoring Report from October 2019 to March 2020



Annexure II
CSR Activities by AVPPL
(October 2019 to March 2020)

adani	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Corporate Social Responsibility Activities by AVPPL		

Annexure II

The half yearly CSR activities at Vizhinjam mainly fall into five major verticals of community development such as


1. Education
2. Community Health
3. Sustainable Livelihood Development
4. Community Infrastructure Development &
5. Other community engagement programmes

I EDUCATION

The focus of intervention during the year was to improve the quality of education and to provide better facilities for children in the intervention area especially those from fishing communities. The relentless efforts under CSR have provided an opportunity to enhance the quality of education to more than 1500 students during the reporting period. Following are the major activities carried out under education.

Table 1.1: Quality improvement programmes

I	Education initiatives	Total	No. of Indirect Beneficiaries	No. of Access Beneficiaries
1	Merit Scholarship, Career Assessment Test (CAT) & Monthly Sessions	100	400	
2	Benevolent Scholarship	30	120	
3	Soft skill training to students	179	716	284
4	Language Skills	500	2000	
5	Evening Class	150	600	
6	Build as Learning Aid (BaLA)	245	980	
7	Literature meet	98	392	8
8	AF- Media - School joint initiatives	100	400	
9	Competitive Exam Preparation	120	480	520
	Sub Total	1,522		

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1.1 MERIT SCHOLARSHIP & OPENHOSUE

Adani Foundation provided scholarships for the meritorious students from weaker sections in the intervention area to support their higher education. A scholarship amount of Rs.10,000/- has been awarded to selected 100 students during the reporting period. The students from weaker sections are selected based on the performance in the last SSLC examination held on 2019-20.

Toting to the scholarships Career Assessment Test & Monthly Open Houses were conducted for all the students to assess their aptitude and to equip them to choose their career path.

Career Assessment Test

The test has been conducted based on the fact the students are not at all aware about their aptitude and career streams. The test has been carrying out by "**Lifology.com**", one of the Guinness world record institutes. The test result has been made into a report format for follow-up action. The open house session are mainly planned according to the Career Assessment test results. Following steps were completed as part of the test.

Step-1: Preparatory:

One hour group counselling cum orientation on the test conducted. The session covered explaining different parts of the online test like

- i. FACE, which threw light on core personality of students consisting of four elements- Fact, Action, Concept and Emotion.
- ii. MTI - Marston's Type Indicator which assessed the aptitude of students according to different circumstances.
- iii. MIO (Multiple Intelligence Orientation): The intelligence inclination of students has been assessed by examining student's intelligence capability in 9 different areas such as logic, linguistic, interpersonal, intrapersonal, visual, rhythmic, metaphysical, and kinaesthetic.


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Vizhinjam International Deepwater Multipurpose Seaport Corporate Social Responsibility Activities by AVPPL		

Step-2: Conduct of Career Test

The "Online Career Assessment Test" has been conducted for selected students using the assessment tool of "**Lifology.com**". The result generated as a customized report of each student indicating personality of the student, careers options based on aptitude and the most appropriate courses for higher studies prepared.

Step-3: Follow-up (After the examination)

- A detailed analysis report with career plan has been given to each student.
- Individual career counselling and follow-up monitoring arranged based on the analysis report of **Career Assessment Test (CAT)**. This individual career coaching was handled by the renowned resource persons of "**Lifology.com**" Mr. Praveen Parameswar, Director, Mr. Tharun P. Karun, Ms. Ankitha Srivastava and Mrs. Hima Sebastian Senior Career Coaches and counsellors.
- The report contains detailed personal assessment on Linguistic Intelligence, Logical/Numerical Intelligence, Musical Intelligence/rhythmic, Visual/Spatial Intelligence, Kinaesthetic Intelligence, Interpersonal Intelligence, Naturalistic Intelligence, Metaphysical Intelligence and suitable career options. The personalized report of each student was handed over to them for reference. The report suggests six careers for each student from a pool of careers. These six careers are shortlisted based on the unique makeup of each student. The assessment evaluated the student's personality, interests, skills and matching career so that they could succeed in their career. The coaches provided clarity and guidance about various paths of career that they could pursue.
- Developed indicators to monitor the career graph of each student.
- A parental awareness session was conducted on 13th April 2019 and 11th January 2020 for two batches of students covering a total of 92 students along with general seminar on "Career Possibilities". This has created awareness among parents on the strength and weakness of their children. Further guide them to choose the career according to the aptitude of the child. This session was handled by Mr. Praveen Parameswaran, Chief Executive Officer, "**Lifology.com**", Trivandrum.

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- A General Knowledge Test was conducted for the students to identify their general knowledge base by the faculty Mr. Kiran of IMAT, an excellent entrance coaching institution in Trivandrum. The test was attended by 42 students. Thereafter the students were oriented on how to do the coding, decoding and other memory techniques as tip to improve their memory techniques.

Output and Outcome

i. For Students

- Students identified their personality traits and prioritized their career most suited them.
- Students got clarity on the courses to be pursued that is most appropriate for their higher studies.
- Students equipped in taking right decision with regard to their academics and career.


ii. For the parents

- Clarity regarding their child's future.
- Guidance to nurture and support child in right path.
- Help to plan and invest in the right sector for the education of kids.
- More collaborative and informal approach in Parent Child bonding.

1.2 OPEN HOUSES

Monthly open houses were conducted for scholarship students to ensure the betterment in both academic performance and career perspectives. Every second Saturday from 2pm to 5pm is fixed for open house. The topics were finalized based on the recommendations of Career Assessment Test as tabled herewith

MONTH&DATE	TOPIC FOR THE DAY	OUTPUT
OCTOBER 12/10/2019	Exposure visit to Vizhinjam Transshipment Terminal Site	<ul style="list-style-type: none"> • 21 students visited the site. • Understood potential opportunities that could grab in their career. • Familiarized Port and related developments.
NOVEMBER		<ul style="list-style-type: none"> • 22 students participated. • Learned to identify problems in life.


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MONTH&DATE	TOPIC FOR THE DAY	OUTPUT
09/11/2019	Problem solving and decision making	<ul style="list-style-type: none"> Well understood about how to make good decisions
DECEMBER 14/12/2019	Professional career possibilities in the field of Science & Technology	<ul style="list-style-type: none"> 82 students participated. Students oriented about career possibilities in the field of science and technology. Helped to identify the best institutes in this field.
JANUARY 18/01/2020	Parents Meeting. (11/01/2020). Career Assessment Test (CAT).	<ul style="list-style-type: none"> 32 Newly selected students participated. Career Assessment Test conducted in the following 3 areas like <ol style="list-style-type: none"> FACE, which threw light on core personality of students in four elements Fact, Action, Concept and emotion. MTI, Marstons Type indicator to assess attitude. MIO (Multiple intelligence orientation) to know the intelligence inclination.
FEBRUARY	One to One counselling. Distribution of analysis report of CAT.	<ul style="list-style-type: none"> 42 students participated. Based on career assessment test detailed personal assessment report on Linguistic, Logical, Musical, Visual were given. Suitable career options were described. Smart cards provided to students for free access to career information
March		<ul style="list-style-type: none"> Avoided the programme due to the wide spread of COVID -19

1.3 EVENING CLASS

Adani Foundation under CSR initiated “**Evening Class**” for the students from fishing community & weaker sections to provide better facilities to study for final exam of SSLC. This was conducted to overcome the challenges in the deprived families like poor facilities in houses to study, alcoholic parents and other socio-economic backwardness.

- This year 150 students from the poor fishing communities who were weak in studies due to poor socio-economic backgrounds have been prepared for SSLC/Plus Two exams.
- The class rooms of Kottappuram St. Mary’s Higher Secondary School were used for

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Evening classes from Monday to Friday 4.00 pm to 7.00 p.m.

- 90 days continuous classes were conducted.
- There were 8 batches having a mentor teacher from the school and a supplementary teacher having BEd qualification.
- Special classes are organised for 20 hours on difficult subjects like English, Maths, Chemistry and Physics.

OUTCOME

- The real outcome of this programme can be measured once the result of 2020 SSLC exam result. Last year out of 169 students appeared from fishing community for 2019 SSLC examination 168 passed with good marks.
- Evening classes helped the fishing community students to stay-back in the schools and prepare for SSLC and Plus two exams.
- The other outcome of this programme is that it motivated the students to appear exams with confidence.

1.4 BaLA (Building as Learning Aid)

Based on the request form ICDS, Social Justice Department, Govt. of Kerala, it is decided to implement BaLA (Building as Learning Aid) this year in 12 Anganwadies having own building at Vizhinjam under the CSR of AVPPL-AF. Following are the major observations of BaLA

- BaLA is planned to convert Anganwadis entire physical environment as a learning aid. This include the inside space, outside, semi-open spaces. At the core, it is about maximizing the educational 'value' of a built space. It is based on the theme '**how children learn**'.
- Indeed, Building as a Learning Aid (BaLA) aims to use the built elements like floor, walls, pillars, windows, doors, ceilings, fans, trees, flowers, or even rainwater falling on the building as learning resource.
- BaLA attempts to encompass a holistic view of the physical environment and make learning fun and child centric.

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Following are the Anganwadies selected for BALA


Sl.No	Ward	Anganwadis Nos.	Places	Name of Teacher
1	Kottappuram	160	Karimpallikara	Clorpies
2		163	Ozavila	Sathidevi Amma
3	Vizhinjam	170	Aluninnavila	Sreekala.BC
4		168	Pallithura	Sethamma.L
5	Harbour	175	Kuzhiyanvila	Saritha
6		171	Township	Santhanavally
7		172	Mannakkal	Sarena.R
8		173	Mathipuram	Bindhu.S
9		176	Mathipuram	Shamila
11	Venganoor	136	Kalluvettankuzhi	Lekha.C.R
12	Mulloor	141	Edivizhunnabila	Kavithagopal
13		146	Mulloor	Manju.J

Expected Out come

- Increased enrolment and retention of children
- Child friendly environment
- Learning become more interesting for children and the teacher
- Abstract notions are expressed through concrete examples
- Distance between children and teachers melted down
- Decrease in vandalism and negative behaviour of children

1.5 COACHING FOR SUCCESS (Competitive exam preparation)

One of the aspirations of youth in Kerala is to get a Government job and become secured in life. However, the number of Government servant at Vizhinjam is comparatively far less than nearby areas. Though people are securing higher degrees, they are less aware and not prepared for exploring the opportunities in the government sector. In order to overcome this issue, a competitive exam coaching programme has been started under the CSR at Vizhinjam.

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The programme started on 16/09/2019 in CSR office Mukkola and has also been extended to Kadakkulam residents association. Presently 112 students are taking advantage of Coaching in the two centres,

SPECIAL FEATURES OF THE COACHING

- Classes are handled by the best subject experts in the industry
- Daily practical examinations with 50 Questions
- Daily updation of score cards
- Periodic examinations
- Reference facilities.
- Facilities for combine study apart from class hours
- Online platform for sharing of study materials
- Assistance in application process
- Updation of current opportunities in State Government as well as Central government.
- The topics covered are (i) General Knowledge (ii) Current Affairs (iii) English (iv) Mathematics (v) Reasoning Ability and (vi) Aptitude Test and (vii) Facts of India.

OUTCOME

- All opportunities announced by Kerala Public Service Commission and in Central government institutions are referred to all students undergoing the training
- All candidates applied for suitable job roles according to their Qualification. Candidates were assisted in the application process, by providing tablets and internet
- A display board is placed in the class room for displaying current openings and for the updation of current affairs.

1.8 BENEVOLENT SUPPORT


Another important programme in education under the CSR of AVPPL-AF is benevolent scholarship. This is a programme to support poor students with critical ill, differently abled or with critical ill parents. Under this programme 32 poor patients have been selected for support. The list of such patients are given below

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SI	Name of Patient	Age	Diagnosis	Socio-Economic profile	Recommendation
1	Rakesh	12	Muscular Dystrophy Affected all 4 limbs. Unable walk. Grade 2 power lower limb than upper limb. Hereditary muscle diseases. It defects in muscle proteins and the death of muscle cells tissue	Father is a fisherman and mother looking after child and a house wife. Economically backward family	Electronic wheel chair
2	Mary	60	Temporoparietal Hematoma Blood Coating on head. Develop sudden loss of consciousness while at home History of generalized tonic colnic one episode had undergone craniotomy. Hematoma evacuation	Economically backward and homeless	wheel chair
3	Desin	8	Hyperkinetic behavior Attention deficit hyper activity disorder combined with border line intelligence and urinary incontinence	Old aged parents, dependent of fishermen brother. Income is not sufficient	Treatment support
4	Sarath .J	16	Mental Retardation, Pyramidal dysfunctions seizure disorder thrombocytopenia .Spastic paraparesis, mild ataxia, and a relatively mild cognitive deficit are common, a major seizure disorder	Father is a fisherman. House is too congested for the family and face financial issues for meeting medical needs	Treatment support
5	Pacita	64	Periventricular Leukoaraiosis due to small vessel Ischemic changes. Diffuse cerebri atrophy a commonly observed and previously ignored degenerative disease of elderly humans, is strongly associated with leuko ... Stenosis or occlusion of deep cerebral veins may	She is an ockhi victim. The basic socio-Economic Condition is very poor	Treatment support

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SI	Name of Patient	Age	Diagnosis	Socio-Economic profile	Recommendation
			promote development of leukoaraiosis		
6	Ebin	19	Oligodendroglioma. Residual oligoastrocytoma with trapped left temporal horn and hydrocephalus Oligodendroglioma Grade II Left parieto occipital lesion and underwent surgery	Socio-Economic status is lower to satisfy basic livelihood needs.	Treatment support
7	Gluastikkamma	49	Chronic Bronchial Asthma. Chest Diseases. airway path of the lungs to swell and narrow	She is widow. Her life dramatically changed because of the disease thus the income of the family is decreased.	Treatment Support
8	Jinisha.V	12	Bilateral Sensorineural Hearing Loss. condition where there is a hearing loss in both the ears due to the hair cells of the inner ear being damaged	Husband is a Fishermen .House is too congested for the family and face financial issues	Treatment support & Hearing Aid
9	Rahamath Aisha.K	49	AIDP, type2 DM, Diabetic Nephropathy, anemia	Husband is a Fishermen .House is too congested for the family and face financial issues	Wheel chair
10	Suhara Beevi	63	Impairment of locomotion, permanent disability	She is a single staying with his brother in law.	Wheel chair
11	Fathima beevi	80	Geriatric case, hand locomotor disability	Old age, dependent of fishermen son. Income is not sufficient for day to day expenses.	Medical Support
12	Sivani.M.S	8	Congenital Hydrocephalus	Auto driver on lease. One operation held another operation at head by inserting tube required	Need 2 lakhs support for operation. Treatment support
13	Shamsudheen	68	Diabetic patient with critical wound on left leg and steel rod	Presently difficulty in finding a livelihood. Staying with sister. Medical treatment needed	Ortho Surgery support needed

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SI	Name of Patient	Age	Diagnosis	Socio-Economic profile	Recommendation
14	Mohammed Harshan & Harshida Said Mohmmmed Asif	10 6 5	House caught fire,	Fishermen. House burned	housing support by involving other stakeholders too
15	Ahammed .H	11	Andopmatal Delay, Sporate Diplepia Seismen.Speakless, Walkless depended all activities Just sitting only wheel chair. He is having 50 % disability.	Father is a fisherman. Monthly income very low. Three siblings. Child fully depended on parents.	wheel chair
16	Al-Ameena	12	MR, Mental Retardation Current Status of patient MR Position Speakless. He is having 80 % disability.	Mentally retarded Father Fishermen, Monthly income 1000/ three siblings. Fully depended on parents.	Wheel chair
17	Saliha Beevi	22	MR,Mental Retardation .This disability is classified as severe. The condition is not likely to improve. She is having 75 % disability.	Since father is a fisherman. They are economically backward. Also face basic health	Wheel chair
18	Adisha	3	Cerebral Palsy & Cleft Patient. Need surgery for cleft palate and long term treatment for cerebral palsy.	Father is a fisherman. House is too congested for the family and face financial issues for meeting medical needs	Wheel chair
19	vaishak	15	Chest wall Tumor. Chest pain Bony swelling 9th rib.	Father is a coolie. Mother and a brother have no jobs. The family face financial issues for medical needs	Medical support
20	Bheema & Hafsa	19 & 13	Mother & Father Died	Genuine Case	Housing Support and GDA Course to elder Girl
21	Mohanan F	55	Lower Limb Hypertension Meningioma. a tumor, usually begin, arising from meningeal tissue of the brain.	Father bedridden. Mother and two children have no job. The family face financial issues for medical needs	support for PSC Coaching to younger girl child, Housing & Medical Support
22	Fels	7	Chronic Kidney Disease Stage V Reflux Nephropathy.	Father is a fisherman. House is too congested for	He need renal transplantation

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SI	Name of Patient	Age	Diagnosis	Socio-Economic profile	Recommendation
				the family and face financial issues for meeting medical needs	
23	Maheswaran	36	Spastic CP-L Locomotor	Not married staying with deceased brother	Wheel chair
24	Sindhu.S	40	cavernous Malformation, Low ferritin anaemia.	Widow lady with 2 younger children. No income	Wheel chair & education support
25	Sobha.V	36	Polio affected, left side is paralyzed.	Daughter of old parents, parents are not in a position to go for livelihood	Three wheeler and Medical support
26	Suresh.G	47	Burst fracture T12 with paraplegia / Bilateral fracture calcaneum	No income and mother of three children.	Livelihood support and treatment support
27	Radhakrishnan Asari Athira (Daughter	57 21	Systemic Arterial Hypertension Papillary Carcinoma Thyroid with metastasis	Financial Difficulties in running basic needs of family	Surgery Support
28	Chithra.J	27	Congenital Distal Limb deficiency B/L Upper limb	Homeless, difficulty in finding an income	Housing support
29	Shobana	55	Left side paralysis of the body after a bike accident	Husband coolie. Suicide of child. Facing financial difficulties in running the basic needs of family	Wheel chair
30	Jayalekshmi.A. S	15	Specific Cerebral Palsy (80%)	Need support for education. Facing financial difficulties in running the basic needs of family	Computer Assistance
31	K.Vinod	44	Non Hodgkin lymphoma	Lottery Sale. Shop closed No income. Livelihood support and medical helping hand	Lively hood support & Cancer treatment support
32	Aromal. A.R	13	visual impairment (Vision only one eye)	Husband coolie. Financial difficulties is running basic needs of family	Surgery support

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1.9 MONTHLY LITERATURE MEET–Poets and Men of Literature

Every second Saturday from 2pm to 5 pm a literature meet was organized at CV smaraka library and Kovalam SNDP Hall by CSR team. It is guided by six renowned writers from Vizhinjam and the members of CV Smaraka Library. Literature is a timeless piece of entertainment and it reflects human nature and a way we can learn and relate to others. Poet and literature meet helps the students to develop and enable their literature talents to apply in appropriate platforms. Following table depicts the topics, monthly sessions, and participation of children.

MONTH & DATE	TOPIC	PARTICIPATION	OUTPUT
12/10/2019	<ul style="list-style-type: none"> Preparation of Travelogue based on the visit. Description of Nobel prize winners 2018,2019 	23 students 2 parents 6 writers	<ul style="list-style-type: none"> Mr.Rethnakaran detailed the statues in Trivandrum city during exposure visit. Understood the Nobel Prize winners.
9/11/2019	<ul style="list-style-type: none"> session on Success and creative writing by Mr.Gireesh Paruthimadan session on Gitanjali of Rabindranath Tagore by Mr.Retnakaran 	91 students. 8resource persons 5 parents	<ul style="list-style-type: none"> New batch started at Kovalam Well understood about creative writing. Students talents presented
14/12/2019	<ul style="list-style-type: none"> Contemporary writing of poems –session by Mr.Vinod Vyshakhi. Honouring of Kumari Anjana for her short story in Arshadeepam Magazine Explanation of poem Chinthavishtayaya Seetha by Mr.S.K Vijaya kumar. 	58 students. 5 parents. 8 resource persons.	<ul style="list-style-type: none"> Discussed the importance of world Human Rights Day Clarity on creative writing of poems and various writing skills like Nattezhuthu, Veettezhuthu, Kadezhuthu
11/01/2020	<ul style="list-style-type: none"> Creative Drawings and Cartoons.-Session by Mr.William Panipitcha 	67 students. 8 resource persons. 7 parents.	<ul style="list-style-type: none"> Understood different colours and different types of cartoons, portraits, sceneries, graphic & animations. Participated in drawing competition.

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MONTH & DATE	TOPIC	PARTICIPATION	OUTPUT
08/02/2020	<ul style="list-style-type: none"> Discussed on Contemporary writers, like A Ayyappan and C.Radhakrishnan. Different style and types of singing. Awareness on corona virus 	51 students. 8parents. 6 resource persons	<ul style="list-style-type: none"> Clarity on the styles of singing. Awareness on contemporary writing. Well aware about corona virus and its way of transmission

2. COMMUNITY HEALTH

The major activities carried out under Community Health included running of a Mobile Health Unit, Medical Camps, Community Awareness Programmes, Waste Management Programmes and Clean Campaigns

2.1 MOBILE HEALTH CARE UNIT (Good Health and Well Being)

Adani Foundation is running a Mobile Health Care Unit (MHCU) in the neighboring communities of Vizhinjam since June 2017. Helpage India is the partnering agency for executing the project. The unit consists of an allopathic doctor, pharmacist and a social worker along with a mobile van and medicines operating 6 days a week. Every day the team visit two pre fixed area. Every Saturday is dedicated for conducting special medical camps in selected areas according to the community needs. The service of MHU has reached to 41,640 over the last three year, where in 29,339 are females. The updates of MHCU for the year 2019-20 are as follows

- During the year, Vizhinjam MHCU has provided 9055 check –ups wherein 591 were during the special medical camps organized on weekends.
- The MHCU Team conducted 36 house visits for bedridden patients and provided necessary medicines.
- Awareness conducted on Seasonal Diseases, Elder Abuse, Cancer, Corona, Hypertension, Diabetes, Skin disease and sanitation conducted in each site.
- 257 Glucose check-ups were done for the patients.
- Organized Special Medical Camp at Karkidaka Vavu Bali.
- Special Awareness created among the communities on "Covid 19".

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Monthly break-up of patients supported during Oct 2019-March 2020

	2019			2020		
MHU Sites	Oct	Nov	Dec	Jan	Feb	Mar
New Church	108	167	197	134	117	168
Kadakkulam	71	103	119	114	112	112
Karayadivila	161	143	167	135	118	92
Thulavila	195	63	168	69	63	47
Theruvu	185	201	160	242	190	153
SNDP	114	95	78	129	96	71
Gateway	141	114	120	161	109	82
Township	267	195	200	276	171	157
MarianNagar	135	149	129	174	107	105
Near Aquarium	159	1236	133	188	113	126
SpecialCamp	48	43	149	170	57	124
Total	1584	1509	1620	1792	1313	1237

Blood glucose test done by Vizhinjam MHU during Oct 2019- March 2020

Months	Total Tests			Total Positive Blood Sugar		
	Male	Female	Total	Male	Female	Total
Oct	24	36	60	12	18	30
Nov	26	53	79	16	22	38
Dec	12	31	43	6	19	25
Jan	11	19	30	5	11	16
Feb	11	21	32	5	13	18
Mar	3	10	13	0	4	4
Total	87	170	257	44	87	131

Medical Camps conducted under MHCU during Oct 2019- March 2020

During the year conducted 7 medical camps in remote areas covering

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SN	Date	Regular Camp site	Male	Female	Total
1	19/10/2019	Aluninnavilla	16	32	48
2	23/11/2019	Harbour	16	27	43
3	07/12/2019	Mukkola	35	51	86
4	21/12/2019	Kadaykulam colony	24	39	63
5	04/01/2020	Vizhinjam	63	107	170
6	15/02/2020	Aluninnavilla	13	44	57
7	14/03/2020	Ursuline Kottappuram	44	80	124
		Total	211	380	591

Referral details

Name	Date	Site	age	sex	Reason	Referred to
Mariyaglory	4/10/2019	Mariyan nagar	3	F	Pediatric	GH Trivandrum
Jeron	28/10/2019	New church	80	M	Ortho	GH Trivandrum
Nidheesh	28/10/2019	New church	1	M	Pediatric	GH Trivandrum
Mary	8/11/2019	Harbour	55	F	Eye specialist	GH Trivandrum
Muthppan	12/11/2019	Harbour	63	M	Ortho	GH Trivandrum
Thadevuse	14/11/2019	New Church	59	M	ORTHO	GH Trivandrum
Leenamma	2/12/2019	New church	70	F	Ortho	GH Trivandrum
Raju	26/12/2019	gateway	40	M	Ortho	GH Trivandrum
Nisha	31/1/2020	Mariyan Nagar	20	F	Ortho	GH Trivandrum
Karthi	10/2/2020	Kadaykulam	74	F	Opthal mology	GH Trivandrum
Vargheese	28/1/2020	Mariyan nagar	77	M	Ortho	GH Trivandrum

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Case Study of Meenakshi

Name: Meenakshi

Age: 60 years

Sex: Female

Marital Status: widow

Address: Karayadivilla

Meenakshi is a regular beneficiary, undergoing treatment for Diabetes mellitus, systemic hypertension, coronary artery disease (cold), dyslipidaemia and peripheral vertigo at MHU. She comes to MHU every week, get checked and have medicines from the unit. Earlier for treatment from Vizhinjam Primary Health centre, used to spend rupees 200 for auto charge. Because of that, she rarely comes to hospital. But Adani MHU has provided the facility at her door step.

Meenakshi is widow, her husband died six years ago. She has five children, three boys and two girls. All are married and one of her daughter is also widow. Meenakshi's daughter is going as house maid. Meenakshi's other children are not helping her. Presently Meenakshi is very much happy and thankful for the medicine and support provided from Adani- MHCU

Case study of Naslyance

Name: Naslyance

Age: 43 male

Place: Mariannagar

Naslyance, is 43 years old man from Mariyannagar Vizhinjam village. He is a fisherman going regularly for fishing, and with that income he takes care of the family and the education of the children. He is suffering from the back pain and leg pain. The income which he is getting from fishing is very less, so he doesn't want to go to hospital. And then he came to know the medical services provided by the Adani CSR team to the community. He got a good medical attention from the MHCU. He is happy of becoming healthy and able to walk in for his livelihood and contribute for the education of his children. He is very much happy for the health services from Vizhinjam MHU.

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Case Study of Ambujakshi

Name: Ambujakshi

Age: 87 Female

Place: Devani Vicar, Venganoor PO

Ambujakshi is an 87 year old widow from Venganoor village. She is presently staying with her daughter. Vizhinjam MHU involvement is very helpful in her life, because of the regular medical attention that she is receiving for the last six months. The reason is that it is very much difficult for her to go every week to hospital and is expensive. But now she is very happy because of the health services available close to her house. Now every week she comes to MHU and takes the medicines for diabetes and other health issues. She was in fact much depressed because of the death of her husband. But now she is happy as MHU is supporting her health along with her daughter.

Case study of Seethalekshmi

Name: Seethalekshmi

Age: 75 years Female

Place: Theruvu

Seethalekshmi is a 75 years old woman from Venganoor, Vizhinjam village. She was a good singer and did lot of stage performances. Presently she is not signing due her age old diseases. She was loved by everyone and received great appreciations. But now she is aged and nobody is giving much attention to her. The age old diseases worried her for the last two years. She is not having anybody to take her to hospital other than her aged husband. The MHCU of Adani Foundation supported her to get free check-up and diagnosed having BP and related diseases. Now she is taking medicines from MHU regularly and living happily with her husband. She tells to her friends and neighbors about the health services and MHU which brought her back to life.

Case Study of Thankam

Name: Ms. Thankam

Age: 77 years

Sex: Female

Marital Status: Married

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Address: njaravillakom, Vizhinjam P.O. Thiruvananthapuram.

Thankam, aged 77 from Njaravilla, Vizhinjam is a house wife living with her husband. As the children are married and staying away, both of them are living in isolation. She is migrated from Tamil Nadu many years ago for the sake of job. She liked Kerala very much and said that the people of Kerala are very kind in helping. Their only source of income is the oldage pension receiving from welfare board. Though she was suffering from hypertension long back, the regular medication was a challenge as the health centre was away from her home. Because of oldage issues and no one to accompany, she seldom visited the health centre. Irregular medication was causing severe problems to her but she was helpless as her husband too was old and couldn't travel. It was at this juncture, the Mobile Health Care Unit of Adani Foundation started visiting the site near to her house. Thereafter she became a regular visitor and her BP and diabetes is now under control. The awareness sessions too has helped her to control the diet to keep BP and diabetes. Now she can travel alone and feel confident to do even household duties. She is very much happy with regard to the medical care provided by MHCU Vizhinjam and always urges her friends and neighbours to avail the health service provided by MHU. She says, "The MHCU Vizhinjam is God's gift to us and I am highly grateful to Adani Foundation for starting this mobile unit. She expressed her happiness that the regular treatment provided at their door step is a boon to hundreds of elder people like her.

2.2 MEDICAL CAMP (Good Health & Well Being)

Vizhinjam being one of the backward areas in the coastal belt of Kerala, it has reported high incidence of communicable diseases like malaria, chikungunya, dengue fever, leptospirosis and swine flu especially among the fishing communities. Hence AVPPL-AF conducted monthly regular medical camp in the CSR intervention area. During the reporting period 12 medical camps were conducted in which 1183 people were treated freely. The details are as follows:

S.N	Date	Camp	Place	Consulted
1	19.10.2019	General Medical Camp	Aluninnavila	48

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S.N	Date	Camp	Place	Consulted
2	18.11.2019	Cancer Detection Camp	Vizmart Vizhinjam	150
3	23.11.2019	General Medical Camp	Harbour	43
4	04.12.2019	Eye Camp (Regional Ophthalmology)	ASDC, Mukkola	156
5	06.04.2019	IMA (Fir Aid & CPR Training	ASDC Mukkola	60
6	07.12.2019	General Medical Camp	Mukkola	86
7	21.12.2019	General Medical Camp	Kadaikulam Colony	63
8	04.01.2020	Dental, Cardiology & Ophthalmology	Zonal Office Vizhinjam	200
9	04.01.2020	General Medical Camp	Zonal Office Vizhinjam	170
10	04.02.2020	Cancer Awareness Programme	CSR Office Mukkola	50
11	15.02.2020	General Medical Camp	Aluninnavila	57
12	04.03.2020	RCC Refresher Training	CSR Office Mukkola	100
			Total	1,183

Cancer Detection Training

As part of the community Health initiatives, a cancer detection training program for community volunteers were organized in association with Regional Cancer Centre on in CSR Office Mukkola on 18.11.2019. Dr.Kalavathy, Associate Professor Community Oncology Department from Regional Cancer Centre took the sessions.100 community volunteers participated. The Training equipped the volunteers on identifying the symptoms of cancer, self-screening and they became aware how to encourage people to attend the cancer Detection Camp.

Detection Camp

A cancer detection camp in association with Regional Cancer Centre (best in Asia) was organized during the reporting period on 18.11.2019 at Viz Mart, Vizhinjam. For the successful implementation of the camp a 50 member community volunteers youth group was formed and named the group as Angel's Army. The camp was organized with doctors and medical team from Govt Regional Cancer Centre on 18.11.2019 at VIZMART. The volunteers brought 137 people screened initially by the volunteers who are doubtful of malignancy. Out this, the doctors detected 16 new cases. Follow-up treatment support

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for the identified patients has been ensured from Regional Cancer center. The volunteers and CSR team are designated with the patients till they return to healthy life.

Eye Camp

An eye camp was conducted at Adani Skill Development Centre, Mukkola on 04.12.2019 for the selected 150 people from Vizhinjam. The camp was organized under the CSR of AVPPL in association with Regional Institute of Ophthalmology, Govt. Medical College, Trivandrum. Among the patients, 49 are directed for specs and two patients to do cataract surgery. The follow-up support for the cataract surgery is arranged free of cost at Govt Ophthalmology hospital. The specs will be provided under the CSR of Adani Foundation.

Distribution of Spectacles


As the follow up of eye camp conducted on 04.12.2019, spectacles of best quality distributed to fifty people as per the prescription of doctors. The distribution of the specs inaugurated by Mr. Preveen, Circle inspector, Vizhinjam, presided over by Mr. Sushil Nair, Head Corporate affairs, Adani Vizhinjam Port Pvt. Ltd. in the presence of Dr. Anil Balakrishnan, Unit CSR head and the team members of Adani Foundation.

First aid & CPR Training for Health Volunteers (IRArmy)

A 60 member "**Immediate Response Army**" from community volunteers of youth group has been teamed up under the CSR of Adani Foundation to provide initial level health care support to the poor and needy in the community. To equip the team, Adani Foundation organized a one day training programme in '**First Aid and CPR**' in association with Indian Medical Association, Trivandrum. It is also decided to provide further trainings to the groups on disaster preparedness and rescue operations. The team will be trained in preparing vulnerability plan and resource plan at community level.


CARDIAC AND DENTAL CMAP

A medical camp was conducted at Zonal Office, Trivandrum Municipal Corporation, Vizhinjam, Trivandrum on 4th January 2020, which was benefited by 200 people. The camp was organized under the CSR of AVPPL in association with NIMS Medicity

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Hospital, Neyyatinkara, Trivandrum. A medical team of 16 members including the specialities of Cardiology, Dental, Ophthalmology and Genral medicine were screened the people.

2.3 COMMUNITY AWARENESS PROGRAMMES

Sl No	Event	Programme details	No of participants
1.	150 th Birth Anniversary Celebration of Mahatma Gandhi Date: 2.10.2019 KSRTC Bus stand	<ul style="list-style-type: none"> Cleaning of bus stand Fit India Plogging Door to Door awareness programme	157
2.	150 th Birth Anniversary Celebration of Mahatma Gandhi Date: 02.10.2020 KSRTC Bus stand	<ul style="list-style-type: none"> marathon on waste picking along with awareness creation campaign 	210
3.	1000 households Door to Door campaign & distribution of cloth bags Period: 02.10.2019 to 05.01.2020	<ul style="list-style-type: none"> Distributed clothe bags to 1000 houses to reduce the use of plastics and promoting cloth bags Prepared a base line data of 1000 poor households in the communities 	2000
		 Total coverage	2367


2.4 CLEAN CAMPAIGN

The cleaning activity has been carried out in the major communities of Vizhinjam especially in coastal belt jointly with the sanitation workers of Municipal Corporation of Thiruvananthapuram. The locations were identified through community interaction and mapping out of the highly sensitive receptacles of waste. Towards that a team has been formed with 38 sanitation workers from Thiruvananthapuram Municipal Corporation, volunteers from CSR team, the members of "clean-4-U" livelihood group promoted under the CSR and the respective community members.

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Table depict the outcome of different community cleaning

Sl.No	Event &Date	No of families benefitted	Activities and outcome
1.	Drainage Cleaning at Vayalinkara 13.07.2019 to 21.03.2020	220	<ul style="list-style-type: none"> • Five times cleaned the drainage at Vayalinkara with six sanitation workers and community. • The accumulation of waste and other filthy items cause the clogging of drain
2.	Clearing sand from the road	50	<ul style="list-style-type: none"> • After the civil work for the Toilet at Kottappuram, the debris dumped at the road side was making difficult for vehicles. Localites requested to remove it and the same has been cleared with the help of Corporation Cleaning staff.
3.	Cleaning of Valiyakadappuram 15.12.2019 to 27.12.2019	520	<ul style="list-style-type: none"> • AVPPL- AF cleaned Valiyakadappuram and levelled it as per the request received from Vizhinjam parish in connection with their annual feast from 27th Dec to 5th Jan 2020. • AF engaged Karshika Karma Sena, the livelihood group to clean the bushes.
4.	Cleaning of Vegetation 5 days work in Jan 2020	100	<ul style="list-style-type: none"> • Based on the call from local community, the vegetation close to the Port area, Kottukal and Mulloor are cleaned. • The local people alleged the presence of snakes, clearing of bushes in the vicinity of the acropode etc.
5.	Cleaning of Panavilacode area Three days in Dec 2019	100	<ul style="list-style-type: none"> • AF jointly with Trivandrum Corporation cleaned Panavilacode area during the period as the request received from the local people regarding the snake biting. • The service of Corporation Cleaning staff and Karshika Karmasena were made available for cleaning.

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Sl.No	Event & Date	No of families benefitted	Activities and outcome
6	Cleaning of Vegetation at Sri Nagar	60	<ul style="list-style-type: none"> Based on the call from community people and Mulloor Sri Nagar Bhagavathy Temple to clear the vegetation close to their Temple in the acquired land for Port Business. AF engaged one of the livelihood groups, Karsheeka Karmasena. They have cleaned all the area before the temple festival.
7	Gangayar canal cleaning Every during rainy season	150	<ul style="list-style-type: none"> The issue of cleaning of Gangayar River keep on coming to Port. The mouth of Gangayar River opening to sea often gets clogged due to sand accumulation. The issue has been put to the notice of Drudging unit and ensured they are clearing the mouth at every interval. A proper drainage plan is being planned by VISL with the technical support of Minor Irrigation Department, which can be executed under the CSR of AVPPL.
Total families benefitted		1200	<ul style="list-style-type: none"> That means around 4800 members are directly benefited with this cleaning campaign This helped to prevent the spread of communicable diseases and ensuring keeping the vicinities neat and clean

2.5 SOLID WASTE MANAGEMENT

Adani Foundation installed “**Thumboormozhi Aero Bins**” in three coastal belt communities Viz Kottappuram Ward, Vizhinjam Ward and Harbour ward as a one-stop solution for the alarming issue of Solid Waste Management. It is on a tri-partite partnership model wherein Adani Foundation bear the one time installation cost for the project; Municipal Corporation ensured the maintenance and monitoring of the project whereas the Ward Councillor together with the Community leaders act as the change agent for a better waste

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management project. The following table depict location of bins and quantum of waste handled through this bins.

Sl.No	Location of Bins	No.of Bins	No of families Served	Quantum of Waste /day
1	Vizhinjam Market	8	850	220 Kg
2	Harbour Mathippuram	10	1000	300 Kg
3	Kottappuram – Charuvila	3	250	100 kg
4	Puloorkonam, Vizhinjam	5	500	150 Kg
Total		26	2600	770 kg

During the reporting period 15 new bins were constructed, wherein 10 bins are in the same location where the old bins dilapidated during Ockhi whereas 5 bins are completed at Vizhinjam ward near Krishna temple.

OUTCOME

- Joint model (CSR, Local authority and community) of Sustained Aerobic solution for waste management established.
- Good community participation in the management of waste wherein people themselves started the habit of segregating the waste and bringing it to the sites wherever Thumbormozhi bins are placed.
- Absolute ownership of Municipal Corporation in handling the waste ensured.
- 2600 families are directly getting the benefit.

2.6 SUPOSHAN (SDG No.2 and SDG No4)

SuPoshan is a special project of Adani Foundation to alleviate malnutrition and anaemia among children in 0-5 years of age, adolescent girls, pregnant women, lactating mothers and women in the reproductive age. The activities under SuPoshan included

- Identifying malnourished children below the age of five and anaemic adolescent girls and women in reproductive age group using anthropometric measurements and HB testing.
- Facilitating to become healthy over a period of time through Ready to Use Therapeutic Food and medical support.

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- Awareness creation and cleaning campaigns in the communities to maintain cleanliness and health.
- Promotion of Kitchen garden and nutritious food for a healthy growth and development of children.
- Frequent Village Level Meetings, Home visits & Counselling sessions to understand the needs and priorities of the communities and facilitate to overcome it.
- Promotion of volunteerism in communities to serve themselves and to act as a quick response team in any emergencies arising from the communities from time to time.

Sl. No	Programme	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	March 2020
1	House hold visits	751	894	1216	2108	1943	354
2	Family based counseling	46	68	63	68	51	20
3	Anganwadi visits	63	67	78	101	74	13
4	Focus Group Discussions	40	43	46	51	50	20
5	Village Level Events	18	18	23	21	21	5
6	Anthropometric Measurements	245	275	1061	0	0	0
7	HB Screening	0	0	0	1559	1737	0
	Total	1163	1365	2487	3908	3876	412

Breakup of Qualitative Change

Month	Conversion from SAM ¹ to MAM ²	MAM to Healthy	Anaemia from Severe to Moderate	Moderate to mild	Mild to Normal
Oct		3			
Nov		2			
Dec					
Jan -20					
Feb					
March					
Total	0	5	0	0	0

¹ SAM means Severe Acute Malnourished

² MAM is Moderate Acute Malnourished

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Breakup of awareness through FGDs and Village Level Meetings

Month	FGD Adolescent girls		FGD Mothers		Village Meeting		Total	
	No of Prog.	No of Parti.	No of Prog.	No of Parti.	No of Prog.	No of Parti.	No of Prog.	No of Part.
Oct	14	186	24	208	10	408	48	802
Nov	20	178	24	202	10	432	54	812
Dec	19	193	26	219	14	452	59	864
Jan -20	28	168	23	154	21	312	72	634
Feb	20	158	30	182	21	690	71	1030
March	6	35	14	60	5	216	25	311
Total	107	918	141	1025	81	2510	329	4453

Other major activities under SuPoshan

- **Adhyamritham- first honey competition** was conducted for mothers, lactating mothers, pregnant ladies and adolescent girls in the 5 wards as part of Breastfeeding day celebrations participated by 45 people. The competitions included essay writing, poems and paintings on the theme.
- **Awareness programmes**, teenage meetings, mothers meetings, village level meetings were done by Sanginies in 5 wards. They gave classes on the importance of breastfeeding and how it can help the physical, mental and psychological development of a child.
- **Nutrition Week / Month Celebrations-2019** under the theme “**Complementary Feeding**” was celebrated at Vizhinjam with the participation of 334 people. Part of the programme conducted awareness classes and kitchen garden promotion in collaboration with ICDS.
- **SuPoshan team in collaboration with ICDS** gave awareness classes to Mothers in the intervening wards. ICDS Supervisor Mrs. Sajitha took classes on health concerns of mothers, schemes available for Children, importance of Nutrition, green leafy vegetables and importance of 1000 days and role of mothers in the developmental stage of a child.
- **Global Hand washing day (Oct 15)**

Global hand washing day celebrated under the theme “**Clean Hands for all**” at Vizhinjam by SuPoshan in association with ICDS and Venganoor Girls School with a participation of 210

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people. As part of the day conducted hand washing practice in 3 Anganwadis at Kottappuram Ward and in HSS for Girls, Venganoor.

- **World Food Day**

World Food Day was observed at Vizhinjam under Suposhan on 16 October 2019. Exhibition on nutritious food and an awareness on healthy eating habits was conducted at SNVLP School, Kovalam and in Anganwadi centers at Mullor. The programme covered 140 participants. The session was led by Mr. Anil Kumar, Junior Head Inspector, PHC Muckola

- **World Iodine Deficiency Day**

Vizhinjam site also observed World Iodine Deficiency Day on 21.10.2019. The sanginis took Special Awareness Classes on Importance of Iodine for adolescent girls, lactating mothers and pregnant ladies.

- **Mahatma Gandhi Jayanthi**

Vizhinjam site celebrated Gandhi Jayanthi on 2nd October 2019 to mark the birth anniversary of Mahatma Gandhi. The Sanginis from Kovalam and Harbour cleaned anganwadi area and create awareness on cleanliness with focus on health and hygiene.

- **World Toilet Day**

The World Toilet Day celebrated under the theme of **leaving no one behind** at Vizhinjam by SuPoshan team of Adani Foundation in association with ICDS and St. Marys HSS, Kottapuram. The programme was participated by 112 people on 19 November 2019. Mrs. Raji H (Assistant Health Inspector, Vizhinjam) took awareness class on importance of hygienic toilet facilities, handwashing practices and safely managed sanitation. Along with this the members of Adolescent clubs under leadership of Sanginis took the initiative of toilet cleaning in households of Mulloor area.

- **Newborn Care Week**

Under Suposhan, Vizhinjam site celebrated New Born Care Week from 15 to 21 November 2019. Suposhan team in association with PHC, Muckola done the screening camp for pregnant ladies. This was participated by 75 pregnant ladies. The programme was coordinated by Mrs. Chandri and Mrs. Jasmine harbour. Door to Door awareness programme & family counselling conducted for lactating mothers on the topics of Colostrum, Health and

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Hygiene and importance of breastfeeding and nutritious food practises under the leadership of Sangini Anitha. Topics covered during counselling were Kangaroo care, exclusive breastfeeding, child vaccination, good hygiene practises & nutritious food habits.

- **Children's Day**

Vizhinjam site observed Children's Day in association with ICDS and Schools on 14 Nov 2019. Celebrated the day in different Anganwadis participated by 70 kids and in St. Paul's School, Uchakada participated by 210 students and in Ursuline English Medium School, Kottapuram participated 150 students. Awareness session on child rights, Rallies with regard to child protection were conducted on the day.

- **One day Workshop – SRADHA**

A one day workshop viz SRADHA was conducted on sexual violence against women on 08.11.2019. The resource persons from ICDS department gave awareness session on gender sensitization, government acts for protection of women and child and different schemes for them. This was participated by 138 community members and seven sanginis.

- **Street Play by Students**

Adolescent club of Suposhan from HSS for girls Venganoor done an awareness skit on environmental cleanliness at Pattani Colony in Harbour ward on 26 Nov 2019. They have also spread awareness on waste management by visiting door to door among the fisher folk. A total of 40 students participated in the programme and the awareness was given to the entire community having more than 500 households.

- **World Cancer Day**

Vizhinjam site observed cancer day on 04-02-2020 with cancer awareness and detection camps. Sanginis throughout the site observed this day by spreading awareness for RPA (Reproductive Age group) of women and adolescent girls. The sessions were handled by sanginis and Assistant SuPoshan Officer. Topics covered included Cancer and its types, Causes, Preventive measures, Importance of Regular medical checkups, Harmful effects of Tobacco, Importance of Personal and environment cleanliness, Awareness carried by a community to reduce the same. Sessions covered for mothers for Kottapuram and Panavila anganwadi by Sangini Justy and Sangini Suja respectively.

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- **Sexual and reproductive health awareness day**

Sexual and reproductive health awareness day was conducted in different villages and Anganwadis on 12-02-2020. The session was handled by Junior Public Health Nurse from PHC. Topics covered were reproductive health, adolescent and maternal health, role of contraceptives, sexually transmitted infections and common reproductive health concerns. Total of 37 Participants from Venganoor, Kottapuram and Vizhinjam participated and the programme was coordinated by Sangini Anitha, Sangini Chandri and Sangini Justy.

- **Poshakahara Saksharatha – Recipe Competition and awareness session**

Adani Foundation in association with State Nutrition Bureau, Kerala and District medical office, Trivandrum conducted "POSHAKAHARA SAKSHARATHA"(Nutritious food literacy) on 17-02-2020. The program was organized by Sangini Anitha in HSS for Girls, Venganoor. Topics covered for awareness session were

- Healthy eating among children, Principle of Nutrition, Reduce screen time,
- Eating a diet high in vegetables, fruits, whole grains, and legumes,
- Choosing lean, low-fat sources of protein, Including proteins, carbohydrates, and a little good fat in all meals and snacks, Boost up physical activity.
- Reduce the consumption of sugar and salt, Reduce fast foods, Usage of locally available fruits like papaya and guava.

Total number of participants were 450.

- **National Deworming Day**

Sanginis involved in the National Deworming Day done by the Health Department at various part of the district on 25-02-2020. Sanginis involved in the distribution of tablets to anganwadi children in the guidance of Anganwadi worker. Also they spread awareness on the steps and objectives of the same.

- **Kerala Nutrition Conference - 2020**

The department of women and child, Kerala Sampusta Keralam organized a two days conference on the theme 'Nutrition'. The theme was 'Hidden hunger' also known as micronutrient deficiency. Three Suposhan Sanginis along with Assistant Suposhan officer participated in the conference. The sessions on Hidden hunger, Double burden of

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malnutrition in India, illnesses in childhood, preconception of folic acid for women planning pregnancies topics were covered.

Outcome of SuPoshan

- 5 children of severe or moderate Acute Malnourished (SAM) status have been changed to healthy children.
- Majority of the houses having SAM and MAM children are from economically weaker sections having total monthly income less than Rs.10,000/-where the parents are engaged in coolie work and fishing. Hence, in such cases RUTF (Ready to Use Therapeutic Food) has been provided to the children continuously till they are converted from severe malnourishment to healthy children.
- Kitchen Garden has been promoted in families with special focus on the houses having malnourished and anemic children. Thereafter we conducted several classes, exhibition and competitions on preparing nutritious food items using the locally available nutrient rich vegetables and other resources.
- More than 30 health camps were organised by the Sanginis in association with MHCU, where the malnourished children and anemic girls were referred to the doctor and provided proper medication.
- Important days such as nutrition week, breast feeding week, international women's day, international water day, earth day and yoga day are celebrated with community with increased participation and ownership.

2.6 Celebrations and important days (SuPoshan, Saksham & CSR)

SL NO	DATE	PARTICULARS OF PROGRAMME	PARTICIPANTS	VENUE	THEME
1	02/10/2019	Gandhi Jayanthi	260	Vizhinjam	150 th Anniversary
2	15.10.2019	Global Hand Washing Day	210	GHS Venganoor	Clean hands for all
3	16/10/2019	World Food Day (Healthy diets for a zero hunger world)	140	SuPoshan	Our actions are future.
4	21/10/2019	World Iodine Deficiency Day	65	Community	

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SL NO	DATE	PARTICULARS OF PROGRAMME	PARTICIPANTS	VENUE	THEME
5	19/11/2019	World Toilet Day	112	St. Mary's HSS	Leaving no one behind
6	15/11/2019-22/11/2019	New Born Care Week	75	PHC Mukkola	New born Care
7	14/11/2019	Children's Day	430	70 (Anganwadi) 210 (St. Paul School) 150 (Ursuline school)	Competitions and message
8	20/12/2019	Christmas Celebration	30	ASDC	
9	23/12/2019	Christmas Celebration	65	CSR Office Mukkola	
10	04/02/2020	International Cancer Day	38	SuPoshan	I am and I will
11	12/02/2020	Sexual and Reproductive Health Awareness Day	37	SuPoshan	Sex - Ed Keeps us healthy
Total			1462		

2.7 SWACHHAGRAHA - (to create a culture of cleanliness)

"Swachhagraha – Swachhata ka Satyagraha" programme launched by Adani Foundation gained good results from the schools and communities during the reporting period. The objective of the project is to create a culture of cleanliness among students community. The activities in each school are coordinated by a Nodal teacher and a team of 20 students known as Dal group members. The project is targeted at students from 5th to 9th standard. The project covered 130 schools in Trivandrum by joining hands with the Department of Public Instructions. Following table gives the progress of Swachhagraha in schools.

Reach of Swachhagraha

Sl. No	Activities	No
1	No of Schools selected for Swachhagraha	130
2	No of teachers trained	210
2	No of swachhagraha Preraks(Nodal teachers)trained	134

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Sl. No	Activities	No
3	No of Swachhagraha Dals	130
4	No of Swachhagraha Members	2586
5	No of School Orientation	10
6	No of School Visited	70
7	No of Swachhagraha walls	89
8	No of Map	38
9	No of no one is looking	11
10	No of Toilet Signage	40
11	No of Toilet etiquette Survey	40
12	No of Hand washing	52
13	No. of Case Studies	11
14	No of School Visit (Till now)	122
15	No. of Litter Graph	23

The community outreach awareness programme on the importance of proper waste disposal and keeping cleanliness of the vicinity under swachhagraha are as follows

Other major initiatives under Swachhagraha

Waste to resources

- As part of the Swachhagraha programme, the students of the Cotton Hill School did beautiful craft designs with coconut shell and used plastic bottles. Similarly, the dal members of PKHSS, Kanjiramkulam made dust bins from waste materials.
- As part of the Swachhagraha programme the students of the Govt. Junior Basic School Neyyattinkara did beautiful craft designs with waste materials coconut shells and plastic bottles.
- Similarly the dal members of Govt. Vocational Higher Secondary School, Kottukal made beautiful items from waste materials. This was as part of making 'best out of waste' that make creative and usable things from waste.
- Swachhagraha Prerak Mrs.Vimala Bai & Dal Members of MCHSS Kottukalkonam intervened to overcome the accumulation of littering Waste material in their School premises. As part of their activities under Swachhagraha project, students have made beautiful crafts products by adding artistic and creative elements to waste materials.

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School compound cleaning

- At Govt. Krishna Vilasom Higher Secondary School, Aiyra, Swachhagraha members under the leadership of Prerak cleaned all the class rooms, toilets and premises of the school.
- Swachhagraha members under the leadership of respective Prerak Teachers cleaned all classrooms, dining halls, toilets and premises in VHSS Poovar and Model HSS Chavadinada.

Swachhagraha Video Documentation


- As part of the documentation of varied activities of Swachhagraha, a Documentary Film was made during the year. The main activities captured are Craft Exhibition by students, Street Play, Skit on Garbage, Swachhagraha Theme Song-Dance, Dal members meeting and Compost Pit. Further shouted important activities of Swachhagraha Wall, Map, Litter Graph, Swachhagraha Pledge.
- The film was telecasted in New-18 channel on 29 March 2020

FELICITATION AND HANDING OVER OF SWACHHAGRAHA

Adani Foundation organized "Swachhagraha Felicitation and handing over workshop" along with a craft exhibition made out of waste by Swachhagraha club members from different schools. The workshop was organized at St. Xavier's Hall, Trivandrum Social Service Society, Bishop's House compound, Vellayambalam, Thiruvananthapuram on 28th September 2019. The workshop was inaugurated by the Sub Collector of Trivandrum Mr. Imbasekar IAS presided over by Mr. Rajesh Jha, CEO, Adani Vizhinjam Port Private Ltd. The other dignitaries participated in the programme are Mr. Aboobacker, Deputy Director Employment, General Education Department, Govt. of Kerala, Mrs. Shylaja. C.M, Asst. Education Officer Trivandrum, Mr. Sushil Nair, Head Corporate Affairs, AVPPL Dr. Anil Balakrishnan Unit Head CSR Adani Foundation. The trophies and certificates were distributed for the following schools.

Best Swachhagraha School

- Govt. Girls HSS Cotton Hill, Trivandrum
- Mount Carmel Residential School, Kanjiramkulam, Trivandrum

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- HSS for girls, Venganoor, Trivandrum
- Govt. VHSS Kottukal, Trivandrum
- MCHSSS Kottukalkonam, Trivandrum

Best student report


- Kumari. Rani Lekshmi, Govt. Girls HSS Cotton Hill, Trivandrum
- Master. Jerin JM, Mount Carmel Residential School, Kanjiramkulam
- Kumari. Binisha Binu, MCHS, Kottukalkonam
- Kumari. Sandra.T.S, HSS For Girls Venganoor
- Kumari. Devika.V.S, Govt VHSS Kottukal


Best Essay

- Kumari. Anagha K Ramanan, Govt. Girls HSS, Cotton Hill School
- Kumari. Vineeshma, Leo XIII, HSS, Pulluvila, Trivandrum
- Kumari. Adhithya K, Girls HSS, Venganoor
- Kumari. Adheena.S.S, Govt GHSS Cotton Hill, Trivandrum
- Kumari. Athira.A, St.Paul's CSI Uchakkada, Trivandrum


Safai Ke Sithare

- Govt. VHSS, Vattiyoorkavu, Trivandrum
- Govt. VHSS, Kottukal, Trivandrum
- Vivekanda Vidhya Peedom, Pachaloor, Trivandrum
- Chinmaya Vidyalaya Kunnumpuram, Trivandrum
- St. Chrystom's HSS Nellimoodu, Trivandrum

 Followed by the inauguration 'A Journey of Swachhagraha' was presented by Swachhagraha Dal members of Govt. Girls HSS, Cotton Hill, Trivandrum and Mount Carmel Residential School, Kanjiramkulam.

 The teachers and Dal members shared that swachhagraha programme helped them a lot to inculcate a behavior of cleanliness among students. A video documented on the activities was also shown in the workshop.

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 An exhibition of craft made out of waste materials was also done along with the workshop by following schools

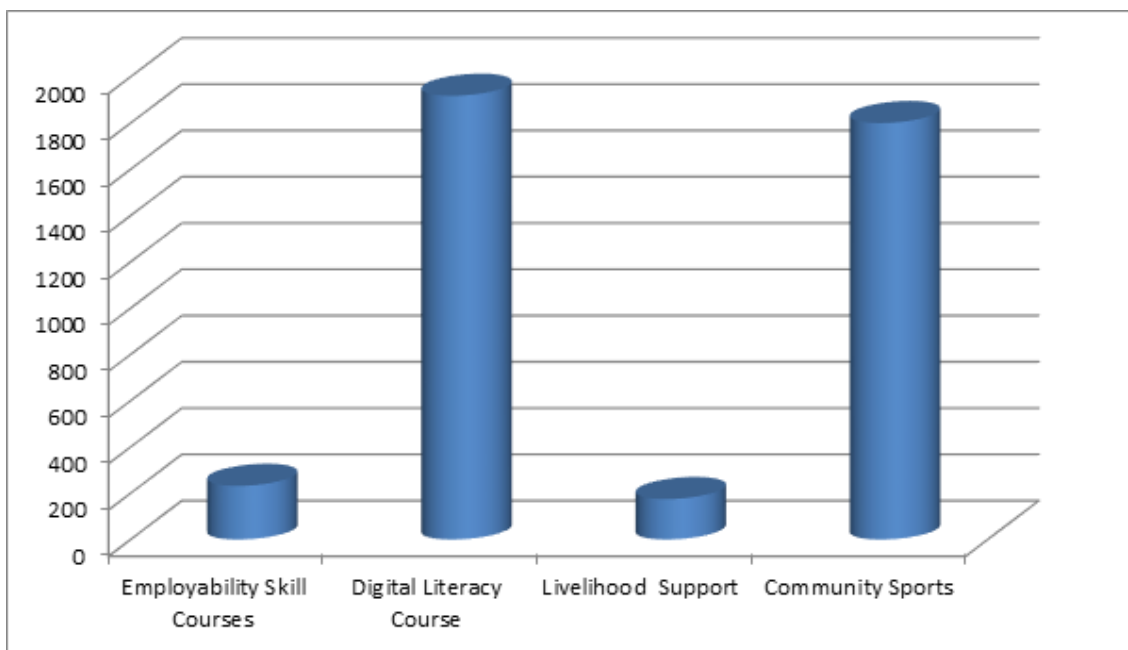
- Govt. Girls HSS, Cotton Hill
- HSS for Girls, Venganoor
- MCHSS, Kottukalkonam
- Govt. VHSS Kottukal
- St. Paul's CSI, Uchhakkada
- SAS UPS, Venganoor
- Govt. HSS, Kamaleswaram
- Govt. HSS, Balaramapuram
- HSS, Vattiyoorkkavu
- VPS for Boys, Venganoor
- Govt. HSS, Poovar
- SNDP UPS Karinkulam
- St. Mary's HSS, Vizhinjam
- Mount Carmel Residential School, Kanjiramkulam
- St. Michael's HSS, Kadinamkulam

The exhibition made everybody to think about the innovative and creative crafts that can be made out of waste. All items in the exhibition are made out waste materials by the students. It included beautiful bags, newspaper photo frames, wall hangings, flowers and penguin made of soft drink bottles, paintings on table calendars, compact disc etc. Not only that students made art and craft from coconut shell, ear buds, food grains, thermocol, plates, pencil etc. The programme was well appreciated by the teachers and thanked for the good initiative of Adani Foundation.

3. SUSTAINABLE LIVELIHOOD DEVELOPMENT (SLD)

III	SLD	Direct beneficiaries	Indirect	Access
1.	Employability Skill Courses	232	928	200
2.	Digital Literacy Course	1918	7672	
3.	Livelihood Support	175	700	100
4.	Community Sports	1800	7200	1600

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3.1 Skill Development

SI No	Name of Course	No of Students	Month of starting	Batch End Date	Exam Date
1	General Duty Assistant	30	18.11.19	15.01.20	26.02.20
2	Consignment Booking Assistant	25	03.10.18	22.12.18	14.06.19
3	Fitness Trainer	25	22.11.18	01.01.19	20.09.19
4	Automotive Service Technician two and 3wheeler	27	22.11.18	23.01.19	16-05-19
7	Trainee Associate Retail	25	15.01.19	30.04.19	
8	Retail Trainee Associate	22	18.12.19	21.03.20	
	Total	154			
<p>Batches started after the mobilization and orientation. Those who enrolled have undergone entry gate assessment and periodic internal assessments. Almost 70% of the students from different skill courses were placed in different organizations with good salary packages</p>					

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General Duty Assistant (Nursing Assistant)

The General Duty Assistant (GDA) course completed for 30 students, in which 26 students cleared the assessment and 16 students placed in different health fields such as Aster Medcity, Asha Homecare etc...

Consignment Booking Assistant

The Consignment Booking Assistant course has been conducted on 14th June 2019, wherein 14 out of 25 students attended and cleared the exam. In this batch, 15 out of 25 students are placed in Sitics Logistics, Ecom express, Safe express and so on.

Fitness Trainer

The Fitness Trainer for the youth at "Ash 2 Fitness Center", Kanjiramkulam has been completed for 25 students in Sep 2019. 10 students out of 25 students got placed in local gyms and 2 got international placement in Qatar.

Automotive Service Technician (Two & Three Wheeler)

The assessment for the Skill Development Course on Automotive Service Technician (Two & Three Wheeler) for 27 students completed and 16 have placed in different companies like Muthoot Yamaha, Cheran motors, Siva motors etc...


Retail Trainee Associate

The Skill Development Course on Retail Trainee Associate started with 25 students and 24 students successfully completed the course. The second batch with 22 students has completed. Those completed the first batch have been engaged in VIZMART, the self-employment market promoted under CSR, whereas the new batches are waiting for assessment.

COMPETITIONS

Participation in World Skill Competition – District Level

- From ASDC Vizhinjam Centre, 2 students each from RTA and GDA batch were nominated for participating World Skill Competition. The GDA students Mr. Ajil R L and

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Ms. Anagha B attended the District Level competition at Women's ITI, Kazhakoottam on 27th January 2020. The Zonal Level competition was held on 3rd February 2020 at KINFRA Academy Trivandrum.

- The competition started at 10 am after the hall ticket verification. The first session has 10 objective type questions to be answered by the students. Then there was a practical session. In total, 89 students were registered and from them 10 will be selected for the next level.

EVENTS AND ACHIEVEMENTS

AWARD FROM ADANI SKILL DEVELOPMENT CENTER

Team Vizhinjam bagged with two awards from Disha-National Meet conducted by ASDC at Ahmedabad, happened on 25th and 26th of July. The awards are for the best outstanding performance from the team during the FY 2018-19 and for international placement done at Centre. Hon. Chairperson of Adani Foundation presented award to the team.


Attended ToT in ASDC, Ahmedabad

Trainers from ASDC, Vizhinjam attended the TOT in ASDC, Ahmedabad. TOT started on 28th JAN and end on 30th JAN 2020. The following listed 4 trainers attended for TOT,

1. Meera M G (Data Entry Operator)
2. Preethy Peter (General Duty Assistant)
3. Mini Jose (Beauty Therapist)
4. Gayathri Pavithran (Retail Trainee Associate)

Live Shopping Experience at ASDC Vizhinjam

Students of RTA batch setup a live shopping environment in their own class room. The class room was arranged seems like a shopping Centre. Different sections which we usually see in a shopping mall was arranged and handled by the students. The students act like a retailer or a salesperson in a shop as well as a customer. ASDC staff members also participated and purchased some of the items what they arranged as a customer.

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New Skill Centre at Vizhinjam


ASDC Vizhinjam had rented a new building in Mukkola for starting the skill courses. The interior plan of new Skill building was approved by ASDC HO. The first floor having GDA (Classroom + Lab) and RTA Classroom. Lab area for Data Entry Operator and Retail Trainee Associate is arranged in the second floor. Second floor also contains a space for reception and office also. The interior and partition works started from 11th January by "Speed Enterprises". Procurements for GDA, ABT, DEO and RTA lab items are completed. Electrical and networking works are going on. The Centre inauguration is postponed due to Covid-19.

OUTCOME

In total 154 youth have been trained, 66 completed assessments whereas 95 are placed in various industries. The process of assessment and placement is progressing for the remaining students. The initial salary of the placed candidates ranges from Rs. 8,000 to 15,000. They are placed in Credence Hospital, Asha Home Care, Airport, S J Hospital, Aster Medicity, Andhra Bank, A J Hospital, Sititics Logistics, 3 Line Decor, Sititics Logistics, etc.

SUCCESS STORY –Aneesh Varghese (RTA)

I am Aneesh Varghese from Vizhinjam belong to the fishing community. My family has a lot of economic difficulties as the only source of income is from fishing done by father. I was not too bad in my studies and I completed my plus two in commerce with good marks. Due to lack of money to carry my regular studies, I joined for B.com in distant education scheme. But i cannot complete my studies as i was more interested in sports. Volleyball was my most interested sports and eventually it ruined all my studies. All my friends who played with me got good jobs and thus i realized my failure. It made me confused on what to study? And what to become in life? It was in such a situation that one of my elder sisters informed me about the RTA course conducted by Adani foundation. Thus I decided to join the course and continue my studies. I completed the course and i got first place in the class. The course was an entirely different experience and it changed me completely. My inferiority complex as I belong to fishermen community is also changed and I was

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transformed into a confident youth. Now I got a chance to work in Canada. I surely believe that the RTA course is a turning point in my life.

SUCCESS STORY –SOUMYA (RTA)

Myself Soumya, residing in Vizhinjam, born as the third daughter of Mr.Sahayaraj and Lilly. As I got two elder brother got good affectionate care from them during my childhood. We could experience the miseries of poverty from that period onwards my father's economic difficulties caused a lot of sufferings to us. I had to face a lot of problems even during my childhood which I could not share with anyone. So I cannot even trust anyone in my life. Eventhough I had a lot of friends i wished to live alone, only source of relief was my prayers. I was excellent in studies during my childhood. But due to financial crisis I could not fulfil my wish. In many occasions I was caught by suicidal tendencies. I felt more and more loneliness. In that circumstances there happened a turning point in my life. I understood from a friend of mine that Adani foundation is about to start RTA training programme. Even though i was totally ignorant of the nature and purpose of the course, I joined this to put an end to my loneliness. But the course was entirely a new experience. The learning process, the approach of teacher towards me, changed me into a new person. I feel that i got everything back which were lost in my life. I can understand my full potential and my abilities. During the course with the help of placement officer I appeared for an Interview and cleared it, and i got a job which was totally beyond my expectations. Now I can put into practice what i have learned through the course. This is not a myth but this is my real life story. Now i can work with all my confidence. I thank all my teachers for this.

3.2 DIGITAL LITERACY PROGRAMME


The digital literacy training has provided to 1968 people reaching to 3268 members. The programme covers internet banking, social media, mobile banking, Digi locker, MS office, cyber security, barcode etc. The programme helped in making the people to equip on online transactions, bill payments like KSEB, water bills, school fee payments and e-commerce activities.

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SI No	Location	Supporting Organization	Number of Participants
1	Kanjirampara	Localites	25
2	Panapazhinji	Localites	16
3	Kuzhipallam	Localites	20
4	Muttacaud	Localites	31
5	Moonnattumukku	Localites	25
6	Adimalathura	Localites	25
7	Harbour	Localites	26
8	Uchakkada	Localites	25
9	Mariyan Nagar	Localites	36
10	Mariyan Nagar	Localites	19
11	Mariyan Nagar	Localites	14
12	Mariyan Nagar	Localites	18
13	Harbour	Localites	15
14	Harbour	Localites	16
15	TheathreJn	Localites	27
16	Ambalkulam	Localites	26
17	TownShip	Localites	17
18	Kamukinkuzhi	Localites	24
19	Uchakkada	Localites	10
20	Mulloor	Localites	12
21	Adimalathura	Localites	14
23	Chunakkara	Localites	26
24	Venniyoor	Localites	32
25	K S Road	Localites	26
26	Sisilipuram	Localites	31
27	Sisilipuram	Localites	31
28	Kuzhipallam	Localites	20
29	Chavadinada	Localites	20
30	Vizhinjam	Localites	40
31	Vizhinjam	Localites	32

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SI No	Location	Supporting Organization	Number of Participants
32	Mannakallu	Localites	76
33	Mulloor	Localites	30
34	Puliyoorkonam	Localites	30
35	Kanjiramkulam	Localites	50
36	Peringamala	Localites	30
37	Kovalam	Localites	35
38	Nellikunnu	Localites	25
39	Thennoorkonam	Localites	30
40	Mukkola	Localites	20
41	Kanjiramkulam	Localites	50
42	Pulivila	Localites	44
43	Karimpallikara	Localites	30
44	Vizhinjam	Localites	27
45	Kadaikulam	Localites	30
46	Payattuville	Localites	46
47	RosaMystica	Localites	117
48	Thiruvallam	Localites	20
49	Nellivila	Localites	30
50	Karinkulam	Localites	36
51	Kadaikulam	Localites	37
52	Kalliyoor	Localites	50
53	Thenkavila	Localites	25
54	Edathekonam	Localites	34
55	Vizhinjam	Localites	15
56	Harbour	Localites	25
57	Chappath	Localites	12
58	Chowara 1	Localites	26
59	Chowara 2	Localites	34
60	Karumbalikkara	Localites	20
61	Neelakeshi	Localites	33

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SI No	Location	Supporting Organization	Number of Participants
62	Vizhinjam	Localites	25
63	Pulinkudi	Localites	25
64	Charuvila	Localites	20
65	Payattuvara 1	Localites	27
66	Payattuvara 2	Localites	40
67	Karumkulam	Localites	25
68	Azhakulam Church	Localites	22
69	Payattuvara 3	Localites	13
70	Venganoor	Localites	27
71	Vallamcodu	Localites	20
72	KSCO Chowara	Localites	25
73	Avanakuzhi	Localites	25
		TOTAL	1968

Digital Literacy beneficiaries use different application

Digital Literacy beneficiaries from different batches in the community understood the use of various applications in internet and installed it in their own smart phones. Digi-Locker, Money transfer application, Saksham Application are some of them. The programme has been executed to different groups of community people with training of 50-70 hours depend on the cognitive level of trainees.


Outcome

- Out of total 3280 trained, 18% are in the age group of 50 years and above in which they showed a high level of interest to attend the programme and learnt this course to make their lives easy by using digital platforms especially in bank transaction and bill payments.
- Among the trained, 54% are mothers in the age group 28-48 years. They have shown their willingness towards this programme, as they want to know how their children are using social media platforms and how best it can be used positively for building career for their children. This helped the trainees to understand about the social media such

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as Facebook, WhatsApp, Twitter and G-mail. Further classes about cyber security helped to understand the pros and cons prevailing in the society.

- **Payment of electricity bill and water bill:** Before digital literacy programme, people used to go to electricity board for payment of electricity bill and water authority offices / Akshaya centers for payment of water bills. However, after completion of the course, the women started paying these bills through online in respective payment gateways installed in their mobiles. The training further helped the people to use various e-payment platforms such as mobile recharge, DTH recharge etc.
- **Online Banking:** The community learned how to access online banking and how to create an online banking Id, learned to add and delete a payee and to do fund transfer via online banking.
- **Digi locker:** After the recent floods in Kerala, people are more conscious about protecting their personal files and certificates from damage. The training on Digi Locker helped majority of trainees especially housewives to install Digi Locker application and link it with Aadhar. They even linked it with Pan Card, Driving License and uploading their educational certificates in Digi Locker.
- **Mobile Banking:** People learned on how to get their respective mobile banking application and how to create mobile banking Id. They learned to add and delete a payee and also learned to do fund transfer via mobile banking. Majority of trainees have installed Bhim Application supported by the Govt. of India.
- **E-Shopping:** The trainees started purchasing their required products through online portals with reduced prices. They changed the conventional method of going physically to the shop and purchasing things. They started buying things through Flipkart, Amazon, Myntra etc.
- **Schemes and Services of Govt.:** As a part of digitization, Govt. of Kerala has started providing various services and schemes through online. The training helped them, to gain knowledge about various schemes and services offered by the Govt. and to get a direct connect to the schemes.

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Success Stories

Margret

She is 64 years old and always very energetic person. Among other students she quickly studied to pay electricity bills, book bus tickets and doing digi-locker. She scored full marks in the online exam, viva and practical. More importantly she is very much happy as she could pay bills online rather going to electricity board and banks for payments.

Preema

Preema is a deaf and dumb from Kottappuram ward of Trivandrum Corporation. She attended the classes regularly as her skills in copying notes, ability to grasping are excellent. She got full marks in the online exam. She is motivating others to attend the course.

Soniya

She is from Charuvila vizhinjam and a locomotor disabled person. Among many students Soniya is most educated (M.com). After her delivery, she thought don't need to study anymore, but when I told her about digital literacy class she came without any interest. The digital literacy has changed her decision and she searched all opportunities for studying chartered accountant and collected online materials. She had lot of limitations because of her health but, now she considers online platform as her tool to overcome the challenges.


3.3 LIVELIHOOD UPDATES

Sustainable Livelihood Development is one of the core activities focused during the year as a tool for economic empowerment of poor community people, especially the women. 500 women from the communities of Vizhinjam are trained during the year on five basic entrepreneurial modules of business management covering Self-Management, Cash Management, Debt Management ideas to business and Leadership. From that presently 22 livelihood units are functioning, wherein 17 are streamlined as indicated in the table. The efforts paved the way for making the poor community people self-reliant. The funding pattern for all the units followed as 10% beneficiary contribution, 40% bank loan, 25% subsidy from VISL and 25% subsidy from AVPPL.

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Following table gives the status of existing livelihood groups


SI No	Group	Type of Business	Business Status during the financial year
1	Clean 4 U	Hi Tech Cleaning for Flats, Hospitals, Offices, water tank, Vehicle and Public Institutions	<ul style="list-style-type: none"> Monthly Cleaning of CSR Office, Hosted a new web site for the group. The clients included offices, hospitals, flats, houses.... Started a new office at Viz Mart on 05.09.2019 The turnover during the half year was Rs. 2,06,000/- A loan has been sanctioned to buy an old vehicle to expand the activities and for that amount Rs. 50,000/- provided as revolving fund from Adani Foundation
2	Anaswara Poultry Unit	Hitech poultry with 14 cages of 630 chicken for 7 member	<ul style="list-style-type: none"> Getting 400 eggs per day for the group and each member gets a revenue of 5000-7000 per month The total revenue for the group for the half year is Rs. 3,09,000/- A Revolving fund of Rs. 25000/- received from AVPPL for the expansion
3	Thriпти Poultry Unit	Hitech poultry with 14 cages capacity of 630 chicken for 7 member group	<ul style="list-style-type: none"> Getting 350 eggs per day for each group member a consolidated of 350-450 eggs for the group Each member gets a revenue of 5000-5500 pm The total revenue for the group for the half year is Rs. 2,41,000/- A Revolving fund of Rs. 25000/- received from AVPPL for expansion
4	Harbour Canteen Unit	Canteen unit specially for traditional seafood's	<ul style="list-style-type: none"> Daily turnover of Rs.8,000 to Rs.10,000 and gets an average profit of Rs.750 per day The total turnover for the group was Rs. 10.19.600/- for the half year The contract with Harbour Engineering wing extended to two more years
5	Sreebhadra Big Shopper Unit	Big shopper / Cloth Bag / Nonwoven Bag Unit	<ul style="list-style-type: none"> Provided an average of Rs.1500-2500 cloth bags to local shops. The group has made a turnover of Rs.75,000/-for the half year Stitched 2000 face masks

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SI No	Group	Type of Business	Business Status during the financial year
6	Vizhinjam Karshika Karmasena	Running of Eco shop, Agri. Works, selling organic vegetables	<ul style="list-style-type: none"> An organic vegetable selling unit started at Vizmart on 05.09.2019 New Karmasena started their initial work at the acquired land for Vizhinjam Port to clear the vegetation The turnover of the group for the half year was Rs. 4,80,000/-
7	Prime Events	Event Management, Marketing, Power Laundry and Steam Pressing Team	<ul style="list-style-type: none"> Consultancy partner for Viz Mart – Livelihood market Steam pressing and hi-tech power laundry units are progressing well A new counter at Vizmart started on 05.09.2019 The team got hands on training from Spick and Span a reputed laundry units in Trivandrum City The group has made a turnover of Rs.3,60,000 for the half year Received a revolving fund of Rs.50000/- from AVPPL for expansion.
9	Data Plus	Data entry Photostat, projects, designing and online jobs	<ul style="list-style-type: none"> Shop commenced on 17.10.2018 The group has made a turnover of Rs.4,00,000 for the half year New Centre being set-up at VizMart Vizhinjam. Digital Literacy programme has been successfully coordinating by the group
10	Thattukkada Unit	Shop for preparation & Selling of steam based snacks	<ul style="list-style-type: none"> The Shop runs from morning 4:30 AM to 9:30 AM Providing fast food for the localities and the labourers of Vizhinjam port The shop has made a turnover of 1,90,000/- for the half year

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SI No	Group	Type of Business	Business Status during the financial year
11	You Me & Tea Cafe	Canteen unit, traditional Kerala Foods	<ul style="list-style-type: none"> Started the unit at VizMart from 05.09.2019. Made a turnover of Rs. 7,00,000/- in 6 months Most of the government servants in and around Vizhinjam prefer this quality and delicious food More regular orders are getting Some snacks like 'ilayada' got good appreciation The group having 3 trained members in the preparation of traditional food recipes. The unit function from 7 am to 7 pm
12	SRM Stitching & Garments unit	Spot stitching and Ladies garments	<ul style="list-style-type: none"> Started a unit at VizMart from 05-09-2019. The group has made a turnover of Rs. 2,14,000/- in six month time A new tie up was established with M/s. Leela Bazaar. Special stitching training is going on. Stitched 2000 face mask for AVPPL-AF The unit functions from 9.30 am to 7 pm The group having 3 members.
14	Turned to fresh - organic shop	Virgin coconut oil, natural pickles and other provisional items	<ul style="list-style-type: none"> Started a unit at VizMart on 18-11-2019 with three members. The group has made a turnover of Rs. 62, 000/- in 3 months. New tie up established with AFSAR trading company to get Rice in whole sale rate. Started a new sales counter for Nestle Products Mineral water distribution is under process.
15	Frozen Days	Fresh juice, ice creams, etc.	<ul style="list-style-type: none"> Started a unit at Vizmart from 02-12-2019. Working hours from 9.30am to 7pm. The group has three members Bank loan is under process
16	The Elite Gift and Fancy shop	Gift items, fancy items, handicrafts, etc.	<ul style="list-style-type: none"> Shop started functioning from 9.30 am to 7 pm The group has 3 members Procured fancy items The group has made a monthly turnover of Rs. 15,000/-.
17	Happy Days Napkin distribution	Sanitary Napkins distribution in tie up with HLL	<ul style="list-style-type: none"> Pan Card received Proposal finalized Loan is under progress

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VIZMART : THE MARKETING SPACE FOR LIVELIHOOD UNITS

A new market outlet named **"Vizmart"** has been opened with 14 shops of community women on 05.09.2019. Adv. Rakhi Ravikumar, Deputy Mayor of Trivandrum Corporation inaugurated the function. The mart has been developed under the CSR of Adani Foundation and handed over to women groups on 29.08.2019 to source the products and arrange counters. This is one step ahead of handholding with better market connectivity for the livelihood groups and their products. The work for setting up of mart has been started on 15 March 2019 and completed in four months' time.

The building belongs to Thiruvananthapuram Corporation, which has been taken on rental basis by the women groups under the guidance of Adani Foundation. The market has been developed with facilities to run 14 shops for different livelihood units. Further necessary training, sourcing of products for the groups, branding support, bank linkages, product packaging, linking of resources and market connected were also provided under the CSR of Adani Foundation.

The units started functioning in this mart are (1) You, Me & Tea café shop, (2) Turn to Fresh - Organic Shop, (3) Agro clinic, (4) Vegetable Shop, (5) Textile shop, (6) SRM-stitching unit, (7) Laundry & ironing unit, (8) Elite Fancy shop, (9) Kitchen utensils unit, (10) Prime Hi-tech laundry unit (11) Data-plus unit, (12) Clean Four You (13) S.R.M Stitching Unit

3.4 COMMUNITY SPORTS

As part of the community sports following activities have done during the reporting period

Play Ground at Kottappuram

A Playground at Kottappuram St. Mary's Higher Secondary school has completed during the reporting period. The playground has facilities for Football play, Basket Ball and Volleyball.


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Distribution of Sports items to St. Mary's Higher Secondary School Kottappuram

In continuation of developing a Playground at St. Mary's Higher Secondary School, Kottappuram it has been started to train the kids to develop them as a professional team for Foot Ball, Basket Ball and Volley Ball

- The coaches for the same have been arranged from District Sport Council, Trivandrum.
- Ms. Annamma, former national team member in Volleyball (a volunteer of digital literacy programme) also ensured her support in coaching.
- AF provided sports items including football, volleyball, basketball, Javelin, Harmer, Pole Vault and table tennis to the school to start the coaching. The distribution of the sports item was inaugurated on 28th February by Fr. Justin Judin, Vicar, Vizhinjam Parish & Local Manager of the school and Mr. A.M.K. Nizar, Vice President, District Sports Council by playing Table Tennis. Ms. W. Shiny, Ward Councilor, Kottappuram Ward, Mr. Johnson, Principal of the School, Mrs. Ida Innet, Head Mistress of the School, Mr. Aloycious, PTA President and Mr. Banance Lopez, Secretary, Vizhinjam Parish were present in the event. Following items were distributed as part of the programme

SI No	Items	Number
1	Jersey for selected students	50
2	Nivia Foot Ball	4
3	Foot Ball Net	2
4	Nivia Basket Ball	4
5	Nivia Volley Ball	4
6	Volley Ball Net Nylon	2
7	Nivia Hand Ball	4
8	Javelin Bamboo	5
9	Hammer Throw with wire 3 kg	5
10	Hammer Throw with wire 7.26 kg	5
11	High Jump stand with Cross Bar	1
12	Pole Vault Stand with Cross Bar	1
13	Pole Vault Stick	1

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Sl No	Items	Number
14	Table Tennis Table vixen foldable & movable	2
15	Table Tennis Bat	4
16	Table Tennis Ball (6 Nos)	1 packet

Football Fest at Kottappuram Ground.


A football fest was conducted at Kottappuram ground (developed under CSR of AF) jointly with Paradise sports club, vizhinjam from 7th to 23rd December 2019. Jerseys and footballs were provided under the CSR for the event. A total of 21 teams from different parts of Trivandrum participated in the event.

Mayor's Cup football tournament

Adani Vizhinjam Port Pvt Ltd supported "the Mayor's Cup" football tournament held at Central stadium from November 24 to December 5, 2019. This was introduced in 1997. It was an all-Kerala tournament, participated by all major clubs. The match was won by the State Bank of Travancore. Twelve teams including those from other states have also participated. The matches were held at the Kerala University Stadium.

Paddle for Kerala- Sea Expedition

The vast swirls of plastic rubbish hurled over 590 kilometers of coastal line of Kerala is posing threat to marine ecology and the livelihood of over one million people from fishing community. The urgently needed solution calls for a combination of enhanced awareness, reduced plastic use, and massively improved waste management. To create awareness on the sustainable development of Kerala from its Coastline perspective, it is planned to conduct a **KERALA COASTAL DEVELOPMENT EXPEDITION**. This is a 14 days Resurgent Kerala Maritime Expedition starting from **Vizhinjam** in the south of Kerala to **Azhikkal Port** in the north at Kannur. The **Hon'ble Chief Minister** of Kerala Shri.Pinarayi Vijayan is the chief Partner of this initiative, wherein the Chief Secretary of Kerala Shri. Tom Jose IAS is the chairman of Advisory committee. An organizing committee has been constituted with Shri. Ramachandran Kadannappalli, Hon'ble Minister for Ports as the chairman, **Shri.Rajesh Jha**, CEO-AVPPL as vice chairman and Dr.Jayakumar MD-VISL as

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secretary of the organizing committee. The programme will be organized by Vizhinjam International Seaport Ltd, in association with Adani Vizhinjam Port Pvt Ltd, Kerala Maritime board, Canoeing and Kayaking Society of Kerala and Kerala Adventure Tourism Promotion Society. The other partners are Coast Guard, Indian Navy, Kerala State Sports Council, Indian Oil Corporation, Technopark and a host of other departments. However, the final event has been postponed due to COVID.

Beach volley

Adani Foundation in association with District Sports Council, Trivandrum organized a beach volley ball tournament on 15th to 16th January 2020 at Sea Rock beach, Kovalam, Vizhinjam. The tournament was inaugurated by Mr. E.P. Jayarajan, Minister for Industry, Sport and Youth Affairs, Govt. of Kerala. Adv. M. Vincent, MLA, Kovalam presided over the function. Dr. Anil Balakrishnan, Unit CSR head was the chief Guest. This was a great opportunity for the coastal youth teams to play and win the game. It was a two days event wherein 5 women team and 13 gents' team participated. Among that KSEB won the first place and BCM Pulluvila, Trivandrum got second place in women's team. Whereas in gents team Puthiyathura, got first prize and G.V.Raja Sports School got second place. This Beach volleyball was first of its kind organized


4. COMMUNITY INFRASTRUCTURE DEVELOPMENT

Playground at Kottappuram

The Construction of playground at Kottappuram St. Mary's School completed. Work included the following

- Football ground
- Basket Ball ground
- Fixing of back board of basketball ground
- Synthetic painting of the basketball court
- Paver blocks at ground entrance

The ground is used by the kids as well as the local youth. The school has strength of 1400 students. The local youth also play football, cricket and basketball during morning and evening time.

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Toilet for teachers, Ayyankali Smaraka UP School, Venganoor

A toilet block with two units have been completed and handed over to Ayyankali Smaraka UP school at Venganoor in the month of November 2019. This is in continuation of toilet blocks and urinals constructed for boys and girls last year at Ayyankali School under the CSR of Adani Vizhinjam Port Pvt Ltd. Adani Foundation constructed separate urinals with toilets for boys, girls and teachers at Ayyankali School, Venganoor. The school has classes from Pre-KG to 7th standard. It is managed by Kerala Pulaya Maha Sabha (KPMS), one of the marginalized sections of society coming under the category of Scheduled Caste. Presently, the school has strength of 173 children with 88 girls and 85 boys.


Public toilet at Kottappuram

A Public toilet with 6 toilets and washing facilities separately for men and women has been constructed under the CSR of Adani Vizhinjam Port Pvt Ltd at Ozavila colony, Kottappuram. Trivandrum Corporation ensures its maintenance and operation. This colony is having 200 families, where about 75 families do not have toilet facilities. Open defecation is prevalent in this area, where the women are worst affected. The Public Toilets would help in protecting the area from open defecation and extend a helping hand to women and older people.

Thumboormuzhi at Vizhinjam

The Thumboormuzhi Aerobins with 5 bins completed at Pulloorkonam, near Krishna temple Vizhinjam. The formal inauguration of the operation of unit was done by Shri. Sreekumar, Standing Committee Chairman, Trivandrum Municipal Corporation. The function was presided over by Shri. Rasheed, ward councilor, Vizhinjam participated by the Health Inspector, Sanitation workers and the community people. The facility would serve for the disposal of waste from 500 families in that area.

Another 10 bins has been constructed at Madippuram in Harbour ward, with corrosion free materials. The construction of these 10 bins was completed in February 2020. This was constructed by replacing the old bins dilapidated during Ockhi. These facilities would be provide support for the waste disposal of another 1200 families in Vizhinjam and Harbour.

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Community Health Centre, Vizhinjam

The construction of new building at Community Health Centre, Vizhinjam is progressing. This is part of upgradation of Community Health Centre (CHC), Vizhinjam with a new three-storied building is another project initiated jointly by Government of Kerala and Adani Foundation in 2018. The building consists of basement, ground floor, first floor and second floor. As per GO (R)No.842/17/F&PD dated 01.11.2017, the revised estimate for the building comes to Rs.779 lakhs with the Government component of Rs.482 lakhs and CSR component of 297 lakhs from Adani Foundation. Adani Foundation handed over the first installment of Rs.1.18 crores to the Harbour Engineering Department on 03.10.2018. Presently about 20% of works completed. As per the request from Harbour Engineering department, Architect agency has been arranged to prepare the detailed drawings of following works in CHC for Elevation drawings, Electrical drawings (Single line diagram + detailed drawings), Plumbing Drawings, Partition details, Tiling drawings, False ceiling drawings, Fire frightening system with water tank, Fire escape stair (Back side of building), Centralized oxygen/Suction storage and distribution, Generator set provision and location, Dry & wet waste storage area.

Inauguration of Azad Smaraka Grandhasala

The inauguration of Azad Smaraka Grandhasala (Library in Memorial of Maulana Abdul Kalam Azad), renovated under the CSR of AVPPL was held on 20th November 2019 by Shri. K. Sreekumar, Hon'ble Mayor, Trivandrum Municipal Corporation. The function was presided over by Mr. M.M. Aneef, President of the Library. Adv. M. Vincent, Hon'ble MLA, Kovalam was the chief guest. Mr. P.K. Thulaseedharan, Grandhasala Sangam, Taluk Secretary, Mr. S.K. Vijayakumar, Area convener, Grandhasala Sangam, Mr. N.A. Rasheed, Ward Counsellor and the secretary of the Library were present. Under Employee Volunteering Programme of Adani Group donated 200 books to the Library.

Mudippura Nada LP School, Venganoor

The works on construction of stage platform and washing facility have been completed in Mudippuranada school under CSR. The official handing over was planned on 14 March 2020 has been postponed due to Corona issue

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HALP School, Harbour Road, Vizhinjam

The works of rain roof and sanitation facilities in HALP school are progressing. However, the works have been stopped since 14 March 20. Following are the works under progress

1. Side roofing to protect from rain water
2. A toilet block for boys (urinals) & Staff with hand washes facility.
3. Water supply to be taken from old existing old building.
4. New pump is to be considered for water supply.

LPS School, Kidarakkuzhy

In Kidarakkuzhy LP school, the following works are progressing

- Toilet block for boys & staff.
- Urinals for boys, Soak pit & septic tank at right side of the existing block.

Oldage Home (Ambranchi villa, Andoorkonam, Vizhinjam)

The work of an Oldage home "Snehasanthram" at Ambranchivila is about to complete. The scheduled inauguration in March 2020 has been postponed due to Corona. The completed work included the following

- Kitchen platforms, Toilet /wash rooms (2 nos,) refurbishment of existing building, cloth washing facility & bathrooms separately (3 nos),
- Beautification works of existing well (Plaster, cleaning color etc.),
- Outside area with IPS or paver, Light weight shed b/w two existing building, Racks for storage.
- Paving/flooring inside the proposed shed and necessary electrification, area lighting, fans etc.
- Refurbishment of existing (old) building.

Community Sitting Facilities

The work has been started for the Community Sitting Space with solar lights & small parks. The facilities are planned in the following locations.

Other major projects under process for the year 2020-21

SI No	Project
1	Drainage facilities at Kottappuram, Vizhinjam and Mulloor. (This is the work requested by the District Collector). • Work Started
2	• Community Sitting Space with solar lights & small parks at five location

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SI No	Project	
	i. Harbour Road Valiyaparambu, Vizhinjam ii. Venganoor ward (Nr. Nehru smaraka grandhashala) iii. Mukkola Junction Bus Stop iv. Vizhinjam , Harbour (Fisherman) v. Vizhinjam Junction Near Zonal office • Work started at two locations	
3	Model Anganwadi, Vizhinjam (Nr. Police Station)	• 1500 Sqft Montessori model Anganwadi at Govt. Vizhinjam LP School compound. • The plan and the location approved by social welfare department • Waiting for permission from Education department
4	Palliative Care Center	• Plan prepared for 9000 Sqft building for Palliative Care Center. Estimate prepared • MoU drafted and given to church committee for approval. • Operational Plan is being prepared by the church committee • NFA will be prepared and work will be commenced only after the MoU is signed.

5. Other Community Engagement Programmes

5.1 Emergency support under COVID – 19

Amidst the wide spread of Corona one of the fatal pandemic started in February 2019, the focus of activities was to support the initiatives of Government to restrain the spread of coronavirus (COVID-19). Aligning with Government initiatives, Adani Foundation initially started awareness creation and preventive measures through break the chain campaign. The important activities undertook to prevent the spread of Corona under “Break the chain campaign” at Vizhinjam are as follows.

- Provided hand washing facilities at major locations of Vizhinjam such as Thennoorkonam junction, Police Station, Vizhinjam Junction and so on
- Distributed 6000 face masks in cloth (reusable), hand sanitizers to police people, health staff, auto and taxi drivers, community volunteers, security staff, Port workers, head load workers, staff of KSEB and other offices at Vizhinjam.
- Hand sanitizers were also distributed to all major public institutions and volunteers of the community as part of the corona virus pandemic emergency response activities.
- As government imposed country wide lockdown, the daily wage earners especially the migrant workers, street vendors, beggars and abandoned people find it difficult to get their daily bread. Adani Foundation has continued to extend the following support.

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- i. Provided 600 kg of rice, green grams, sugar and tea to 142 migrant labours at Vizhinjam.
 - ii. Provided 1500 kg rice and grocery items in the community kitchen organized for 1500 people by Government through Trivandrum Corporation and Community Volunteers.
 - iii. Provided 200 kg of rice for the community Kitchen at Kottukal serving to 500 people from poor families, migrant labours and to the aged people.
- Adani Foundation did an intensive awareness on corona precautions in communities. Eighteen awareness sessions were conducted for community people covering 840 public and students in the wards of Kottappuram, Mulloor, Vizhinjam, Venganoor and Harbour. Topic covered on symptoms, mode of transmission, preventive and quarantine measures of Corona in detail. The toll-free number of DISHA, health helpline of Health Department, Government of Kerala & National Rural Health Mission was also given to the community people, in case of any emergency.

5.2 VAYALINKARA - MODEL VILLAGE

Vayalinkara belongs to Kottappuram division of Vizhinjam village in Thiruvananthapuram Corporation. The community is facing serious issues with regard to drinking water supply, lack of lighting, unemployment, health problems, water logging and spread of communicable diseases. There are more than 150 people living in 39 families, with men engaged in fishing. During rainy season this area often gets flooded as it is a low lying area and become filthy for 6 to 7 months' time in a year. The CSR team along with HOWE, Corporation Sanitation workers and community people cleaned the area. A temporary drain has been created for the free flow of water.

In order to overcome the challenges, a community monitoring group has been formed and prepared a plan to overcome the issues. According to the plan, work for proper drainage, extension of pipelines and putting streetlights has been started under the CSR. The entire work is monitored by the community people only. The proposal is to convert this worsened community into healthy community over a period of five years. Medical camps, Digital Literacy, SuPoshan and Livelihood programmes are the other community engagement programmes started in that community.

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5.3 Gangayar canal cleaning

The mouth of Gangayar River close to Port often gets closed due to sand accumulation. Further to that the heavy rain in Kerala, causes over flow of Gangayar canal during Monsoon. The fishing harbor, auction hall, fish market are flooded because of that. As per the request from the community, local political parties ward councilor and church committee, a plan has been prepared to overcome it. As per the plan, it is recommended to clean the siltation and vegetation behind the KSRTC Bus stand to the mouth of the canal with necessary repairing works. Further a drainage plan is being planned by VISL with the technical support of Minor Irrigation Department, which can be executed under the CSR of AVPPL. Presently the dredging team is cleaning the tip of drain frequently whenever such sand accumulation happens.


5.4 Local Employment

From the inception of Port construction activities there has been constant request coming from local leaders and community people to get jobs in Port related activities. The same has also been discussed in all the R&R package meetings chaired by the District Collector. Considering all these requests a total of 411 Malayalees including 204 localites are engaged in different construction activities through contractors as depicted in the table.

Details of Local Employment - Adani Vizhinjam Port Pvt. Ltd. As on date

Sl.No	Name of the Contractor	No. of Malayalees	No. of Localities	Percentage of Localities
1	AFCONS	77	62	80.52
2	Bridge & Roof	197	64	32.49
3	HOWE	63	38	60.32
4	APSEZ	28	17	60.71
5	Shankar	5	5	100.00
6	Shrine	11	8	72.73
7	ABB (GIS)	2	2	100.00
8	ABB	5	2	40.00
9	ITD	4	2	50.00
10	KGPS	19	4	21.05
Total		411	204	49.64

Annexure III
Environment Monitoring Report
(October 2019 to March 2020)

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Annexure III

HALF YEARLY ENVIRONMENT MONITORING REPORT

For the period October 2019 to March 2020

CONTENTS

- Introduction
- QA/QC Procedure
- Ambient Air Quality Monitoring
- Ambient Noise Level Monitoring
- Marine water & Sediment
 - Marine water Analysis Report
 - Sediment Analysis Report
 - Phytoplankton Analysis from Marine Samples
 - Zooplankton Analysis from Marine Samples
- Groundwater Analysis Report
- Surface water Analysis Report
- Soil Analysis

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CHAPTER 1

Introduction

Ashwamedh Engineers and Consultants (AEC) AEC was engaged by Adani Vizhinjam Port Pvt. Ltd. (AVPPL) for the Post EIA Environmental Monitoring as per Environmental Monitoring Plan mentioned in EIA and EC. AVPPL issued service order no. 5700182233 dated: 31.05.2016 and S.O. No. 5700273929 dated: 07.08.2019; which mentions the matrix, parameters and frequency of environmental monitoring. AEC carried out said environmental monitoring strictly as per above mention service order. As per the service order Ambient Air Monitoring (twice in a week), Ambient Noise Monitoring (fortnightly), Marine Ecological Survey including marine water, sediment, phytoplankton and zooplankton analysis (monthly), Ground Water and Surface Water Analysis (monthly), Soil Analysis (yearly).

AEC is submitting monthly reports of Environmental Monitoring which includes details of sampling locations, methodology used, analytical results and summary of reports. The monthly environmental monitoring report serves the information about the present environmental status as per terms and condition mentioned in service order.

This present report is the consolidated half yearly report over the six month period of October 2019 to March 2020.

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CHAPTER 2

Quality Assurance /Quality Control Procedure

The quality assurance and quality control plan include following elements:

1. Sample collection, preservation and transportation of sample
2. Chain of custody
3. Laboratory Analysis
4. Data evaluation and validation


1. Sample collection, preservation and transportation of sample:

The Team leader ensures that selected members of the study team meet all the selection criteria identified. Prior to the starting of the study, individual team members were put to test in the laboratory for their competency in carrying out typical environmental sampling/monitoring for different parameters as per the requirements of the project.

The team leader has ensured that the selected procedures are documented and the study team members are familiar with the sampling and analytical procedures. Before commencement of work, the team leader has checked for availability of all the items required for sampling at site and in the laboratory. In case of any missing items, suitable alternate arrangements have been made and required materials were procured.

Precautions are taken to protect the samples, the material being sampled, the sampling instruments and containers for samples from contamination. Samples are sufficient in volume and frequency is decided based on scope of work. Samples are collected, packed and transported prior to analysis in a manner that safeguards against change in the particular constituents or properties to be examined.

For the collection of samples appropriate containers are used with respective sample matrix and parameters analysed as per the method reference.

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Labelling of samples is done at site only and it includes the name of location, date of sample collection. Sampling sheet is filled at site with required information. The sample is sent along with the sampling sheet to laboratory for further analysis. For the preservation of sample appropriate preservation techniques with respect to parameters analysed is followed and samples are transported with due care to the laboratory.

2. Chain of Custody:

Firstly, after receiving the samples at the laboratory, assigning Sample ID is a very systematic and methodical way of representing samples identification as Sample ID is a Permanent Identification Number of a sample and it maintains traceability and transparency throughout the process.

It is the format for communication between Sample Receipt Department and the Laboratory. Laboratory also communicates to the Sample Receipt Department. It gives all details of sample except its company name. It includes parameters to be analysed, method reference for each parameter analysed, units in which the analytical results to be expressed, results of each parameter analysed, date at which the analysis was started and date at which the analysis was completed.

After completion of analysis, analytical values duly filled in by respective analyst with the help of test data in respective report format. This draft report is verified and approved by Technical Manager. Final reports are prepared and authorised by Technical Manager and sent to client.

3. Laboratory Analysis:

All physiochemical and biological analysis, as per the scope of work are carried out at our permanent facility at Nashik, Maharashtra. For the sampling and analysis of samples standard reference methods are used.

4. Data evaluation and validation:

For the quality control and validation, laboratory follows the following procedures:


1. Participation in Inter-Laboratory Comparison (ILC) with NABL accredited laboratories.

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2. The results obtained from all laboratories are recorded and reviewed for performance by Quality Manager and acceptance criteria is satisfactory ≤ 2 .
3. The laboratory also participates in Proficiency testing (PT) programmes conducted by NABL/Central Pollution Control Board (CPCB)/other Proficiency testing (PT) providers depending on the availability of the programme.
4. The results received from nodal laboratory are recorded and reviewed for performance.
5. Replicate testing is done on received samples in a planned manner as per schedule. Replicate testing is done by same/different analysts or using same/different methods.
6. Reviewing the results of replicate testing for performance evaluation is done by Quality Manager.
7. Acceptance criteria in case of replicate/duplicate testing is $</20\%$ relative standard deviation.
8. Testing of retained samples is carried out, by allotting a new sample ID and sending it to laboratory for retesting done by same/different analyst or using same/different methods.
9. Reviewing the results of retesting for performance evaluation is done by Quality Manager.
10. Acceptance criteria in case of retesting is $</20\%$ relative standard deviation.
11. Correlation of results for different characteristics like TDS/EC ratio, Anion/cation balance, COD/BOD correlation is carried out.
12. The quality control data is analysed and where they are found to be outside predefined criteria, planned action is taken to correct the problem and to prevent incorrect results from being reported.

Table 2.1: Check list format for sampling

Item	Yes or No	If No, reason and Justification for acceptance
Was the sampling point correctly located?	Yes	
Permanent facility available?	Yes	
Was the correct sample used?	Yes	
Were the proper types of sample containers used?	Yes	
Were the replicates or multiple samples taken as required?	Yes	

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Item	Yes or No	If No, reason and Justification for acceptance
Were adequate quantities of samples taken?	Yes	
Were the sample containers properly labelled?	Yes	
Were the preservatives added and sample containers sealed as required?	Yes	
Were the sealed sample containers maintained at required storage condition?	Yes	
Checked by: Team In-charge	Yes	

Note: It is not necessary that this form be filled each sample/sampling point. It is sufficient if the deviations if any are recorded in the log books.

Table 2.2: Check list for sample Integrity

Item	Yes or No	If No, reason and Justification for acceptance
Is the chain of custody record attached?	Yes	
Is the chain of custody record filled in properly	Yes	
Is the sample received within the holding time?	Yes	
Is the sample seal on sample containers intact?	Yes	
Is the sample received in proper storage condition?	Yes	
Is the sample quantity adequate for required analysis?	Yes	
Checked By: Team In - charge		

Note: It is not necessary that this form be filled each sample/sampling point. It is sufficient if the deviations if any are recorded in the log books.

Table 2.3: Check list format for analysis

Item	Yes or No	If No, reason and Justification for acceptance
Was the correct method used for the analysis?	Yes	
Were the correct instruments, equipment and apparatus used for the analysis?	Yes	
Was the competence of the analyst deployed for the analysis verified?	Yes	
Were the instruments, equipment and apparatus used pre-calibrated as required?	Yes	
Was the sample correctly and adequately identified and described in the analysis logbook?	Yes	
Were all the raw data properly recorded?	Yes	
Were the correct equations and units used?	Yes	
Checked By: Lab Manager		

Note: It is not necessary that this form be filled each sample/sampling point. It is sufficient if the deviations if any are recorded in the log books.

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Table 2.4: Check list format for quality check in the field

Parameters	Comments (Yes/No)	Remarks
Sample bottle labelled?	Yes	
Sample container rinsed with D.D. water?	Yes	
Field equipment blanks are identified	Yes	
Is the preservative has been added after sampling or preserved as per sampling/ Test method?	Yes	
Are proper storage conditions are maintained?	Yes	
The sample quantity is adequate?	Yes	
Is sample properly identified?	Yes	
Is proper type of container used?	Yes	
Checked By: Lab Manager		

Note: It is not necessary that this form be filled each sample/sampling point. It is sufficient if the deviations if any are recorded in the log books.

Table 2.5: Check list format for quality check in the lab

Parameters	Comments (Yes/No)	Remarks
Is the sample details entered into Raw data register?	Yes	
Sample quantity measured?	Yes	
Glassware is calibrated?	Yes	
Balance/equipment is calibrated?	Yes	
Data entered in the analyst work book or not?	Yes	

Note: It is not necessary that this form be filled each sample/sampling point. It is sufficient if the deviations if any are recorded in the log books.

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CHAPTER 3

Ambient Air Quality Monitoring

1. Ambient Air Quality Monitoring location details:

This chapter describes the sampling location, methodology adopted for monitoring ambient air quality and analysis of Ambient Air Quality results. The prime objective of the environment monitoring with respect to ambient air quality is to establish the present air quality and its conformity to ambient air quality standards. Ambient Air quality monitoring was carried out at five (5) locations including Venganoor, Proposed Port Estate Area, Port Site, Chani and Balaramapuram during October 2019 to March 2020. For the month of March 2020, monitoring was conducted on the 2nd, 5th, 9th and 12th. Samples for the 16th, 19th and 23rd were collected but could not be sent to the laboratory due to restrictions in courier service due to the COVID-19 situation. Monitoring was not been able to be conducted on 26th and 30th March 2020 due to the nationwide lock-down imposed.

Table 3.1: Ambient Air Quality Monitoring Locations

Sr. No.	Location	Latitude	Longitude
1.	Venganoor	8°23'55.10"N	77°00'11.30"E
2.	Proposed Port Estate Area	8°22'41.47"N	77°01'02.94"E
3.	Port Site	8°22'13.53"N	77°00'08.78"E
4.	Chani	8°20'56.86"N	77°03'16.19"E
5.	Balaramapuram	8°25'42.67"N	77°02'13.78"E

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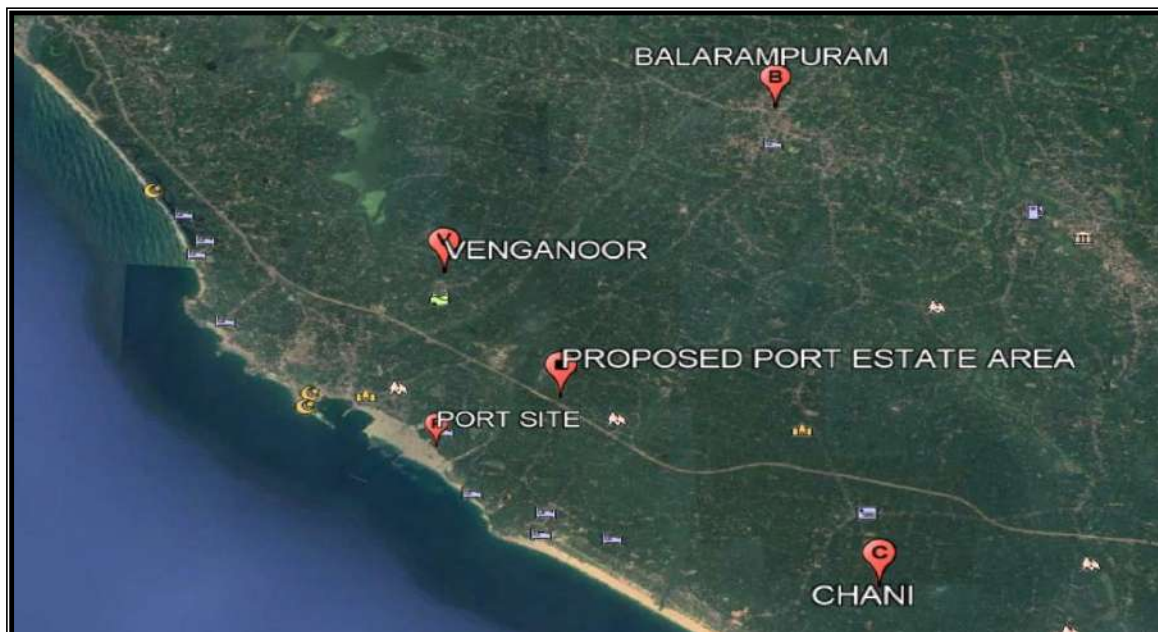



Figure 3.1: Google earth view of AAQM stations

2. Methodology of Sampling and Analysis:

Table 3.2: Ambient Air Quality Monitoring Methodology


Sr. No.	Parameter	Unit	Detection Limit	Method Reference
1.	Particulate Matter (size less than 10 µm) or PM ₁₀	µg/m ³	2	IS 5182 (Part 23): 2006, AEC/C/SAP/AA-1
2.	Particulate Matter (size less than 2.5 µm) or PM _{2.5}	µg/m ³	0.4	CPCB Guidelines, Volume I,36/2012-13, Page no. 15, AEC/C/SAP/AA-1,
3.	Sulphur Dioxide (SO ₂)	µg/m ³	4.0	IS 5182 (Part 2): 2001, Reaffirmed 2006, AEC/C/SAP/AA-2,
4.	Nitrogen Dioxide (NO ₂)	µg/m ³	6.5	IS 5182 (Part 6): 2006, AEC/C/SAP/AA-3
5.	Carbon Monoxide (CO)	mg/m ³	0.5	By portable CO meter
6.	Hydrocarbon (HC)	ppm	1.0	By portable HC meter

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3. National Ambient Air Quality Standards:

Table 3.3: National Ambient Air Quality Standards Dated 16th November 2009


Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air	
			Industrial, Residential, Rural & other areas	Ecologically Sensitive Areas
1.	Sulphur dioxide (SO ₂), µg/m ³	Annual	50	20
		24 h	80	80
2.	Nitrogen Dioxide (NO ₂), µg/m ³	Annual	40	30
		24 h	80	80
3.	Particulate matter (size less than 10µm) or PM ₁₀ , µg/m ³	Annual	60	60
		24 h	100	100
4.	Particulate matter (size less than 2.5µm) or PM _{2.5} , µg/m ³	Annual	40	40
		24 h	60	60
5.	Carbon Monoxide(CO), µg/m ³	8 h	02	02
		1 h	04	04
6.	Hydrocarbon (HC), ppm	-	-	-

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4. Ambient Air Quality Monitoring Results for the period October 2019 to March 2020:

Table 3.4: Location - Venganoor

Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
03.10.2019	59	15	5.65	9.12	BDL	BDL
07.10.2019	62	16	6.06	6.90	BDL	BDL
10.10.2019	78	20	5.84	7.10	BDL	BDL
14.10.2019	45	14	BDL	BDL	BDL	BDL
17.10.2019	40	13	BDL	BDL	BDL	BDL
21.10.2019	38	11	BDL	BDL	BDL	BDL
24.10.2019	48	15	BDL	BDL	BDL	BDL
28.10.2019	42	12	BDL	BDL	BDL	BDL
31.10.2019	45	14	BDL	BDL	BDL	BDL
04.11.2019	68	16	5.08	6.60	BDL	BDL
07.11.2019	52	12	5.62	9.88	BDL	BDL
11.11.2019	70	19	5.74	8.58	BDL	BDL
14.11.2019	83	23	5.64	9.43	BDL	BDL
18.11.2019	67	15	6.49	8.02	BDL	BDL
21.11.2019	71	18	6.21	8.96	BDL	BDL
25.11.2019	51	12	5.65	8.48	BDL	BDL
28.11.2019	54	14	6.49	10.40	BDL	BDL
02.12.2019	54	14	5.36	7.54	BDL	BDL
05.12.2019	60	17	5.93	8.02	BDL	BDL
09.12.2019	76	26	6.49	7.54	BDL	BDL
12.12.2019	92	25	7.34	9.43	BDL	BDL
16.12.2019	66	18	5.08	8.01	BDL	BDL
19.12.2019	89	20	5.36	7.54	BDL	BDL
23.12.2019	67	31	6.49	8.02	BDL	BDL
26.12.2019	66	35	BDL	BDL	BDL	BDL
30.12.2019	96	21	BDL	BDL	BDL	BDL
02.01.2020	75	19	5.20	7.10	BDL	BDL
06.01.2020	76	20	7.60	9.40	BDL	BDL
09.01.2020	52	15	7.90	8.00	BDL	BDL
13.01.2020	76	20	6.70	7.70	BDL	BDL
16.01.2020	76	20	7.30	9.40	BDL	BDL
20.01.2020	83	18	5.90	8.00	BDL	BDL
23.01.2020	58	12	5.30	7.10	BDL	BDL
27.01.2020	56	16	8.00	8.50	BDL	BDL
30.01.2020	42	13	7.60	9.00	BDL	BDL
03.02.2020	80	26	8.02	6.21	BDL	BDL
06.02.2020	90	30	8.39	10.20	BDL	BDL

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Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
10.02.2020	78	22	6.57	9.07	BDL	BDL
13.02.2020	90	27	6.78	8.49	BDL	BDL
17.02.2020	89	25	8.47	10.80	BDL	BDL
20.02.2020	78	21	6.76	9.90	BDL	BDL
24.02.2020	68	19	7.20	11.60	BDL	BDL
27.02.2020	62	16	5.80	9.70	BDL	BDL
02.03.2020	70	30	5.40	8.20	BDL	BDL
05.03.2020	68	18	6.50	8.70	BDL	BDL
09.03.2020	58	16	5.26	6.34	BDL	BDL
12.03.2020	64	22	5.92	6.14	BDL	BDL
NAAQS 2009	100	60	80	80	4	-

*BDL: Below Detection Limit/Level



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Table 3.5: Location - Proposed Port Estate Area

Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
03.10.2019	57	16	6.87	9.54	BDL	BDL
07.10.2019	75	20	7.04	8.09	BDL	BDL
10.10.2019	79	22	5.48	7.34	BDL	BDL
14.10.2019	44	16	BDL	BDL	BDL	BDL
17.10.2019	48	18	BDL	BDL	BDL	BDL
21.10.2019	40	12	BDL	BDL	BDL	BDL
24.10.2019	49	14	BDL	BDL	BDL	BDL
28.10.2019	38	11	BDL	BDL	BDL	BDL
31.10.2019	35	10	BDL	BDL	BDL	BDL
04.11.2019	84	25	5.79	8.22	BDL	BDL
07.11.2019	74	20	7.92	12.50	BDL	BDL
11.11.2019	78	22	5.43	10.00	BDL	BDL
14.11.2019	60	18	5.36	9.90	BDL	BDL
18.11.2019	63	16	6.27	8.91	BDL	BDL
21.11.2019	58	15	5.65	7.54	BDL	BDL
25.11.2019	65	17	5.98	9.03	BDL	BDL
28.11.2019	55	14	5.36	8.01	BDL	BDL
02.12.2019	68	20	7.83	10.20	BDL	BDL
05.12.2019	98	26	5.65	8.49	BDL	BDL
09.12.2019	84	32	5.93	8.02	BDL	BDL
12.12.2019	76	33	6.21	8.02	BDL	BDL
16.12.2019	72	25	6.49	8.95	BDL	BDL
19.12.2019	85	23	6.78	9.90	BDL	BDL
23.12.2019	73	20	7.06	8.49	BDL	BDL
26.12.2019	69	20	6.49	8.95	BDL	BDL
30.12.2019	81	24	BDL	BDL	BDL	BDL
02.01.2020	88	38	7.30	7.80	BDL	BDL
06.01.2020	83	22	9.00	9.40	BDL	BDL
09.01.2020	96	31	8.50	9.10	BDL	BDL
13.01.2020	89	36	10.10	8.20	BDL	BDL
16.01.2020	86	39	7.00	8.80	BDL	BDL
20.01.2020	77	22	8.40	8.80	BDL	BDL
23.01.2020	86	18	9.90	9.00	BDL	BDL
27.01.2020	78	34	10.50	8.50	BDL	BDL
30.01.2020	82	31	7.60	9.40	BDL	BDL
03.02.2020	94	33	8.49	7.34	BDL	BDL
06.02.2020	90	34	8.89	10.00	BDL	BDL
10.02.2020	94	32	7.12	8.78	BDL	BDL
13.02.2020	93	31	6.57	9.07	BDL	BDL

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Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
17.02.2020	94	35	7.62	9.90	BDL	BDL
20.02.2020	97	40	5.93	8.49	BDL	BDL
24.02.2020	87	37	6.80	10.60	BDL	BDL
27.02.2020	82	29	5.40	9.80	BDL	BDL
02.03.2020	92	35	6.14	9.50	BDL	BDL
05.03.2020	90	34	6.20	8.80	BDL	BDL
09.03.2020	86	32	5.92	6.61	BDL	BDL
12.03.2020	80	30	5.36	6.61	BDL	BDL
NAAQS 2009	100	60	80	80	4	-

*BDL: Below Detection Limit/Level



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Table 3.6: Location - Port Site

Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
03.10.2019	53	11	6.29	9.91	BDL	BDL
07.10.2019	82	21	6.56	7.39	BDL	BDL
10.10.2019	78	20	7.12	7.18	BDL	BDL
14.10.2019	41	14	BDL	BDL	BDL	BDL
17.10.2019	38	11	BDL	BDL	BDL	BDL
21.10.2019	35	10	BDL	BDL	BDL	BDL
24.10.2019	48	18	BDL	BDL	BDL	BDL
28.10.2019	42	14	BDL	BDL	BDL	BDL
31.10.2019	45	15	BDL	BDL	BDL	BDL
04.11.2019	57	15	4.75	7.44	BDL	BDL
07.11.2019	70	18	6.24	9.92	BDL	BDL
11.11.2019	84	28	6.03	8.96	BDL	BDL
14.11.2019	61	17	5.69	9.98	BDL	BDL
18.11.2019	58	16	6.74	8.71	BDL	BDL
21.11.2019	62	18	6.80	9.39	BDL	BDL
25.11.2019	80	24	6.21	9.43	BDL	BDL
28.11.2019	73	18	6.08	11.10	BDL	BDL
02.12.2019	70	18	6.00	8.59	BDL	BDL
05.12.2019	54	14	5.36	8.02	BDL	BDL
09.12.2019	91	30	5.17	7.67	BDL	BDL
12.12.2019	51	14	7.24	9.19	BDL	BDL
16.12.2019	59	16	BDL	19.80	BDL	BDL
19.12.2019	59	16	BDL	19.80	BDL	BDL
23.12.2019	69	14	6.78	7.54	BDL	BDL
26.12.2019	83	13	BDL	10.50	BDL	BDL
30.12.2019	88	22	BDL	BDL	BDL	BDL
02.01.2020	80	27	6.80	8.20	BDL	BDL
06.01.2020	76	17	7.90	9.20	BDL	BDL
09.01.2020	73	21	9.10	11.30	BDL	BDL
13.01.2020	75	22	8.70	10.00	BDL	BDL
16.01.2020	84	28	8.00	8.20	BDL	BDL
20.01.2020	92	24	9.30	11.80	BDL	BDL
23.01.2020	94	35	6.20	8.50	BDL	BDL
27.01.2020	57	16	9.30	11.30	BDL	BDL
30.01.2020	59	17	7.90	9.00	BDL	BDL
03.02.2020	89	30	8.61	7.73	BDL	BDL
06.02.2020	92	35	6.98	9.71	BDL	BDL
10.02.2020	86	29	6.34	8.67	BDL	BDL
13.02.2020	81	39	6.49	7.54	BDL	BDL

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Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
17.02.2020	90	33	6.54	8.08	BDL	BDL
20.02.2020	82	28	8.47	11.30	BDL	BDL
24.02.2020	96	36	9.20	10.40	BDL	BDL
27.02.2020	70	27	7.60	8.50	BDL	BDL
02.03.2020	90	33	5.00	9.10	BDL	BDL
05.03.2020	92	35	9.50	7.51	BDL	BDL
09.03.2020	86	30	6.20	7.55	BDL	BDL
12.03.2020	80	28	6.44	7.17	BDL	BDL
NAAQS 2009	100	60	80	80	4	-

*BDL: Below Detection Limit/Level

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Table 3.7: Location - Chani

Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
03.10.2019	68	18	6.37	9.19	BDL	BDL
07.10.2019	78	20	6.12	6.82	BDL	BDL
10.10.2019	65	19	5.12	6.58	BDL	BDL
14.10.2019	40	14	BDL	BDL	BDL	BDL
17.10.2019	42	15	BDL	BDL	BDL	BDL
21.10.2019	38	12	BDL	BDL	BDL	BDL
24.10.2019	44	16	BDL	BDL	BDL	BDL
28.10.2019	36	10	BDL	BDL	BDL	BDL
31.10.2019	32	9	BDL	BDL	BDL	BDL
04.11.2019	61	17	5.97	7.61	BDL	BDL
07.11.2019	56	12	5.41	8.55	BDL	BDL
11.11.2019	50	13	5.64	9.43	BDL	BDL
14.11.2019	82	22	5.64	9.43	BDL	BDL
18.11.2019	59	16	6.49	7.54	BDL	BDL
21.11.2019	60	15	7.18	9.59	BDL	BDL
25.11.2019	50	14	6.78	10.80	BDL	BDL
28.11.2019	80	20	6.47	9.67	BDL	BDL
02.12.2019	60	18	5.93	10.80	BDL	BDL
05.12.2019	68	19	6.32	11.50	BDL	BDL
09.12.2019	64	26	6.49	8.02	BDL	BDL
12.12.2019	95	25	6.49	8.49	BDL	BDL
16.12.2019	60	18	5.69	7.60	BDL	BDL
19.12.2019	79	21	5.84	8.78	BDL	BDL
23.12.2019	79	18	7.06	8.96	BDL	BDL
26.12.2019	57	11	7.34	9.43	BDL	BDL
30.12.2019	79	16	BDL	BDL	BDL	BDL
02.01.2020	75	16	6.80	7.90	BDL	BDL
06.01.2020	95	21	7.30	9.90	BDL	BDL
09.01.2020	73	29	7.00	9.20	BDL	BDL
13.01.2020	96	21	8.40	8.70	BDL	BDL
16.01.2020	88	34	6.50	10.40	BDL	BDL
20.01.2020	93	20	7.90	9.00	BDL	BDL
23.01.2020	97	20	9.10	7.80	BDL	BDL
27.01.2020	77	32	8.50	9.40	BDL	BDL
30.01.2020	70	25	9.10	9.20	BDL	BDL
03.02.2020	85	24	9.42	7.62	BDL	BDL
06.02.2020	87	24	5.79	8.67	BDL	BDL
10.02.2020	90	35	6.26	8.56	BDL	BDL
13.02.2020	95	36	6.95	8.22	BDL	BDL

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Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
17.02.2020	92	32	5.86	8.32	BDL	BDL
20.02.2020	96	33	7.60	11.00	BDL	BDL
24.02.2020	80	26	6.40	9.80	BDL	BDL
27.02.2020	82	28	6.80	8.80	BDL	BDL
02.03.2020	90	32	6.71	8.12	BDL	BDL
05.03.2020	86	30	6.90	9.96	BDL	BDL
09.03.2020	91	34	6.54	7.45	BDL	BDL
12.03.2020	84	26	6.89	8.01	BDL	BDL
NAAQS 2009	100	60	80	80	4	-

*BDL: Below Detection Limit/Level



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Table 3.8: Location - Balaramapuram

Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
03.10.2019	80	22	6.98	8.43	BDL	BDL
07.10.2019	68	18	6.14	7.01	BDL	BDL
10.10.2019	71	21	6.84	7.35	BDL	BDL
14.10.2019	46	15	BDL	BDL	BDL	BDL
17.10.2019	40	12	BDL	BDL	BDL	BDL
21.10.2019	38	13	BDL	BDL	BDL	BDL
24.10.2019	51	16	5.05	BDL	BDL	BDL
28.10.2019	35	11	BDL	BDL	BDL	BDL
31.10.2019	30	10	BDL	BDL	BDL	BDL
04.11.2019	78	25	4.79	9.43	BDL	BDL
07.11.2019	63	21	6.05	10.5	BDL	BDL
11.11.2019	84	30	5.92	9.43	BDL	BDL
14.11.2019	80	27	5.64	9.90	BDL	BDL
18.11.2019	72	17	6.78	7.54	BDL	BDL
21.11.2019	61	13	5.93	7.55	BDL	BDL
25.11.2019	53	16	6.49	9.90	BDL	BDL
28.11.2019	67	22	5.93	7.07	BDL	BDL
02.12.2019	84	18	6.78	8.02	BDL	BDL
05.12.2019	96	28	5.99	8.47	BDL	BDL
09.12.2019	93	25	6.21	8.49	BDL	BDL
12.12.2019	90	23	7.06	9.72	BDL	BDL
16.12.2019	93	28	6.05	9.14	BDL	BDL
19.12.2019	95	24	5.33	8.40	BDL	BDL
23.12.2019	92	26	7.06	8.96	BDL	BDL
26.12.2019	98	46	8.20	7.99	BDL	BDL
30.12.2019	96	21	BDL	BDL	BDL	BDL
02.01.2020	80	25	8.50	9.80	BDL	BDL
06.01.2020	82	34	6.90	8.80	BDL	BDL
09.01.2020	75	33	8.50	11.80	BDL	BDL
13.01.2020	90	43	7.50	9.70	BDL	BDL
16.01.2020	68	38	9.60	10.00	BDL	BDL
20.01.2020	76	35	7.90	9.80	BDL	BDL
23.01.2020	68	30	9.10	8.40	BDL	BDL
27.01.2020	97	27	8.50	11.30	BDL	BDL
30.01.2020	87	29	9.30	10.80	BDL	BDL
03.02.2020	92	32	9.03	7.63	BDL	BDL
06.02.2020	86	35	7.86	10.10	BDL	BDL

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Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
10.02.2020	98	43	6.98	11.10	BDL	BDL
13.02.2020	93	41	6.45	8.82	BDL	BDL
17.02.2020	89	36	5.79	7.25	BDL	BDL
20.02.2020	98	42	5.07	8.47	BDL	BDL
24.02.2020	80	32	7.20	10.50	BDL	BDL
27.02.2020	95	36	6.50	9.20	BDL	BDL
02.03.2020	89	38	5.41	7.40	BDL	BDL
05.03.2020	91	40	5.22	10.40	BDL	BDL
09.03.2020	86	36	6.19	8.27	BDL	BDL
12.03.2020	75	32	7.17	8.16	BDL	BDL
NAAQS 2009	100	60	80	80	4	-

*BDL: Below Detection Limit/Level

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5. Monthly Average Results of Ambient Air Quality Monitoring

Table 3.9: Monthly Average Results

Parameter	NAAQS 2009	Month	Venganoor	Proposed Port Estate Area	Port Site	Chani	Balaramapuram
Particulate matter (size less than 10µm) or PM ₁₀ , µg/m ³	100	Oct-19	51	52	51	49	51
		Nov-19	65	67	68	62	70
		Dec-19	74	78	69	71	93
		Jan-20	66	85	77	85	80
		Feb-20	79	91	86	88	91
		Mar-20	65	87	87	88	85
Particulate matter (size less than 2.5µm) or PM _{2.5} , µg/m ³	60	Oct-19	14	15	15	15	15
		Nov-19	16	18	19	16	21
		Dec-19	23	25	17	19	27
		Jan-20	17	30	23	24	33
		Feb-20	23	34	32	30	37
		Mar-20	22	33	32	31	37
Sulphur dioxide (SO ₂), µg/m ³	80	Oct-19	5.85	6.46	6.66	5.87	6.25
		Nov-19	5.87	5.97	6.07	6.20	5.94
		Dec-19	6.01	6.56	6.11	6.40	6.59
		Jan-20	6.83	8.70	8.13	7.84	8.42
		Feb-20	7.25	7.10	7.53	6.89	6.86
		Mar-20	5.77	5.91	6.79	6.76	6.00
Nitrogen Dioxide (NO ₂), µg/m ³	80	Oct-19	7.71	8.32	8.16	7.53	7.60
		Nov-19	8.79	9.26	9.37	9.08	8.92
		Dec-19	8.01	8.88	11.39	9.20	8.65
		Jan-20	8.24	8.78	9.72	9.06	10.04
		Feb-20	9.50	9.25	8.99	8.87	9.13
		Mar-20	7.35	7.88	7.83	8.39	8.56
Carbon Monoxide (CO), µg/m ³	4	Oct-19	BDL	BDL	BDL	BDL	BDL
		Nov-19	BDL	BDL	BDL	BDL	BDL
		Dec-19	BDL	BDL	BDL	BDL	BDL
		Jan-20	BDL	BDL	BDL	BDL	BDL
		Feb-20	BDL	BDL	BDL	BDL	BDL
		Mar-20	BDL	BDL	BDL	BDL	BDL
Hydrocarbon (HC), ppm	-	Oct-19	BDL	BDL	BDL	BDL	BDL
		Nov-19	BDL	BDL	BDL	BDL	BDL
		Dec-19	BDL	BDL	BDL	BDL	BDL
		Jan-20	BDL	BDL	BDL	BDL	BDL
		Feb-20	BDL	BDL	BDL	BDL	BDL
		Mar-20	BDL	BDL	BDL	BDL	BDL

6. Graphical representation of Results for the period October 2019 to March 2020

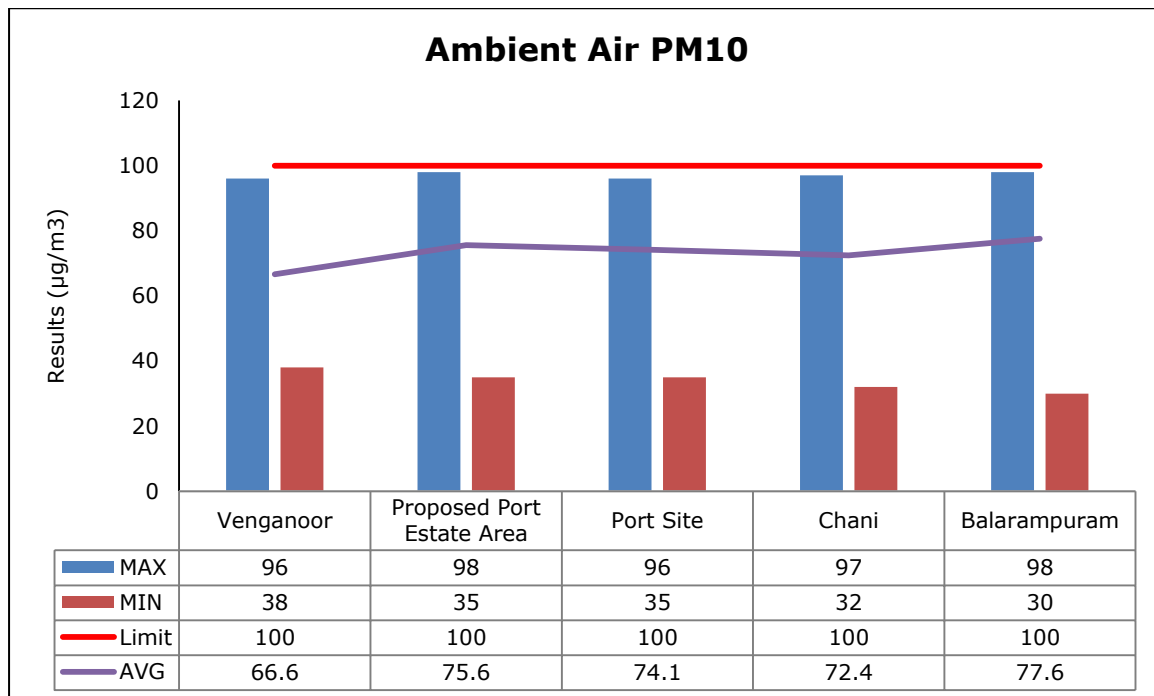


Figure 3.2: Particulate matter (size less than 10µm) (PM₁₀)

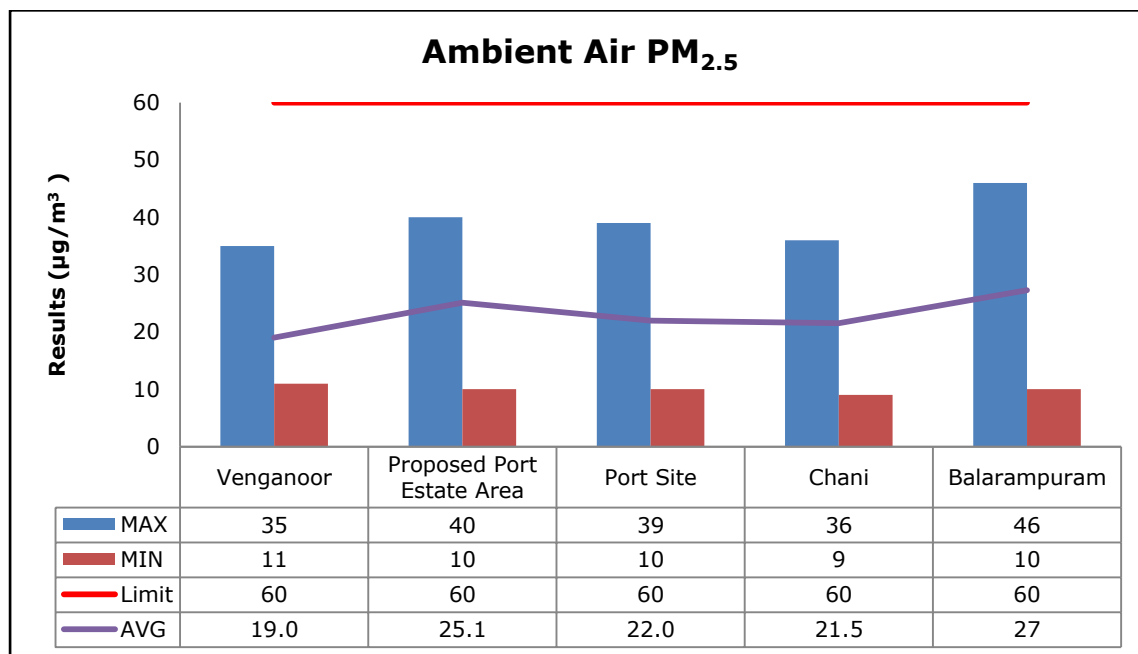


Figure 3.3: Particulate matter (size less than 2.5µm) (PM_{2.5})

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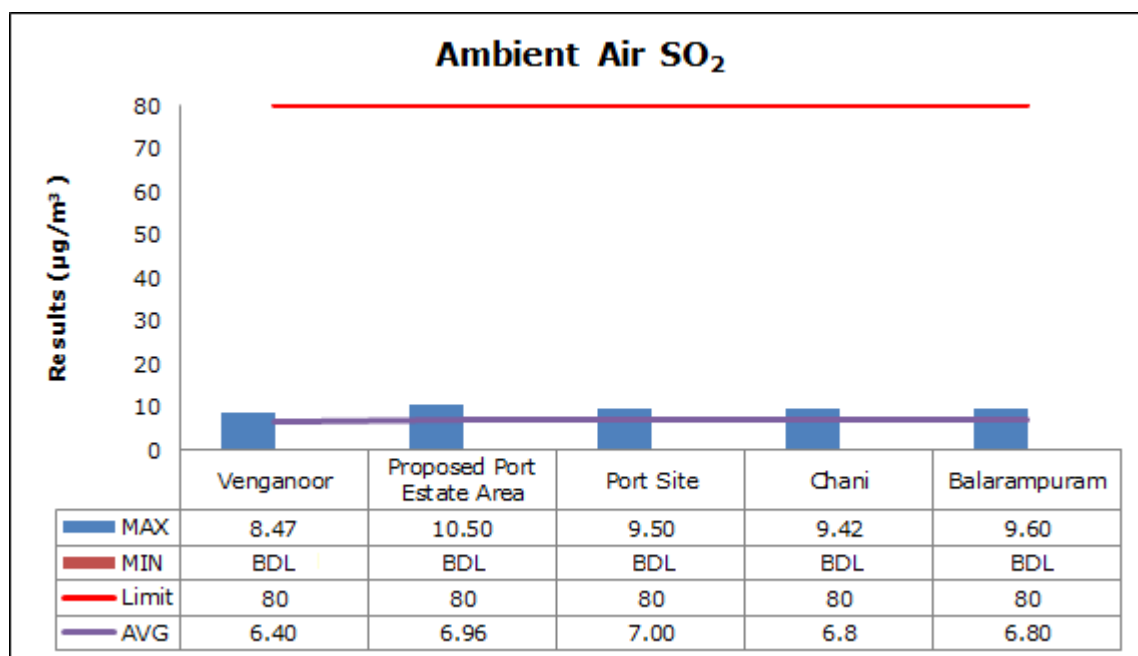


Figure 3.4: Sulphur dioxide (SO₂)

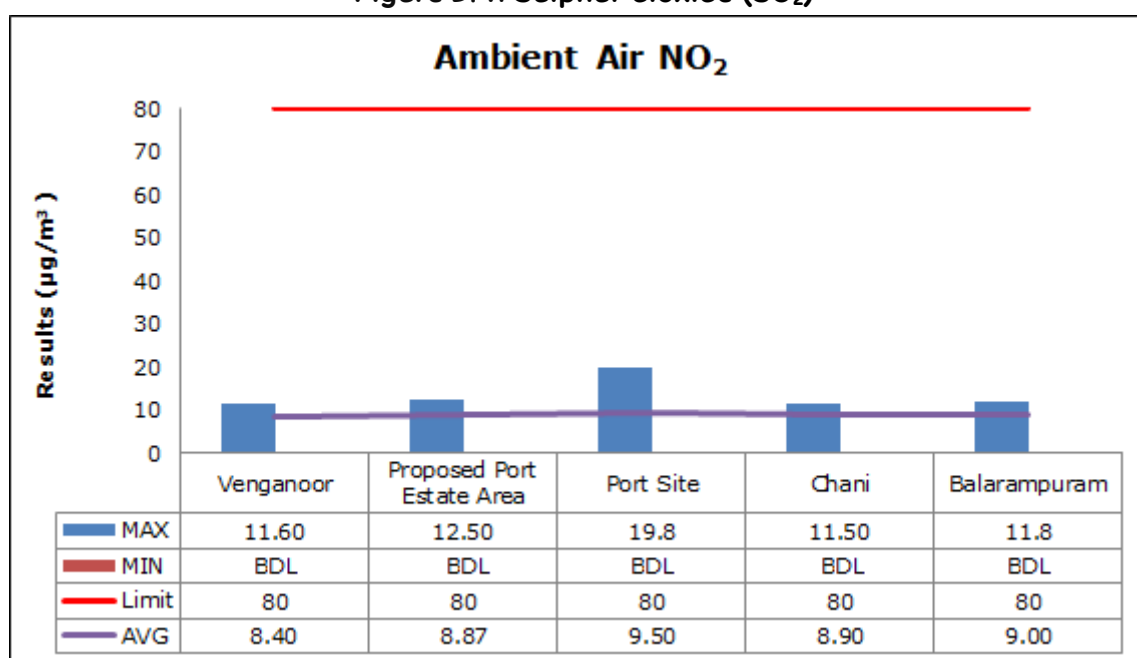



Figure 3.5: Nitrogen Dioxide (NO₂)

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7. Summary - Ambient Air Quality


During the period of October 2019 to March 2020, at the location **Venganoor**, the concentration of PM₁₀ was observed in the range between 38-96 µg/m³ with an average of 66.6 µg/m³, PM_{2.5} was observed in the range between 11-35 µg/m³ with an average of 19.0 µg/m³, SO₂ was observed in the range between BDL-8.47 µg/m³ with an average of 6.40 µg/m³, NO₂ was observed in the range between BDL-11.60 µg/m³ with an average of 8.40 µg/m³, CO and HC were observed BDL for all six months.

At the location **Proposed Port Colony**, concentration of PM₁₀ was observed in the range between 35-98 µg/m³ with an average of 75.6 µg/m³, PM_{2.5} was observed in the range between 10-40 µg/m³ with an average of 25.1 µg/m³, SO₂ was observed in the range between BDL-10.50 µg/m³ with an average of 6.96 µg/m³, NO₂ was observed in the range between BDL-12.50 µg/m³ with an average of 8.87 µg/m³, CO and HC were observed BDL for all six months.

At the location **Port site**, concentration of PM₁₀ was observed in the range between 35-96 µg/m³ with an average of 74.1 µg/m³, PM_{2.5} was observed in the range between 10-39 µg/m³ with an average of 22.0 µg/m³, SO₂ was observed in the range between BDL-9.50 µg/m³ with an average of 7.00 µg/m³, NO₂ was observed in the range between BDL-19.8 µg/m³ with an average of 9.50 µg/m³, CO and HC were observed BDL for all six months.

At the location **Chani**, concentration of PM₁₀ was observed in the range between 32-97 µg/m³ with an average of 72.4 µg/m³, PM_{2.5} was observed in the range between 9-36 µg/m³ with an average of 21.5 µg/m³, SO₂ was observed in the range between BDL-9.42 µg/m³ with an average of 6.8 µg/m³, NO₂ was observed in the range between BDL-11.50 µg/m³ with an average of 8.90 µg/m³, CO and HC were observed BDL for all six months.

At the location **Balaramapuram**, concentration of PM₁₀ was observed in the range between 30-98 µg/m³ with an average of 77.6 µg/m³, PM_{2.5} was observed in the range between 10-46 µg/m³ with an average of 27.0 µg/m³, SO₂ was observed in the

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range between BDL-9.60 $\mu\text{g}/\text{m}^3$ with an average of 6.80 $\mu\text{g}/\text{m}^3$, NO_2 was observed in the range between BDL-11.8 $\mu\text{g}/\text{m}^3$ with an average of 9.00 $\mu\text{g}/\text{m}^3$, CO and HC were observed BDL for all six months.

The obtained results were compared with National Ambient Air Quality Standards (NAAQS), 2009. The results were well within the limit on all monitoring days at all 5 locations.

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CHAPTER 4

Ambient Noise Monitoring

1. Ambient Noise Monitoring location details

This chapter describes the sampling location, methodology adopted for monitoring ambient noise and analysis of monitored results. Ambient Noise Monitoring during October 2019 to March 2020 was carried out at Venganoor, Proposed Port Estate Area, Port Site, Chani and Balaramapuram. Classification of locations as per the Noise Pollution (Regulation & Control) Rules, 2000 (Rules 3 (1) and 4(1)) are as below:

Table 4.1: Ambient Noise Monitoring Stations details

Sr. No.	Location	Area Type	Latitude	Longitude
1.	Port Site	Industrial	8°22',13.53"N	77°00',08.78"E
2.	Balaramapuram	Commercial	8°25',37.60"N	77°02',43.80"E
3.	Proposed Port Estate Area	Residential	8°22',41.47"N	77°01',02.94"E
4.	Chani	Residential	8°20',56.86"N	77°03',16.19"E
5.	Venganoor	Residential	8°23',55.10"N	77°00',11.30"E

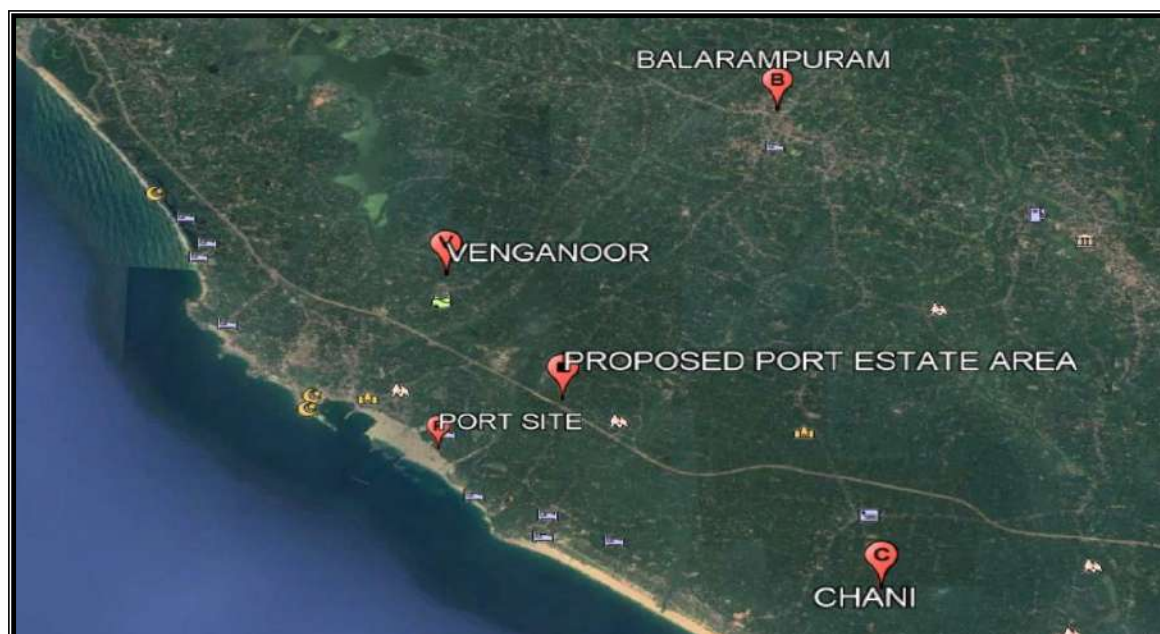


Figure 4.1: Google earth view of Ambient Noise Monitoring Stations

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2. Methodology of Sampling

Ambient Noise Monitoring is being carried out as per CPCB Protocol for Ambient Level Noise Monitoring, July 2015 & AEC/C/SAP/SAM/35 & 36, Issue No.4, Issue date 01.04.2018

3. Ambient Noise Standards

As per the Noise Pollution (Regulation & Control) Rules, 2000 (Rules 3 (1) and 4(1))

Table 4.2: Ambient Noise Standard

Area Code	Area Type	Limits in dB (A) Leq	
		Day (6 a.m. to 10 p.m.)	Night (10 p.m. to 6 a.m.)
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45

4. Ambient Noise Monitoring Results for the period October 2019 to March 2020

Table 4.3 : Location - Port Site (Industrial)

Month	Date	L _{max} Day time	L _{max} Night time	L _{min} Day time	L _{min} Night time	L _{eq} Day time	L _{eq} Night time
		dB (A)					
Oct-19	10.10.2019	93.9	75.2	45.3	42.1	68.0	59.5
	24.10.2019	89.2	77.8	45.0	44.9	70.4	58.1
Nov-19	07.11.2019	91.7	76.9	44.4	44.2	65.2	58.5
	21.11.2019	96.2	83.4	43.8	43.3	68.3	60.7
Dec-19	05.12.2019	94.7	74.6	44.9	45.0	67.6	56.1
	19.12.2019	94.7	78.0	43.4	43.8	64.3	55.3
Jan-20	09.01.2020	91.9	75.0	45.7	42.1	68.0	59.5
	23.01.2020	90.1	81.6	44.3	42.0	65.1	55.0
Feb-20	06.02.2020	83.3	82.8	43.1	42.2	64.8	58.7
	20.02.2020	92.7	79.8	43.1	40.3	67.5	59.2
Mar-20	12.03.2020	86.3	83.9	40.4	40.1	66.1	58.5
	19.03.2020	81.3	67.8	42.2	41.2	60.7	51.9
As per Noise Pollution (Regulation & Control) Rules, 2000						75	70

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Table 4.4: Location - Balaramapuram (Commercial)

Month	Date	L _{max} Day time	L _{max} Night time	L _{min} Day time	L _{min} Night time	L _{eq} Day time	L _{eq} Night time
		dB (A)					
Oct-19	14.10.2019	85.2	73.2	41.6	38.5	58.4	49.2
	28.10.2019	89.8	70.8	41.6	41.1	59.2	51.8
Nov-19	11.11.2019	79.0	77.6	39.6	36.4	59.5	50.5
	25.11.2019	87.2	79.8	39.7	35.6	60.5	52.1
Dec-19	09.12.2019	96.9	73.1	42.4	43.0	62.5	50.4
	23.12.2019	90.3	74.1	39.9	39.6	62.6	48.3
Jan-20	13.01.2020	82.7	74.9	38.7	38.1	62.5	50.7
	27.01.2020	89.8	70.8	38.6	38.4	59.2	51.8
Feb-20	10.02.2020	91.9	72.3	41.6	37.3	61.8	54.6
	24.02.2020	87.0	77.9	36.0	34.7	60.1	49.5
Mar-20	16.03.2020	86.9	73.0	39.3	38.6	60.2	50.6
	24.03.2020	87.0	77.9	36.0	34.7	60.1	49.5
As per Noise Pollution (Regulation & Control) Rules, 2000						65	55

Table 4.5: Location - Proposed Port Estate Area (Residential)

Month	Date	L _{max} Day time	L _{max} Night time	L _{min} Day time	L _{min} Night time	L _{eq} Day time	L _{eq} Night time
		dB (A)					
Oct-19	11.10.2019	82.0	81.5	38.7	35.9	54.4	44.1
	25.10.2019	82.6	72.1	38.0	37.9	53.6	45.0
Nov-19	08.11.2019	89.0	74.4	35.4	35.8	53.8	45.0
	22.11.2019	86.8	67.7	35.2	35.9	54.8	44.8
Dec-19	06.12.2019	81.9	76.1	38.4	37.3	54.2	44.0
	20.12.2019	82.5	75.1	39.1	37.1	54.4	44.4
Jan-20	10.01.2020	80.7	69.7	37.3	37.5	54.4	44.8
	24.01.2020	81.2	67.8	39.0	37.0	54.0	44.6
Feb-20	07.02.2020	81.2	73.6	38.9	36.3	54.1	44.6
	21.02.2020	82.6	70.2	39.0	34.9	54.5	44.7
Mar-20	13.03.2020	79.1	74.9	39.5	38.6	53.8	47.2
	20.03.2020	80.6	72.5	35.4	35.9	51.8	42.9
As per Noise Pollution (Regulation & Control) Rules, 2000						55	45

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Table 4.6: Location - Chani (Residential)

Month	Date	L _{max} Day time	L _{max} Night time	L _{min} Day time	L _{min} Night time	L _{eq} Day time	L _{eq} Night time
		dB (A)					
Oct-19	12.10.2019	86.3	71.9	38.1	34.9	51.7	44.9
	26.10.2019	81.3	72.9	35.5	35.5	51.9	42.5
Nov-19	09.11.2019	76.9	71.8	35.8	36.7	48.7	44.0
	23.11.2019	80.3	68.4	34.9	36.9	52.2	43.9
Dec-19	07.12.2019	80.1	60.2	38.9	39.0	51.0	41.2
	21.12.2019	80.1	78.5	35.6	35.1	49.8	44.0
Jan-20	11.01.2020	78.3	72.4	37.4	35.8	51.1	44.8
	25.01.2020	83.5	67.5	38.2	38.7	52.7	44.4
Feb-20	08.02.2020	85.8	72.7	37.8	36.9	54.6	43.4
	22.02.2020	79.6	67.9	38.7	34.2	53.7	44.0
Mar-20	14.03.2020	78.9	71.5	35.8	35.8	51.2	44.7
	21.03.2020	72.1	63.7	36.4	36.4	45.3	40.1
As per Noise Pollution (Regulation & Control) Rules, 2000						55	45

Table 4.7: Location - Venganoor (Residential)

Month	Date	L _{max} Day time	L _{max} Night time	L _{min} Day time	L _{min} Night time	L _{eq} Day time	L _{eq} Night time
		dB (A)					
Oct-19	13.10.2019	75.7	70.4	34.8	35.4	48.2	41.4
	27.10.2019	71.6	66.9	37.9	36.1	44.4	40.3
Nov-19	10.11.2019	71.0	67.0	34.3	36.8	47.0	39.8
	24.11.2019	71.9	61.7	34.8	34.8	47.9	38.7
Dec-19	08.12.2019	79.5	60.5	35.3	35.5	49.1	37.6
	22.12.2019	77.7	69.7	36.1	35.4	48.1	40.4
Jan-20	12.01.2020	77.3	67.5	37.7	36.5	50.9	40.5
	26.01.2020	71.6	66.9	37.7	36.4	44.9	40.3
Feb-20	09.02.2020	76.2	63.4	34.7	34.1	51.7	40.0
	23.02.2020	75.7	61.3	34.8	35.4	47.8	37.7
Mar-20	15.03.2020	74.7	70.5	34.9	35.2	47.5	43.3
	22.03.2020	70.2	61.3	35.1	35.2	46.8	37.9
As per Noise Pollution (Regulation & Control) Rules, 2000						55	45

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5. Half Yearly Average Results of Ambient Noise Monitoring

Table 4.8: Half Yearly Average Results

Parameter		Proposed Port Estate Area	Chani	Venganoor	Port Site	Balaramapuram
		Residential	Residential	Residential	Industrial	Commercial
		Day Time (55) Night Time (45)	Day Time (55) Night Time (45)	Day Time (55) Night Time (45)	Day Time (75) Night Time (70)	Day Time (65) Night Time (55)
L_{max} Day time dB (A)	Max	89.0	86.3	79.5	96.2	96.9
	Min	79.1	72.1	70.2	81.3	79.0
	Avg	82.5	80.3	74.4	90.5	87.8
L_{max} Night time dB (A)	Max	81.5	78.5	70.5	83.9	79.8
	Min	67.7	60.2	60.5	67.8	70.8
	Avg	73.0	70.0	65.6	78.1	74.6
L_{min} Day time dB (A)	Max	39.5	38.9	37.9	45.7	42.4
	Min	35.2	34.9	34.3	40.4	36.0
	Avg	37.8	36.9	35.7	43.8	39.6
L_{min} Night time dB (A)	Max	38.6	39.0	36.8	45.0	43.0
	Min	34.9	34.2	34.10	40.1	34.7
	Avg	36.7	36.3	35.6	42.6	38.0
Leq Day time dB (A)	Max	54.8	54.6	51.7	70.4	62.6
	Min	51.8	45.3	44.4	60.7	58.4
	Avg	54.0	51.2	47.9	66.3	60.6
Leq Night time dB (A)	Max	47.2	44.9	43.3	60.7	54.6
	Min	42.9	40.1	37.6	51.9	48.3
	Avg	44.7	43.5	39.8	57.6	50.8

6. Graphical representation of Results for the period October 2019 to March2020

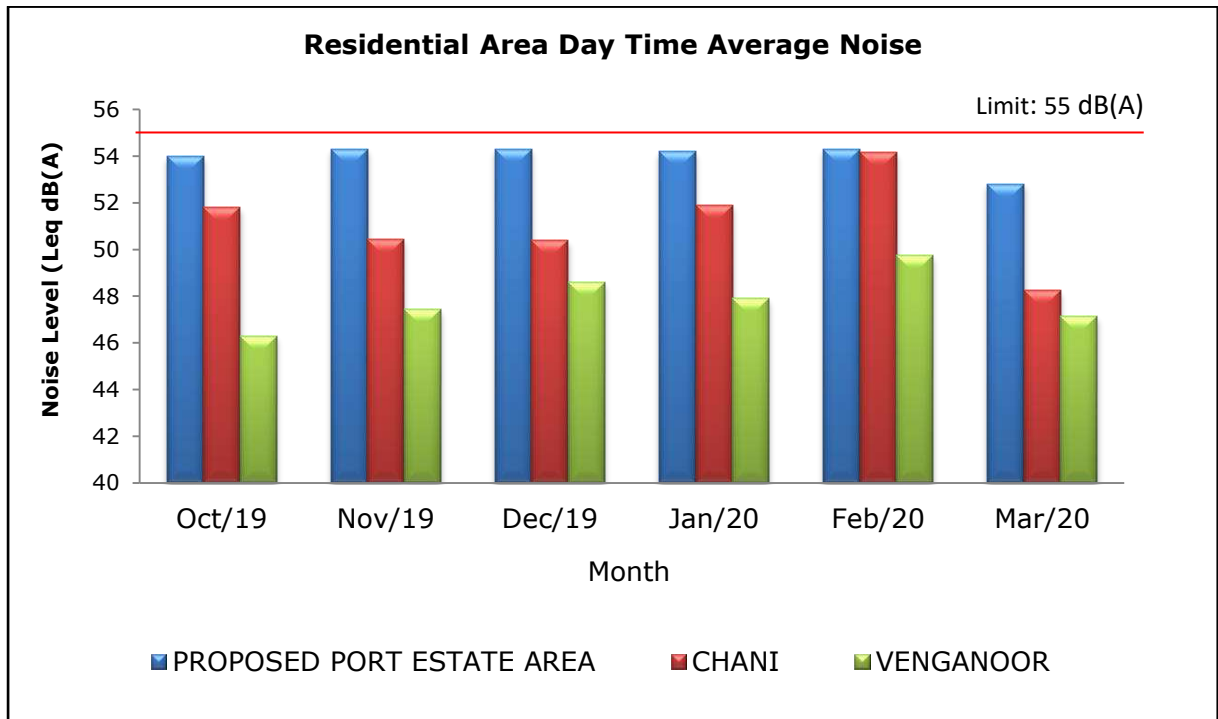


Figure 4.2: Residential Area Noise Level at day time

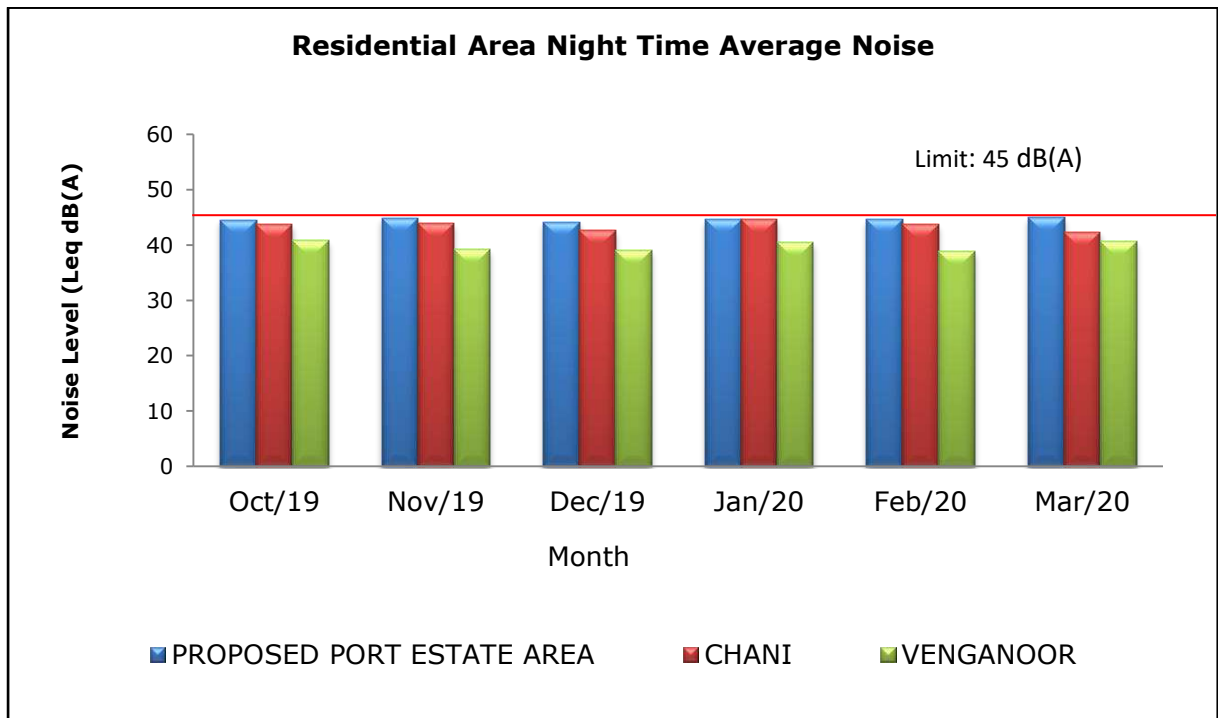


Figure 4.3: Residential Area Noise Level at night time

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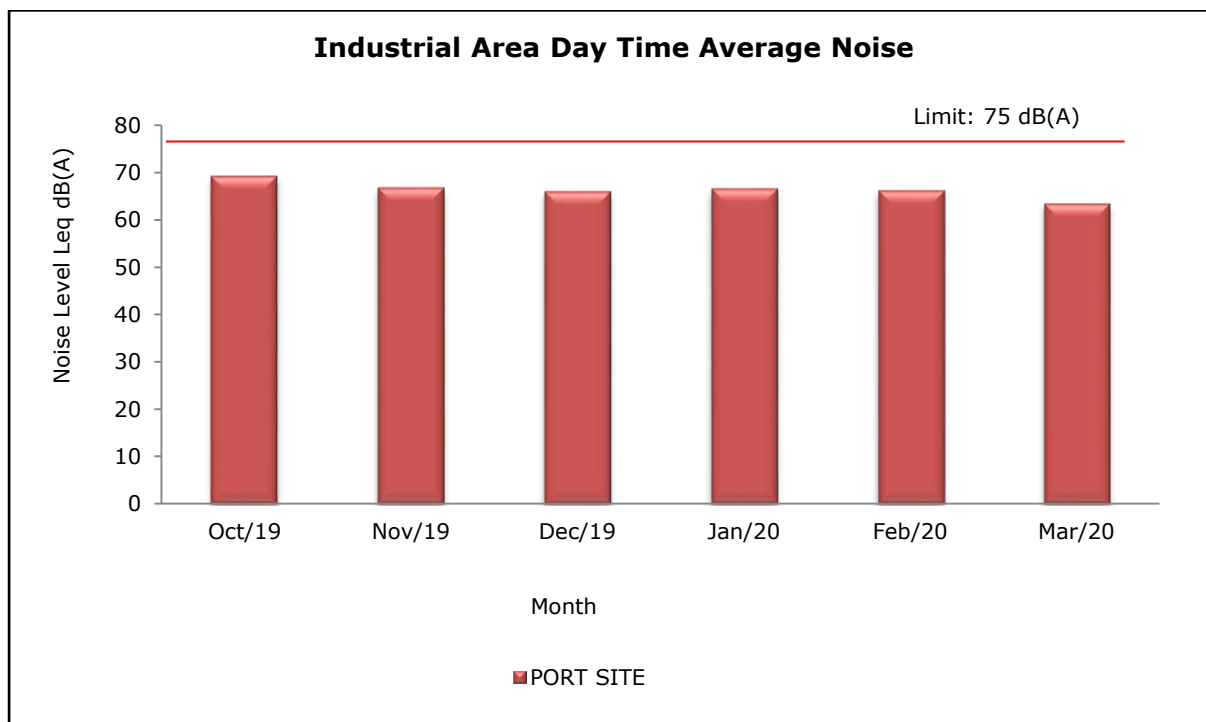


Figure 4.4: Industrial Area Noise Level at day time

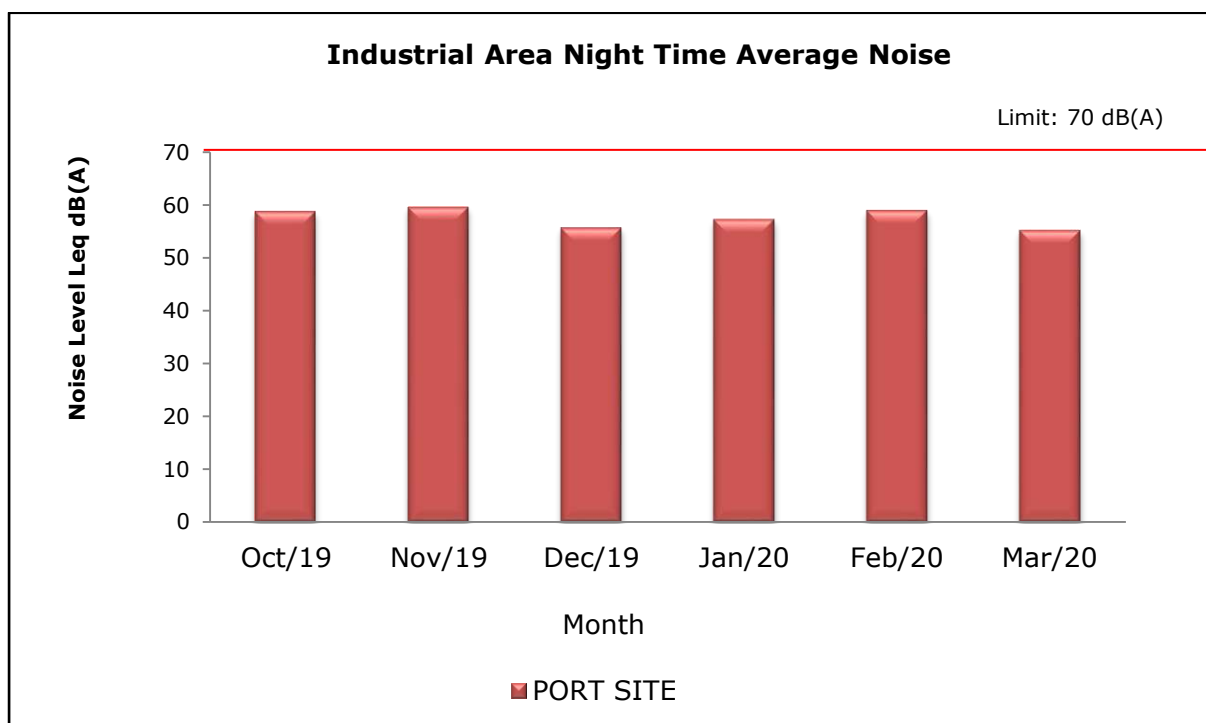


Figure 4.5: Industrial Area Noise Level at night time

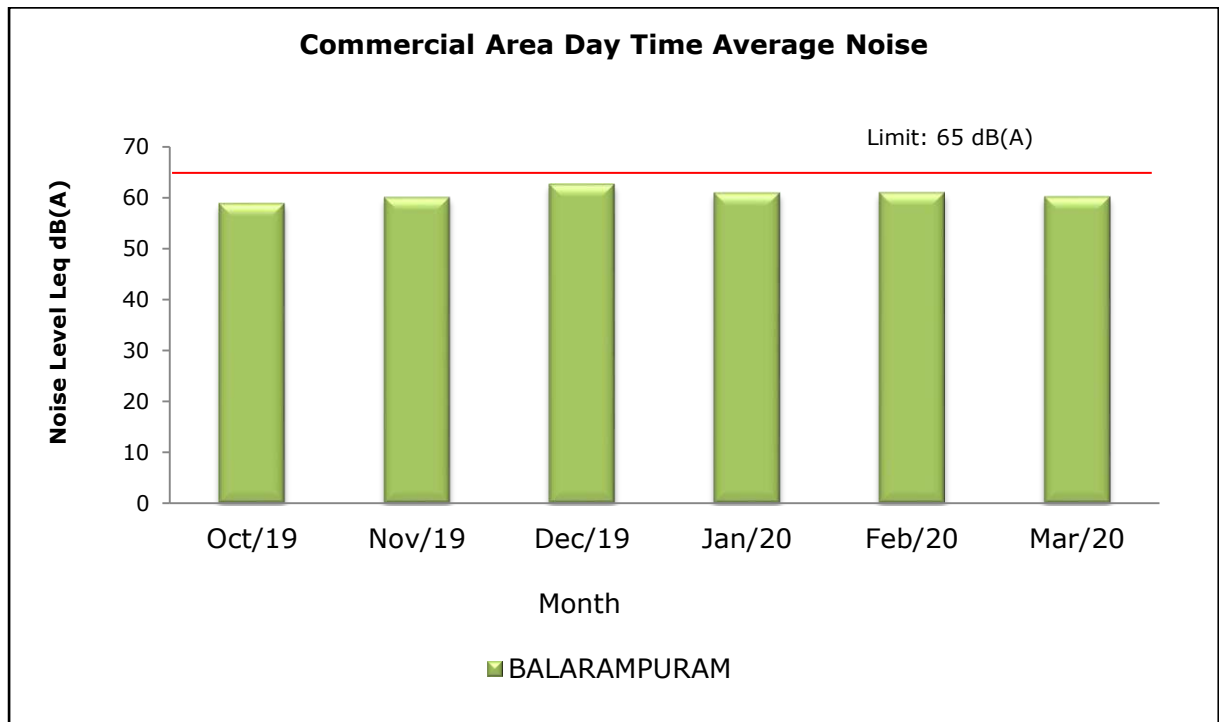


Figure 4.6: Commercial Area Noise Level at day time

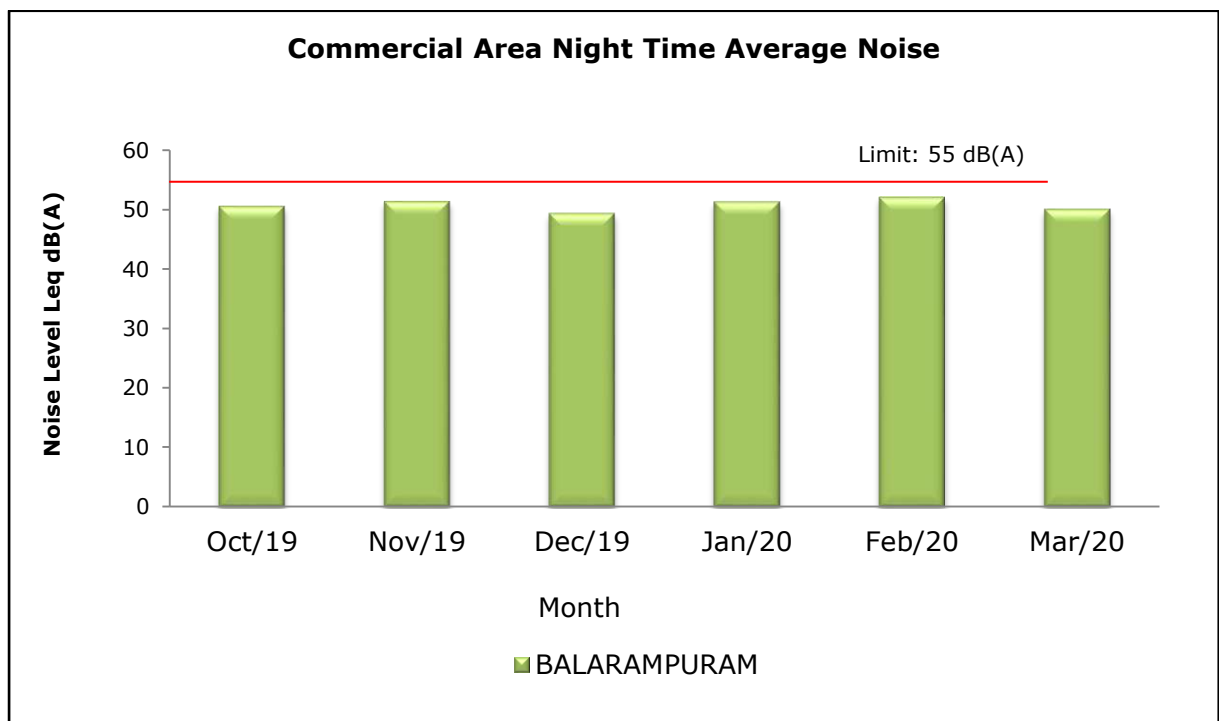



Figure 4.7: Commercial Area Noise Level at night time

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7. Summary - Ambient Noise Monitoring

During the period October 2019 to March 2020, average noise level observed at residential areas i.e. at Proposed Port Estate Area, Chani and Venganoor during day time were 54.0 dB(A), 51.2 dB(A) and 47.9 dB(A) respectively and during night time 44.7 dB(A), 43.5 dB(A) and 39.8 dB(A) respectively.

At industrial area i.e. at Port Site area average noise level observed at day time 66.3 dB(A) and at night time 57.6 dB(A).

At commercial area i.e. Balaramapuram area average noise level observed at day time 60.6 dB(A) and at night time 50.8 dB(A).

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CHAPTER 5

Marine water and Sediment Analysis

1. Marine Water and Sediment Sampling location details:

This chapter describes the sampling location, methodology adopted for analysis and the analysis of monitored data for Marine Water and Sediment. Sampling and analysis of marine water at high tide and low tide during October 2019 to March 2020 carried out at different locations such as; Near Kovalam Beach, Proposed Dredge Material Disposal Site, South of Break Water, Port Basin, Inner Approach Channel and Kovalam Beach. Classification of locations as per the Noise Pollution (Regulation & Control) Rules, 2000 (Rules 3 (1) and 4(1)) is as below:

Table 5.1: Marine Water and Sediment sampling locations details

Sr. No.	Location	Latitude	Longitude
1.	Near Kovalam Beach	8°22',28.20"N	76°58',48.70"E
2.	Proposed Dredge Material Disposal Site	8°21',54.40"N	76°59',27.90"E
3.	South of Break Water	8°22',03.20"N	76°59',46.50"E
4.	Port Basin	8°22',00.00"N	77°00',03.30"E
5.	Inner Approach Channel	8°21',05.90"N	77°00',40.70"E
6.	Kovalam Beach	8°23',03.61" N	76°58',37.62" E

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Figure 5.1: Google earth view of Marine Water and Sediment Sampling Locations


2. Methodology of Sampling and Analysis

Table 5.2: Sampling and Analysis Methodology

Sr. No.	Parameter	Unit	Detection Limit	Method Reference
Marine Water Analysis				
1.	Temperature	°C	0	IS 3025 (Part 9):1984
2.	pH Value	-	1	IS 3025 (Part 11):1983
3.	Turbidity	N.T.U.	0.1	IS 3025 (Part 10):1984
4.	Electrical Conductivity (at 25°C)	µmho/cm	0.1	IS 3025(Part 14): 1984
5.	Total Suspended Solids	mg/L	5	IS 3025 (Part 17): 1984
6.	Total Dissolved Solids	mg/L	5	IS 3025 (Part 16):1984
7.	Dissolved Oxygen	mg/L	0.05	IS 3025 (Part 38): 1989
8.	Biochemical Oxygen Demand (3 days, 27°C)	mg/L	1	IS 3025 (Part 44): 1993
9.	Floating Materials - Oil, Grease and Scum (Including Petroleum Products)	mg/L	0.005	APHA, 23 rd Ed., 2017,5520-B, 5-40 and Clause 6 of IS: 3025 (Part 39): 1991, Amds.2, Sept 2013
10.	Nitrite (as NO ₂)	mg/L	0.01	APHA, 23 rd Ed., 2017, 4500-NO ₂ -B,4-124
11.	Nitrate (as NO ₃)	mg/L	0.2	APHA, 23 rd Ed., 2017, 4500-NO ₃ B-4-127
12.	Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	0.001	APHA, 23 rd Ed., 2017, 5530- B & C, 5-49

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Sr. No.	Parameter	Unit	Detection Limit	Method Reference
13.	Ammonical Nitrogen (as NH ₃ -N)	mg/L	5	APHA, 23 rd Ed., 2017, 4500 NH ₃ , B & C, 4 -114, 4-116
14.	Total Nitrogen (as N)	mg/L	0.1	APHA, 23 rd Ed., 2017, 4500 NH ₃ , B & C, 4 -114, 4-116
15.	Total Phosphorous (as P)	mg/L	0.1	APHA, 23 rd Ed., 2017, 4500 P,E, 4-155
16.	Reactive Phosphorous	mg/L	0.1	APHA, 23 rd Ed., 2017, 4500 P,E, 4-155
17.	Polycyclic Aromatic Hydrocarbon	mg/L	0.00007	APHA, 23 rd Ed., 2017, 6440, 6-94
18.	Salinity	PPT	0.01	CPCB ADSORBS /8/1983-84
19.	Total Chlorophyll	mg/L	ND	APHA, 23 rd Ed.,2017, 10200 H
20.	Total Coliforms	MPN Index /100 ml	1.8	APHA, 23 rd Ed., 2017, 9221-B, 9-69
21.	Faecal Coliforms	MPN Index /100ml	1.8	APHA, 23 rd Ed., 2017, 9221-E, 9-77
22.	Phytoplankton	No./100ml	ND	APHA, 23 rd Ed., 2017
23.	Zooplanktons	No./100ml	ND	APHA, 23 rd Ed., 2017
Sediment Analysis				
1.	Texture	-	Qualitative	AEC/C/SAP/S-3
2.	Organic Matter	%	0.043	FAO 1976, Sec. III,3, Page no.73
3.	Total Phosphorus (as P)	mg/kg	5	WLII, B-10a,Page no. 16
4.	Aluminium (as Al)	mg/kg	1	USEPA / SW 846/ 6010 C
5.	Chromium (as Cr)	mg/kg	1	USEPA / SW 846/ 6010 C
6.	Copper (as Cu)	mg/kg	0.08	USEPA / SW 846/ 6010 C
7.	Iron (as Fe)	mg/kg	1	USEPA / SW 846/ 6010 C
8.	Lead (as Pb)	mg/kg	0.1	USEPA / SW 846/ 6010 C
9.	Manganese (as Mn)	mg/kg	0.5	USEPA / SW 846/ 6010 C
10.	Mercury (as Hg)	mg/kg	0.01	USEPA / SW 846/ 6010 C
11.	Zinc (as Zn)	mg/kg	0.5	USEPA / SW 846/ 6010 C
12.	Nickel (as Ni)	mg/kg	0.1	USEPA / SW 846/ 6010 C
13.	Benthic Organism	/m ²	ND	APHA, 23 rd Ed., 2017
Note: ND: Not Detected				

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3. Marine Water Standards

As per the Environment (Protection) Rules, 1986 Schedule I.

Table 5.3: Marine Water Standard


Parameter	Unit	# E(P)A Rules, 1986
pH Value	-	6.5-9.0
Dissolved Oxygen	mg/L	3.0 mg/L or 40% saturation value; whichever is higher
Colour and Odour	-	No visible colour or offensive odour
Floating Materials(Oil, Grease and Scum) (Including Petroleum Products)	mg/L	<i>Max.</i> 10
Faecal Coliforms	/100ml	<i>Max.</i> 500
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	<i>Max.</i> 5
#: Environment (Protection) Rules, 1986, Schedule I, Table 1.4, Primary Water Quality Criteria for Class - IV Water (For Harbour Waters).		

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4. Marine Water Analysis Result for the period October 2019 to March 2020

Table 5.4: Marine Water Analysis Results


Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
1	Temperature (°C)	Oct-19	High tide	28.1	28.1	28.3	28.1	27.9	28.6
			Low tide	28.5	28.4	28.4	28.3	27.6	28.9
		Nov-19	High tide	28.3	27.8	27.9	27.8	27.6	28.3
			Low tide	28.7	28.2	27.6	28.1	28.6	28.6
		Dec-19	High tide	27.6	27.8	27.8	27.6	27.7	27.6
			Low tide	28.3	28.3	27.2	29.2	28.2	27.3
		Jan-20	High tide	26.5	26.8	26.8	26.4	26.1	26.5
			Low tide	26.9	26.9	26.9	26.5	26.3	26.7
		Feb-20	High tide	27.1	26.8	27.1	27.2	26.8	27.2
			Low tide	27.2	26.9	27.0	27.1	26.7	27.1
		Mar-20	High tide	27.8	27.5	28.2	28.2	27.9	27.8
			Low tide	27.5	27.2	27.9	27.9	27.6	27.5
2	Colour and Odour	Oct-19	High tide & Low tide	No visible colour or offensive odour					
		Nov-19	High tide & Low tide						

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
		Dec-19	High tide & Low tide	No visible colour or offensive odour					
		Jan-20	High tide & Low tide						
		Feb-20	High tide & Low tide						
		Mar-20	High tide & Low tide						
3	pH Value	Oct-19	High tide	8.21	8.36	8.36	8.37	8.35	8.35
			Low tide	8.37	8.37	8.54	8.36	8.34	8.37
		Nov-19	High tide	8.26	8.39	8.28	7.66	7.42	7.96
			Low tide	8.20	8.37	8.37	8.16	8.26	8.99
		Dec-19	High tide	8.34	8.33	8.44	8.48	8.50	8.49
			Low tide	8.61	8.47	8.31	8.50	8.52	8.46
		Jan-20	High tide	8.43	8.41	8.48	8.55	8.50	8.55
			Low tide	8.61	8.29	8.38	8.17	8.56	8.43
		Feb-20	High tide	7.99	8.26	8.39	8.27	8.29	8.24
			Low tide	8.05	8.28	8.22	8.20	8.22	8.12
		Mar-20	High tide	8.40	8.35	8.38	8.30	8.35	8.36
			Low tide	8.32	8.42	8.36	8.25	8.36	8.45

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
4	Turbidity (N.T.U.)	Oct-19	High tide	0.7	0.8	1.1	0.7	1.0	1.1
			Low tide	0.8	0.9	1.2	0.9	1.2	1.2
		Nov-19	High tide	0.4	0.9	0.8	0.6	0.9	0.7
			Low tide	0.5	1.1	0.9	0.7	1.1	0.9
		Dec-19	High tide	0.5	0.7	1.1	0.5	1.1	0.9
			Low tide	0.4	0.8	1.0	0.8	1.2	0.7
		Jan-20	High tide	0.4	0.6	0.6	0.6	0.4	0.6
			Low tide	0.3	0.7	0.4	0.5	0.9	0.5
		Feb-20	High tide	0.6	0.4	0.4	0.5	0.8	0.5
			Low tide	0.5	0.5	0.7	0.7	0.6	0.8
5	Electrical Conductivity (at 25°C) (µmho/cm)	Oct-19	High tide	48741	46466	45204	48808	48150	48660
			Low tide	48145	45933	49420	49300	49393	49988
		Nov-19	High tide	57400	48300	50750	51850	47396	46700
			Low tide	48920	48366	51110	50930	49083	50350
		Dec-19	High tide	53535	50214	55368	52696	51589	54000
			Low tide	53780	51535	55107	54160	55339	56120
		Jan-20	High tide	44735	44088	44720	45178	44911	43970
			Low tide	44512	46897	47382	45176	44279	45897
		Feb-20	High tide	59986	54446	58017	54800	65012	58896
			Low tide	59803	58912	58910	55340	66946	58017

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
		Mar-20	High tide	33400	32200	32623	34000	36000	34200
			Low tide	32300	32352	34130	32000	32100	32200
6	Total Suspended Solids (mg/L)	Oct-19	High tide	7	8	7	8	8	10
			Low tide	6	9	10	10	9	11
		Nov-19	High tide	6	7	6	6	7	7
			Low tide	7	10	7	7	10	8
		Dec-19	High tide	7	8	9	8	9	6
			Low tide	6	8	8	9	11	7
		Jan-20	High tide	9	7	7	8	6	8
			Low tide	7	6	6	6	8	7
		Feb-20	High tide	8	6	6	7	6	7
			Low tide	6	6	6	6	6	6
7	Total Dissolved Solids (mg/L)	Oct-19	High tide	27110	27880	26222	29280	28890	29010
			Low tide	29850	27560	30210	30180	30190	29980
		Nov-19	High tide	34440	28980	30450	31110	27490	28020
			Low tide	29670	29020	30990	30780	29450	30210
		Dec-19	High tide	29980	28120	31010	29510	28890	30240
			Low tide	30120	28860	30860	30330	30990	31680
		Jan-20	High tide	30420	29980	30410	30720	30540	29900
			Low tide	30260	31890	32220	30620	30110	31210

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
		Feb-20	High tide	33590	30490	46410	35990	32480	32980
			Low tide	33490	32990	46990	30990	37490	32490
		Mar-20	High tide	22400	21890	22190	23120	23000	23260
			Low tide	22100	22000	23890	21760	21830	21900
8	Dissolved Oxygen (mg/L)	Oct-19	High tide	5.7	5.6	5.1	5.2	5.2	5.8
			Low tide	5.5	5.7	5.3	5.1	5.3	5.5
		Nov-19	High tide	5.1	5.3	4.9	5.1	4.9	5.2
			Low tide	4.9	5.1	4.8	4.9	4.7	5.1
		Dec-19	High tide	5.0	5.2	4.8	5.0	4.8	5.1
			Low tide	4.9	5.1	4.7	4.9	4.6	5.0
		Jan-20	High tide	4.9	5.1	4.9	4.9	4.8	5.0
			Low tide	5.1	5.0	5.5	5.0	4.9	4.9
		Feb-20	High tide	4.7	4.9	4.8	4.7	4.7	4.9
			Low tide	4.9	4.7	5.0	4.5	4.6	4.6
		Mar-20	High tide	4.5	4.6	4.6	4.6	4.4	4.7
			Low tide	4.8	4.6	4.8	4.7	4.2	4.5
9	Biochemical Oxygen Demand (3 days, 27°C) (mg/L)	Oct-19	High tide	4.1	3.5	4.8	4.8	4.7	4.5
			Low tide	4.2	3.7	4.9	4.9	4.1	4.7
		Nov-19	High tide	4.5	3.8	5.2	4.9	5.0	4.8
			Low tide	4.4	3.9	5.3	5.1	5.2	4.9

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
		Dec-19	High tide	4.4	4.1	5.3	5.2	5.2	5.2
			Low tide	4.7	4.2	5.4	5.3	5.3	5.1
		Jan-20	High tide	5.2	5.0	5.2	5.4	5.7	5.3
			Low tide	6.0	5.2	5.1	5.5	5.8	5.4
		Feb-20	High tide	5.6	5.3	5.0	5.1	5.6	5.4
			Low tide	5.2	5.5	4.0	5.2	5.7	5.6
		Mar-20	High tide	5.4	5.5	5.1	5.4	5.8	5.5
			Low tide	5.4	5.8	5.3	5.4	5.8	5.8
		Oct-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
10	Floating Materials (Oil, Grease and Scum) (Including Petroleum Products) (mg/L)	Nov-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Dec-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Jan-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Feb-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Mar-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
11	Nitrite (as NO ₂) (mg/L)	Oct-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Nov-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Dec-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Jan-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Feb-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
12	Nitrate (as NO ₃) (mg/L)	Oct-19	High tide	2.00	2.30	1.98	1.72	2.15	1.96
			Low tide	1.70	2.76	1.70	1.81	1.83	2.21
		Nov-19	High tide	1.60	2.18	1.79	1.62	1.86	2.15
			Low tide	1.65	2.10	1.63	1.69	1.63	1.96
		Dec-19	High tide	1.67	1.89	1.83	1.69	1.26	1.50
			Low tide	1.48	1.74	1.55	1.35	1.40	2.21
		Jan-20	High tide	1.89	1.79	1.84	2.25	1.48	1.50
			Low tide	1.81	1.93	2.37	1.93	1.64	1.88
		Feb-20	High tide	1.60	1.64	1.7	1.52	1.62	1.70
			Low tide	1.52	1.62	1.6	1.57	1.52	1.55

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
		Mar-20	High tide	1.40	1.65	1.86	2.36	1.50	2.15
			Low tide	1.21	1.53	1.74	1.72	1.67	1.82
13	Phenolic Compounds (as C ₆ H ₅ OH) (mg/L)	Oct-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Nov-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Dec-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Jan-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Feb-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
14	Ammonical Nitrogen (as NH ₃ -N) (mg/L)	Oct-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Nov-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Dec-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Jan-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
		Feb-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Mar-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
15	Total Nitrogen (as N) (mg/L)	Oct-19	High tide	0.66	0.84	0.76	0.71	0.69	0.65
			Low tide	0.59	0.93	0.81	0.85	0.63	0.93
		Nov-19	High tide	0.69	0.70	0.72	0.80	0.96	1.03
			Low tide	0.81	0.90	0.68	0.70	0.81	0.65
		Dec-19	High tide	0.82	0.98	0.74	0.81	0.62	0.89
			Low tide	0.88	0.83	0.9	0.75	0.97	0.92
		Jan-20	High tide	1.08	1.06	0.96	1.05	0.77	1.12
			Low tide	0.95	0.98	0.95	1.09	0.92	0.97
		Feb-20	High tide	1.13	1.03	1.30	1.33	1.13	1.26
			Low tide	1.22	1.35	1.25	1.25	1.10	1.74
		Mar-20	High tide	1.07	1.03	1.08	1.30	1.04	1.03
			Low tide	0.9	0.79	1.05	1.04	1.03	0.96
16	Total Phosphorous (as P) (mg/L)	Oct-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Nov-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Dec-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
		Jan-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Feb-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Mar-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
17	Reactive Phosphorous (mg/L)	Oct-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Nov-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Dec-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Jan-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Feb-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Mar-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
18	Polycyclic Aromatic Hydrocarbon (mg/L)	Oct-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Nov-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
		Dec-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Jan-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Feb-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
		Mar-20	High tide	BDL	BDL	BDL	BDL	BDL	BDL
			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
19	Salinity (ppt)	Oct-19	High tide	33.4	33.4	33.0	33.8	33.8	32.9
			Low tide	34.3	33.0	33.4	34.3	33.8	33.8
		Nov-19	High tide	34.3	33.4	33.4	33.8	33.0	33.0
			Low tide	33.0	33.0	33.8	33.8	33.4	34.3
		Dec-19	High tide	33.0	33.4	33.4	33.8	33.8	34.3
			Low tide	33.0	33.8	33.0	33.8	33.8	33.4
		Jan-20	High tide	33.4	33.8	33.8	34.7	34.7	33.8
			Low tide	34.3	34.7	34.7	33.8	33.4	34.3
		Feb-20	High tide	33.8	34.7	34.3	34.7	35.0	35.0
			Low tide	33.8	34.3	34.3	33.8	34.7	34.7
		Mar-20	High tide	34.5	34.7	34.7	34.3	34.2	34.2
			Low tide	33.8	32.0	36.0	34.7	35.0	33.3
20	Total Chlorophyll (mg/m ³)	Oct-19	High tide	1.0	1.1	1.1	0.9	1.0	1.0
			Low tide	0.8	1.2	0.8	0.7	0.9	0.8

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
		Nov-19	High tide	1.1	1.2	0.9	1.1	1.1	1.1
			Low tide	1.0	1.1	1.0	0.9	1.0	0.9
		Dec-19	High tide	1.2	1.1	1.0	0.8	1.2	1.0
			Low tide	0.9	1.0	0.9	1.0	1.1	1.1
		Jan-20	High tide	1.4	1.3	1.2	1.0	1.1	0.8
			Low tide	1.2	1.0	1.2	0.8	1.0	1.0
		Feb-20	High tide	1.0	1.1	0.9	0.8	0.9	1.0
			Low tide	0.9	0.8	0.7	0.7	0.7	0.8
		Mar-20	High tide	1.1	1.0	1.1	0.9	0.8	1.1
			Low tide	1.0	0.9	0.9	0.8	0.9	0.9
21	Total Coliforms (MPN Index/100 mL)	Oct-19	High tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
			Low tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
		Nov-19	High tide	<1.8	<1.8	<1.8	47	39	<1.8
			Low tide	<1.8	<1.8	<1.8	34	39	<1.8
		Dec-19	High tide	<1.8	<1.8	<1.8	49	34	<1.8
			Low tide	<1.8	<1.8	<1.8	22	22	<1.8
		Jan-20	High tide	<1.8	<1.8	<1.8	17	<1.8	<1.8
			Low tide	<1.8	<1.8	<1.8	7.8	<1.8	<1.8
		Feb-20	High tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
			Low tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
		Mar-20	High tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
			Low tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

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Sr. No.	Parameter	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
22	Faecal Coliforms (MPN Index/100 mL)	Oct-19	High tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
			Low tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
		Nov-19	High tide	<1.8	<1.8	<1.8	14	14	<1.8
			Low tide	<1.8	<1.8	<1.8	17	11	<1.8
		Dec-19	High tide	<1.8	<1.8	<1.8	14	14	<1.8
			Low tide	<1.8	<1.8	<1.8	7.8	14	<1.8
		Jan-20	High tide	<1.8	<1.8	<1.8	14	<1.8	<1.8
			Low tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
		Feb-20	High tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
			Low tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
		Mar-20	High tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
			Low tide	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

5. Graphical representation of Results for the period October 2019 to March 2020

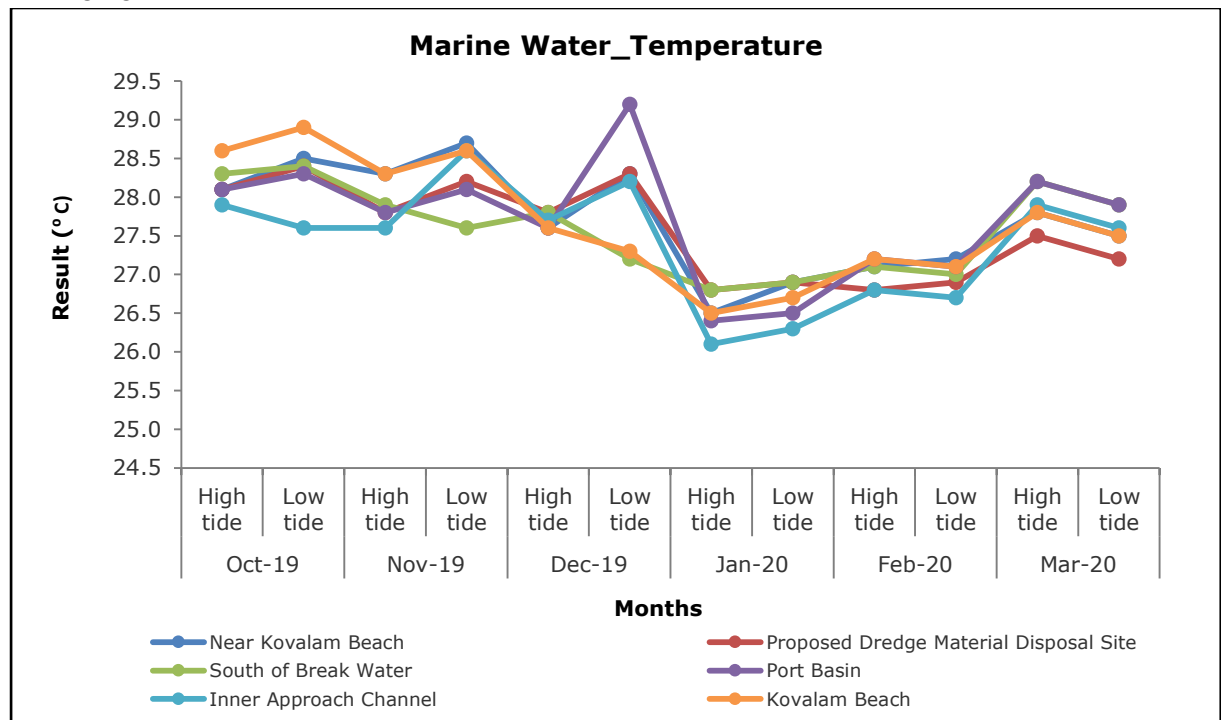


Figure 5.2: Marine Water Analysis for Temperature

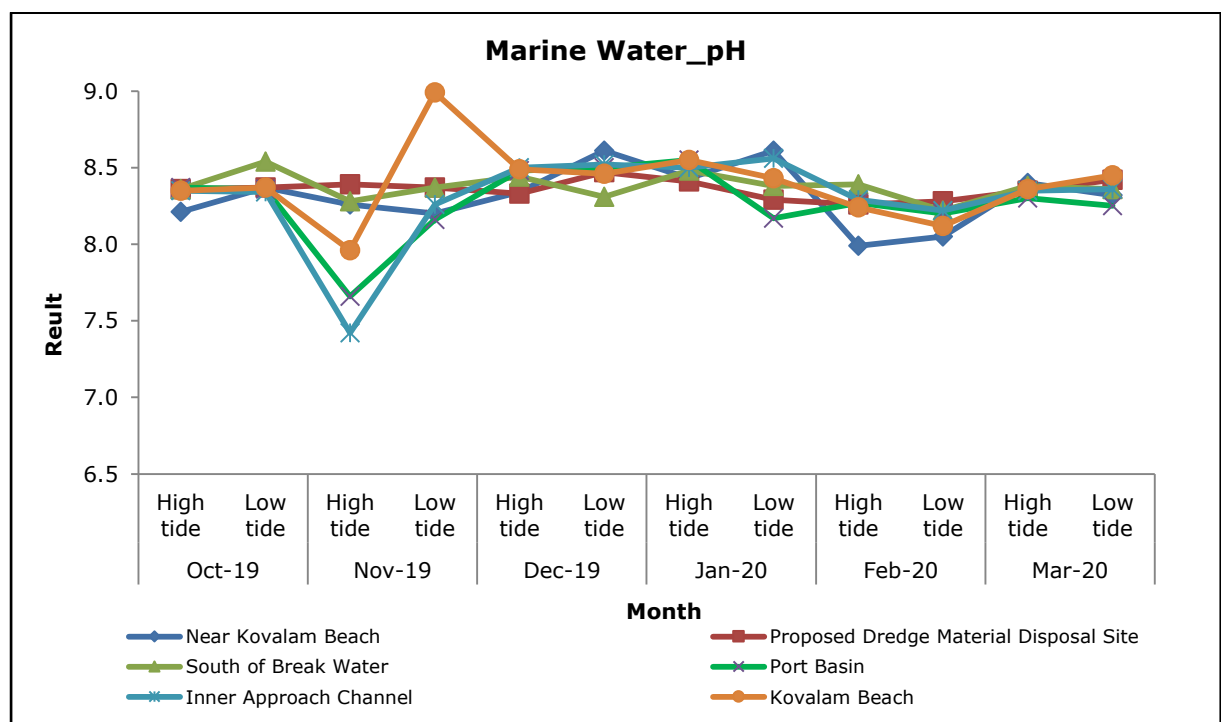


Figure 5.3: Marine Water Analysis for pH

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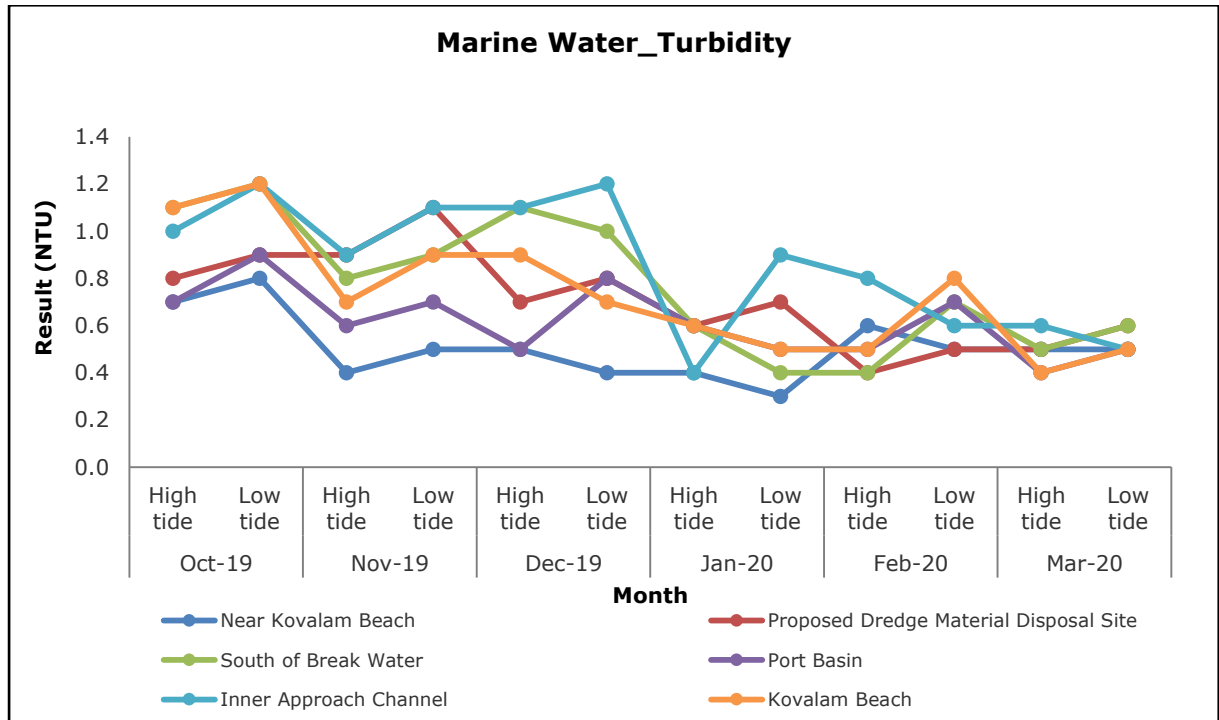


Figure 5.4: Marine Water Analysis for Turbidity

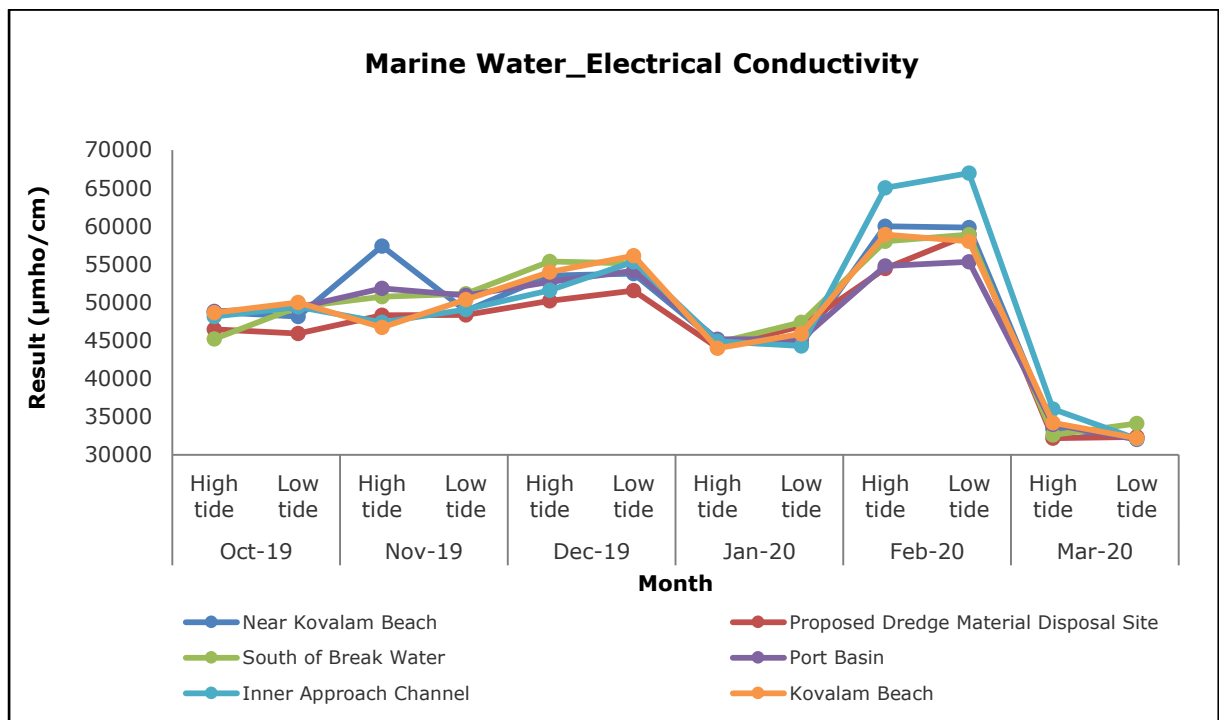


Figure 5.5: Marine Water Analysis for Electrical Conductivity

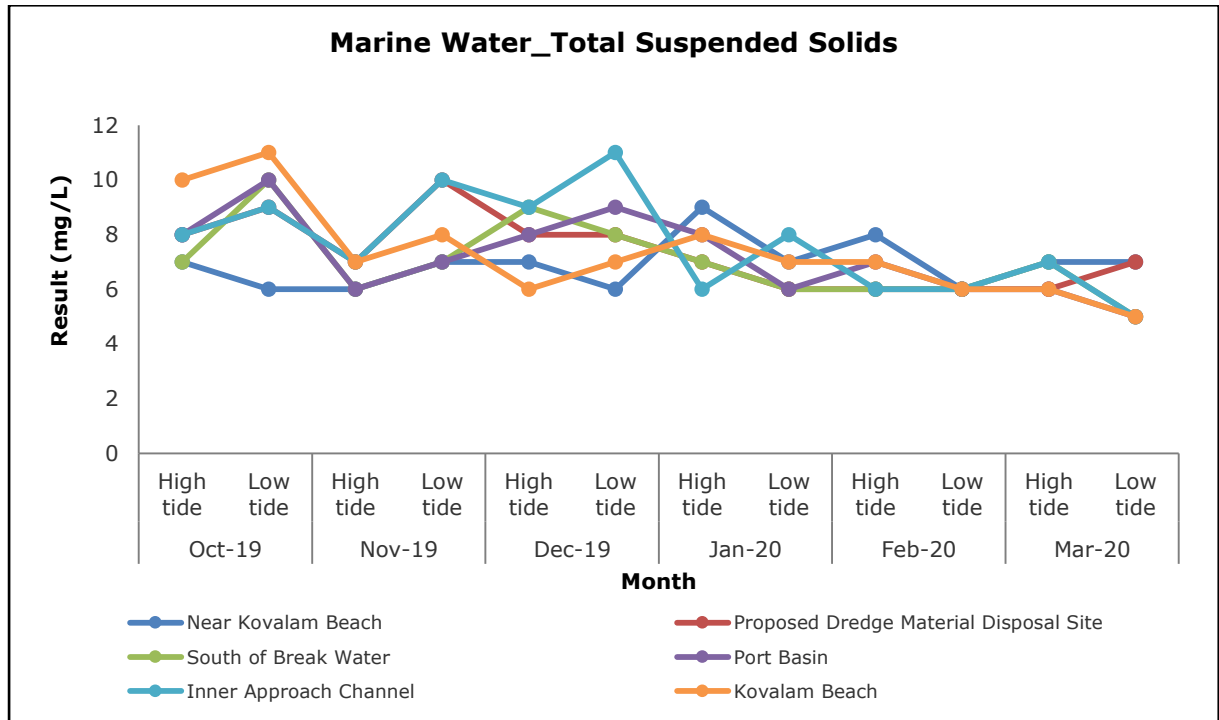


Figure 5.6: Marine Water Analysis for Total Suspended Solids

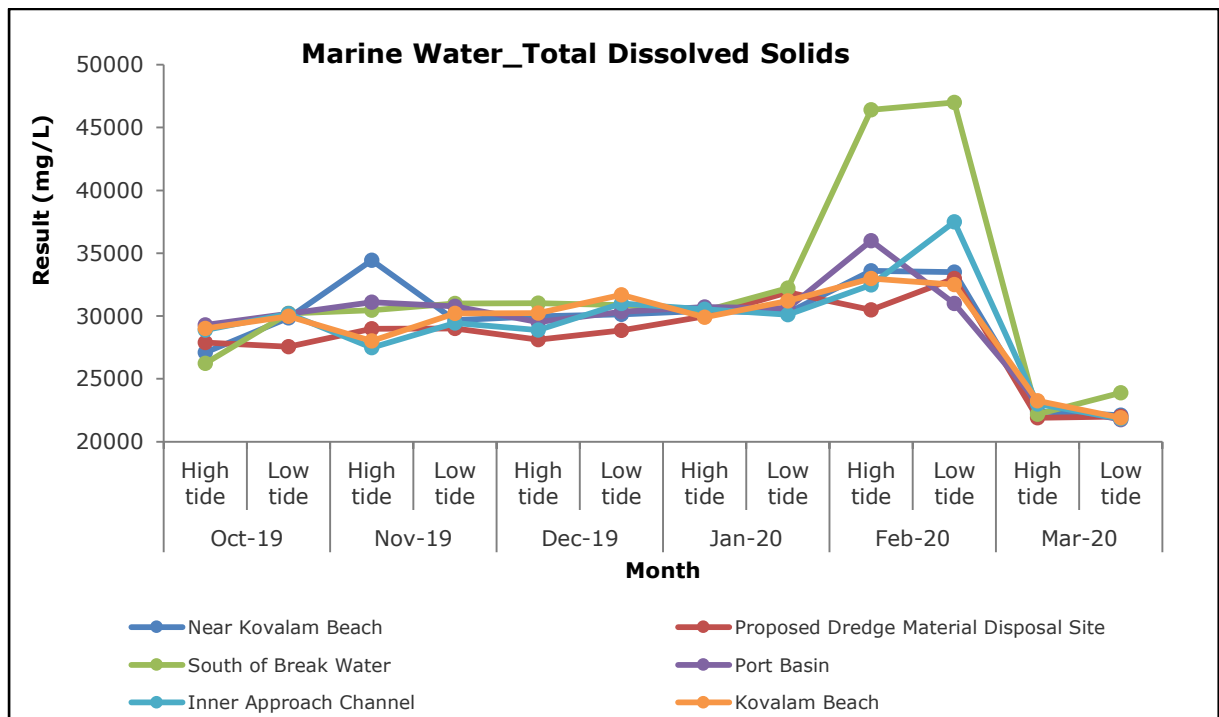


Figure 5.7: Marine Water Analysis for Total Dissolved Solids

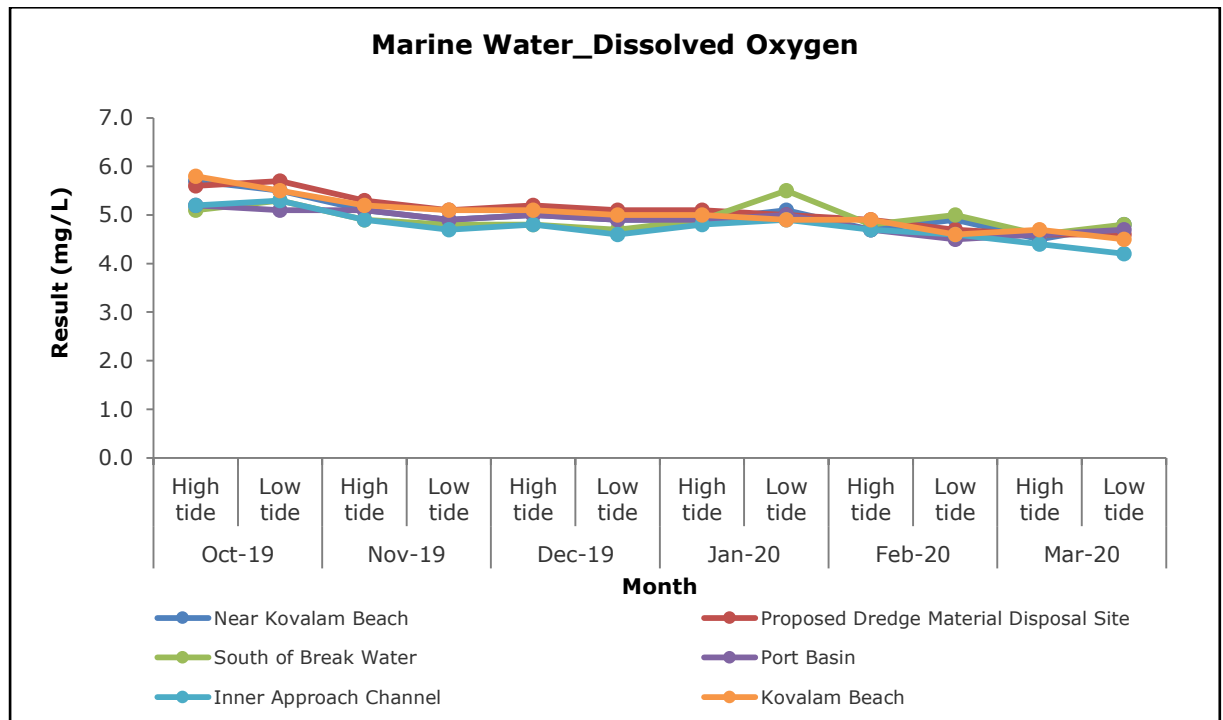


Figure 5.8: Marine Water Analysis for Dissolved Oxygen

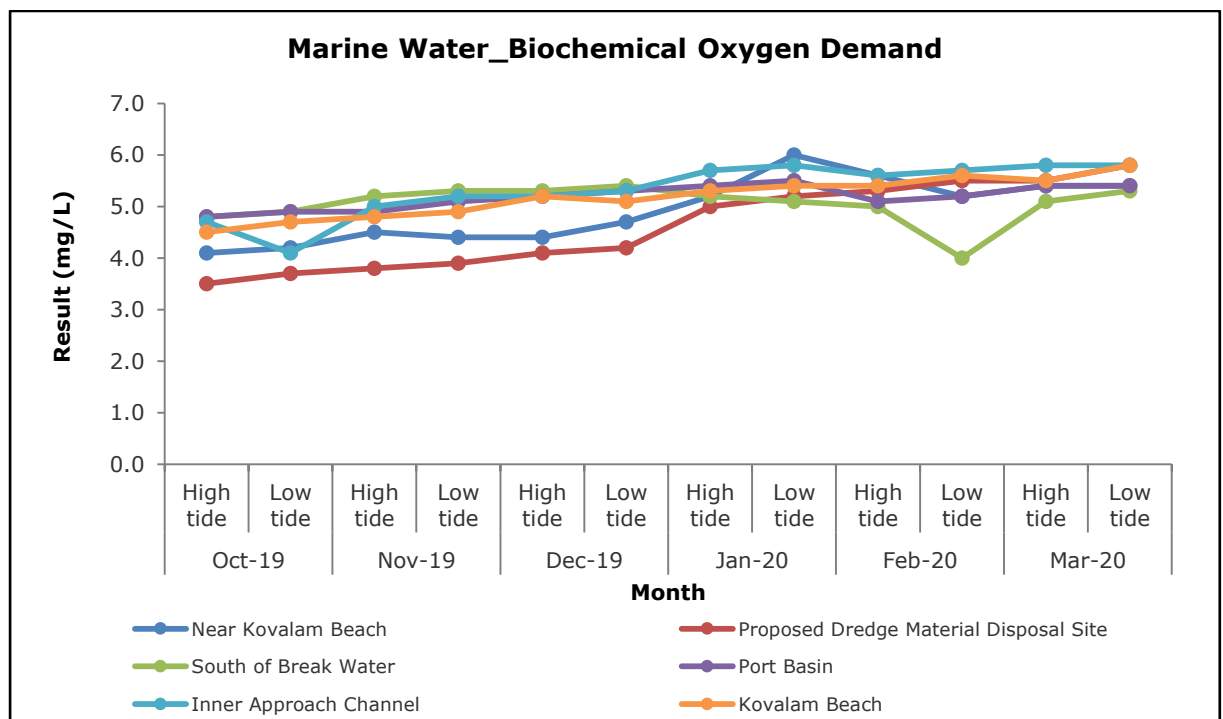


Figure 5.9: Marine Water Analysis for Biochemical Oxygen Demand

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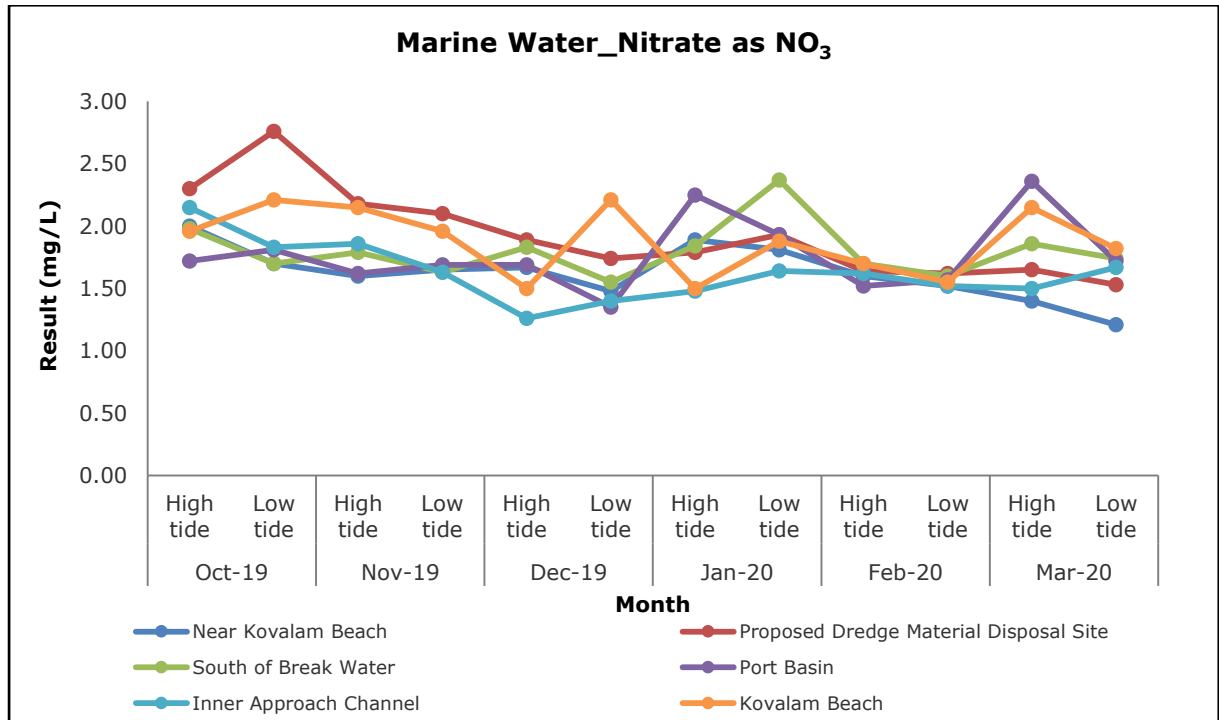


Figure 5.10: Marine Water Analysis for Nitrate as NO₃

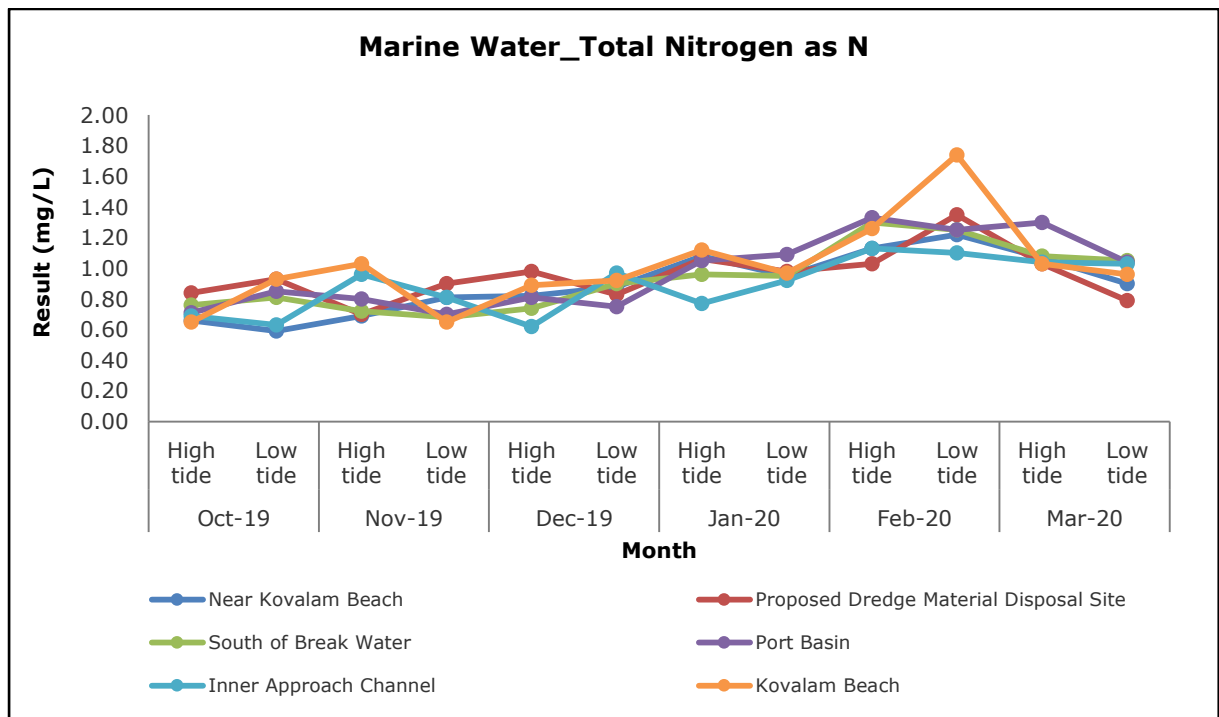


Figure 5.11: Marine Water Analysis for Total Nitrogen as N

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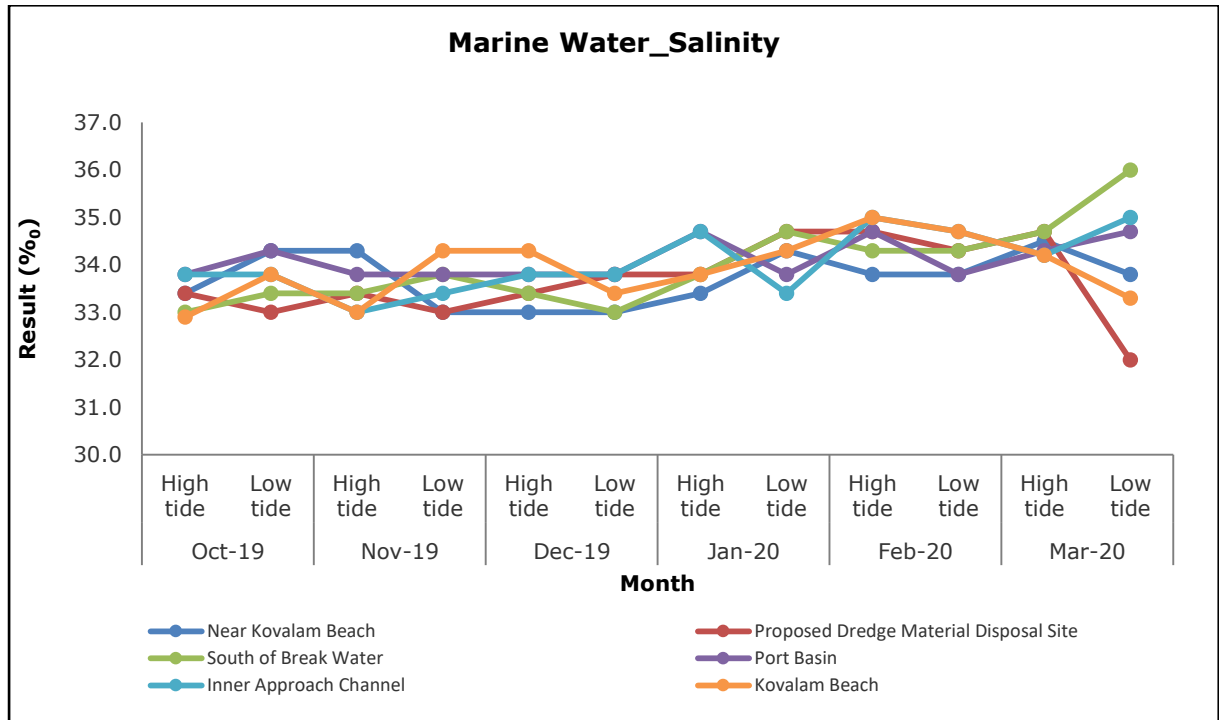


Figure 5.12: Marine Water Analysis for Salinity

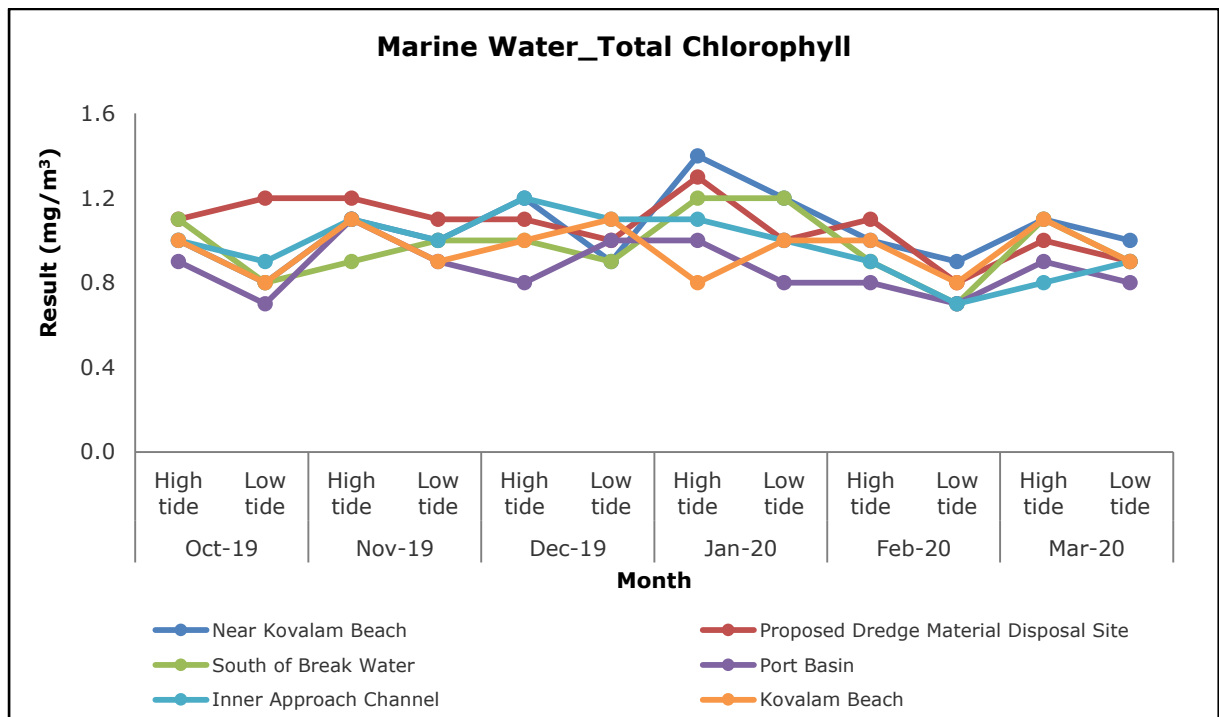


Figure 5.13: Marine Water Analysis for Total Chlorophyll

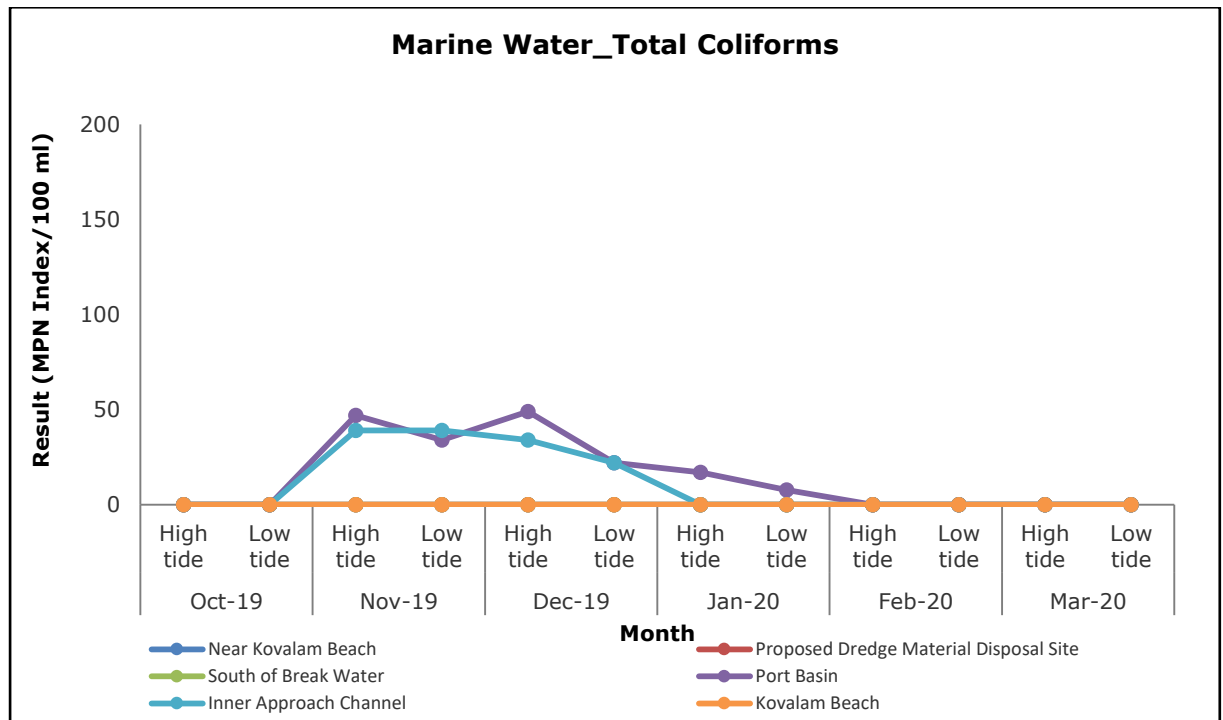


Figure 5.14: Marine Water Analysis for Total Coliforms

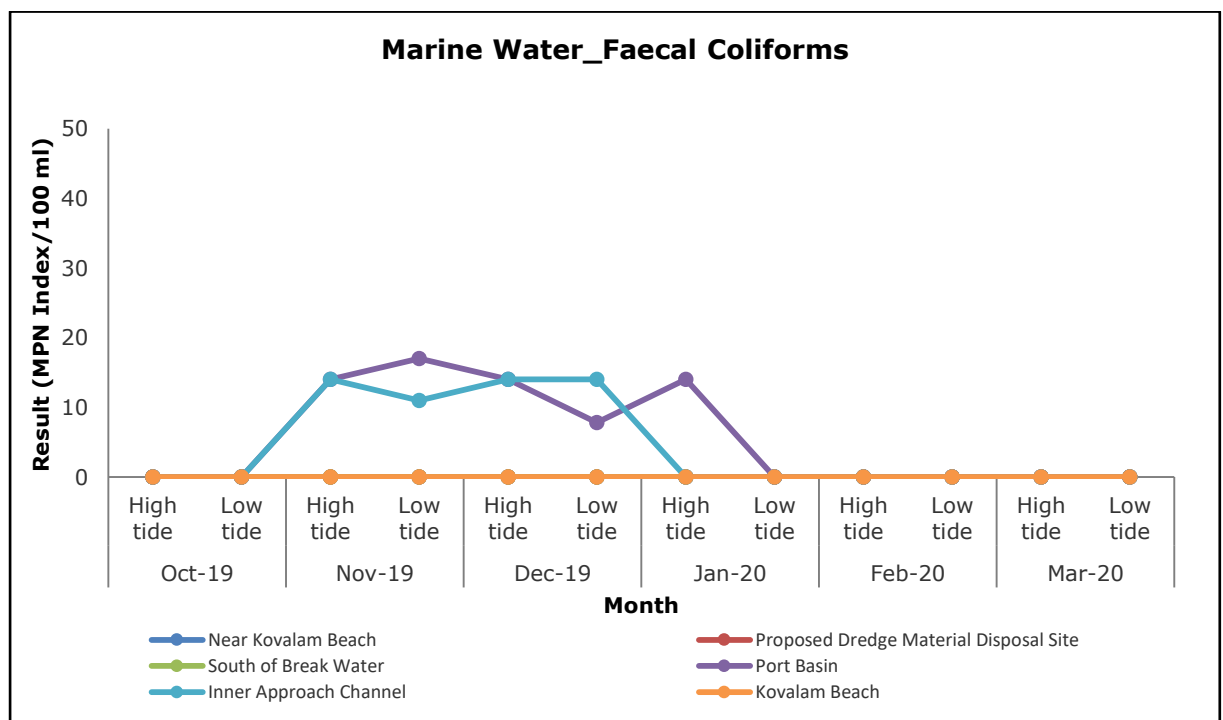




Figure 5.15: Marine Water Analysis for Faecal Coliforms

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6. Summary - Marine water analysis:

During the period October 2019 to March 2020, at the location **Near Kovalam Beach**, the low tide and high tide Temperature was observed in the range between 26.5-28.7°C, No visible colour or offensive odour was observed, concentration of p^H were observed in the range between 7.99-8.61, Turbidity was observed in the range between 0.30-0.80 N.T.U, Electrical Conductivity (at 25°C) was observed in the range between 32300-59986 $\mu\text{mho/cm}$, Total Suspended Solid was observed in the range between 6 - 9 mg/L, Total Dissolved Solids was observed in the range between 22100 - 34440 mg/L, Dissolved Oxygen was observed in the range between 4.5 - 5.7 mg/L, Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 4.1 - 6.0 mg/L, Nitrite (as NO_2) was observed in the range between BDL - 0.02 mg/L, Nitrate (as NO_3) was observed in the range between 1.21 - 2.00 mg/L, Ammonical Nitrogen (as $\text{NH}_3\text{-N}$) was observed BDL, Total Nitrogen (as N) was observed in the range between 0.59 - 1.22 mg/L. Floating materials, Phenolic Compounds (as $\text{C}_6\text{H}_5\text{OH}$), Total Phosphorous (as P), Reactive Phosphorous and Polycyclic Aromatic Hydrocarbon were observed below the detection limits. Salinity was observed in the range between 33.0 - 34.5 PPT, Total Chlorophyll was observed in the range between 0.80 - 1.40 mg/m^3 , Total Coliforms and Faecal Coliforms were observed <1.8 MPN Index/100 mL.


At the location **Proposed Dredge Material Disposal Site**, the low tide and high tide Temperature was observed in the range between 26.8-28.4 °C, No visible colour or offensive odour was observed, concentration of p^H were observed in the range between 8.26-8.47, Turbidity was observed in the range between 0.40 -1.10 N.T.U, Electrical Conductivity (at 25°C) was observed in the range between 32200-58912 $\mu\text{mho/cm}$, Total Suspended Solids was observed in the range between 6 - 10 mg/L, Total Dissolved Solids was observed in the range between 21890 - 32990 mg/L, Dissolved Oxygen was observed in the range between 4.6 - 5.7 mg/L, Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 3.5 - 5.8 mg/L, Nitrite (as NO_2) was observed BDL, Nitrate (as NO_3) was observed in the range between 1.53 - 2.76 mg/L, Ammonical Nitrogen (as $\text{NH}_3\text{-N}$) was observed BDL, Total Nitrogen (as N) was observed in the range between 0.70 - 1.35 mg/L. Floating materials, Phenolic Compounds (as $\text{C}_6\text{H}_5\text{OH}$), Total Phosphorous (as P), Reactive Phosphorous and Polycyclic Aromatic Hydrocarbon were observed below the

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detection limits. Salinity was observed in the range between 32.0 - 34.7 PPT, Total Chlorophyll was observed in the range between 0.80 - 1.30 mg/m³, Total Coliforms and Faecal Coliforms were observed <1.8 MPN Index/100 mL.

At the location **South of Break Water**, the low tide and high tide Temperature was observed in the range between 26.8-28.4 °C, No visible colour or offensive odour was observed, concentration of p^H were observed in the range between 8.54-8.22, Turbidity was observed in the range between 0.40-1.20 N.T.U, Electrical Conductivity (at 25°C) was observed in the range between 32623-58910 µmho/cm, Total Suspended Solids was observed in the range between 5 - 10mg/L, Total Dissolved Solids was observed in the range between 22190 - 46990 mg/L, Dissolved Oxygen was observed in the range between 4.6 - 5.5 mg/L, Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 4.0 - 5.4 mg/L, Nitrite (as NO₂) was observed BDL, Nitrate (as NO₃) was observed in the range between 1.55 - 2.37 mg/L, Ammonical Nitrogen (as NH₃-N) was observed BDL, Total Nitrogen (as N) was observed in the range between 0.68 - 1.30 mg/L, Floating materials, Phenolic Compounds (as C₆H₅OH), Total Phosphorous (as P), Reactive Phosphorous and Polycyclic Aromatic Hydrocarbon were observed below the detection limits. Salinity was observed in the range between 33.0 - 36.0 PPT, Total Chlorophyll was observed in the range between 0.70 - 1.20 mg/m³, Total Coliforms and Faecal Coliforms were observed <1.8 MPN Index/100 mL.


At the location **Port Basin**, the low tide and high tide Temperature was observed in the range between 26.4-29.2°C, No visible colour or offensive odour were observed, concentration of p^H were observed in the range between 8.55-7.66, Turbidity was observed in the range between 0.40-0.90 N.T.U, Electrical Conductivity (at 25°C) was observed in the range between 32000 -55340 µmho/cm, Total Suspended Solids was observed in the range between 5 - 10 mg/L, Total Dissolved Solids was observed in the range between 21760 - 35990 mg/L, Dissolved Oxygen was observed in the range between 4.5 - 5.2 mg/L, Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 4.8 - 5.5 mg/L, Nitrite (as NO₂) was observed BDL, Nitrate (as NO₃) was observed in the range between 1.35 - 2.36 mg/L, Total Nitrogen (as N) was observed in the range between 0.70 - 1.33 mg/L, Floating materials, Phenolic

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Compounds (as C₆H₅OH), Ammonical Nitrogen (as NH₃-N), Total Phosphorous (as P), Reactive Phosphorous and Polycyclic Aromatic Hydrocarbon were observed below the detection limits. Salinity was observed in the range between 33.8 - 34.7 PPT, Total Chlorophyll was observed in the range between 0.70 - 1.10 mg/m³, Total Coliforms were observed in the range between <1.8 - 49 MPN Index/100 mL and Faecal Coliforms were observed in the range between <1.8 - 17 MPN Index/100 mL.

At the location **Inner Approach Channel**, the low tide and high tide Temperature was observed in the range between 26.1-28.6°C, No visible colour or offensive odour was observed, concentration of pH were observed in the range between 7.42-8.56, Turbidity was observed in the range between 0.40-1.20 N.T.U, Electrical Conductivity (at 25°C) was observed in the range between 32100-66946 µmho/cm, Total Suspended Solids was observed in the range between 5 - 11 mg/L, Total Dissolved Solids was observed in the range between 21830 - 37490 mg/L, Dissolved Oxygen was observed in the range between 4.2 - 5.3 mg/L, Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 4.1 - 5.8 mg/L, Nitrite (as NO₂) was observed BDL, Nitrate (as NO₃) was observed in the range between 1.26 - 2.15 mg/L, Ammonical Nitrogen (as NH₃-N) was observed BDL, Total Nitrogen (as N) was observed in the range between 0.62 - 1.13 mg/L. Floating materials, Phenolic Compounds (as C₆H₅OH), Total Phosphorous (as P), Reactive Phosphorous and Polycyclic Aromatic Hydrocarbon were observed below the detection limits. Salinity was observed in the range between 33.0 - 35.0 PPT, Total Chlorophyll was observed in the range between 0.7 - 1.20 mg/m³, Total Coliforms were observed in the range between <1.8 - 39 MPN Index/100 mL and Faecal Coliforms were observed in the range between <1.8 - 14 MPN Index/100 mL.

At the location **Kovalam Beach**, the low tide and high tide Temperature was observed in the range between 26.5 - 28.9 °C, No visible colour or offensive odour was observed, concentration of pH were observed in the range between 7.96-8.99, Turbidity was observed in the range between 0.40-1.20 N.T.U, Electrical Conductivity (at 25°C) was observed in the range between 32200 - 58896 µmho/cm, Total Suspended Solids was observed in the range between 6 - 11 mg/L, Total Dissolved Solids was observed in the range between 21900 - 32980 mg/L, Dissolved Oxygen

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was observed in the range between 4.5 - 5.8 mg/L, Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 4.5 - 5.8 mg/L, Nitrite (as NO₂) was observed BDL, Nitrate (as NO₃) was observed in the range between 1.50 - 2.21 mg/L, Ammonical Nitrogen (as NH₃-N) was observed BDL, Total Nitrogen (as N) was observed in the range between 0.65 - 1.74 mg/L, Floating materials, Phenolic Compounds (as C₆H₅OH), Total Phosphorous (as P), Reactive Phosphorous, Polycyclic Aromatic Hydrocarbon were observed below the detection limits. Salinity was observed in the range between 32.9 - 35.00 PPT, Total Chlorophyll was observed in the range between 0.80 - 1.10 mg/m³, Total Coliforms and Faecal Coliforms were observed <1.8 MPN Index/100 mL.

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7. Sediment Analysis Result

Table 5.5: Near Kovalam Beach

Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	3.65	2.84	1.17	3.93	2.53	2.46
Total Phosphorus (as P)	mg/kg	13.5	18.6	12.0	16.5	14.7	13.5
Aluminium (as Al)	mg/kg	769	768	768	1192	818	1142
Chromium (as Cr)	mg/kg	BDL	BDL	BDL	BDL	BDL	13.8
Copper (as Cu)	mg/kg	BDL	BDL	BDL	BDL	BDL	3.56
Iron (as Fe)	mg/kg	3390	3521	3516	3850	4580	7078
Lead (as Pb)	mg/kg	9.25	5.00	2.19	9.07	8.24	7.13
Manganese (as Mn)	mg/kg	7.96	10.4	10.8	12.6	12.6	15.0
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL
Zinc (as Zn)	mg/kg	4.73	4.73	5.24	8.78	8.78	11.2
Nickel (as Ni)	mg/kg	5.80	BDL	BDL	4.21	4.21	4.75
Benthic Organism							
Micro Benthic Organism	/m ²	95600	96000	92400	94580	92630	91000
Macro Benthic Organism	/m ²	90000	91000	87600	86832	83520	82000
Total	/m²	185600	187000	180000	181412	176150	173000


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Table 5.6: Proposed Dredge Material Disposal Site

Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	1.27	2.60	5.65	4.93	3.28	3.60
Total Phosphorus (as P)	mg/kg	8.11	9.06	13.2	12.1	11.6	12.7
Aluminium (as Al)	mg/kg	774	773	771	1006	680	2218
Chromium (as Cr)	mg/kg	BDL	BDL	BDL	BDL	BDL	14.1
Copper (as Cu)	mg/kg	BDL	BDL	BDL	BDL	BDL	4.24
Iron (as Fe)	mg/kg	3654	3540	3548	5462	6823	7132
Lead (as Pb)	mg/kg	7.01	4.49	2.7	8.48	8.7	9.13
Manganese (as Mn)	mg/kg	7.96	9.64	9.75	26.5	26.7	25.2
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL
Zinc (as Zn)	mg/kg	4.54	4.77	4.76	11.2	5.99	9.00
Nickel (as Ni)	mg/kg	4.20	BDL	BDL	4.81	3.88	4.24
Benthic Organism							
Micro Benthic Organism	/m ²	15900	16000	14600	15500	14200	13800
Macro Benthic Organism	/m ²	98000	98500	99300	97200	95400	94000
Total	/m²	113900	114500	113900	112700	109600	107800


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Table 5.7: South of Breakwater

Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	2.39	0.89	2.55	3.89	1.93	2.08
Total Phosphorus (as P)	mg/kg	23.2	20.2	24.8	19.7	22.8	25.9
Aluminium (as Al)	mg/kg	934	935	868	341	210	345
Chromium (as Cr)	mg/kg	BDL	BDL	BDL	BDL	BDL	12.8
Copper (as Cu)	mg/kg	BDL	BDL	BDL	BDL	BDL	4.93
Iron (as Fe)	mg/kg	3139	3155	3143	4883	5550	7566
Lead (as Pb)	mg/kg	15.70	5.20	BDL	5.60	7.93	9.36
Manganese (as Mn)	mg/kg	17.9	11.1	12.	7.9	11.3	13.6
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	4.92	BDL	BDL
Zinc (as Zn)	mg/kg	4.19	4.20	4.8	3.2	8.93	8.98
Nickel (as Ni)	mg/kg	6.20	BDL	BDL	BDL	4.39	4.43
Benthic Organism							
Micro Benthic Organism	/m ²	45000	46000	43200	38500	35400	32000
Macro Benthic Organism	/m ²	30500	31000	30400	25100	23600	22000
Total	/m²	75500	77000	73600	63600	59000	54000


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Table 5.8: Port Basin

Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	1.25	1.07	2.1	1.92	0.88	0.91
Total Phosphorus (as P)	mg/kg	10.6	11.3	11.9	11.2	11.6	13.1
Aluminium (as Al)	mg/kg	940	942	897	319	240	313
Chromium (as Cr)	mg/kg	BDL	BDL	BDL	BDL	BDL	13.4
Copper (as Cu)	mg/kg	BDL	BDL	BDL	BDL	BDL	5.37
Iron (as Fe)	mg/kg	2725	2771	3290	4560	5420	7292
Lead (as Pb)	mg/kg	11.5	4.8	1.69	6.27	9.92	9.76
Manganese (as Mn)	mg/kg	17.7	15.1	16.1	6.17	12.1	11.9
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL
Zinc (as Zn)	mg/kg	3.65	6.04	5.26	2.68	6.77	6.87
Nickel (as Ni)	mg/kg	7.1	BDL	BDL	BDL	BDL	4.1
Benthic Organism							
Micro Benthic Organism	/m ²	79000	80000	75900	82400	80700	78000
Macro Benthic Organism	/m ²	73500	74000	72200	65400	63600	64000
Total	/m²	152500	154000	148100	147800	144300	142000


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Table 5.9: Inner Approach Channel

Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	0.86	1.12	1.07	0.89	0.78	0.81
Total Phosphorus (as P)	mg/kg	17.8	16.9	12.4	14.7	19.1	14.6
Aluminium (as Al)	mg/kg	769	778	798	932	618	939
Chromium (as Cr)	mg/kg	BDL	BDL	BDL	BDL	BDL	13.4
Copper (as Cu)	mg/kg	BDL	BDL	BDL	BDL	BDL	4.69
Iron (as Fe)	mg/kg	3080	3061	3380	4530	5260	6974
Lead (as Pb)	mg/kg	16.2	8.5	2.68	6.28	9.07	8.88
Manganese (as Mn)	mg/kg	8.19	9.61	12.3	10.7	13.2	16.0
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL
Zinc (as Zn)	mg/kg	4.44	4.68	5.32	5.86	8.51	8.61
Nickel (as Ni)	mg/kg	5.8	BDL	BDL	3.66	3.42	3.94
Benthic Organism							
Micro Benthic Organism	/m ²	38000	38500	36600	34600	33400	32000
Macro Benthic Organism	/m ²	10000	11000	10000	9600	8700	8500
Total	/m²	48000	49500	46600	44200	42100	40500


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Table 5.10: Kovalam Beach

Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	3.15	1.25	2.91	2.45	1.26	1.13
Total Phosphorus (as P)	mg/kg	14.2	20.2	9.45	13.7	13.4	12.0
Aluminium (as Al)	mg/kg	771	779	792	1119	820	1123
Chromium (as Cr)	mg/kg	BDL	BDL	BDL	BDL	BDL	14.6
Copper (as Cu)	mg/kg	BDL	BDL	BDL	BDL	BDL	5.49
Iron (as Fe)	mg/kg	2828	3136	3497	4090	4460	7433
Lead (as Pb)	mg/kg	10.1	6.2	BDL	10.1	8.04	9.14
Manganese (as Mn)	mg/kg	8.26	12.4	9.56	12.9	13.6	22.5
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL
Zinc (as Zn)	mg/kg	4.57	4.52	5.08	9.02	8.86	8.42
Nickel (as Ni)	mg/kg	5.1	BDL	BDL	4.38	4.44	5.24
Benthic Organism							
Micro Benthic Organism	/m ²	97000	98000	96200	97400	96800	95000
Macro Benthic Organism	/m ²	98000	99000	80700	95300	94700	93000
Total	/m²	195000	197000	176900	192700	191500	188000

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8. Graphical representation of Results for the period October 2019 to March 2020

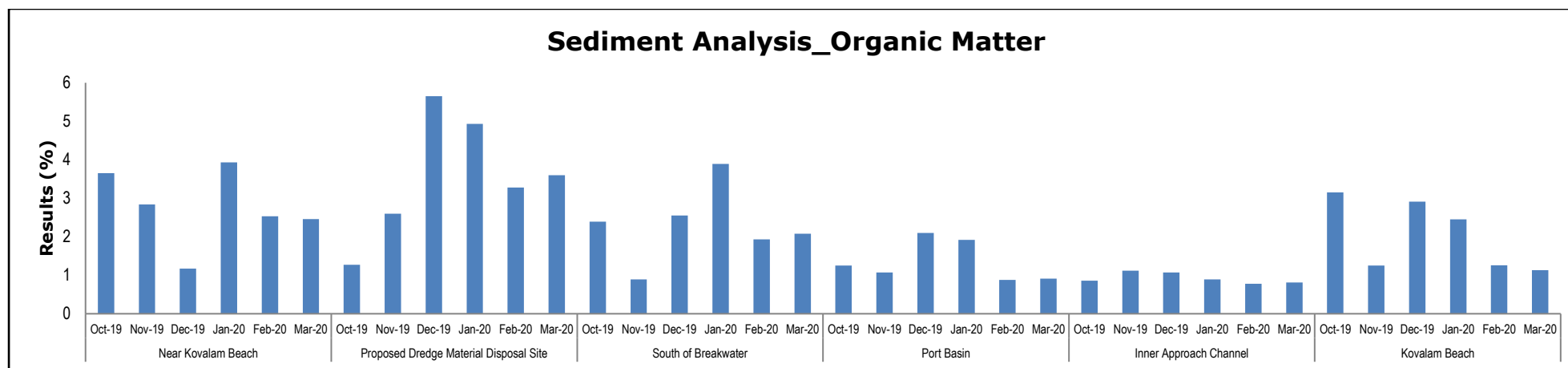


Figure 5.16: Sediment analysis for Organic Matter

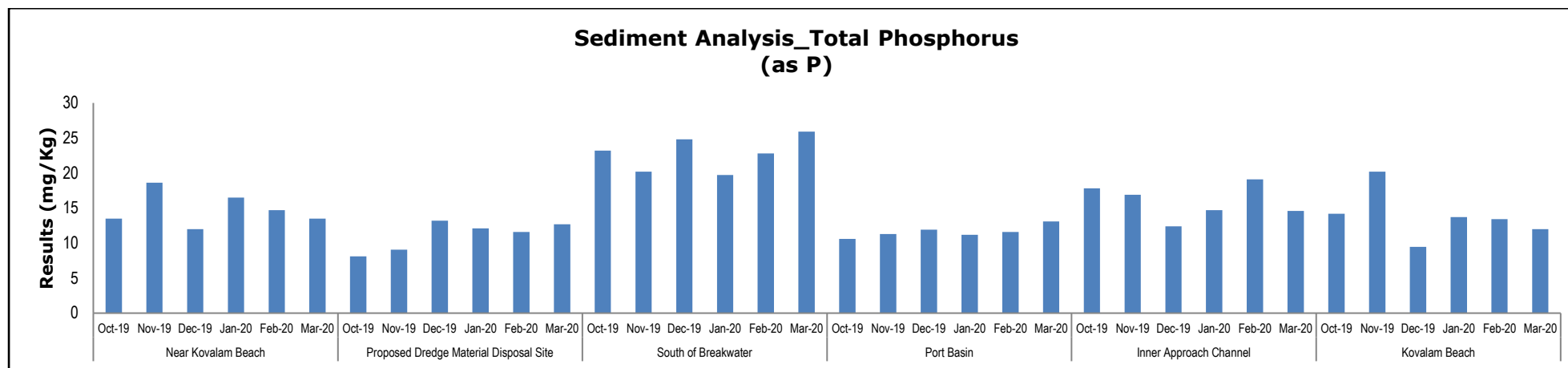


Figure 5.17: Sediment analysis for Total Phosphorus

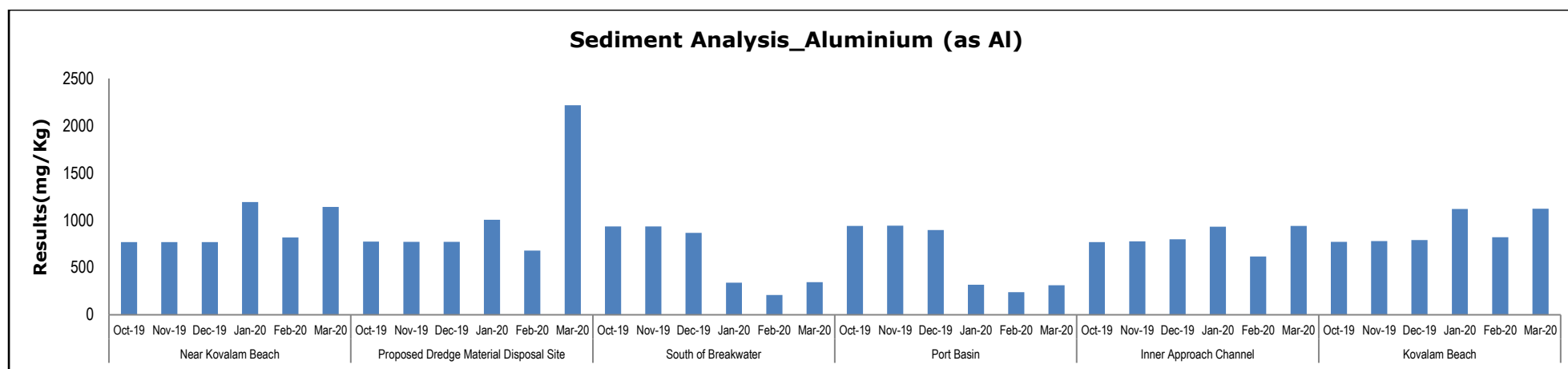


Figure 5.18: Sediment analysis for Aluminium

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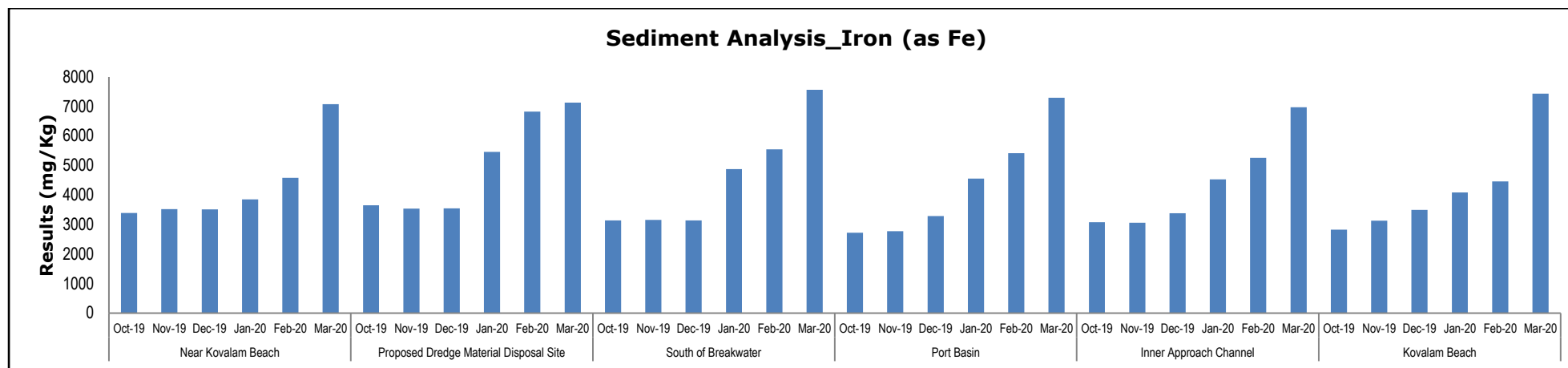


Figure 5.20: Sediment analysis for Iron

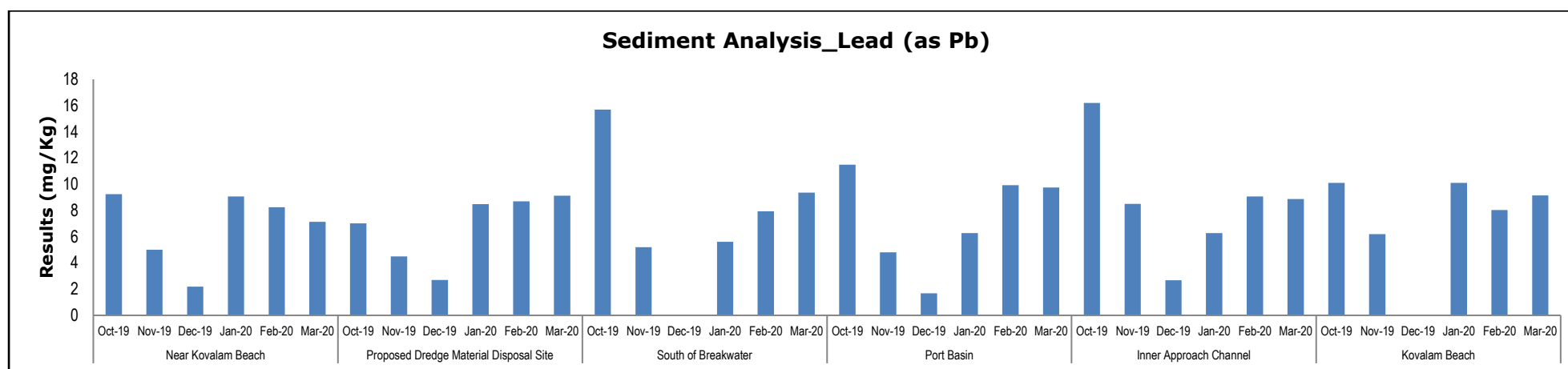


Figure 5.21: Sediment analysis for Lead

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
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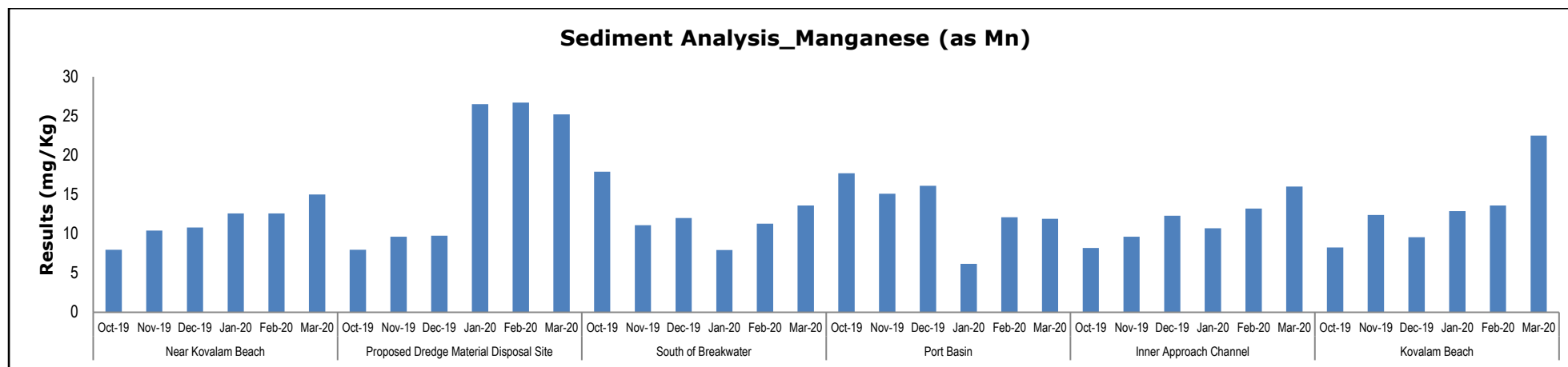


Figure 5.22: Sediment analysis for Manganese

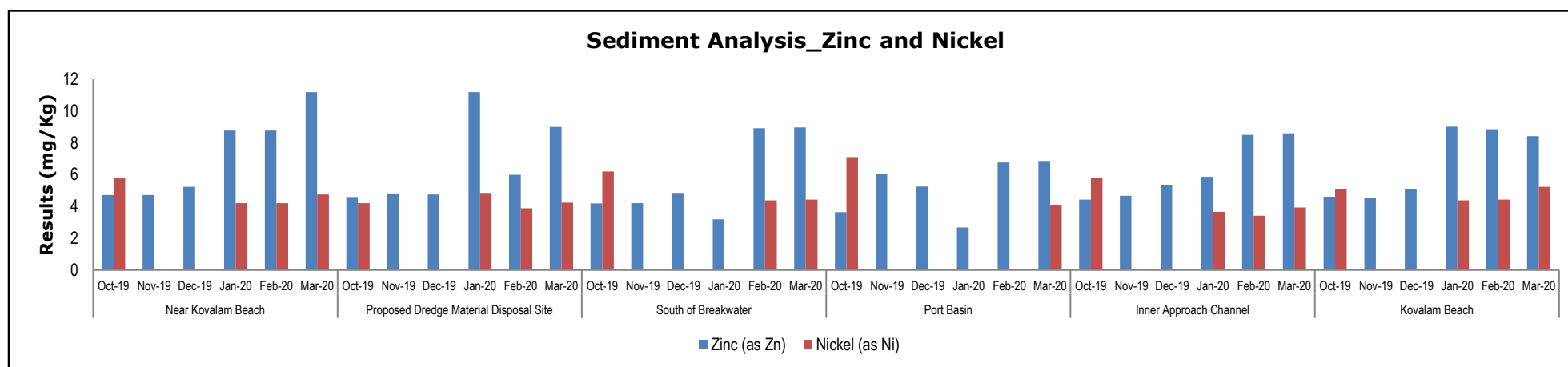


Figure 5.24: Sediment analysis for Zinc and Nickel

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
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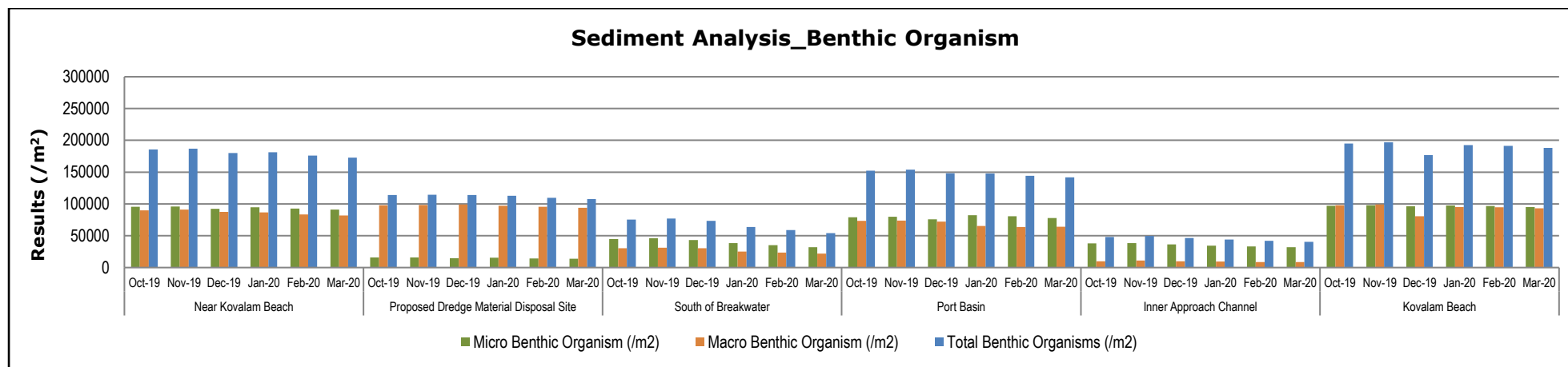



Figure 5.25: Sediment analysis for Benthic Organism


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9. Summary - Sediment Analysis:

During the period October 2019 to March 2020, at the location **Near Kovalam Beach**, the observed texture was sandy, Organic matter was observed in the range between 1.17 - 3.93%, Total Phosphorus (as P) was observed in the range between 12.0 - 18.6 mg/kg. Aluminium (as Al) was observed in the range between 768 - 1192 mg/kg. Chromium (as Cr) was observed in the range between BDL - 13.8 mg/kg. Copper (as Cu) was observed in the range between BDL - 3.56 mg/kg. Iron (as Fe) was observed in the range between 3390 - 7078 mg/kg. Lead (as Pb) was observed in the range between 2.19 - 9.25 mg/kg. Manganese (as Mn) was observed in the range between 7.96 - 15.0 mg/kg. Mercury (as Hg) was observed between BDL. Zinc (as Zn) was observed in the range between 4.73 - 11.2 mg/kg. Nickel (as Ni) was observed in the range between 4.21 - 5.8 mg/kg. Micro benthic organisms were observed in the range between 91000 - 96000 /m² and macro benthic organisms were observed in the range between 82000- 91000 /m².

At the location **Proposed Dredge Material Disposal site**, the observed texture was clay and sandy, Organic matter was observed in the range between 1.27 - 5.65 %, Total Phosphorus (as P) was observed in the range between 8.11 - 13.2 mg/kg. Aluminium (as Al) was observed in the range between 680 - 2218 mg/kg. Chromium (as Cr) was observed in the range between BDL- 14.1 mg/kg. Copper (as Cu) was observed in the range between BDL - 4.24 mg/kg. Iron (as Fe) was observed in the range between 3540 - 7132 mg/kg. Lead (as Pb) was observed in the range between 2.7 - 9.13 mg/kg. Manganese (as Mn) was observed in the range between 7.96-26.7 mg/kg. Mercury (as Hg) was observed BDL. Zinc (as Zn) was observed in the range between 4.54 - 11.2 mg/kg. Nickel (as Ni) was observed in the range between 3.88 - 4.81 mg/kg. Micro benthic organisms were observed in the range between 13800 - 16000 /m² and macro benthic organisms were observed in the range between 94000 - 99300 /m².


At the location **South of break water**, the observed texture was clay and sandy, Organic matter was observed in the range between 0.893 - 3.89 %, Total Phosphorus (as P) was observed in the range between 19.7 - 25.9 mg/kg. Aluminium (as Al) was observed in the range between 210 - 935 mg/kg. Chromium (as Cr) was observed in

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the range between BDL - 12.8 mg/kg. Copper (as Cu) was observed in the range between BDL - 4.93 mg/kg. Iron (as Fe) was observed in the range between 3139 - 7566 mg/kg. Lead (as Pb) was observed in the range between 5.2 - 15.7 mg/kg. Manganese (as Mn) was observed in the range between 7.93-17.9 mg/kg. Mercury (as Hg) was observed in the range between BDL - 4.92 mg/kg. Zinc (as Zn) was observed in the range between 3.2 - 8.98 mg/kg. Nickel (as Ni) was observed in the range between below 4.39 - 6.2 mg/kg. Micro benthic organisms were observed in the range between 32000 - 46000 /m² and macro benthic organisms were observed in the range 22000 - 31000 /m².

At the location **Port Basin**, the observed texture was sandy, Organic matter was observed in the range between 0.88-2.1percent, Total Phosphorus (as P) was observed in the range between 10.6 - 13.1 mg/kg. Aluminium (as Al) was observed in the range between 240-942 mg/kg. Chromium (as Cr) was observed in the range between BDL -13.4 mg/kg. Copper (as Cu) was observed in the range between BDL - 5.37 mg/kg. Iron (as Fe) was observed in the range between 2725- 7292 mg/kg. Lead (as Pb) was observed in the range between 1.69-11.5 mg/kg. Manganese (as Mn) was observed in the range between 6.17 -17.7 mg/kg. Mercury (as Hg) was observed BDL. Zinc (as Zn) was observed in the range between 2.68- 6.87 mg/kg. Nickel (as Ni) was observed in the range between 4.1 -7.1 mg/kg. Micro benthic organisms were observed in the range between 75900-82400 /m² and macro benthic organisms were observed in the range between 63900-74000 /m².

At the location **Inner Approach Channel**, the observed texture was sandy, Organic matter was observed in the range between 0.78 - 1.12%, Total Phosphorus (as P) was observed in the range between 12.4 -19.1 mg/kg. Aluminium (as Al) was observed in the range between 618 - 939 mg/kg. Chromium (as Cr) was observed in the range between BDL - 13.4 mg/kg. Copper (as Cu) was observed in the range between BDL - 4.69 mg/kg. Iron (as Fe) was observed in the range between 3061- 6974 mg/kg. Lead (as Pb) was observed in the range between 2.68 - 16.2 mg/kg. Manganese (as Mn) was observed in the range between 8.19 - 16 mg/kg. Mercury (as Hg) was observed BDL. Zinc (as Zn) was observed in the range between 4.44 - 8.61 mg/kg. Nickel (as Ni) was observed in the range between 3.42 - 5.8 mg/kg. Micro benthic

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organisms were observed in the range between 32000 - 38500 /m² and macro benthic organisms were observed in the range between 8500 - 11000 /m².

At the location **Kovalam Beach**, the observed texture was sandy, Organic matter was observed in the range between 1.13 - 3.15%, Total Phosphorus (as P) was observed in the range between 9.45 - 20.2 mg/kg. Aluminium (as Al) was observed in the range between 771 - 1123 mg/kg. Chromium (as Cr) was observed in the range between BDL - 14.6 mg/kg. Copper (as Cu) was observed in the range between BDL - 5.49 mg/kg. Iron (as Fe) was observed in the range between 2828-7433 mg/kg. Lead (as Pb) was observed in the range between 6.2- 10.1 mg/kg. Manganese (as Mn) was observed in the range between 8.26 - 22.5 mg/kg. Mercury (as Hg) was observed BDL. Zinc (as Zn) was observed in the range between 4.52 -9.02 mg/kg. Nickel (as Ni) was observed in the range between 4.38 - 5.24 mg/kg. Micro benthic organisms were observed in the range between 95000 - 98000 /m² and macro benthic organisms were observed in the range between 80700 - 99000 /m².

10. Marine Water Analysis for Phytoplankton and Zooplankton

Table 5.11: Total Phytoplankton and Zooplankton Results

Parameter	Month	Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break water	Port Basin	Inner Approach Channel	Kovalam Beach
Total Phytoplankton No/100 mL	Oct-19	4435000	411000	1489900	141000	1444000	4583000
	Nov-19	4452000	417000	1505800	145000	1458500	4609500
	Dec-19	4371000	401000	1450400	138000	1424000	4578400
	Jan-20	4449800	423000	1499200	144000	1463400	4620800
	Feb-20	4430500	400000	1461400	136500	1440000	4592300
	Mar-20	4339100	382100	1425700	131000	1381000	4449500
Total Zooplankton No/ 100 mL	Oct-19	8720	9285	9380	5470	11074	9242
	Nov-19	8468	9037	9081	5232	11033	9003
	Dec-19	8922	6555	9086	5535	11425	9377
	Jan-20	8346	8819	9114	5175	10432	8323
	Feb-20	8898	10079	10322	5708	11023	9116
	Mar-20	8600	9618	10255	5460	10915	9152

11. Graphical representation of Results for the period October 2019 to March 2020

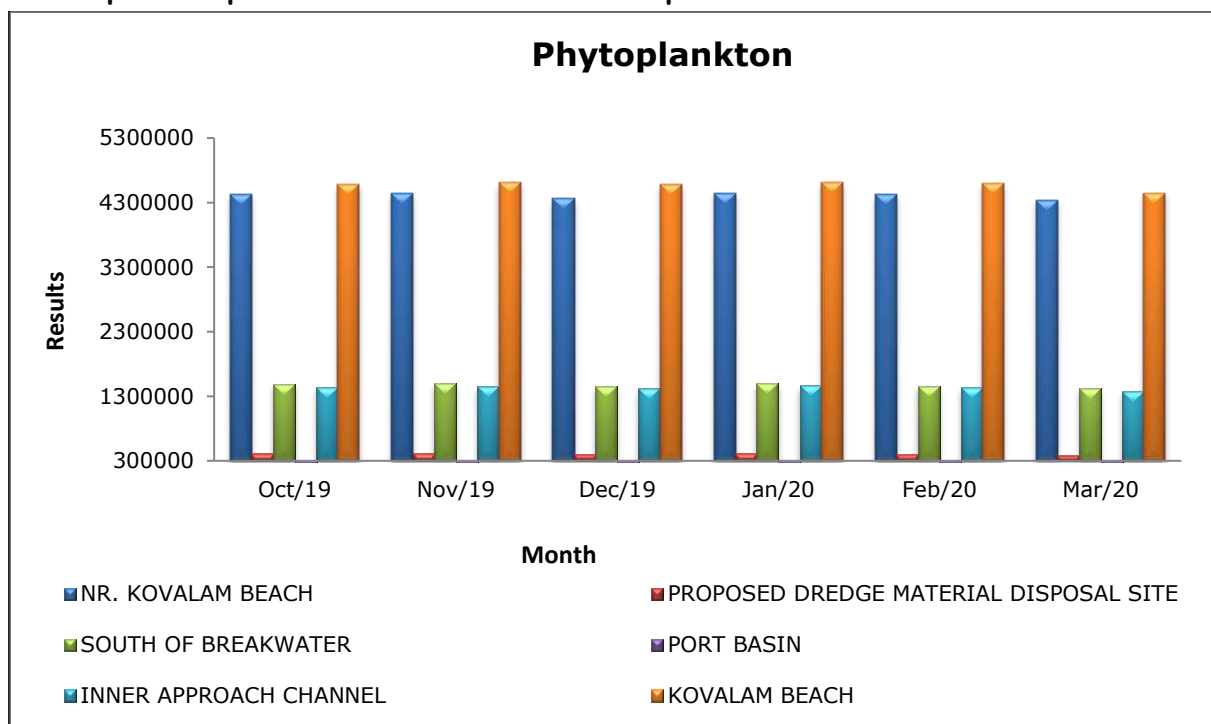


Figure 5.26: Marine Water Analysis for Total Phytoplankton

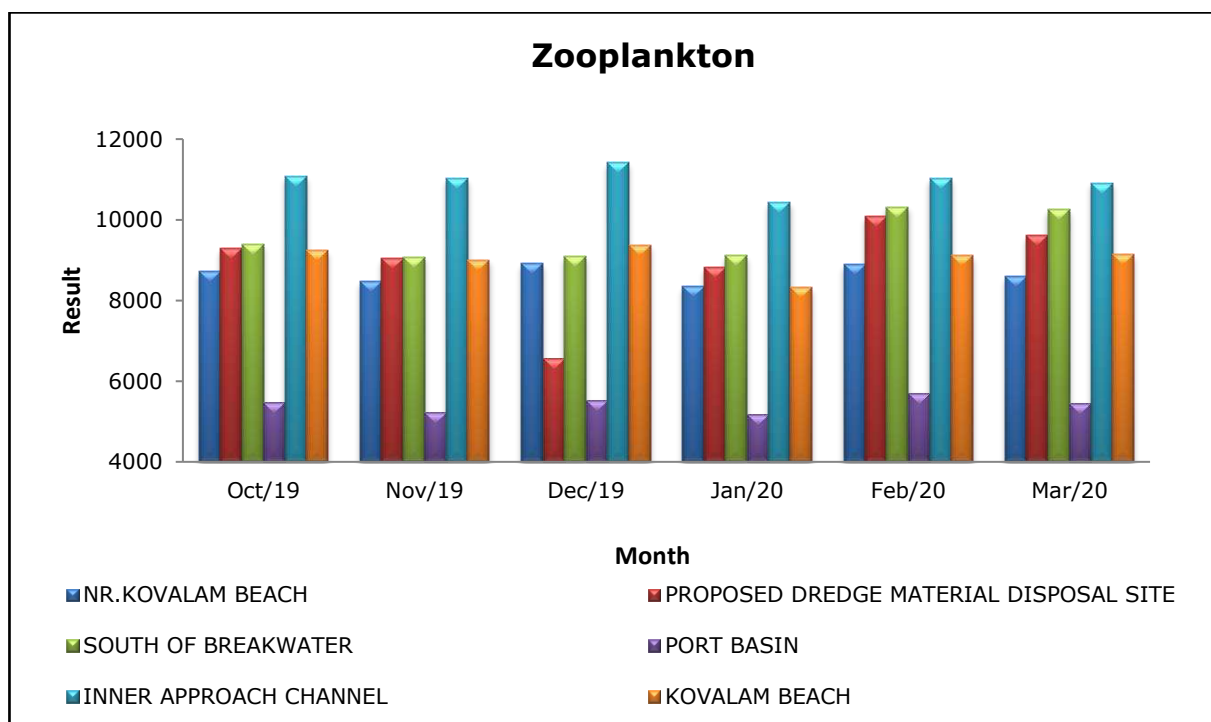



Figure 5.27: Marine Water Analysis for Total Zooplankton

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12. Summary-Marine Water Analysis for Phytoplankton and Zooplanktons

During the period October 2019 to March 2020, at the location **Near Kovalam Beach**, Phytoplankton were observed in the range between 4339100 - 4452000 No/100 mL and Zooplanktons were observed in the range between 8346 - 8922 No/100 mL.

At the location **Proposed Dredge Material Disposal site**, Phytoplankton were observed in the range between 382100 - 423000 No/100 mL and Zooplanktons were observed in the range between 6555 - 10079 No/100 mL.

At the location **South of Breakwater**, Phytoplankton were observed in the range between 1425700 - 1505800 No/100 mL and Zooplanktons were observed in the range between 9081 - 10322 No/100 mL.

At the location **Port Basin**, Phytoplankton were observed in the range between 131000 - 145000 No/100 mL and Zooplanktons were observed in the range between 5175 - 5708 No/100 mL.

At the location **Inner Approach Channel**, Phytoplankton were observed in the range between 1381000 - 1463400 No/100 mL and Zooplanktons was observed in the range between 10432 - 11425 No/100 mL.

At the location **Kovalam Beach**, Phytoplankton were observed in the range between 4449500 - 4620800 No/100 mL and Zooplanktons was observed in the range between 8323 - 9377 No/100 mL.

CHAPTER 6

Water Analysis

1. Ground water and surface water sources details:

This chapter describes the sampling location, methodology adopted for analysis and analysis results of Ground water and Surface water during the period October 2019 to March 2020. Ground water sampling was carried out at three locations including Port Site, PAF Area and Proposed Port Estate Area and surface water sampling was carried out at Poovar West Canal, Vizhinjam Branch Canal and Vellayani Lake.

Table 6.1: Ground Water Location details

Sr. No.	Location	Latitude	Longitude
Ground Water			
1.	Port Site	8°22'02.10"N	77°00'17.96"E
2.	PAF Area	8°22',14.86"N	77°00',9.20"E
3.	Proposed Port Estate Area	8°22',24.64"N	77°01',46.27"E
Surface Water			
1.	Poovar West Canal	8°19',08.18"N	77°04',35.30"E
2.	Vizhinjam Branch Canal	8°22',49.55"N	76°59',35.01"E
3.	Vellayani Lake	8°25',30.71"N	76°59',37.70"E

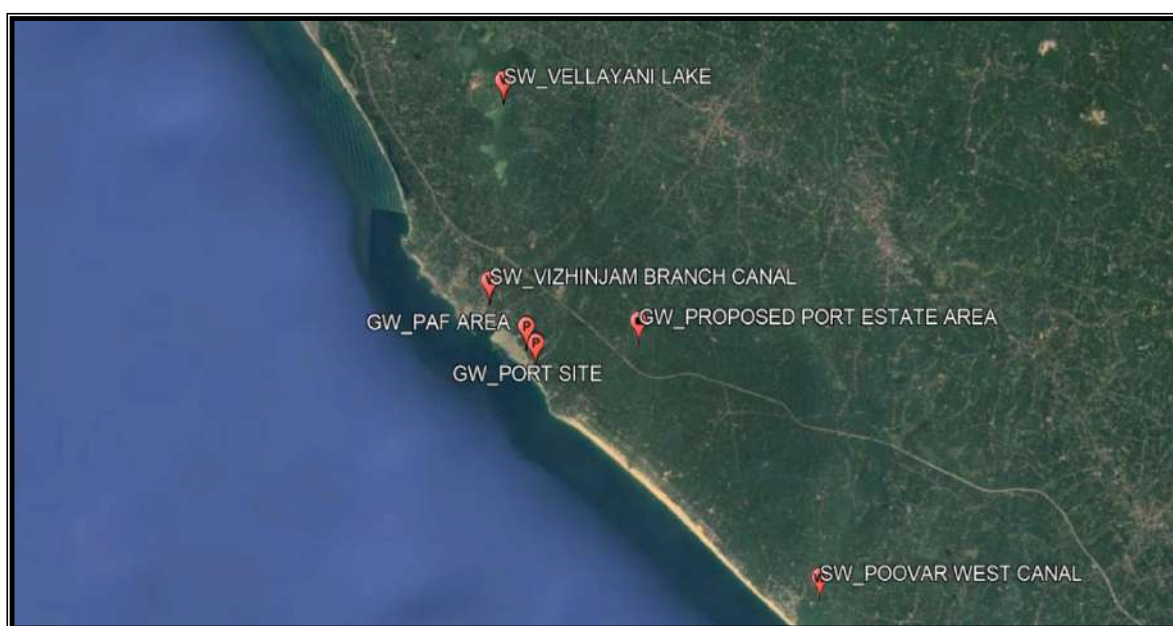




Figure 6.1: Google earth views of Ground water and Surface water sources

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2. Methodology of Sampling and Analysis:

Table 6.2: Ground Water and Surface Water methodology


Sr. No.	Parameter	Unit	Detection Limit	Method Reference
1.	Colour	Hazen Units	1	IS 3025(Part 4): 1983,
2.	Odour	-	Qualitative	IS 3025 (Part 5): 1983
3.	p ^H Value	-	1-14	IS 3025(Part 11):1983
4.	Turbidity	N.T.U.	0.1	IS 3025(Part 10):1984
5.	Electrical Conductivity (at 25°C)	µmho/cm	0.1	IS 3025(Part 14): 1984
6.	Total Dissolved Solids	mg/L	5	IS 3025 (Part 16):1984
7.	Dissolved Oxygen	mg/L	0.05	IS 3025 (Part 38): 1989,
8.	Biochemical Oxygen Demand (3 days, 27°C)	mg/L	1	IS 3025 (Part 44): 1993
9.	Oil & Grease	mg/L	1	APHA, 23 rd Ed., 2017,5520-B, 5-40
10.	Aluminium (as Al)	mg/L	0.025	IS 3025 (Part 55):2003
11.	Ammonia (as NH ₃ - N)	mg/L	0.1	APHA, 23 rd Ed., 2017,4500 NH ₃ , B & C, 4 -110, 4-112,
12.	Anionic Detergents (as MBAS) Calculated as LAS mol. wt. 288.38	mg/L	0.1	APHA, 23 rd Ed., 2017, 5540-B&C,5-51& 5-53,
13.	Barium (as Ba)	mg/L	0.1	IS 3025(Part 2): 2004
14.	Boron (as B)	mg/L	0.1	IS 13428:2005, Amds.4 IS 3025 (Part 57):2003,
15.	Calcium (as Ca)	mg/L	0.4	IS 3025(Part 40): 1991
16.	Chloramines (as Cl ₂)	mg/L	0.05	APHA, 22 nd Ed., 2012, 4500-Cl-G, 4-69
17.	Chloride (as Cl)	mg/L	0.25	IS 3025 (Part 32):1988
18.	Copper (as Cu)	mg/L	0.02	IS 3025(Part 2): 2004
19.	Fluoride (as F)	mg/L	0.05	IS 3025(Part 60): 2008
20.	Iron (as Fe)	mg/L	0.06	IS 3025(Part 2): 2004
21.	Magnesium (as Mg)	mg/L	0.02	IS 3025(Part 46):1994
22.	Manganese (as Mn)	mg/L	0.02	IS 3025(Part 2): 2004
23.	Mineral Oil	mg/L	0.005	Clause 6 of IS: 3025 (Part 39): 1991, Amds.2, Sept 2013
24.	Nitrate (as NO ₃)	mg/L	0.2	APHA, 23 rd Ed., 2017,4500-NO ₃ ,B-4-122
25.	Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	0.001	APHA, 23 rd Ed., 2017,5530- B & C, 5-47
26.	Selenium (as Se)	mg/L	0.005	IS 3025(Part 2): 2004
27.	Silver (as Ag)	mg/L	0.005	IS 3025(Part 2): 2004
28.	Sulphate (as SO ₄)	mg/L	2	IS 3025 (Part 24): 1986
29.	Sulphide (as H ₂ S)	mg/L	0.025	IS 3025 (Part 29) 1986
30.	Total Phosphate (as PO ₄)	mg/L	0.1	APHA, 23 rd Ed., 2017,4500 P,E, 4-155
31.	Total Alkalinity (as CaCO ₃)	mg/L	0.5	IS 3025(Part 23): 1986
32.	Total Hardness (as CaCO ₃)	mg/L	0.5	IS 3025(Part 21): 1983

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Sr. No.	Parameter	Unit	Detection Limit	Method Reference
33.	Calcium Hardness (as CaCO ₃)	mg/L	-	IS 3025(Part 21): 1983
34.	Zinc (as Zn)	mg/L	0.05	IS 3025(Part 2): 2004
35.	Sodium (as Na)	mg/L	0.2	IS 3025 (Part 45):1993
36.	Potassium (as K)	mg/L	0.06	IS 3025(Part 45): 1993
37.	Sodium Absorption Ratio	-	-	IS 11624:1986
38.	Cadmium (as Cd)	mg/L	0.002	IS 3025(Part 2): 2004
39.	Cyanide (as CN)	mg/L	0.001	APHA, 23 rd Ed., 2017, 4500-CN, C & E, 4-41 & 4-44
40.	Lead (as Pb)	mg/L	0.008	IS 3025(Part 2): 2004
41.	Mercury (as Hg)	mg/L	0.0008	IS 3025(Part 2): 2004
42.	Molybdenum (as Mo)	mg/L	0.002	IS 3025(Part 2): 2004
43.	Nickel (as Ni)	mg/L	0.01	IS 3025(Part 2): 2004
44.	Pesticide Residues			
i.	Alachlor	µg/L	0.01	US EPA 525.2,1995
ii.	Atrazine	µg/L	0.01	US EPA 525.2,1995
iii.	Aldrin/Dieldrin	µg/L	0.01	US EPA 525.2,1995
iv.	Alpha HCH	µg/L	0.01	US EPA 525.2,1995
v.	Beta HCH	µg/L	0.01	US EPA 525.2,1995
vi.	Butachlor	µg/L	0.01	US EPA 525.2,1995
vii.	Chlorpyrifos	µg/L	0.05	US EPA 525.2,1995
viii.	Delta HCH	µg/L	0.01	US EPA 525.2,1995
ix.	2,4D chlorophenoxyacetic acid	µg/L	0.07	US EPA 515.1,1995
x.	DDT (o,p & p,p- Isomers of DDT, DDE, DDD)	µg/L	0.01	US EPA 525.2,1995
xi.	Endosulfan (, & Sulphate)	µg/L	0.01	US EPA 525.2,1995
xii.	Ethion	µg/L	0.05	US EPA 525.2,1995
xiii.	γ HCH (Lindane)	µg/L	0.01	US EPA 525.2,1995
xiv.	Isoproturon	µg/L	0.07	US EPA 532,2000
xv.	Malathion	µg/L	0.05	US EPA 525.2,1995
xvi.	Methyl Parathion	µg/L	0.05	US EPA 525.2,1995
xvii.	Monocrotophos	µg/L	0.05	US EPA 525.2,1995
xviii.	Phorate	µg/L	0.07	US EPA 8141B ,Rev2,Feb2007
45.	Polychlorinated Biphenyls (PCB)	mg/L	0.00007	Annex M of IS 13428:2005,Amds.4
46.	Polynuclear Aromatic Hydrocarbons (PAH)	mg/L	0.00007	APHA, 23 rd Ed., 2017, 6440, 6-94
47.	Total Arsenic (as As)	mg/L	0.005	IS 3025(Part 2): 2004
48.	Total Chromium (as Cr)	mg/L	0.02	IS 3025(Part 2): 2004
49.	Trihalomethanes			
a)	Bromoform	mg/L	0.01	AEC/C/SAP/INS/5-16
b)	Dibromochloromethane	mg/L	0.01	AEC/C/SAP/INS/5-16
c)	Bromodichloroethane	mg/L	0.01	AEC/C/SAP/INS/5-16

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Sr. No.	Parameter	Unit	Detection Limit	Method Reference
d)	Chloroform	mg/L	0.01	AEC/C/SAP/INS/5-16
50.	<i>E. coli</i>	MPN Index /100 ml	1.8	APHA, 23 rd Ed., 2017, 9221-E, G, 9-80
51.	Total Coliforms	MPN Index /100 ml	1.8	APHA, 23 rd Ed., 2017, 9221-B, 9-69
52.	Faecal Coliforms	MPN Index /100ml	1.8	APHA, 23 rd Ed., 2017, 9221-E, 9-77

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3. Ground Water Analysis Results for the period October 2019 to March 2020:

Table 6.3: Location - Port Site

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Organoleptic & Physical Parameters								
Colour	Hazen Units	Max. 5	1	1	1	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH Value	-	6.5 to 8.5	7.32	7.38	6.65	7.07	7.34	7.46
Turbidity	N.T.U.	Max. 1	BDL	0.23	1.52	BDL	BDL	BDL
Total Dissolved Solids	mg/L	Max. 500	272	432	480	466	486	462
General Parameters concerning substances undesirable in excessive amounts								
Aluminum (as Al)	mg/L	Max. 0.03	BDL	BDL	BDL	BDL	BDL	BDL
Ammonia (as NH ₃ - N)	mg/L	Max.0.5	BDL	BDL	BDL	BDL	BDL	BDL
Anionic Detergents (as MBAS) Calculated as LAS mol. wt. 288.38	mg/L	Max. 0.2	BDL	BDL	BDL	BDL	BDL	BDL
Barium (as Ba)	mg/L	Max. 0.7	BDL	BDL	BDL	BDL	BDL	BDL
Boron (as B)	mg/L	Max. 0.5	BDL	BDL	BDL	BDL	BDL	BDL
Calcium (as Ca)	mg/L	Max. 75	16.8	42.5	51.0	32.0	43.2	43.3
Chloramines (as Cl ₂)	mg/L	Max. 4.0	BDL	BDL	BDL	BDL	BDL	BDL
Chloride (as Cl)	mg/L	Max.250	85	144	170	140	146	152
Copper (as Cu)	mg/L	Max.0.05	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	Max. 1	0.5	0.8	0.9	0.9	0.8	0.8
Iron (as Fe)	mg/L	Max.0.3	BDL	BDL	BDL	BDL	BDL	BDL
Magnesium (as Mg)	mg/L	Max. 30	11.7	22.8	25.5	18	28	22.3
Manganese (as Mn)	mg/L	Max.0.1	BDL	BDL	BDL	BDL	BDL	BDL
Mineral Oil	mg/L	Max.0.5	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO ₃)	mg/L	Max.45	1.67	11.1	28.0	13.2	22.7	32.6
Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	Max. 0.001	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Silver (as Ag)	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate (as SO ₄)	mg/L	Max. 200	22.1	62.6	160	53	62.8	60
Sulphide (as H ₂ S)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as CaCO ₃)	mg/L	Max.200	90	87.5	110	140	125	117
Total Hardness (as CaCO ₃)	mg/L	Max. 200	55	195	198	154	168	195
Zinc (as Zn)	mg/L	Max. 5	BDL	BDL	BDL	BDL	BDL	BDL
Parameters Concerning Toxic Substances								
Cadmium (as Cd)	mg/L	Max. 0.003	BDL	BDL	BDL	BDL	BDL	BDL
Cyanide (as CN)	mg/L	Max.0.05	BDL	BDL	BDL	BDL	BDL	BDL
Lead (as Pb)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL

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Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Mercury (as Hg)	mg/L	Max. 0.001	BDL	BDL	BDL	BDL	BDL	BDL
Molybdenum (as Mo)	mg/L	Max. 0.07	BDL	BDL	BDL	BDL	BDL	BDL
Nickel (as Ni)	mg/L	Max.0.02	BDL	BDL	BDL	BDL	BDL	BDL
Pesticide Residues								
Alachlor	µg/L	20	BDL	BDL	BDL	BDL	BDL	BDL
Atrazine	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Aldrin/Dieldrin	µg/L	0.03	BDL	BDL	BDL	BDL	BDL	BDL
Alpha HCH	µg/L	0.01	BDL	BDL	BDL	BDL	BDL	BDL
Beta HCH	µg/L	0.04	BDL	BDL	BDL	BDL	BDL	BDL
Butachlor	µg/L	125	BDL	BDL	BDL	BDL	BDL	BDL
Chlorpyrifos	µg/L	30	BDL	BDL	BDL	BDL	BDL	BDL
Delta HCH	µg/L	0.04	BDL	BDL	BDL	BDL	BDL	BDL
2,4D chlorophenoxyacetic acid	µg/L	30	BDL	BDL	BDL	BDL	BDL	BDL
DDT (o, p & p,p- Isomers of DDT, DDE, DDD)	µg/L	1	BDL	BDL	BDL	BDL	BDL	BDL
Endosulfan (a, b & Sulphate)	µg/L	0.4	BDL	BDL	BDL	BDL	BDL	BDL
Ethion	µg/L	3	BDL	BDL	BDL	BDL	BDL	BDL
γ HCH (Lindane)	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Isoproturon	µg/L	9	BDL	BDL	BDL	BDL	BDL	BDL
Malathion	µg/L	190	BDL	BDL	BDL	BDL	BDL	BDL
Methyl Parathion	µg/L	0.3	BDL	BDL	BDL	BDL	BDL	BDL
Monocrotophos	µg/L	1	BDL	BDL	BDL	BDL	BDL	BDL
Phorate	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Polychlorinated Biphenyls (PCB)	mg/L	Max.0.0005	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear Aromatic Hydrocarbons (PAH)	mg/L	Max.0.0001	BDL	BDL	BDL	BDL	BDL	BDL
Total Arsenic (as As)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium (as Cr)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Trihalomethanes								
Bromoform	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Dibromochloro Methane	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloroethane	mg/L	Max. 0.06	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	mg/L	Max. 0.2	BDL	BDL	BDL	BDL	BDL	BDL
Bacteriological Analysis								
<i>E. coli</i>	MPN Index/ 100 mL	Not Detectable	<1.8	<1.8	<1.8	79	<1.8	<1.8
Total Coliforms	MPN Index/ 100 mL	-	27	14	280	170	280	350



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Table 6.4: Location - Proposed Port Estate Area

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Organoleptic & Physical Parameters								
Colour	Hazen Units	Max. 5	1	1	1	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH Value	-	6.5 to 8.5	7.2	7.2	6.75	6.54	6.59	6.61
Turbidity	N.T.U.	Max. 1	1.4	0.27	0.8	0.96	BDL	0.69
Total Dissolved Solids	mg/L	Max. 500	70	135	210	72	58	50
General Parameters concerning substances undesirable in excessive amounts								
Aluminum (as Al)	mg/L	Max. 0.03	BDL	BDL	BDL	BDL	BDL	BDL
Ammonia (as NH ₃ - N)	mg/L	Max.0.5	BDL	BDL	BDL	BDL	BDL	BDL
Anionic Detergents (as MBAS) Calculated as LAS mol. wt. 288.38	mg/L	Max. 0.2	BDL	BDL	BDL	BDL	BDL	BDL
Barium (as Ba)	mg/L	Max. 0.7	BDL	BDL	BDL	BDL	BDL	BDL
Boron (as B)	mg/L	Max. 0.5	BDL	BDL	BDL	BDL	BDL	BDL
Calcium (as Ca)	mg/L	Max. 75	7.2	14.8	20	6.41	5.6	5.6
Chloramines (as Cl ₂)	mg/L	Max. 4.0	BDL	BDL	BDL	BDL	BDL	BDL
Chloride (as Cl)	mg/L	Max.250	49	53	49	15	18.5	18
Copper (as Cu)	mg/L	Max.0.05	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	Max. 1	0.6	0.6	0.6	0.1	0.1	0.1
Iron (as Fe)	mg/L	Max.0.3	0.1	BDL	BDL	BDL	0.198	BDL
Magnesium (as Mg)	mg/L	Max. 30	7.77	12.1	11.2	2.43	4.86	1.45
Manganese (as Mn)	mg/L	Max.0.1	BDL	BDL	BDL	BDL	BDL	BDL
Mineral Oil	mg/L	Max.0.5	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO ₃)	mg/L	Max.45	2.8	7.82	5.2	1.5	1.83	2.22
Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	Max. 0.001	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Silver (as Ag)	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate (as SO ₄)	mg/L	Max. 200	6.8	20.8	20	4	9.35	11.2
Sulphide (as H ₂ S)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as CaCO ₃)	mg/L	Max.200	30	65	90	25	15	10
Total Hardness (as CaCO ₃)	mg/L	Max. 200	35	86	96	26	34	20
Zinc (as Zn)	mg/L	Max. 5	BDL	BDL	BDL	BDL	BDL	BDL
Parameters Concerning Toxic Substances								
Cadmium (as Cd)	mg/L	Max. 0.003	BDL	BDL	BDL	BDL	BDL	BDL
Cyanide (as CN)	mg/L	Max.0.05	BDL	BDL	BDL	BDL	BDL	BDL
Lead (as Pb)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Mercury (as Hg)	mg/L	Max. 0.001	BDL	BDL	BDL	BDL	BDL	BDL

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Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Molybdenum (as Mo)	mg/L	Max. 0.07	BDL	BDL	BDL	BDL	BDL	BDL
Nickel (as Ni)	mg/L	Max.0.02	BDL	BDL	BDL	BDL	BDL	BDL
Pesticide Residues								
Alachlor	µg/L	20	BDL	BDL	BDL	BDL	BDL	BDL
Atrazine	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Aldrin/Dieldrin	µg/L	0.03	BDL	BDL	BDL	BDL	BDL	BDL
Alpha HCH	µg/L	0.01	BDL	BDL	BDL	BDL	BDL	BDL
Beta HCH	µg/L	0.04	BDL	BDL	BDL	BDL	BDL	BDL
Butachlor	µg/L	125	BDL	BDL	BDL	BDL	BDL	BDL
Chlorpyrifos	µg/L	30	BDL	BDL	BDL	BDL	BDL	BDL
Delta HCH	µg/L	0.04	BDL	BDL	BDL	BDL	BDL	BDL
2,4D chlorophenoxyacetic acid	µg/L	30	BDL	BDL	BDL	BDL	BDL	BDL
DDT (o,p & p,p- Isomers of DDT, DDE, DDD)	µg/L	1	BDL	BDL	BDL	BDL	BDL	BDL
Endosulfan (a ,b & Sulphate)	µg/L	0.4	BDL	BDL	BDL	BDL	BDL	BDL
Ethion	µg/L	3	BDL	BDL	BDL	BDL	BDL	BDL
γ HCH (Lindane)	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Isoproturon	µg/L	9	BDL	BDL	BDL	BDL	BDL	BDL
Malathion	µg/L	190	BDL	BDL	BDL	BDL	BDL	BDL
Methyl Parathion	µg/L	0.3	BDL	BDL	BDL	BDL	BDL	BDL
Monocrotophos	µg/L	1	BDL	BDL	BDL	BDL	BDL	BDL
Phorate	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Polychlorinated Biphenyls (PCB)	mg/L	Max.0.0005	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear Aromatic Hydrocarbons (PAH)	mg/L	Max.0.0001	BDL	BDL	BDL	BDL	BDL	BDL
Total Arsenic (as As)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium (as Cr)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Bromoform	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Dibromochloro Methane	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloroethane	mg/L	Max. 0.06	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	mg/L	Max. 0.2	BDL	BDL	BDL	BDL	BDL	BDL
Bacteriological Analysis								
<i>E. coli</i>	MPN Index/ 100 mL	Not Detectable	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
Total Coliforms	MPN Index/ 100 mL	-	14	22	130	110	210	350



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Table 6.5: Location - PAF Area

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Organoleptic & Physical Parameters								
Colour	Hazen Units	Max. 5	1	1	1	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH Value	-	6.5 to 8.5	7.81	7.35	6.7	7.47	7.79	6.52
Turbidity	N.T.U.	Max. 1	0.46	0.27	BDL	BDL	BDL	BDL
Total Dissolved Solids	mg/L	Max. 500	454	416	460	480	438	446
General Parameters concerning substances undesirable in excessive amounts								
Aluminum (as Al)	mg/L	Max. 0.03	BDL	BDL	BDL	BDL	BDL	BDL
Ammonia (as NH ₃ -N)	mg/L	Max.0.5	BDL	BDL	BDL	BDL	BDL	BDL
Anionic Detergents (as MBAS) Calculated as LAS mol. wt. 288.38	mg/L	Max. 0.2	BDL	BDL	BDL	BDL	BDL	BDL
Barium (as Ba)	mg/L	Max. 0.7	BDL	BDL	BDL	BDL	BDL	BDL
Boron (as B)	mg/L	Max. 0.5	BDL	BDL	BDL	BDL	BDL	BDL
Calcium (as Ca)	mg/L	Max. 75	47.2	43.2	54	58.5	19.2	38
Chloramines (as Cl ₂)	mg/L	Max. 4.0	BDL	BDL	BDL	BDL	BDL	BDL
Chloride (as Cl)	mg/L	Max.250	148	142	195	240	224	227
Copper (as Cu)	mg/L	Max.0.05	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	Max. 1	0.5	0.7	0.8	0.9	0.9	0.9
Iron (as Fe)	mg/L	Max.0.3	BDL	BDL	BDL	BDL	BDL	BDL
Magnesium (as Mg)	mg/L	Max. 30	21.8	22.8	26.4	33.5	24.3	20
Manganese (as Mn)	mg/L	Max.0.1	BDL	BDL	BDL	BDL	BDL	BDL
Mineral Oil	mg/L	Max.0.5	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO ₃)	mg/L	Max.45	6.06	10.8	12.7	20.2	28	34.8
Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	Max. 0.001	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Silver (as Ag)	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate (as SO ₄)	mg/L	Max. 200	75.6	59.2	85	163	32.5	39.5
Sulphide (as H ₂ S)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as CaCO ₃)	mg/L	Max.200	60	87.5	60	180	15	12.5
Total Hardness (as CaCO ₃)	mg/L	Max. 200	208	196	197	190	148	176
Zinc (as Zn)	mg/L	Max. 5	BDL	BDL	BDL	BDL	BDL	BDL
Parameters Concerning Toxic Substances								
Cadmium (as Cd)	mg/L	Max. 0.003	BDL	BDL	BDL	BDL	BDL	BDL
Cyanide (as CN)	mg/L	Max.0.05	BDL	BDL	BDL	BDL	BDL	BDL
Lead (as Pb)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Mercury (as Hg)	mg/L	Max. 0.001	BDL	BDL	BDL	BDL	BDL	BDL

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Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Molybdenum (as Mo)	mg/L	Max. 0.07	BDL	BDL	BDL	BDL	BDL	BDL
Nickel (as Ni)	mg/L	Max.0.02	BDL	BDL	BDL	BDL	BDL	BDL
Pesticide Residues								
Alachlor	µg/L	20	BDL	BDL	BDL	BDL	BDL	BDL
Atrazine	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Aldrin/Dieldrin	µg/L	0.03	BDL	BDL	BDL	BDL	BDL	BDL
Alpha HCH	µg/L	0.01	BDL	BDL	BDL	BDL	BDL	BDL
Beta HCH	µg/L	0.04	BDL	BDL	BDL	BDL	BDL	BDL
Butachlor	µg/L	125	BDL	BDL	BDL	BDL	BDL	BDL
Chlorpyrifos	µg/L	30	BDL	BDL	BDL	BDL	BDL	BDL
Delta HCH	µg/L	0.04	BDL	BDL	BDL	BDL	BDL	BDL
2,4D chlorophenoxyacetic acid	µg/L	30	BDL	BDL	BDL	BDL	BDL	BDL
DDT (o,p & p,p- Isomers of DDT, DDE, DDD)	µg/L	1	BDL	BDL	BDL	BDL	BDL	BDL
Endosulfan (a, b & Sulphate)	µg/L	0.4	BDL	BDL	BDL	BDL	BDL	BDL
Ethion	µg/L	3	BDL	BDL	BDL	BDL	BDL	BDL
γ HCH (Lindane)	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Isoproturon	µg/L	9	BDL	BDL	BDL	BDL	BDL	BDL
Malathion	µg/L	190	BDL	BDL	BDL	BDL	BDL	BDL
Methyl Parathion	µg/L	0.3	BDL	BDL	BDL	BDL	BDL	BDL
Monocrotophos	µg/L	1	BDL	BDL	BDL	BDL	BDL	BDL
Phorate	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Polychlorinated Biphenyls (PCB)	mg/L	Max.0.0005	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear Aromatic Hydrocarbons (PAH)	mg/L	Max. 0.0001	BDL	BDL	BDL	BDL	BDL	BDL
Total Arsenic (as As)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium (as Cr)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Trihalomethanes								
Bromoform	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Dibromochloro Methane	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloroethane	mg/L	Max. 0.06	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	mg/L	Max. 0.2	BDL	BDL	BDL	BDL	BDL	BDL
Bacteriological Analysis								
<i>E. coli</i>	MPN Index/100mL	Not Detectable	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
Total Coliforms	MPN Index/100mL	-	47	14	<1.8	<1.8	350	210

4. Graphical representation of Results for the period October 2019 to March 2020:

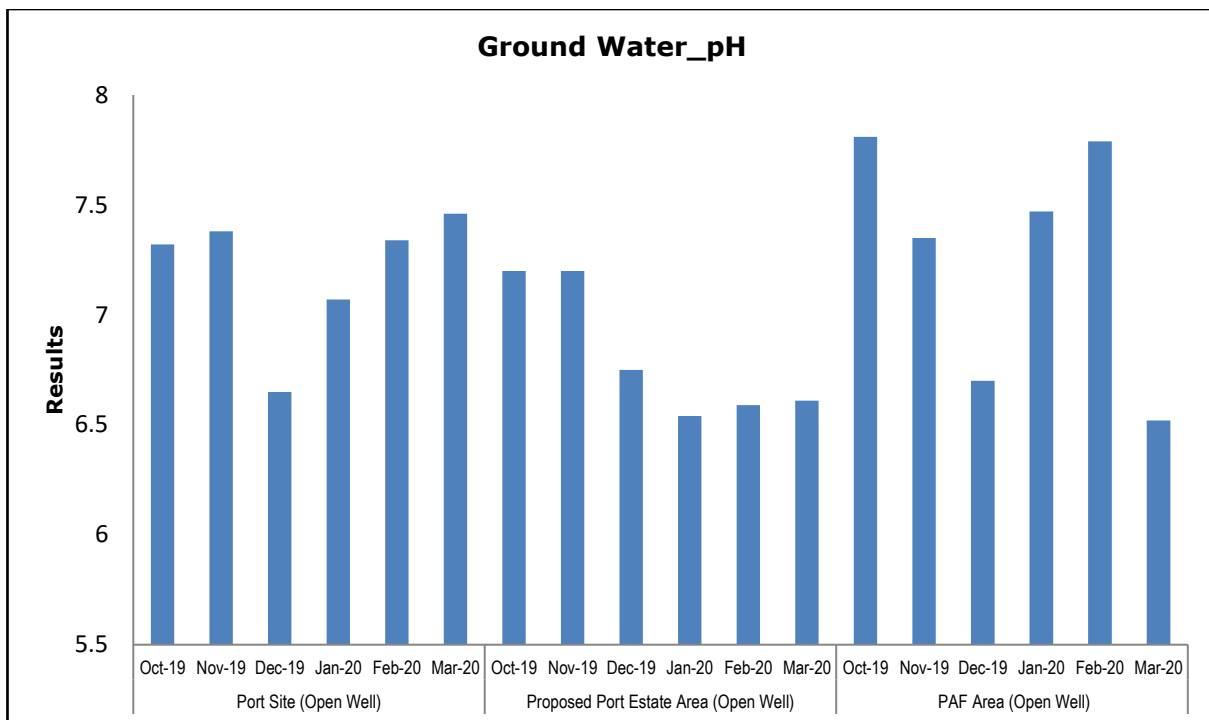


Figure 6.2: Ground Water Analysis for pH

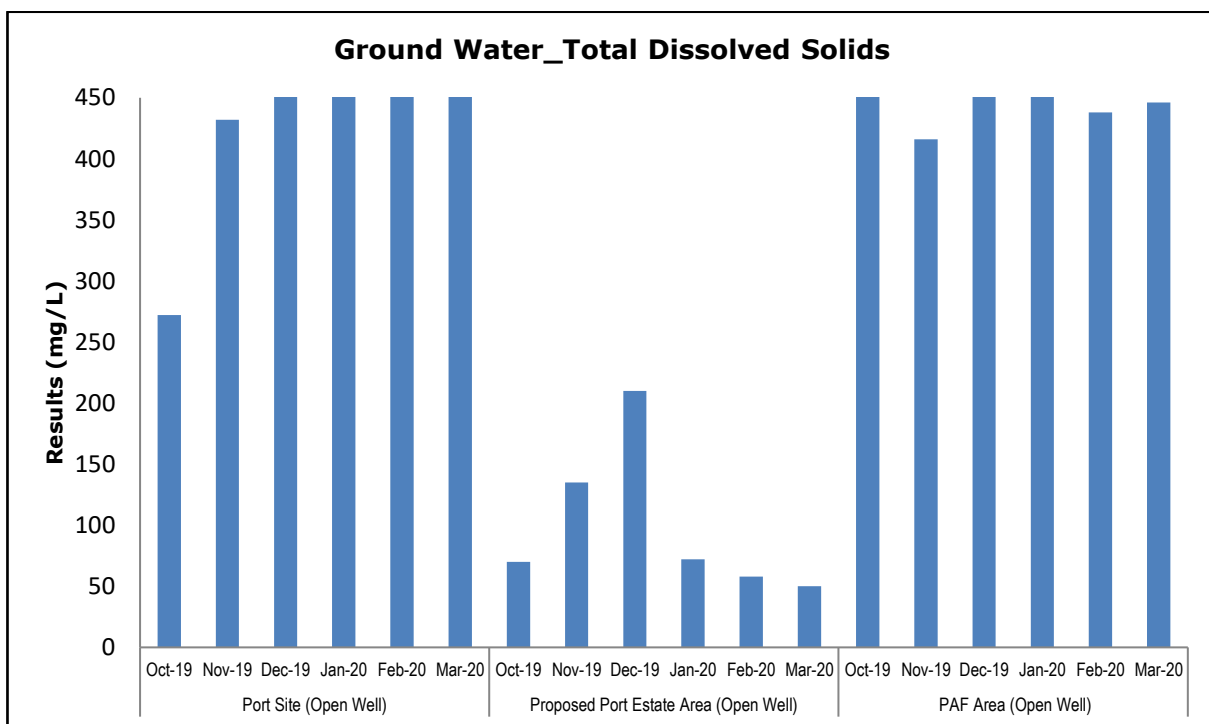


Figure 6.3: Ground Water Analysis for Total Dissolved Solids

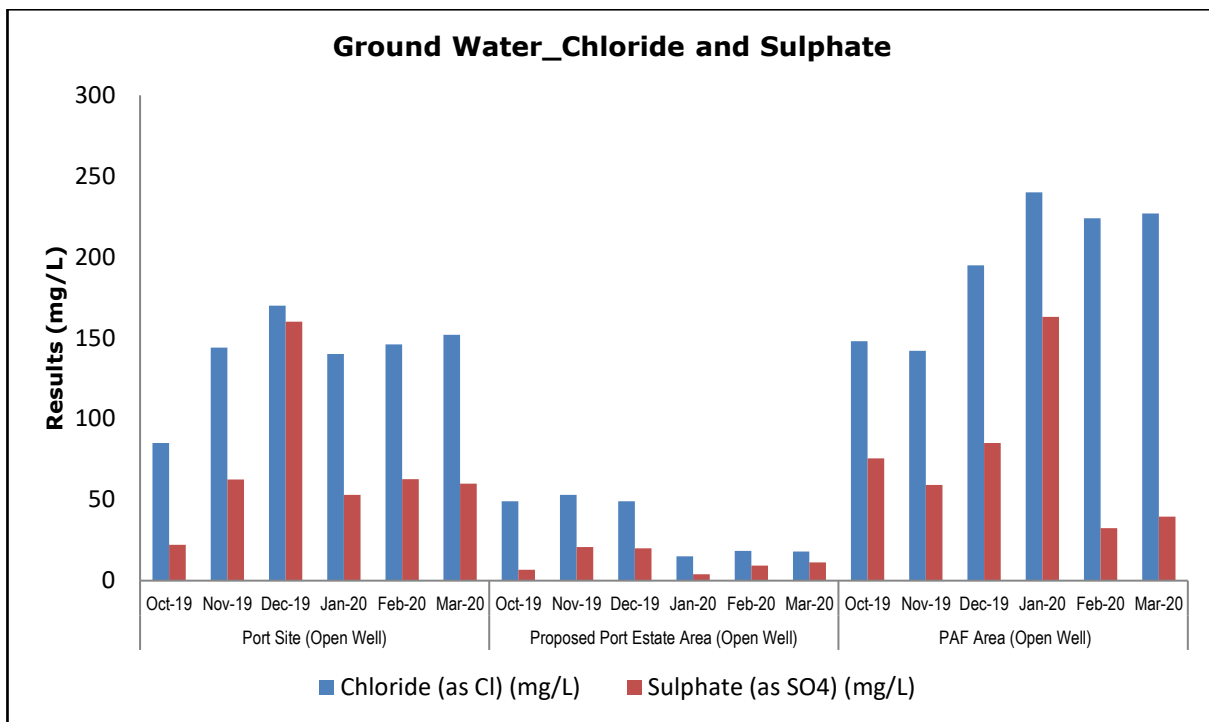


Figure 6.4: Ground Water Analysis for Chloride and Sulphate

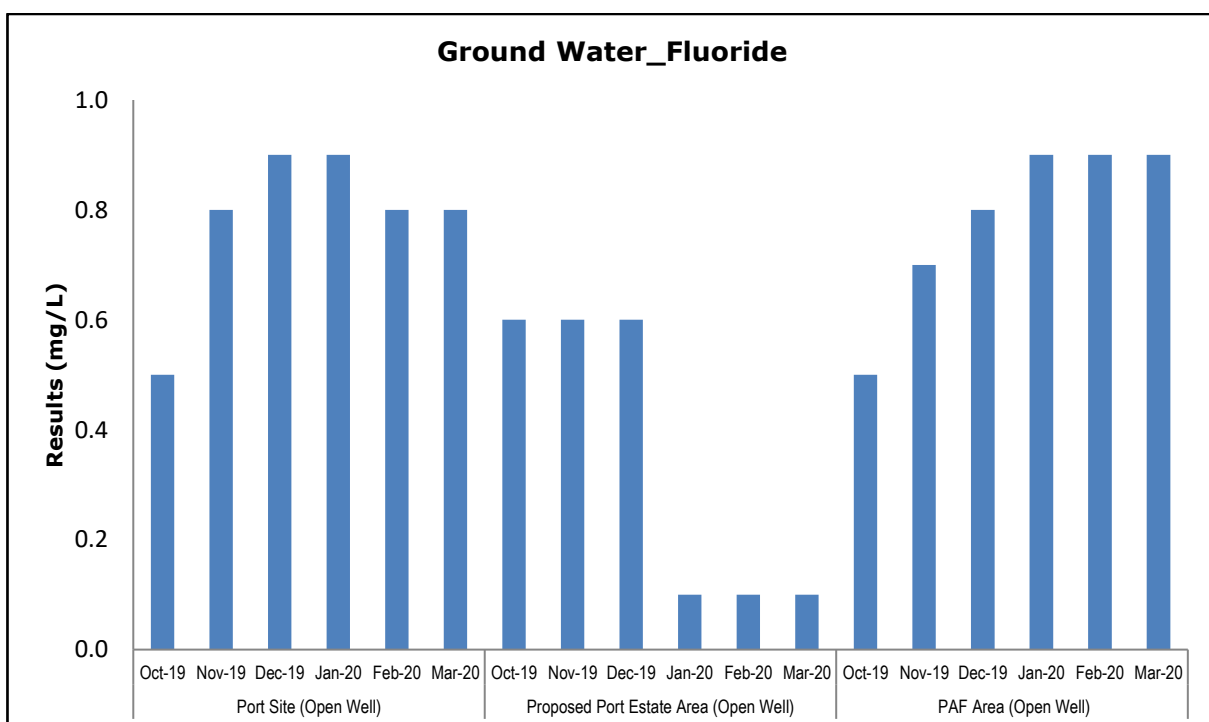


Figure 6.5: Ground Water Analysis for Fluoride

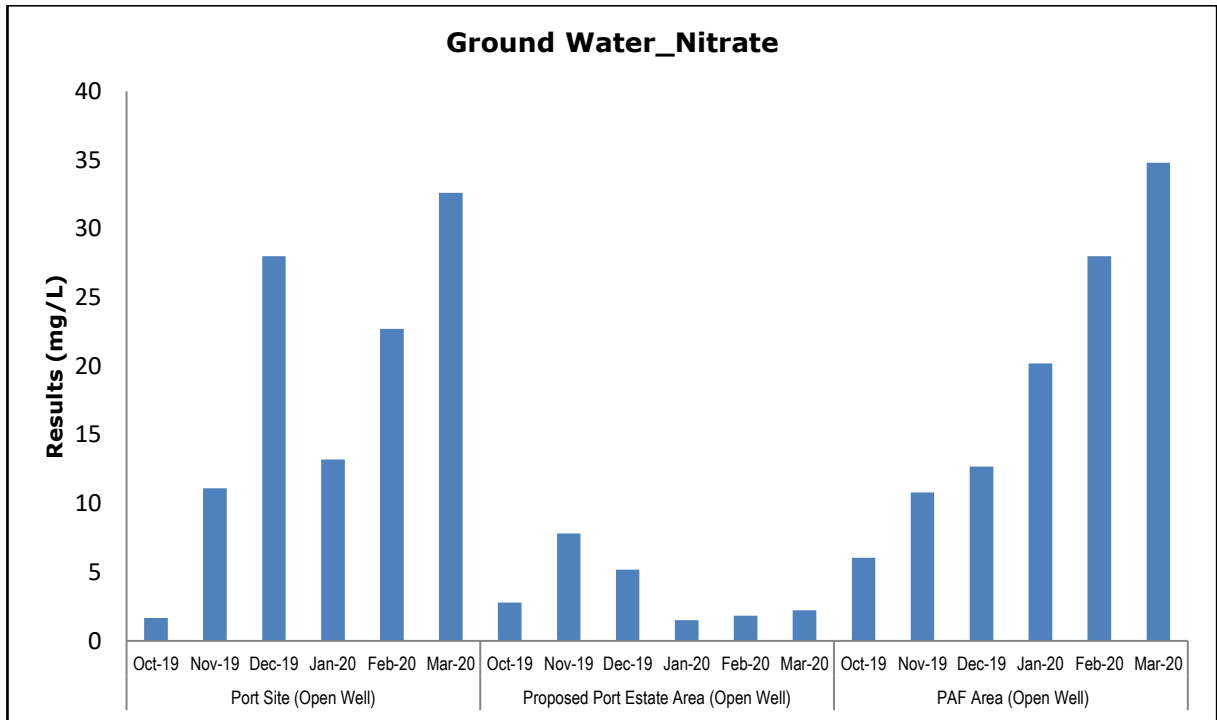


Figure 6.6: Ground Water Analysis for Nitrate

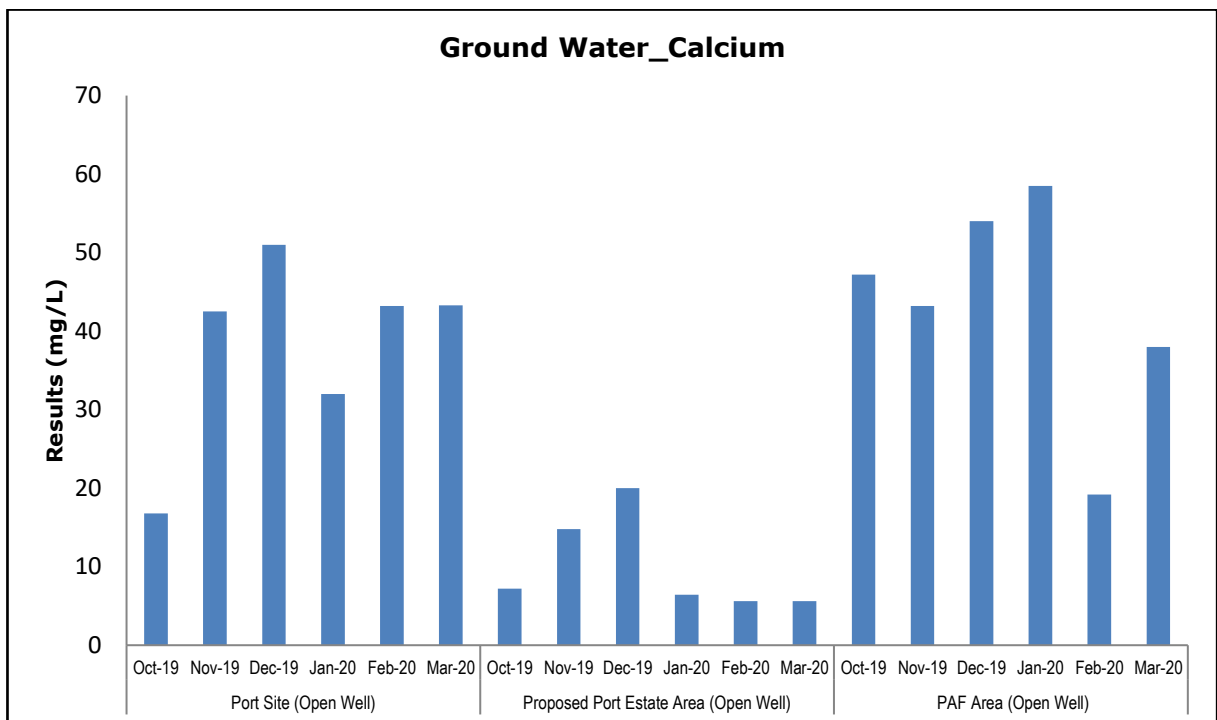


Figure 6.7: Ground Water Analysis for Calcium

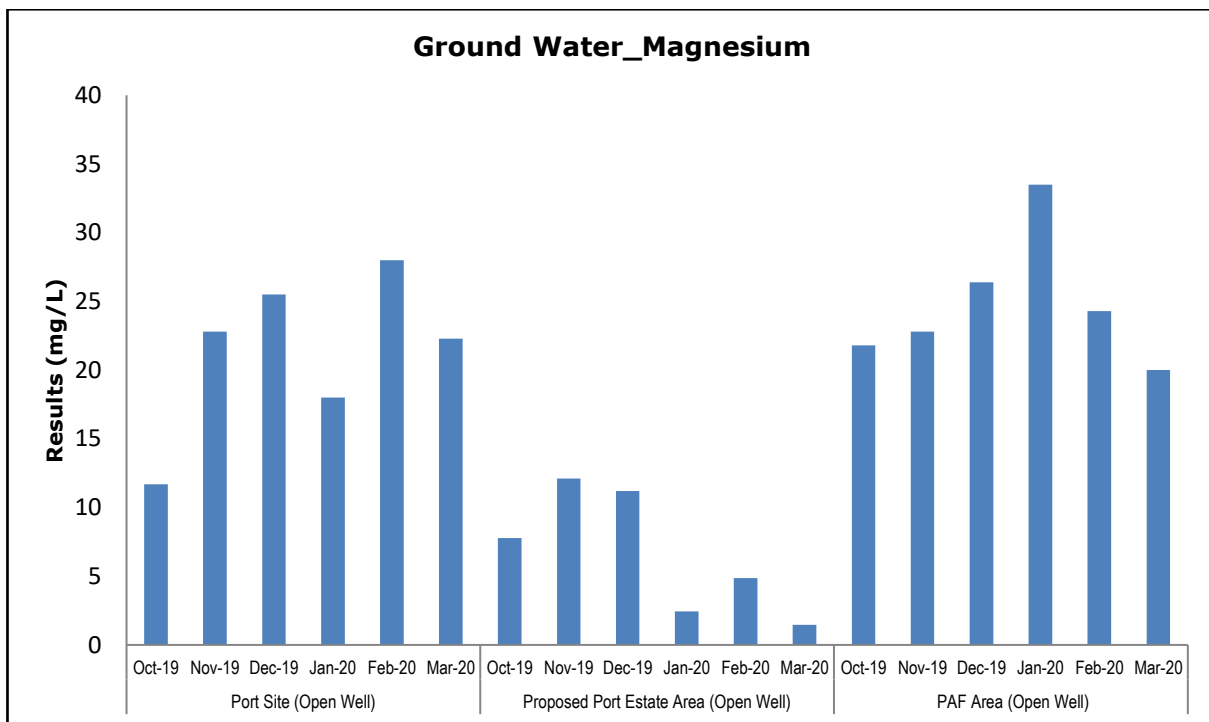


Figure 6.8: Ground Water Analysis for Magnesium

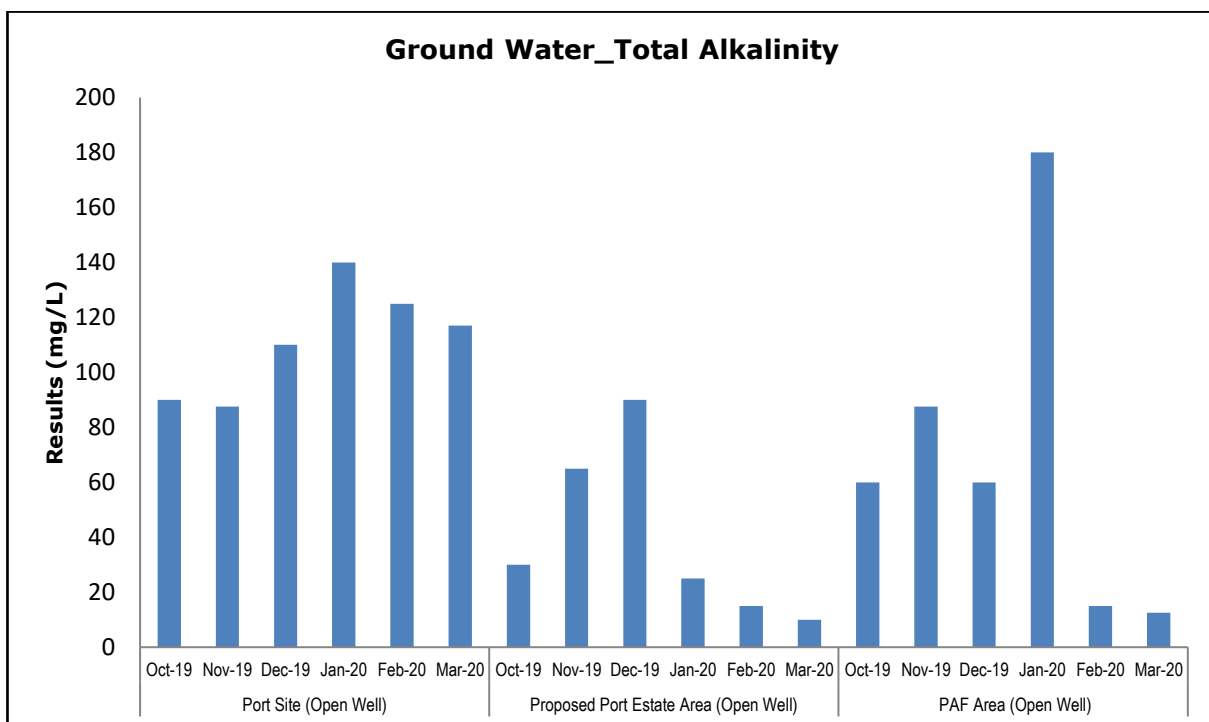


Figure 6.9: Ground Water Analysis for Total Alkalinity

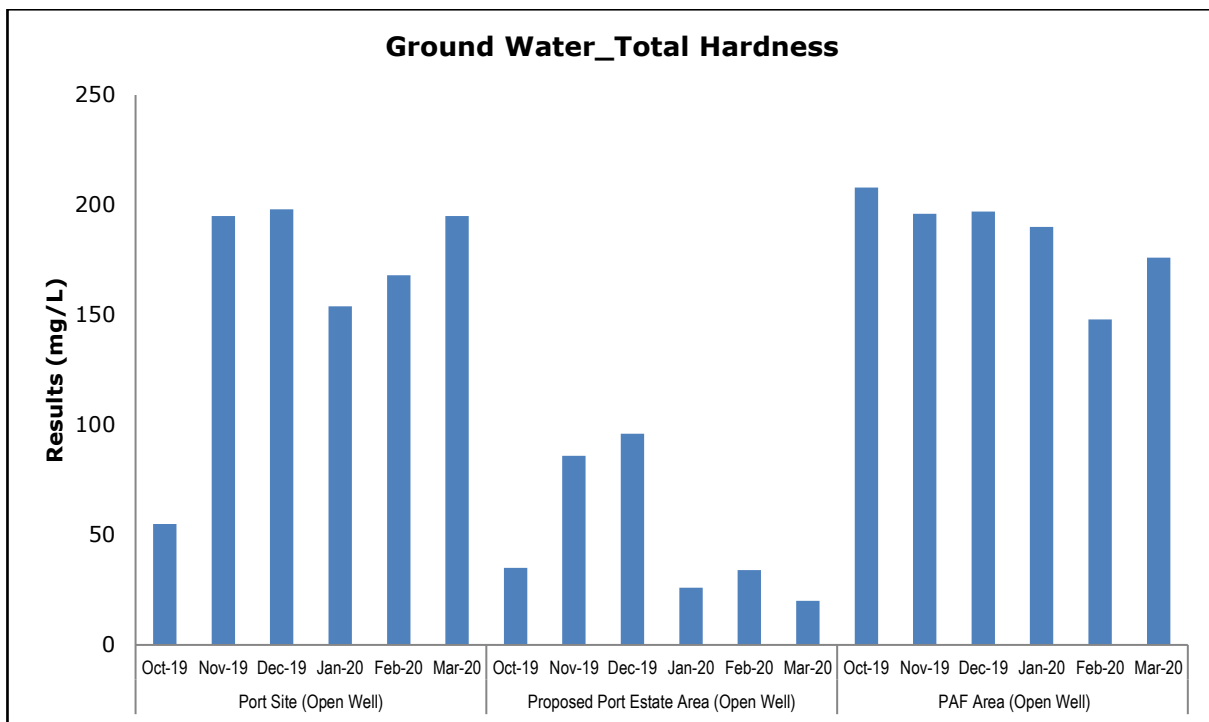


Figure 6.10: Ground Water Analysis for Total Hardness

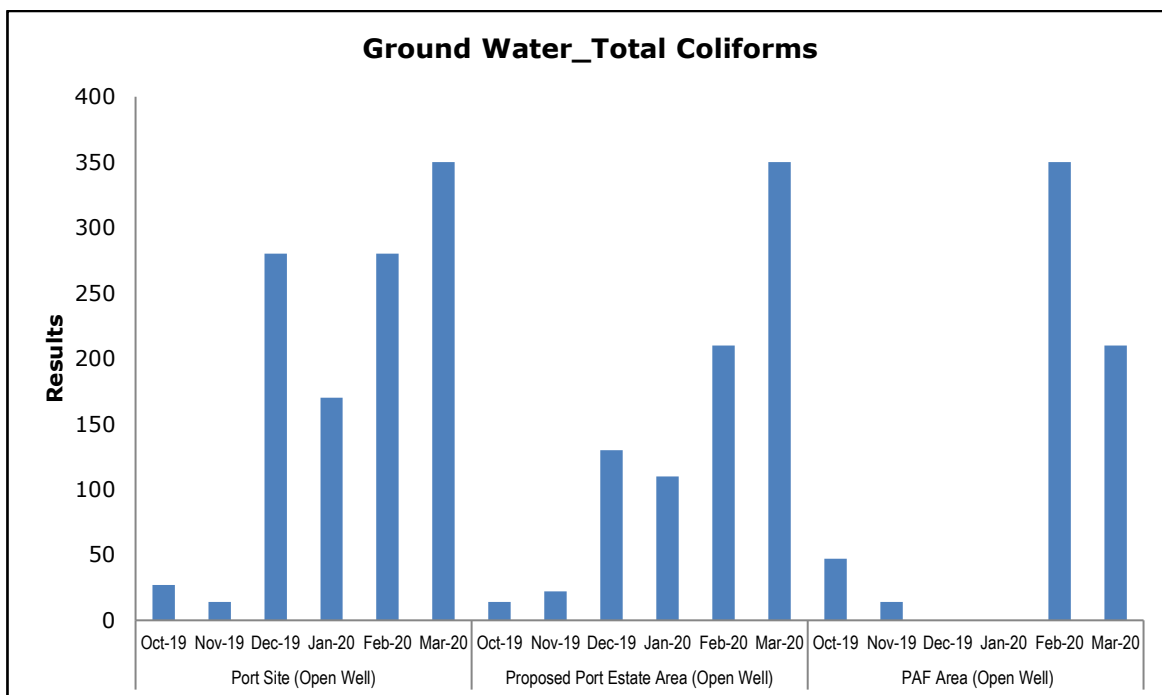




Figure 6.12: Ground Water Analysis for Total Coliforms

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5. Summary- Ground Water Analysis


During the period October 2019 to March 2020, at the location **Port Site** (Open Well), the Colour observed was 1 Hazen unit and the odour was agreeable. pH was observed in the range between 6.65-7.46. Turbidity was observed in the range between BDL to 1.52 NTU. Total Dissolved Solids was observed in the range between 272-486 mg/L. Calcium (as Ca) was observed in the range between 16.8 - 51mg/L. Chloride (as Cl) was observed in the range between 85 -170 mg/L. Fluoride (as F) was observed in the range between 0.5 - 0.9 mg/L. Iron (as Fe) was observed BDL. Magnesium (as Mg) was observed in the range between 11.7- 28 mg/L. Nitrate (as NO₃) was observed in the range between 1.67 - 32.6 mg/L. Sulphate (as SO₄) was observed in the range between 22.1-160 mg/L. Total Alkalinity (as CaCO₃) was observed in the range between 87.5-140 mg/L. Total Hardness (as CaCO₃) was observed in the range between 55-198 mg/L. Manganese (as Mn), Aluminium (as Al), Ammonia (as NH₃-N), Anionic Detergents, Barium (as Ba), Boron, Chloramines (as Cl₂), Copper (as Cu), Mineral Oil, Phenolic Compounds (as C₆H₅OH), Selenium (as Se), Silver (as Ag), Sulphide (as H₂S), Zinc (as Zn), Cadmium (as Cd), Cyanide (as CN), Lead (as Pb), Mercury (as Hg), Molybdenum (as Mo), Nickel (as Ni), Total Arsenic (as As), Total Chromium (as Cr), Pesticide Residues, Trihalomethanes, Polychlorinated Biphenyls (PCB) and Polynuclear Aromatic Hydrocarbons (PAH) were observed BDL. Bacteriological parameters such as *E.coli* was observed in the range between <1.8 - 79 MPN Index/100 mL and Total Coliforms were observed in the range between <1.8- 350 MPN Index/100 mL.

At the location **Proposed Port Estate Area** (Open Well), the Colour observed was 1 Hazen unit and the odour was agreeable. pH was observed in the range between 6.54 - 7.2. Turbidity was observed in the range between BDL - 1.4 NTU. Total Dissolved Solids was observed in the range between 50-210 mg/L. Calcium (as Ca) was observed in the range between 5.6 - 20mg/L. Chloride (as Cl) was observed in the range between 15 - 53 mg/L. Fluoride (as F) was observed in the range between 0.1- 0.6 mg/L. Iron (as Fe) was observed in the range between BDL - 0.198 mg/L. Magnesium (as Mg) was observed in the range between 1.45- 12.1 mg/L. Manganese (as Mn) was observed BDL. Nitrate (as NO₃) was observed in the range between 1.5 - 7.82 mg/L. Sulphate (as SO₄) was observed in the range between 4 - 20.8 mg/L. Total

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Alkalinity (as CaCO₃) was observed in the range between 10- 90 mg/L. Total Hardness (as CaCO₃) was observed in the range between 20-96 mg/L. Aluminium (as Al), Ammonia (as NH₃- N), Anionic Detergents, Barium (as Ba), Boron, Chloramines (as Cl₂), Copper (as Cu), Iron (as Fe), Mineral Oil, Phenolic Compounds (as C₆H₅OH), Selenium (as Se) and Silver (as Ag), Sulphide (as H₂S), Zinc (as Zn), Cadmium (as Cd), Cyanide (as CN), Lead (as Pb), Mercury (as Hg), Molybdenum (as Mo), Nickel (as Ni), Total Arsenic (as As), Total Chromium (as Cr), Pesticide Residues, Trihalomethanes, Polychlorinated Biphenyls (PCB) and Polynuclear Aromatic Hydrocarbons (PAH) were observed BDL. Bacteriological parameters such as *E.coli* was observed <1.8 - 14 MPN Index/100 mL and Total Coliforms were observed in the range between 14- 350 MPN Index/100 mL.


At the location **Proposed PAF Area** (Open Well), the Colour observed was 1 Hazen unit and the odour was agreeable. pH was observed in the range between 6.52-7.81. Turbidity was observed in the range between BDL - 0.46 NTU. Total Dissolved Solids was observed in the range between 416-480 mg/L. Calcium (as Ca) was observed in the range between 19.2 - 58.5 mg/L. Chloride (as Cl) was observed in the range between 142 - 240 mg/L. Fluoride (as F) was observed in the range between 0.5 - 0.9 mg/L. Iron (as Fe) was observed BDL. Magnesium (as Mg) was observed in the range between 20- 33.5 mg/L. Manganese (as Mn) was observed BDL. Nitrate (as NO₃) was observed in the range between 6.06 - 34.8 mg/L. Sulphate (as SO₄) was observed in the range between 32.5 - 163 mg/L. Total Alkalinity (as CaCO₃) was observed in the range between 12.5 - 180 mg/L. Total Hardness (as CaCO₃) was observed in the range between 148 - 208 mg/L. Aluminium, Ammonia (as NH₃- N), Anionic Detergents and Barium (as Ba), Boron (as B), Chloramines (as Cl₂), Copper (as Cu), Manganese (as Mn), Mineral Oil, Phenolic Compounds (as C₆H₅OH), Selenium (as Se) and Silver (as Ag), Sulphide (as H₂S), Cadmium (as Cd), Cyanide (as CN), Lead (as Pb), Mercury (as Hg), Molybdenum (as Mo), Nickel (as Ni), Total Arsenic (as As), Total Chromium (as Cr), Pesticide Residues, Trihalomethanes, Polychlorinated Biphenyls (PCB), Polynuclear Aromatic Hydrocarbons (PAH) and Zinc (as Zn) were observed BDL. Bacteriological parameters such as *E.coli* was observed <1.8 MPN Index/100 mL and Total Coliforms were observed in the range <1.8 to 350 MPN Index/100 mL.

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6. Surface Water Analysis Results for the period October 2019 to March 2020:

Table 6.6: Location - Poovar West Canal

Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Physical Parameters							
Colour	Hazen Units	1	1	1	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
p ^H Value	-	7.53	7.32	6.6	6.58	8.02	6.83
Turbidity	N.T.U.	2.2	0.89	1.95	0.5	1.86	0.28
Electrical Conductivity (at 25°C)	µmho/cm	213	164	167	842	1071	2108
Total Dissolved Solids	mg/L	134	92	92	488	600	1180
Chemical Parameters							
Dissolved Oxygen	mg/L	6.2	6.4	6.5	6.9	6.5	6.0
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	1.8	BDL	BDL	BDL	BDL	BDL
Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Free Ammonia	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Anionic Detergents (as MBAS) Calculated as LAS mol. wt. 288.38	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Barium (as Ba)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Boron (as B)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Calcium (as Ca)	mg/L	13.6	10.4	8	22.4	12	43.3
Chloride (as Cl)	mg/L	44.9	32.5	23	244	282	590
Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	0.3	0.4	0.1	0.3	0.3	1.2
Iron (as Fe)	mg/L	0.96	BDL	BDL	0.86	0.091	BDL
Magnesium (as Mg)	mg/L	2.43	5.83	4.8	10.7	15.5	26.2
Manganese (as Mn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Mineral Oil	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO ₃)	mg/L	1.64	3.32	2.1	5.4	1.4	2.34
Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Silver (as Ag)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate (as SO ₄)	mg/L	19.1	8.84	6.75	39.5	32.4	98
Total Phosphate (as PO ₄)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as CaCO ₃)	mg/L	17.5	17.5	40	25	20	22.5
Total Hardness (as CaCO ₃)	mg/L	44	50	40	100	94	216
Calcium Hardness (as CaCO ₃)	mg/L	34	26	20	56	64	108
Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sodium (as Na)	mg/L	16.3	11.8	17	138	101	214

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Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Potassium (as K)	mg/L	4.5	3.1	3.1	11.5	10	14.9
Sodium Absorption Ratio	-	1.06	0.73	1.15	6	4.57	6.32
Cadmium (as Cd)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Cyanide (as CN)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Lead (as Pb)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Mercury (as Hg)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Pesticide Residues							
Alachlor	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Atrazine	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Aldrin/Dieldrin	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Alpha HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Beta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Butachlor	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Chlorpyrifos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Delta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
2,4D chlorophenoxyacetic acid	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
DDT (o,p & p,p- Isomers of DDT, DDE, DDD)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Endosulfan (a, b & Sulphate)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Ethion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
γ HCH (Lindane)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Isoproturon	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Malathion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Methyl Parathion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Monocrotophos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Phorate	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear Aromatic Hydrocarbons (PAH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Arsenic (as As)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium (as Cr)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Biological Analysis							
Total Coliforms	MPN Index/ 100 mL	220	11	34	920	540	1600
Faecal Coliforms	MPN Index/ 100 mL	47	4.5	14	350	220	350



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Table 6.7: Location - Vizhinjam Branch Canal

Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Physical Parameters							
Colour	Hazen Units	1	1	1	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
p ^H Value	-	7.62	7.13	7.08	6.88	7.08	6.75
Turbidity	N.T.U.	1.8	1.11	2.1	0.9	BDL	0.41
Electrical Conductivity (at 25°C)	µmho/cm	400	232	229	198	262	192
Total Dissolved Solids	mg/L	264	132	128	110	144	112
Chemical Parameters							
Dissolved Oxygen	mg/L	5.2	6.3	7.1	6.5	6.2	6.2
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	1.6	1	BDL	1.9	1.6	1.1
Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Free Ammonia	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Anionic Detergents (as MBAS) Calculated as LAS mol.wt. 288.38	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Barium (as Ba)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Boron (as B)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Calcium (as Ca)	mg/L	17.6	14.4	8.01	9.61	12.8	9.6
Chloride (as Cl)	mg/L	70	38.5	39	38.5	33.5	39.4
Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	0.4	0.5	0.6	0.2	0.1	0.2
Iron (as Fe)	mg/L	1.28	BDL	BDL	0.47	0.321	BDL
Magnesium (as Mg)	mg/L	8.74	7.29	4.37	4.37	4.35	5.8
Manganese (as Mn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Mineral Oil	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO ₃)	mg/L	11.5	6.64	6.04	4.23	5.02	3.57
Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Silver (as Ag)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate (as SO ₄)	mg/L	42.4	16.8	8.1	2.39	11.5	7.06
Total Phosphate (as PO ₄)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as CaCO ₃)	mg/L	30	32.5	32	35	37.5	32.5
Total Hardness (as CaCO ₃)	mg/L	80	66	38	42	50	48
Calcium Hardness (as CaCO ₃)	mg/L	44	36	20	24	32	24
Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sodium (as Na)	mg/L	49	20.9	25.6	25	20.7	23.1
Potassium (as K)	mg/L	11.8	3.4	6.6	0.29	5	2.3
Sodium Absorption Ratio	-	2.39	1.11	1.8	1.68	1.27	1.47

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Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Cadmium (as Cd)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Cyanide (as CN)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Lead (as Pb)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Mercury (as Hg)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Pesticide Residues							
Alachlor	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Atrazine	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Aldrin/Dieldrin	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Alpha HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Beta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Butachlor	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Chlorpyrifos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Delta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
2,4D chlorophenoxyacetic acid	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
DDT (o,p & p,p- Isomers of DDT, DDE, DDD)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Endosulfan (a, b & Sulphate)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Ethion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
γ HCH (Lindane)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Isoproturon	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Malathion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Methyl Parathion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Monocrotophos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Phorate	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear Aromatic Hydrocarbons (PAH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Arsenic (as As)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium (as Cr)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Biological Analysis							
Total Coliforms	MPN Index/ 100 mL	34	14	49	280	540	920
Faecal Coliforms	MPN Index/ 100 mL	14	9.3	17	220	170	130



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Table 6.8: Location - Vellayani Lake

Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Physical Parameters							
Colour	Hazen Units	1	1	1	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
p ^H Value	-	7.97	7.15	6.97	6.57	6.54	6.66
Turbidity	N.T.U.	0.92	0.9	4.18	0.6	BDL	0.39
Electrical Conductivity (at 25°C)	µmho/cm	162	152	171	157	236	165
Total Dissolved Solids	mg/L	90	92	96	88	130	92
Chemical Parameters							
Dissolved Oxygen	mg/L	5.5	6.8	6.9	5.5	5.6	5.9
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	1.4	BDL	1.0	3	1.7	1.5
Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Free Ammonia	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Anionic Detergents (as MBAS) Calculated as LAS mol. wt. 288.38	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Barium (as Ba)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Boron (as B)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Calcium (as Ca)	mg/L	10.4	11.2	8.01	7.21	12	10.4
Chloride (as Cl)	mg/L	29	29	28.5	30.5	38.5	33.4
Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	0.2	0.4	0.2	0.1	0.4	0.1
Iron (as Fe)	mg/L	0.173	BDL	BDL	0.5	0.276	BDL
Magnesium (as Mg)	mg/L	5.83	5.34	4.37	2.91	2.43	3.4
Manganese (as Mn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Mineral Oil	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO ₃)	mg/L	1.98	2.28	1.98	1.96	1.67	1.96
Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Silver (as Ag)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate (as SO ₄)	mg/L	6.8	7.2	8.55	BDL	2.6	BDL
Total Phosphate (as PO ₄)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as CaCO ₃)	mg/L	30	30	30	33	32.5	27.5
Total Hardness (as CaCO ₃)	mg/L	50	50	38	30	40	40
Calcium Hardness (as CaCO ₃)	mg/L	26	28	20	18	30	26
Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sodium (as Na)	mg/L	11.8	12.1	17.6	22	18.8	20.3
Potassium (as K)	mg/L	3.8	3.2	5.2	2	6.3	3.1
Sodium Absorption Ratio	-	0.72	0.75	1.24	1.75	1.28	1.41

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Parameter	Unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Cadmium (as Cd)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Cyanide (as CN)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Lead (as Pb)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Mercury (as Hg)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Pesticide Residues							
Alachlor	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Atrazine	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Aldrin/Dieldrin	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Alpha HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Beta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Butachlor	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Chlorpyrifos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Delta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
2,4D chlorophenoxyacetic acid	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
DDT (o,p & p,p- Isomers of DDT, DDE, DDD)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Endosulfan (a, b & Sulphate)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Ethion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
γ HCH (Lindane)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Isoproturon	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Malathion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Methyl Parathion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Monocrotophos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Phorate	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear Aromatic Hydrocarbons (PAH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Arsenic (as As)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium (as Cr)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Biological Analysis							
Total Coliforms	MPN Index/ 100 mL	39	47	27	58	220	110
Faecal Coliforms	MPN Index/ 100 mL	17	14	14	46	39	70

7. Graphical representation of Results for the period October 2019 to March 2020:

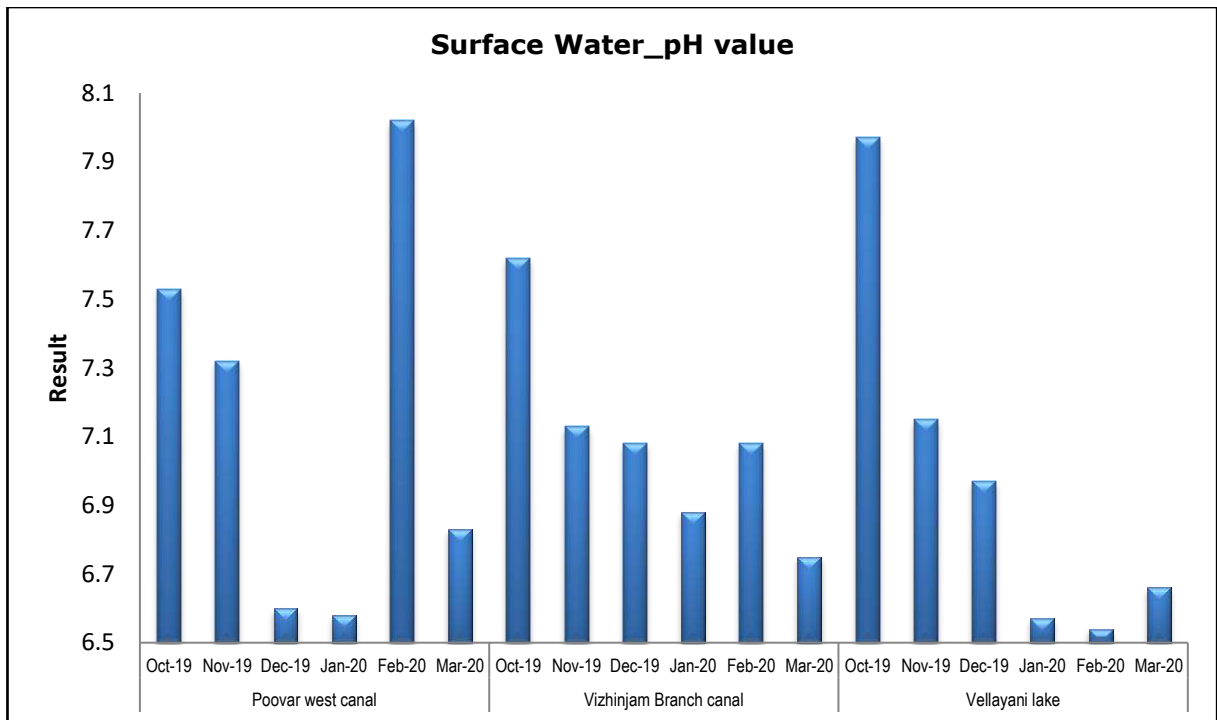


Figure 6.11: Surface Water Analysis for pH value

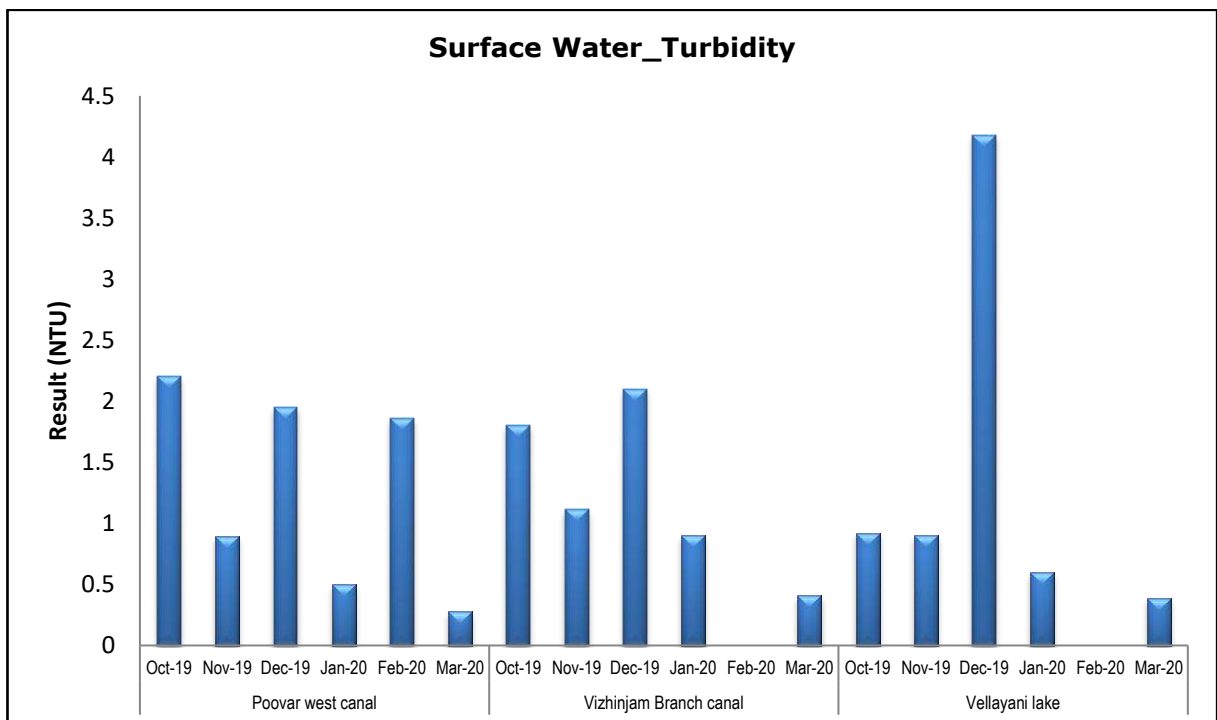


Figure 6.12: Surface Water Analysis for Turbidity

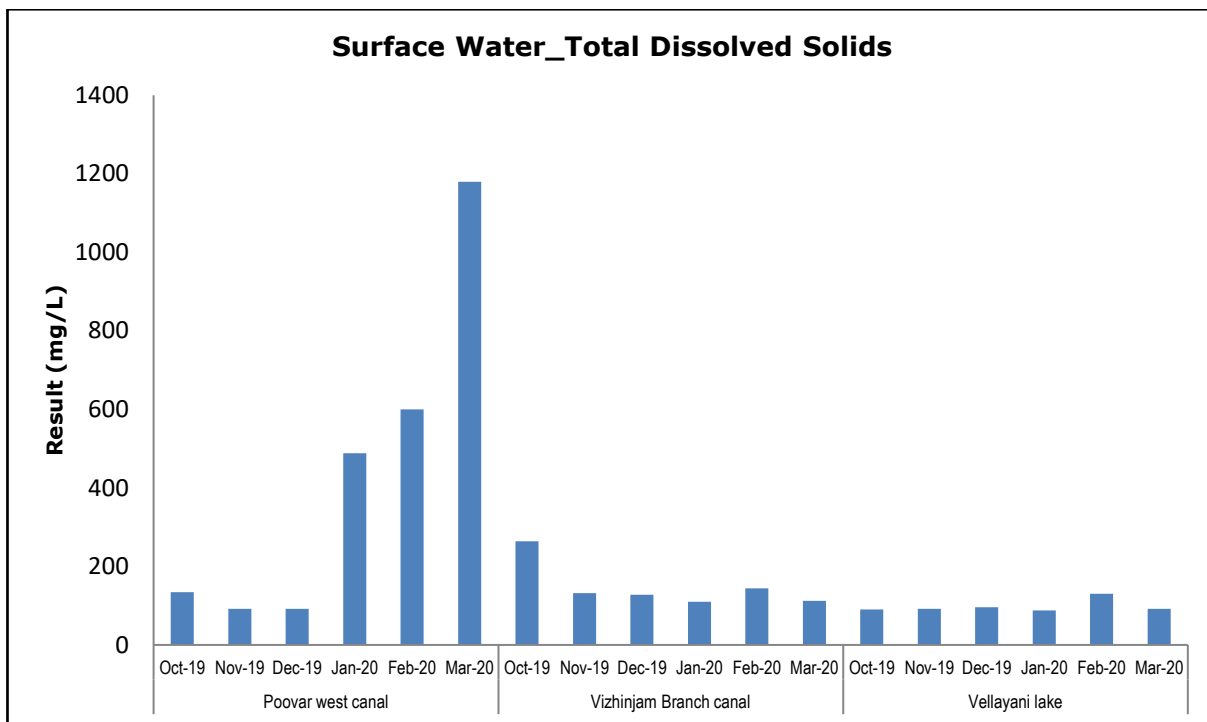


Figure 6.13: Surface Water Analysis for Total Dissolved Solids

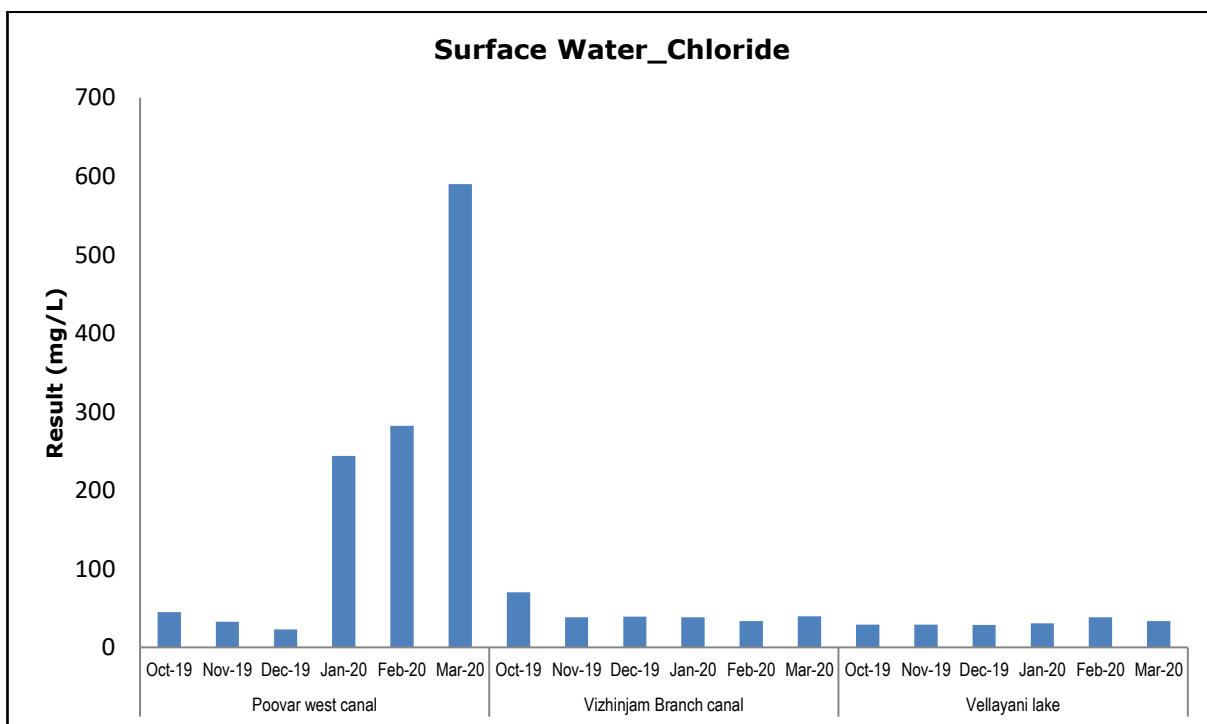


Figure 6.14: Surface Water Analysis for Chloride

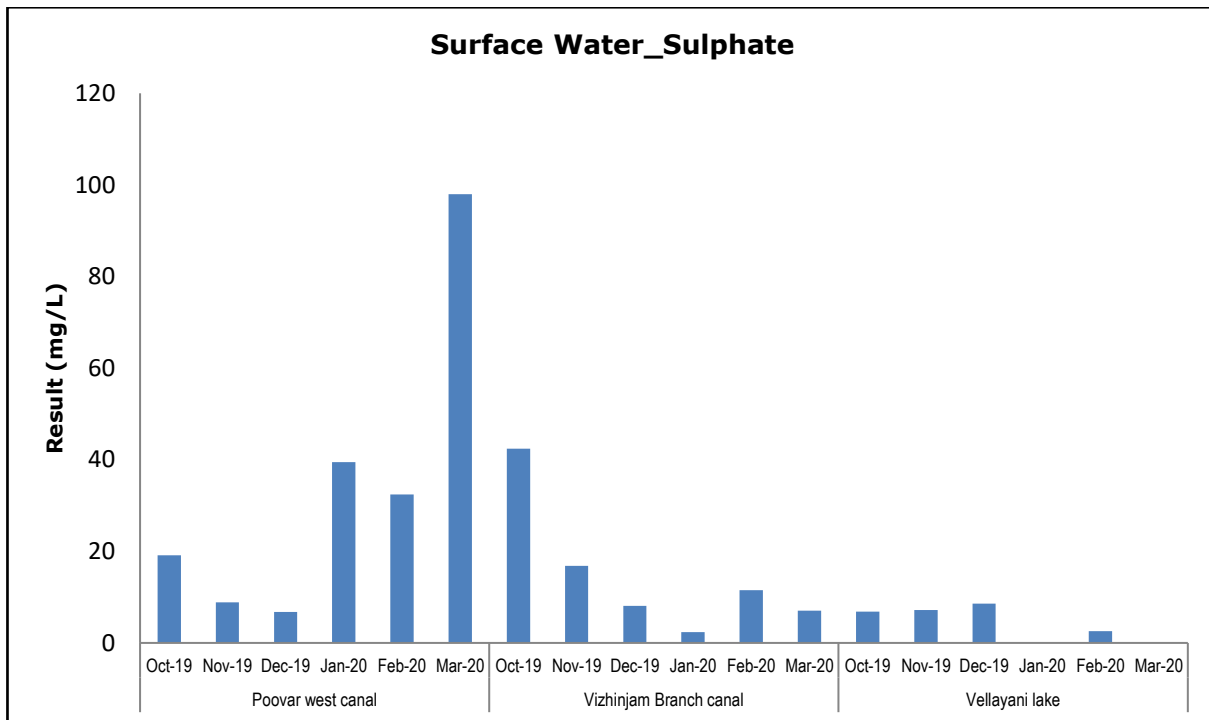


Figure 6.15: Surface Water Analysis for Sulphate

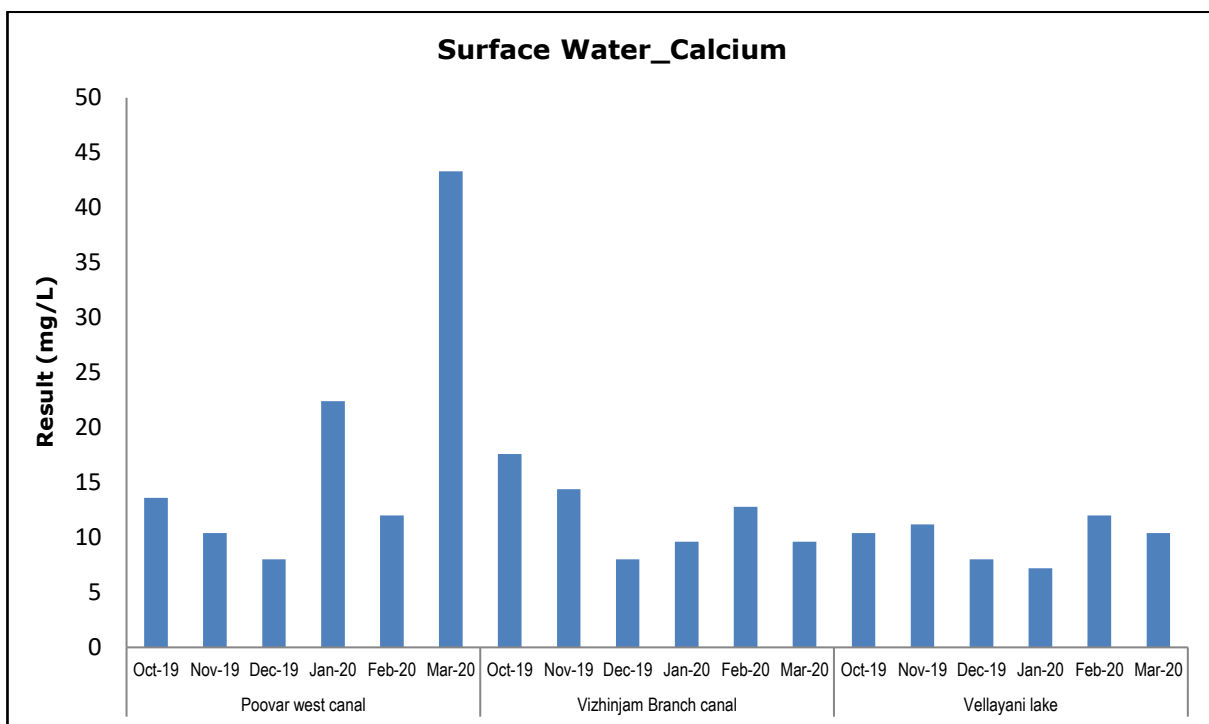


Figure 6.16: Surface Water Analysis for Calcium

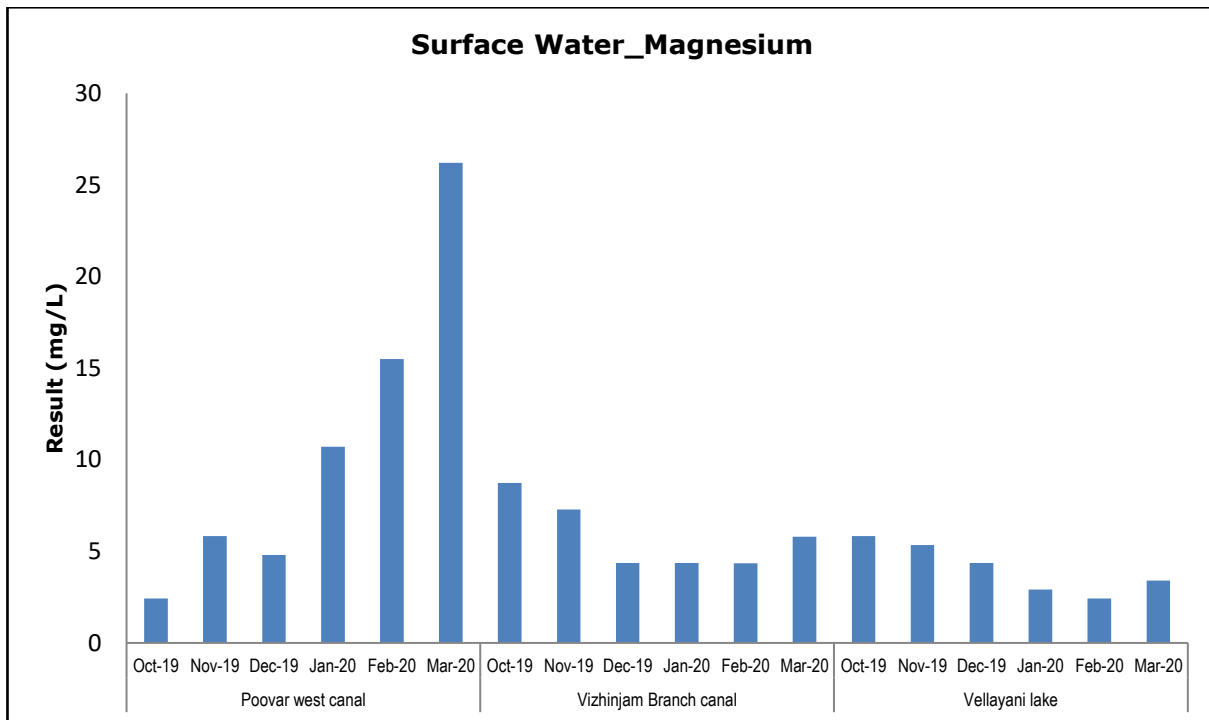


Figure 6.16: Surface Water Analysis for Magnesium

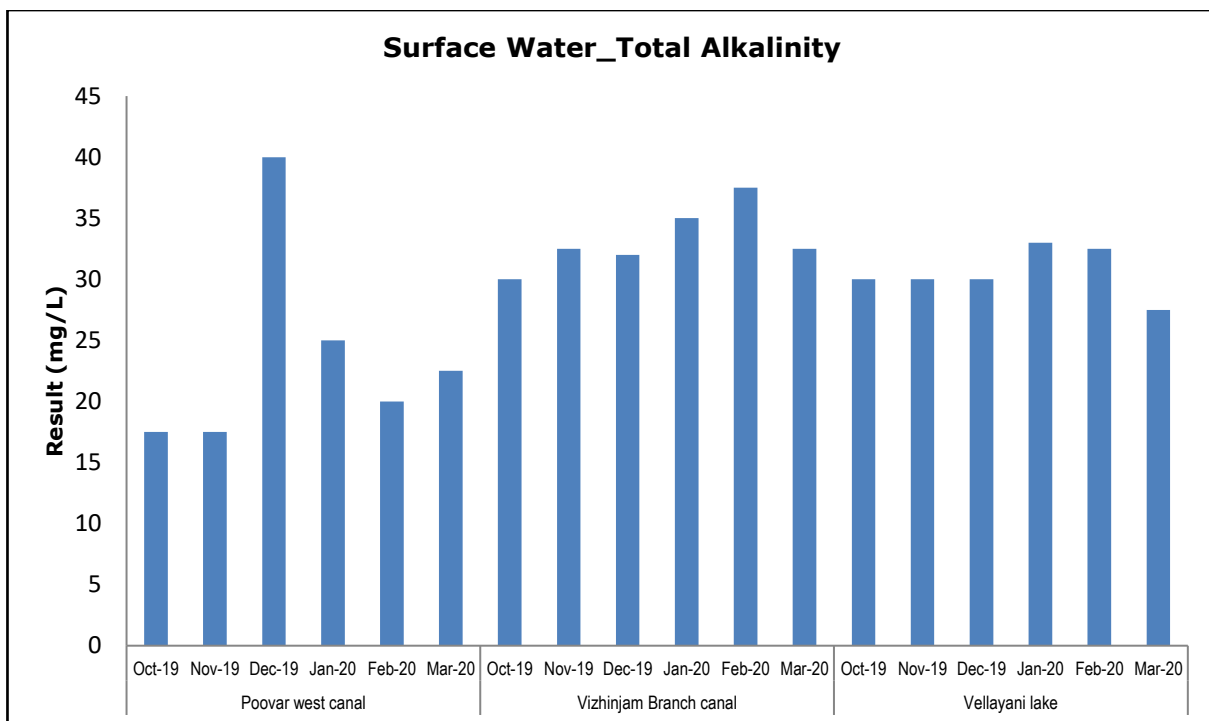


Figure 6.17: Surface Water Analysis for Total Alkalinity

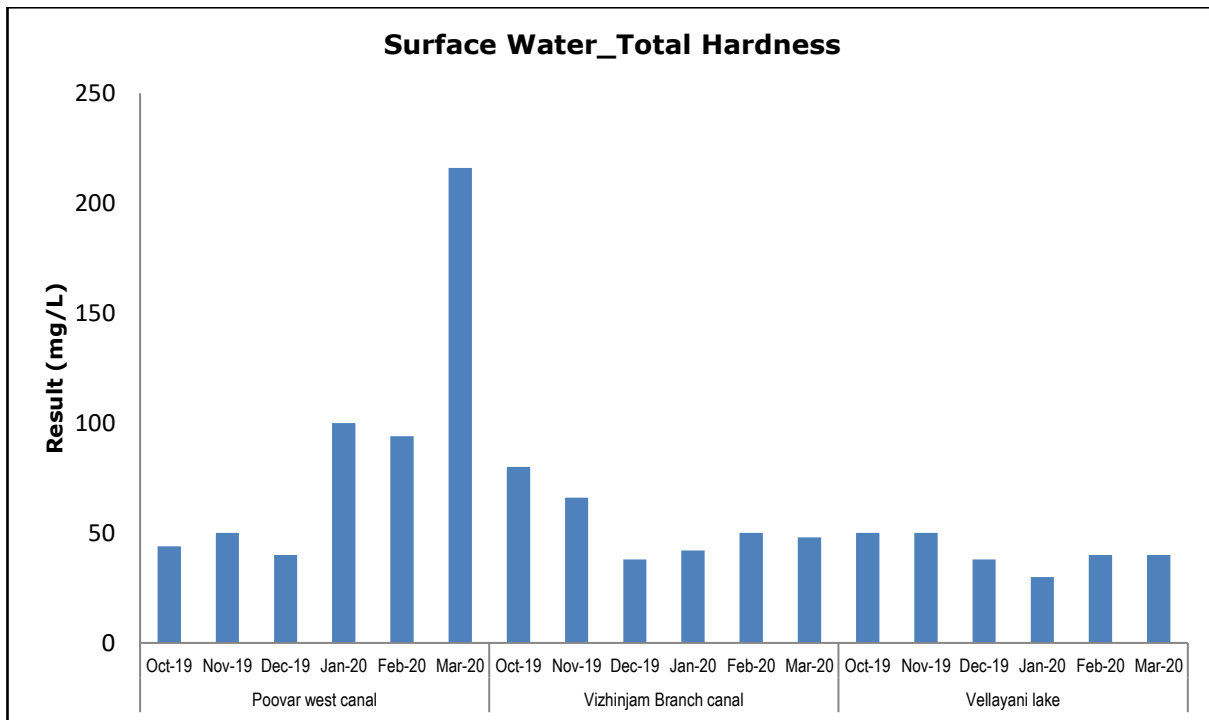


Figure 6.18: Surface Water Analysis for Total Hardness

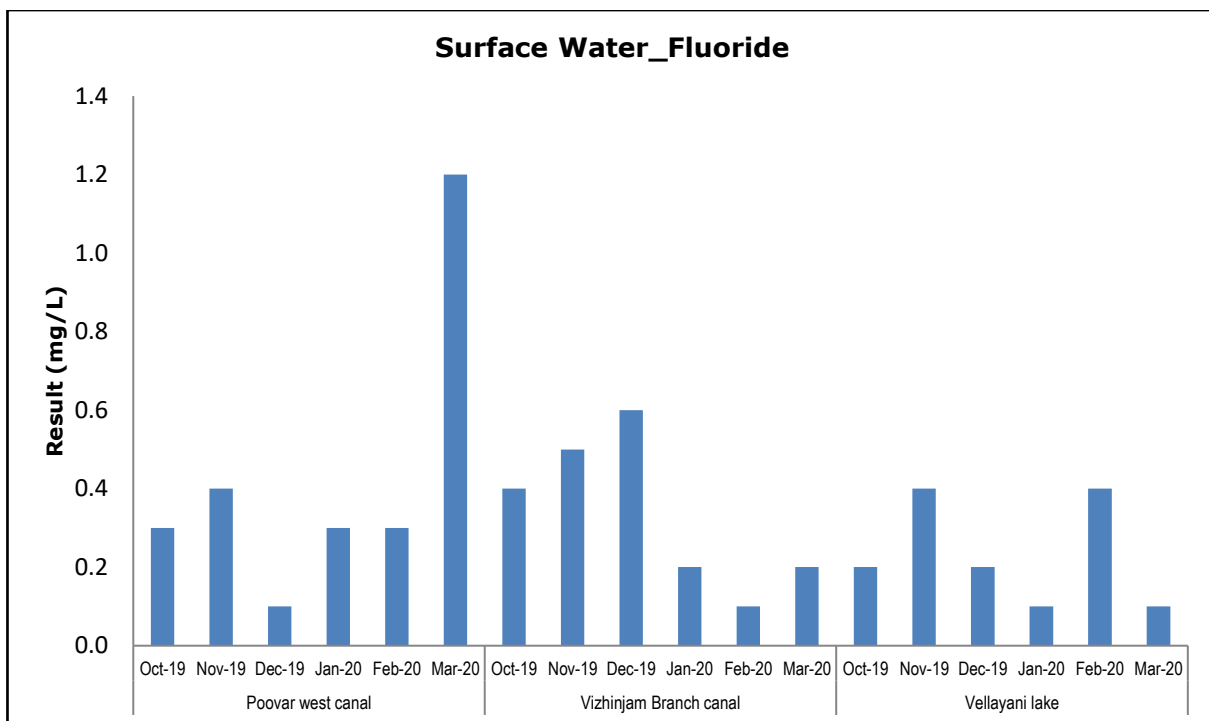


Figure 6.19: Surface Water Analysis for Fluoride

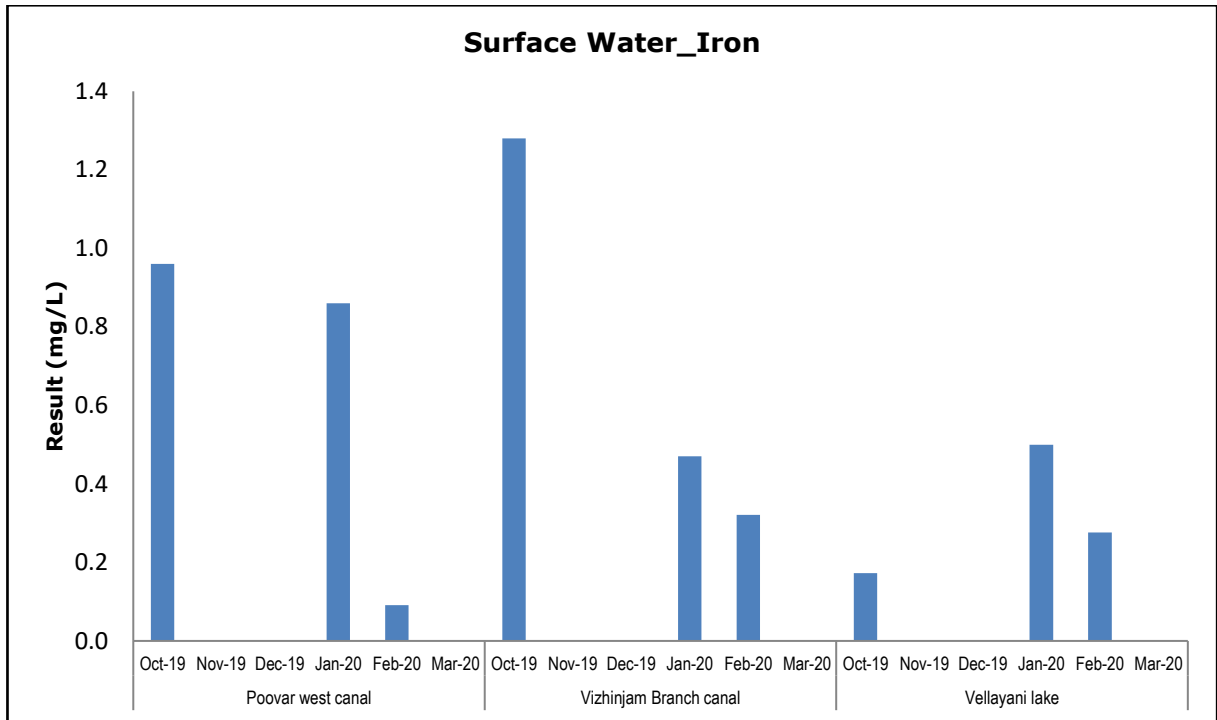


Figure 6.20: Surface Water Analysis for Iron

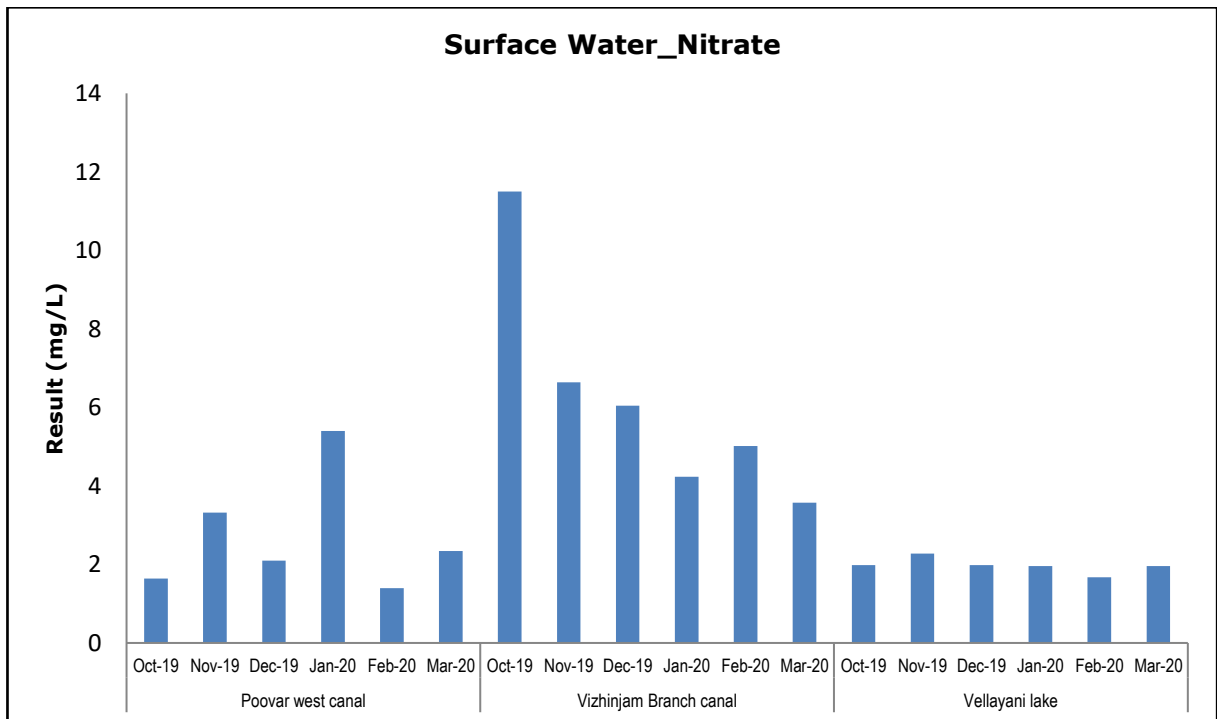


Figure 6.21: Surface Water Analysis for Nitrate

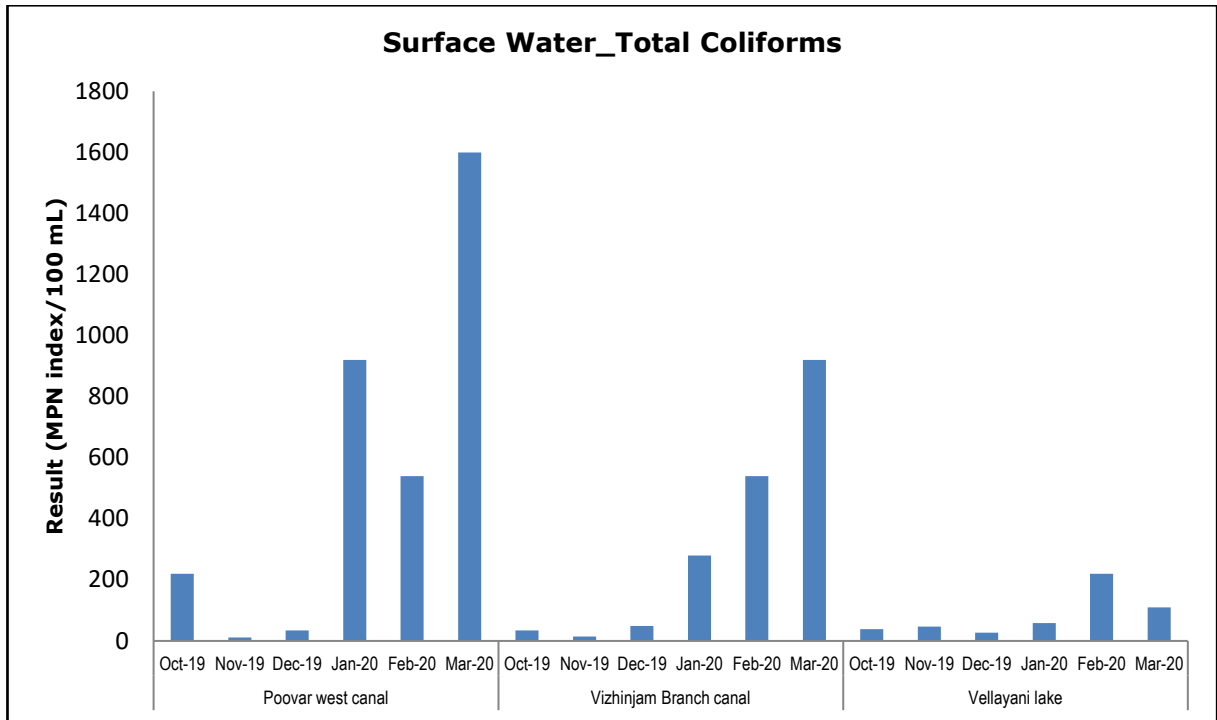


Figure 6.22: Surface Water Analysis for Total Coliforms

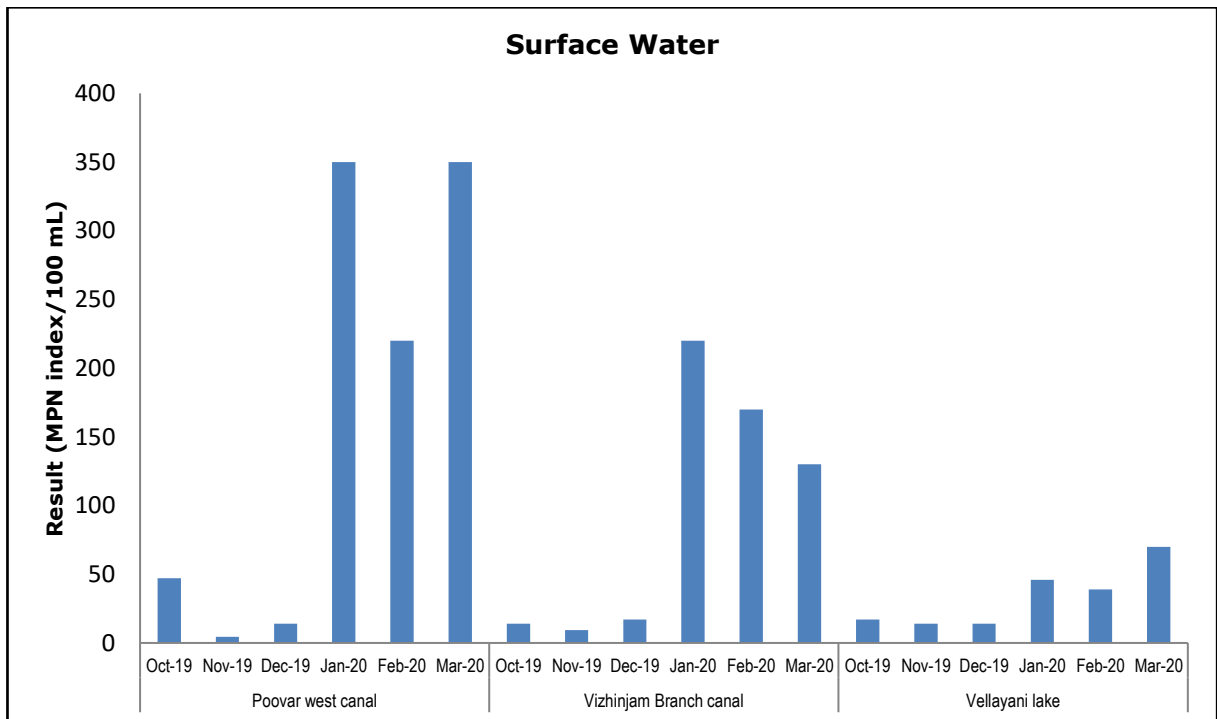




Figure 6.23: Surface Water Analysis for Faecal Coliforms

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8. Summary of Surface water


During the period October 2019 to March 2020, at the location **Poovar West Canal**, Colour was observed 1 Hazen unit and odour was agreeable. pH was observed in the range between 6.58 - 8.02. Turbidity was observed in the range between 0.28-2.2 NTU. Total Dissolved Solids was observed in the range between 92 - 1180 mg/L. Electrical Conductivity was observed in the range between 164 - 2108 $\mu\text{mho/cm}$. Dissolved Oxygen was observed in the range between 6 - 6.9 mg/L. Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between BDL- 1.80 mg/L. Calcium (as Ca) was observed in the range between 8 - 18.28mg/L. Chloride (as Cl) was observed in the range between 23 -590 mg/L. Fluoride (as F) was observed in the range 0.1 - 1.20 mg/L. Iron (as Fe) was observed in the range between BDL - 0.96 mg/L. Magnesium (as Mg) was observed in the range between 2.43 - 26.20 mg/L. Manganese (as Mn) was observed BDL. Nitrate (as NO_3) was observed in the range between 1.40 - 5.40 mg/L. Sulphate (as SO_4) was observed in the range between 6.75 - 98 mg/L. Total Alkalinity (as CaCO_3) was observed in the range between 17.5 - 40 mg/L. Total Hardness (as CaCO_3) was observed in the range between 40 -216 mg/L. Calcium Hardness (as CaCO_3) was observed in the range between 20 - 108 mg/L. Sodium (as Na) was observed in the range between 11.8 - 214 mg/L. Potassium (as K) was observed in the range between 3.10 - 14.90 mg/L. Sodium Absorption Ratio was observed in the range between 0.73 - 6.32 mg/L. Free Ammonia, Total Phosphate (as PO_4), Oil & Grease, Anionic Detergents, Barium (as Ba), Boron (as B), Copper (as Cu), Mineral Oil, Phenolic Compounds (as $\text{C}_6\text{H}_5\text{OH}$), Selenium (as Se), Silver (as Ag), Zinc (as Zn), Cadmium (as Cd), Cyanide (as CN), Lead (as Pb), Mercury (as Hg), Total Arsenic (as As), Total Chromium (as Cr), Pesticide Residues and Polynuclear Aromatic Hydrocarbons (PAH) were observed below detection limit. Bacteriological parameters such as Total Coliforms were observed in the range between 11 - 1600 MPN Index/100 mL and Faecal Coliforms were observed in the range between 4.5 to 350 MPN Index/100 mL.

At the location **Vizhinjam Branch Canal**, Colour was observed 1 Hazen unit and odour was agreeable. pH was observed in the range between 6.75 - 7.62. Turbidity was observed in the range between BDL - 2.1 NTU. Total Dissolved

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Solids was observed in the range between 110 - 264 mg/L. Electrical Conductivity was observed in the range between 192 - 400 μ mho/cm. Dissolved Oxygen was observed in the range between 5.20 - 7.10 mg/L. Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 1.00 - 1.90 mg/L. Calcium (as Ca) was observed in the range between 8.01 - 17.60 mg/L. Chloride (as Cl) was observed in the range between 33.50 - 70 mg/L. Fluoride (as F) was observed in the range between 0.1- 0.60 mg/L. Iron (as Fe) was observed in the range between BDL - 1.28 mg/L. Magnesium (as Mg) was observed in the range between 4.35 - 8.74 mg/L. Nitrate (as NO₃) was observed in the range between 3.57 - 11.50 mg/L. Sulphate (as SO₄) was observed in the range between 2.39 - 42.40 mg/L. Total Alkalinity (as CaCO₃) was observed in the range between 30 - 37.50 mg/L. Total Hardness (as CaCO₃) was observed in the range between 38 - 80 mg/L. Calcium Hardness (as CaCO₃) was observed in the range between 20 - 44 mg/L. Sodium (as Na) was observed in the range between 20.7 - 49 mg/L. Potassium (as K) was observed in the range between 0.29 - 11.80 mg/L. Sodium Absorption Ratio was observed in the range between 1.11 - 2.39. Manganese (as Mn), Oil & Grease, Free Ammonia, Anionic Detergents and Barium (as Ba), Boron (as B), Copper (as Cu), Mineral Oil, Phenolic Compounds (as C₆H₅OH), Selenium (as Se), Silver (as Ag), Total Phosphate (as PO₄), Zinc (as Zn), Cadmium (as Cd), Cyanide (as CN), Lead (as Pb), Mercury (as Hg), Total Arsenic (as As), Total Chromium (as Cr), Pesticide Residues and Polynuclear Aromatic Hydrocarbons (PAH) were observed BDL. Bacteriological parameters such as Total Coliforms were observed in the range between 14 to 920 MPN Index/100 mL and Faecal Coliforms were observed in the range between 9.3 - 220 MPN Index/100 mL.

At the location **Vellayani Lake**, Colour was observed 1 Hazen unit and odour was agreeable. pH was observed in the range between 6.54 - 7.97. Turbidity was observed in the range between BDL to 4.18 NTU. Total Dissolved Solids was observed in the range between 88 - 130 mg/L. Electrical Conductivity was observed in the range between 152 - 236 μ mho/cm. Dissolved Oxygen was observed in the range between 5.50 - 6.90 mg/L. Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 1 - 3 mg/L. Calcium (as Ca) was observed in the range between 7.21 - 12 mg/L. Chloride (as Cl) was observed in

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the range between 28.5 - 38.5 mg/L. Fluoride (as F) was observed in the range between 0.1 - 0.40 mg/L. Iron (as Fe) was observed in the range between BDL - 0.5 mg/L. Magnesium (as Mg) was observed in the range between 2.43 - 5.83 mg/L. Manganese (as Mn) was observed BDL. Nitrate (as NO₃) was observed in the range between 1.67 - 2.28 mg/L. Sulphate (as SO₄) was observed in the range between BDL - 8.55 mg/L. Total Alkalinity (as CaCO₃) was observed in the range between 27.5 - 33 mg/L. Total Hardness (as CaCO₃) was observed in the range between 30 - 50 mg/L. Calcium Hardness (as CaCO₃) was observed in the range between 18 - 30 mg/L. Sodium (as Na) was observed in the range between 11.80 - 22 mg/L. Potassium (as K) was observed in the range between 2 - 6.30 mg/L. Sodium Absorption Ratio was observed in the range between 0.72 - 1.75. Free Ammonia, Oil & Grease, Anionic Detergents, Barium (as Ba), Boron (as B), Copper (as Cu), Mineral Oil, Phenolic Compounds (as C₆H₅OH), Selenium (as Se), Silver (as Ag), Zinc (as Zn), Cadmium (as Cd), Cyanide (as CN), Lead (as Pb), Mercury (as Hg), Total Arsenic (as As), Total Chromium (as Cr), Total Phosphate (as PO₄), Pesticide Residues and Polynuclear Aromatic Hydrocarbons (PAH) were observed below detection limit. Bacteriological parameters such as Total Coliforms were observed in the range between 27 to 220 MPN Index/100 mL and Faecal Coliforms were observed in the range between 14 - 70 MPN Index/100 mL.

CHAPTER 7

Soil Analysis

1. Soil sampling location details:

This chapter describes the sampling location, methodology adopted for analysis and analysis results of soil during the period October 2019 to March 2020. Soil sampling was carried out at four locations including Port Site, Proposed Port Estate Area, along with road Network (Mulloor) and along with Rail Network (Balarampuram).

Table 7.1: Soil Sampling Location details

Sr. No.	Location	Latitude	Longitude
1.	Port Site	8°22',20.43"N	77°00',04.06"E
2.	Proposed Port Estate Area	8°22',25.51"N	77°01',44.11"E
3.	Along with road Network (Mulloor)	8°22',41.01"N	77°00',45.71"E
4.	Along with Rail Network (Balarampuram)	8°25',48.80"N	77°02',22.00"E

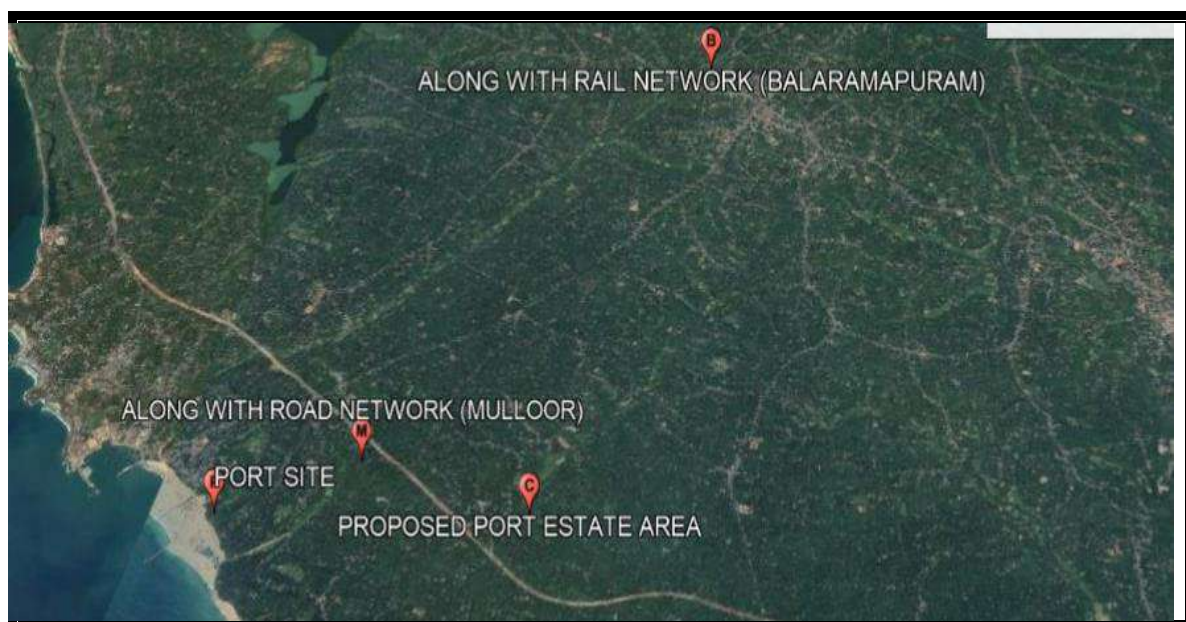



Figure 6.1: Google earth views of sampling locations of Soil

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2. Methodology of Sampling and Analysis:

Table 7.2: Ground Water and Surface Water methodology

Sr. No.	Parameter	Unit	Detection Limit	Method Reference
1.	Texture	-	1	AEC/C/SAP/S-3
2.	Particle Size Distribution	%	1	AEC/C/SAP/S-3
3.	pH (1:5 Suspension)	-	1	FAO 1976, Sec. III, 1, Page no.65
4.	Electrical Conductivity (1:5 Suspension at 25°C)	µS/cm	5	FAO 1976, Sec. III,5, Page no.85
5.	Porosity	%	-	WI/SAP-Soil/5/19
6.	Total Kjeldhal Nitrogen (as TKN)	mg/kg	20	FAO 1976, Sec. III,4, Page no.78
7.	Available Phosphorus (as P)	mg/kg	5	FAO Sec. III .12-1, Page No.157
8.	Available Potassium (as K)	mg/kg	1	FAO Sec. III .8-1, Page No. 115
9.	Total Organic Carbon	g/100g (%)	0.025	FAO, Sec. III,3, Page no.73
10.	Organic Matter	g/100g (%)	0.025	FAO, Sec. III,3, Page no.73
11.	Available Sodium	mg/kg	1	FAO 1976, Sec. III,8-1, Page no.115
12.	Lead (as Pb)	mg/kg	0.5	USEPA/SW 846/7000B

Note:

FAO: Food & Agriculture Organization, United Nations

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3. Soil Analysis Results for the period October 2019 to March 2020:

Table 7.3: Soil Analysis Result

Sr. No.	Parameters		Units	Results			
				Port Site	Port Colony	Along Road Network (Mullor)	Along Rail Network (Balarampuram)
1.	Texture		-	Sandy Silt	Sandy	Sandy	Sandy
2.	Particle Size Distribution	Gravel	%	16.05	0.65	0.36	1.14
		Sand		25.09	59.5	53.8	58.86
		Silt		38.41	29.41	34.26	25.97
		Clay		20.45	10.44	11.58	14.03
3.	pH (1:5 Suspension)		-	6.29	5.8	6.41	5.63
4.	Electrical Conductivity (1:5 Suspension at 25°C)		µS/cm	180	18	50	9
5.	Porosity		%	42.33	27.41	44.92	39.64
6.	Infiltration (Void Ratio)		-	1.31	1.99	1.78	1.14
7.	Total Kjeldhal Nitrogen (as TKN)		mg/kg	44.5	80.4	90	35.8
8.	Available Phosphorus (as P)		mg/kg	120	107	280	110
9.	Available Potassium (as K)		mg/kg	40	50.2	51	30
10.	Total Organic Carbon		g/100g (%)	0.562	0.755	0.907	0.768
11.	Organic Matter		g/100g (%)	0.969	1.30	1.56	1.32
12.	Available Sodium		mg/kg	10.85	31.5	10.5	1.4
13.	Lead (as Pb)		mg/kg	2.10	6.81	8.00	2.98
Note: All results are on air dry basis.							

4. Graphical representation of Results for the period October 2019 to March 2020:

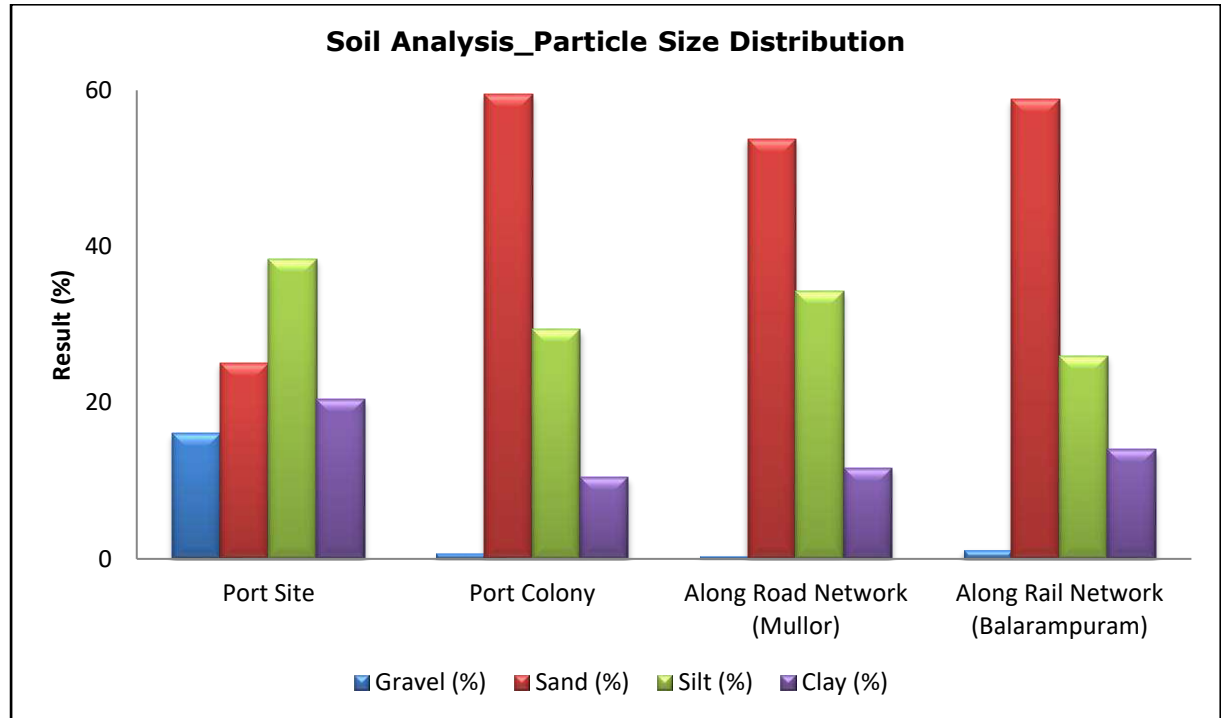


Figure 7.2: Soil Analysis for Particle Size Distribution

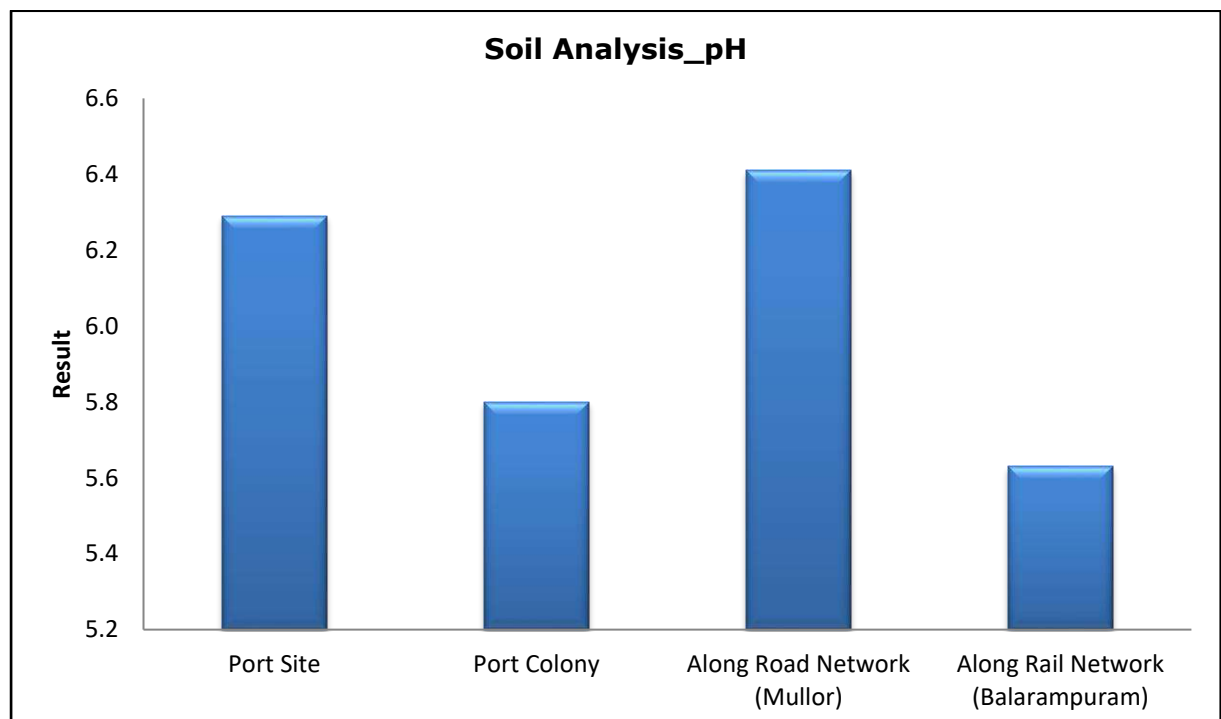


Figure 7.3: Soil Analysis for pH

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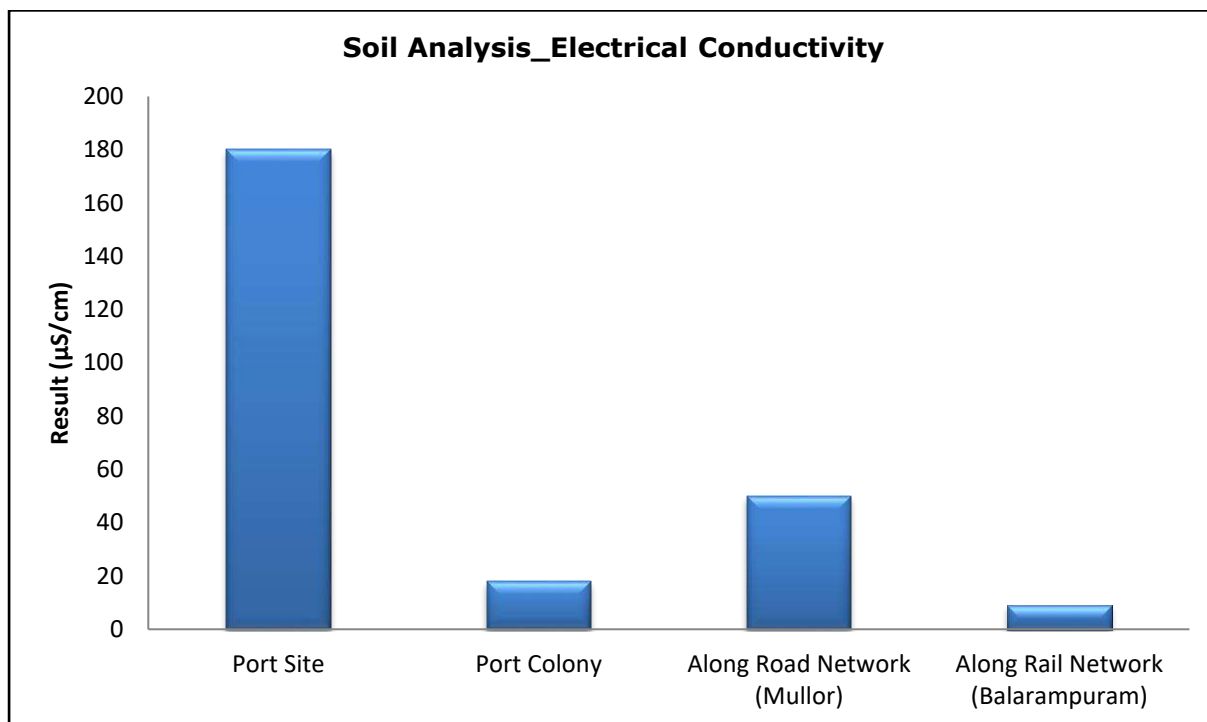


Figure 7.4: Soil Analysis for Electrical Conductivity (1:5 Suspension at 25°C)

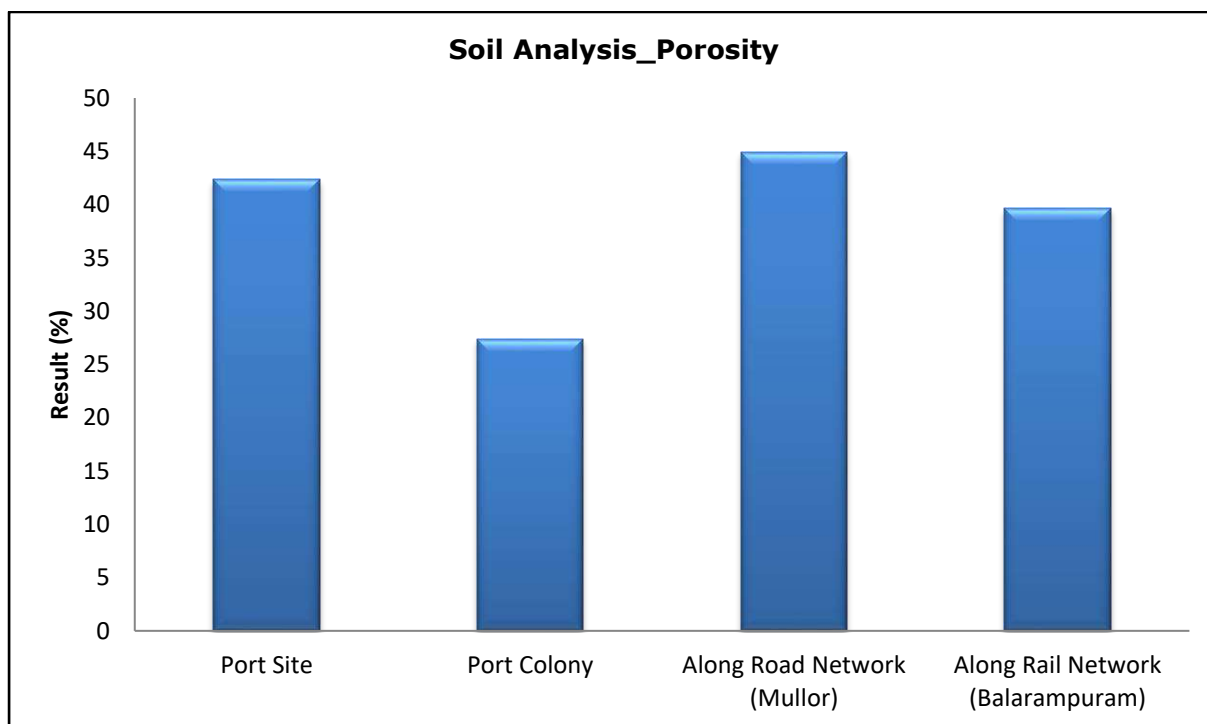


Figure 7.5: Soil Analysis for Porosity

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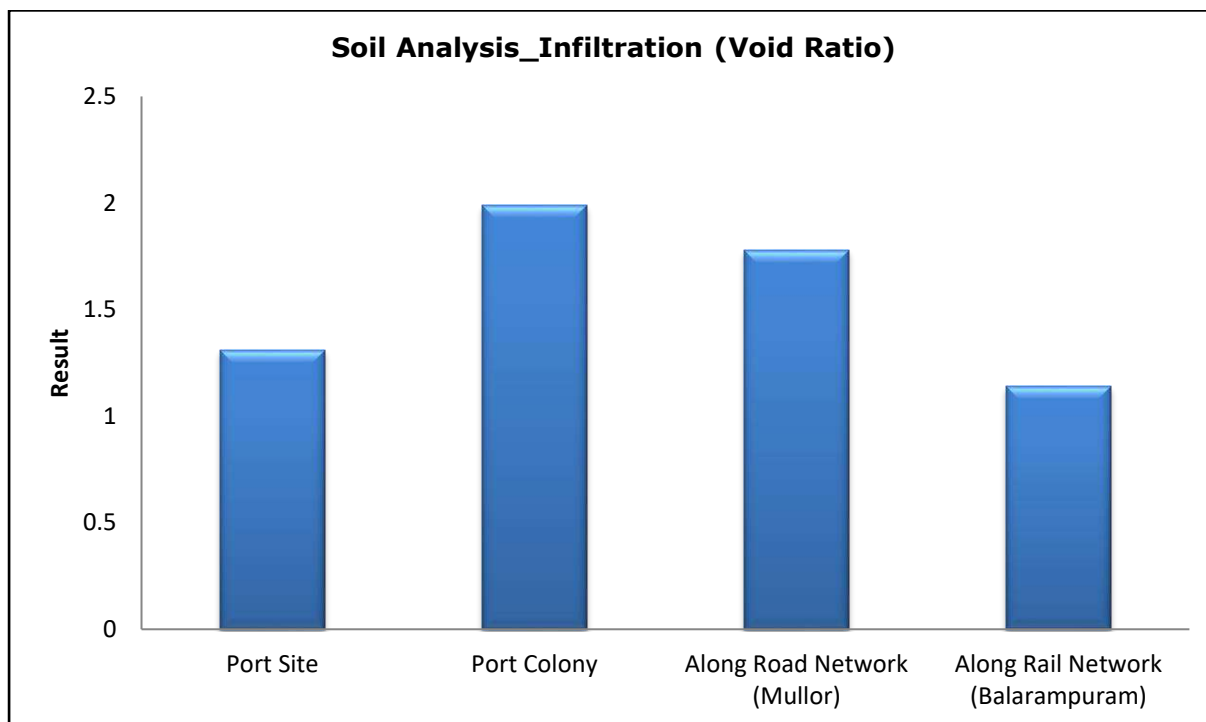


Figure 7.6: Soil Analysis for Infiltration (Void Ratio)

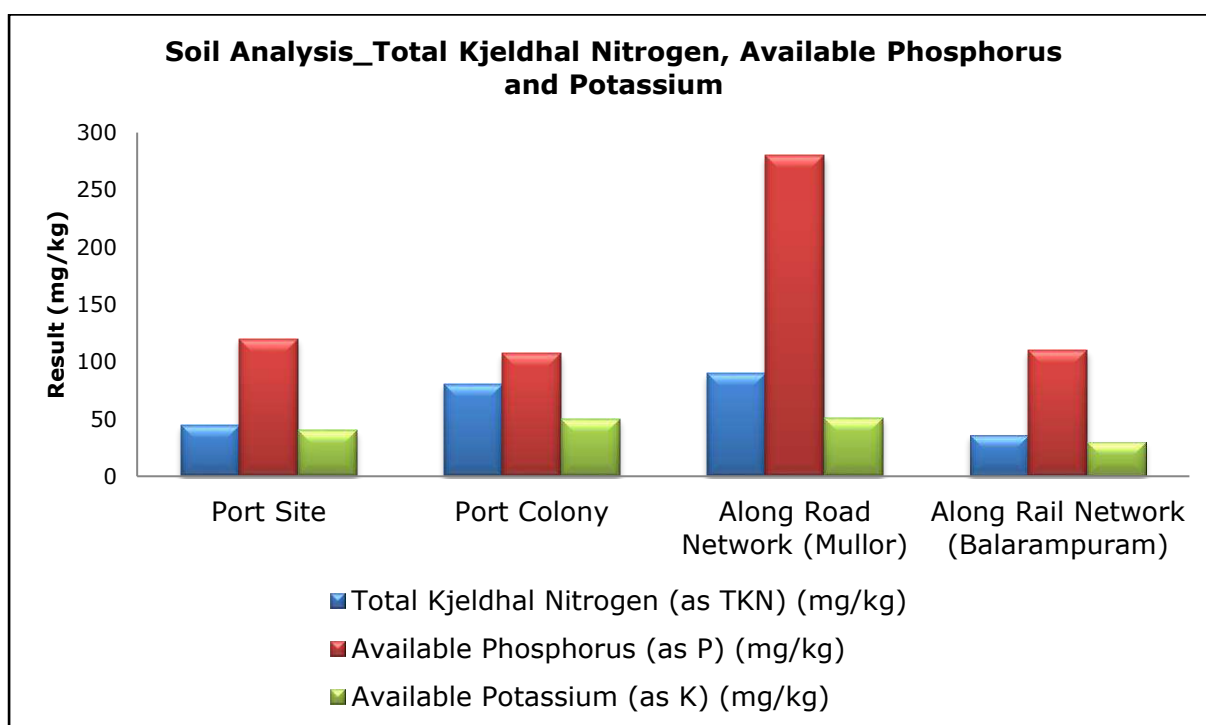


Figure 7.7: Soil Analysis for Total Kjeldhal Nitrogen, Available Phosphorus and Potassium

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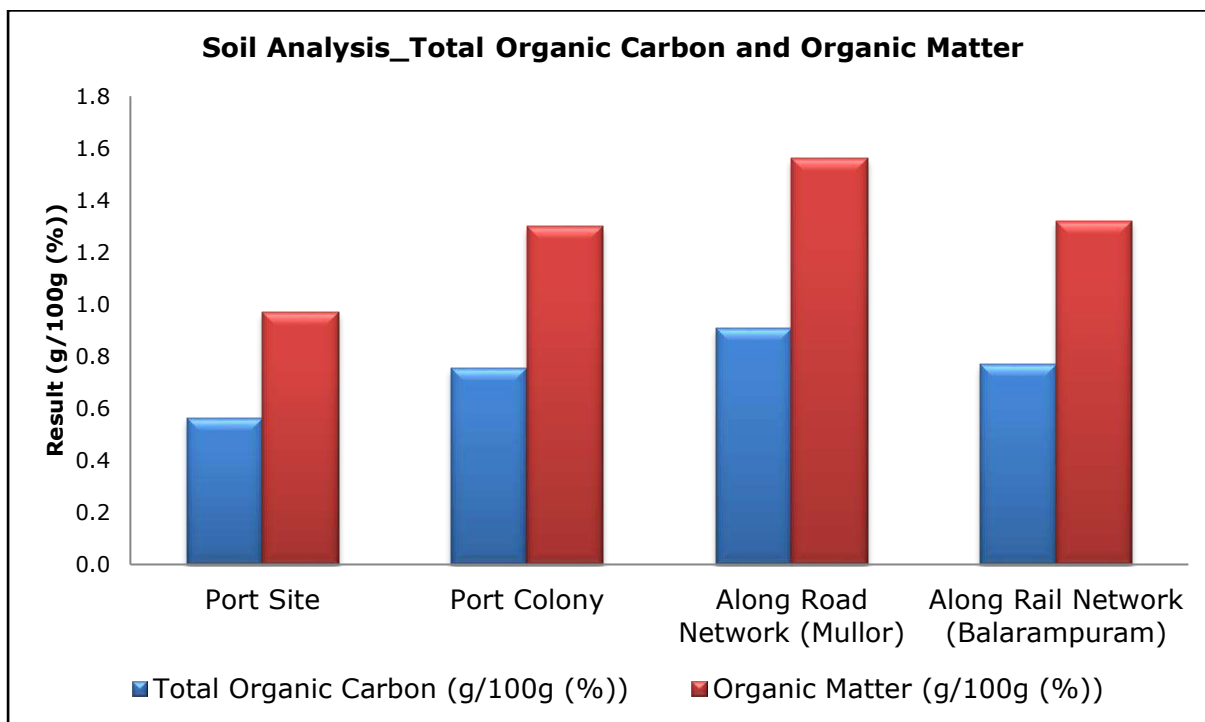


Figure 7.8: Soil Analysis for Total Organic Carbon and Organic Matter

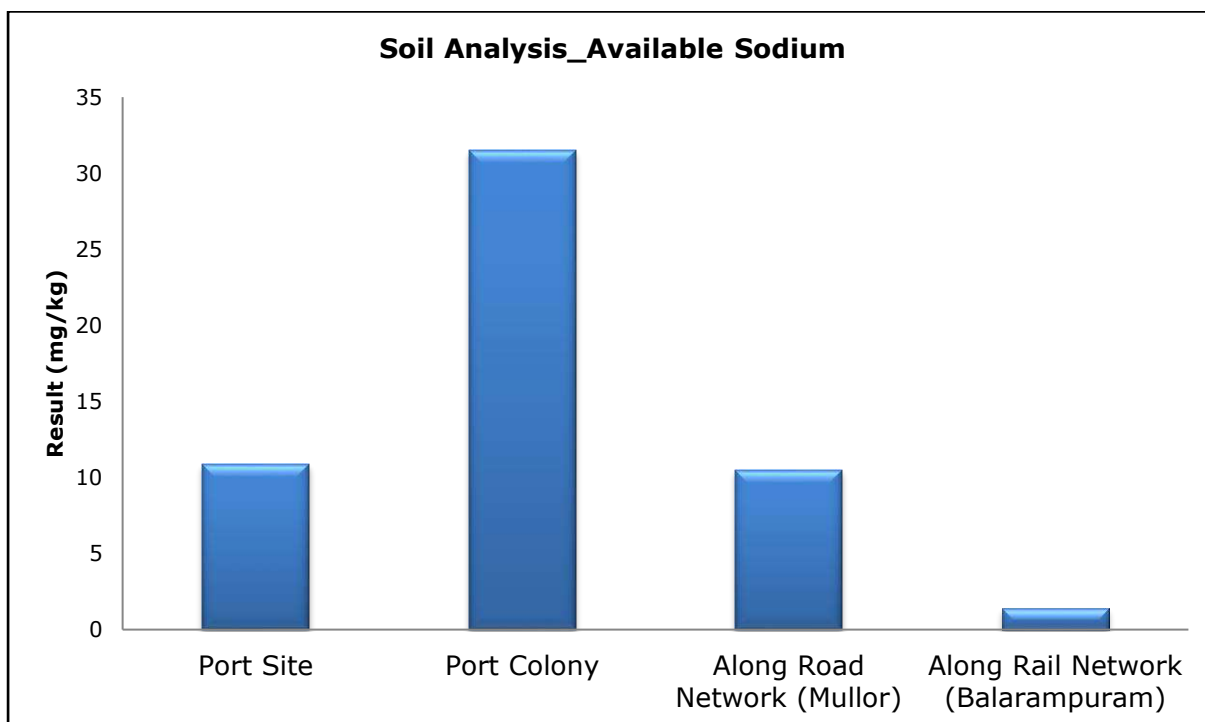
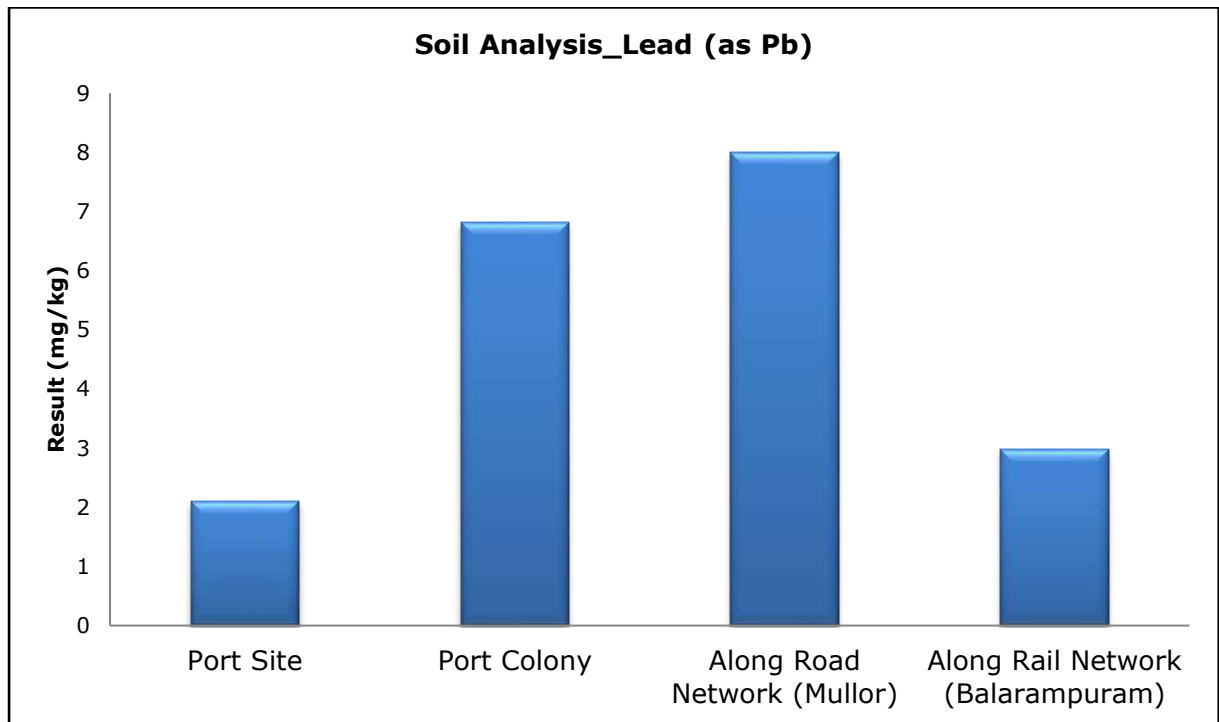


Figure 7.9: Soil Analysis for Available Sodium

**Vizhinjam International Deepwater Multipurpose Seaport
Environment Monitoring Report from October 2019 to March 2020****Figure 7.10: Soil Analysis for Lead (as Pb)**

Annexure IV

Compliance of Conditions of KCZMA Recommendation for EC/CRZ Clearance

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Annexure IV


Half Yearly Compliance Report of Conditions Stipulated in KCZMA Recommendation for Environment and CRZ Clearance		
S. No.	Conditions	Compliance Status as on 31.03.2020
(i)	The developmental works and the construction of the structures may be undertaken as per the plans approved by the concerned local Authorities, local administration, conforming to the existing local and central rules and regulations including the existing provisions of CRZ Notification.	<p>Complied</p> <p>All the construction activities are being carried out as per existing Central/local rules. Necessary permissions under CRZ Notification 2011 & its amendments have been obtained. Further, necessary approvals from concerned Statutory Departments / Agencies have been obtained for the construction designs/drawings relating to the proposed construction as mentioned hereunder:</p> <ul style="list-style-type: none"> • Consent to Establish (CTE) No. PCB/HO/TVM/ICE/08/2015 dated 15.09.2015 valid up to 31.07.2018 was renewed from State Pollution Control Board vide Consent No. PCB/HO/TVM/ICE-R/02/2018, dated 19.07.2018 valid up to 31/07/2023. • Airport Authority of India NOC vide NOC no AAI/SR/NOC/RHQ dated 7.12.2015 (Submitted along with the compliance report for the period October 2015 to March 2016). • As per the exemption granted by Government of Kerala (GoK) G.O. No. 310/2015/LSGD dated 01/10/2015, AVPPL is not required to obtain any further building permit/permission to construct port related building within the port premises.
(ii)	Since the project envisages development of roads, infrastructural facilities, dredging of the lake and kayals proper environmental safety measures must be ensured.	<p>Complied</p> <p>All safety measures are being adopted. Full time Environment & Safety professionals are employed by AVPPL, contractors & subcontractors to oversee the implementation of environmental safety measures. Organizational Structure for Environment, Health, and Safety (EHS) &</p>

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Half Yearly Compliance Report of Conditions Stipulated in KCZMA Recommendation for Environment and CRZ Clearance		
S. No.	Conditions	Compliance Status as on 31.03.2020
		<p>CSR for construction phase is enclosed as Annexure VIII. All work plans are executed after assessing the defined EHS plans.</p> <p>It is also submitted that dredging of lakes or kayals are not envisaged as part of this project.</p>
(iii)	The project proponent must obtain necessary clearance separately from the Kerala State Pollution Control Board, Health Department and other appropriate Authorities when such implementation programmes are undertaken.	<p>Complied</p> <p>CTE has been obtained from Kerala State Pollution Control Board vide Consent No. PCB/HO/TVM/ICE/08/2015, dated 15.09.2015 valid up to 31.07.2018. Subsequently, the CTE was renewed vide Consent No. PCB/HO/TVM/ICE-R/02/2018 dated 19.07.2018 valid up to 31.07.2023.</p>
(iv)	The construction should be undertaken, if any with least damages to the existing mangroves. A buffer zone of 50m shall be provided for mangroves present in the area.	<p>Not Applicable</p> <p>There are no mangroves in the vicinity of the project area.</p>
(v)	The project proponent must take necessary arrangements for disposal of solid wastes and for the treatment of effluents / wastes. It must be ensured that the effluents/solid wastes are not discharged into the backwater area/sea.	<p>Being Complied</p> <p>As prescribed in EIA during construction stage, the contractors have been made responsible for management of Solid Waste. Necessary arrangement has been made for collection, segregation and disposal of Solid Waste as per Solid Waste Management Rules, 2016, as amended. A dedicated integrated solid waste management facility is planned which will be constructed along with project.</p> <ul style="list-style-type: none"> No solid waste is being disposed of in the CRZ area. Currently no effluent is generated; domestic wastewater generated is treated in STP at labour camps and treated water is used for sprinkling within port area.

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Half Yearly Compliance Report of Conditions Stipulated in KCZMA Recommendation for Environment and CRZ Clearance		
S. No.	Conditions	Compliance Status as on 31.03.2020
(vi)	The project proponent should provide necessary facilities for official of the Kerala Coastal Zone Management Authority (KCZMA) for inspection of the project site and its premises at any time.	<p>Being Complied</p> <p>NGT Expert committee and shoreline monitoring cell along with officials from KCZMA visited the site on 05.03.2020 and reviewed the compliance conditions of Environmental & CRZ Clearance on 05.03.2020 and 06.03.2020.</p> <p>All necessary facilities/support were extended to the officials during the compliance review/site visit; and the same will be provided during any future planned inspection of the project site.</p> <p>Additionally, AVPPL meet regularly officials of KCZMA from time to time for suggestions and to apprise them of various project related work. Copy of half yearly Environmental & CRZ Clearance compliance report is being sent to KCZMA regularly. The same will be continued in future.</p>
(vii)	The KCZMA may be duly informed of any construction/developmental works/major activities undertaken in the CRZ area of the project	<p>Complied</p> <ul style="list-style-type: none"> Member Secretary KCZMA is also the member secretary of NGT appointed committee; the committee meets every six months to review the compliance of Environmental & CRZ Clearance. Regular meetings are held with officials of KCZMA to appraise them on various project related activities. Half yearly reports are being furnished to KCZMA including the details of the development works. <p>Following construction activities have taken place till March 2020:</p> <ul style="list-style-type: none"> No dredging was carried out during the compliance period from October 2019 to March 2020. The dredged material till

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Half Yearly Compliance Report of Conditions Stipulated in KCZMA Recommendation for Environment and CRZ Clearance		
S. No.	Conditions	Compliance Status as on 31.03.2020
		<p>31.03.2020 amounting to 2.90 Mm³ has been utilized for reclamation of 36 Ha area. The dredged material has been used for reclamation.</p> <ul style="list-style-type: none"> • Berth Construction: <ul style="list-style-type: none"> ○ Piling (617 nos.) and casting of pile muffs (617 nos.) have been completed. ○ Casting of Precast element completed: Cross beams (492 nos.), Long beams (353 nos.) Deck Plank (2653 nos.), Service Duct (129 nos.), Retaining wall (294 nos.) and Cable pull pit (20 nos.). ○ Precast erection of Pile Muff (617 nos.), Cross Beam: 492 nos., Longitudinal Beam: 353 nos. and Service Duct: 129 nos. have been completed. • Breakwater construction: <ul style="list-style-type: none"> ○ The restoration work of breakwater has commenced from 16.10.2019 by end on dumping. ○ Core dumping has been completed till chainage 674 m and 1,18,328 MT has been dumped in breakwater alignment by end on dumping. Armour placing is in progress. • Yard development work: <ul style="list-style-type: none"> ○ Reefer structure foundation and structure erection of 3 numbers completed. ○ Compact sub- station, high mast foundation and erection, Cantilevered Rail Mounted Gantry (CRMG) beam works are in progress. ○ Firefighting pipeline laying is in progress. ○ Paver block casting for yard

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Half Yearly Compliance Report of Conditions Stipulated in KCZMA Recommendation for Environment and CRZ Clearance		
S. No.	Conditions	Compliance Status as on 31.03.2020
		<p>development is in progress.</p> <ul style="list-style-type: none"> ○ Backup yard progress: <ul style="list-style-type: none"> ▪ Cement Bound Materials (CBM) layer completion and Paver block laying; 52,869 sqm ▪ Electrical Pit - 140 no's completed out of 274. • Boundary wall work has been completed at various locations; remaining is on hold due to local issues • Following buildings construction work is in progress: <ul style="list-style-type: none"> ○ Gas Insulated Substation (GIS) substation ○ Substation building (Inside port) ○ Port Operation Building ○ Rail Mounted Unit (RMU) buildings-yard ○ RMU buildings-berth ○ Workshop Building ○ Gate Complex ○ Driver Rest Room ○ DG Shed Building ○ Water Tank & Pump House ○ Security Building ○ Port User Building (PUB) Building ○ Port Canteen • Port Access Road <ul style="list-style-type: none"> ○ Construction of electrical pits and laying of Hume Pipe along with Retaining Wall are in progress from chainage 0 to 520 m ○ Bridge construction over lotus pond: Precast yard development, Piling and Road diversion works are in progress. ○ Excavation, sludge removal, sub-base and sub grade filling are in progress beyond chainage 520 m • Storm water drain construction is in

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of Conditions of KCZMA recommendation for Environmental/CRZ Clearance		

Half Yearly Compliance Report of Conditions Stipulated in KCZMA Recommendation for Environment and CRZ Clearance		
S. No.	Conditions	Compliance Status as on 31.03.2020
		<p>progress</p> <ul style="list-style-type: none"> Electrical Installation works in progress <p>Due to outbreak of COVID-19 pandemic, all the project works have been suspended from 23.03.2020.</p>
(viii)	Environmental clearance must be obtained from the Ministry of Environment & Forests.	<p>Complied</p> <p>Environment & CRZ Clearance has been obtained from Ministry of Environment & Forest vide MoEF letter dated 03.01.2014 (F.No.11-122/2011-IA.III).</p>
(ix)	An adequate financial provision has to be made for environmental protection measures.	<p>Complied</p> <p>A total of Rs. 40 Crore has been set aside for environment protection measures as per the EIA report. Activity wise fund break up and expenditure during the compliance period October 2019 to March 2020 is enclosed as Annexure VII.</p>
(x)	Scrutiny fee of Rs. 10,00,000/- (Rupees Ten lakh only) to be remitted under the head account 1425-800-97 applications for scrutiny fee etc. for CRZ clearance, in the district/Sub Treasury concerned, if private parties are involved in the project and the challan receipt in original be forwarded to the Science & Technology Department quoting this letter.	<p>Not Applicable</p> <p>The condition is not applicable since the application for Environmental & CRZ clearance was submitted by Vizhinjam International Seaport Ltd. (VISL), a Government of Kerala (GoK) undertaking.</p>

Annexure V

**Compliance of the Response/Commitments made
during Public Hearing**

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		

Annexure V

Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
1	Good compensation package for all livelihood issues have been included for all related PAPs for all affected sectors including the fisheries sector. Strict adherence to EMP compliance with all relevant rules and regulations will be done	<p>Being Complied</p> <p>In consultation with the fishermen, enhanced livelihood compensation of Rs. 101.86 Crores was sanctioned by Government of Kerala (GoK), instead of Rs. 7.10 crores suggested earlier in the EIA stage. Till date an amount of Rs. 83.32 crores have been disbursed till 31.03.2020 for a total number of 2625 Livelihood Affected Persons (LAPs) whose verification was complete in all respects; this includes boat owners to whom kerosene is supplied free of cost as well during the port construction period. Verification of the documents of balance LAPs is in progress.</p> <p>Out of the 5 identified EMP areas, work is ongoing in Port Site, Road/Rail Corridor and in PAF (Project Annex Facility)). Recommendations of the Construction stage EMP for these areas are being implemented and strict adherence to EMP compliance with all relevant rules and regulations is being done. Status of construction stage EMP in matrix format is enclosed as Annexure VI.</p>
2	Land under the Jamaath which includes Karimppaly, Magham, Varuthari Pally, etc. need to be protected and should not be acquired.	<p>Complied</p> <p>These lands have not been acquired.</p>
3	Compensation for the land acquired (rail/road connectivity and back up areas) are paid promptly and any for additional land required also will be paid in the same way.	<p>Complied</p> <p>Compensation for all the procured land has been disbursed along with R&R package. Same policy will be followed for the remaining extent of land acquisition also viz a via applicable.</p>
4	Additional fish landing centre will be constructed	<p>Being Complied</p> <p>The work for construction of the fish landing centre (Rs. 16.00 crores) and the fishery breakwater (Rs. 131.12 crores) has been initiated as part of the funded work component of the concession agreement with AVPPL in the form of a new fishing</p>

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		

Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
		harbour. The EPC Contractor is finalising the design for the fishing berth. However, AVPPL is unable to start the construction activities since the proposed site is blocked by fishermen with their fishing boats. The proposed area needs to be cleared for the commencement of works. GoK has initiated discussions with fishermen representatives for removal of the boats to facilitate construction work and discussions underway.
5	Existing harbour will be improved under the CSR provisions of the project	Being Complied Tender for modernization of the existing fishing harbour was invited by Harbour Engineering Department (HED) and work awarded. However, the works could not be initiated due to sectoral protests among different fishermen groups.
6	Fisherman will get first preference to cross the ship channel	Will be Complied Will be complied as per the applicable laws
7	GoK/VISL will monitor the shore line changes during construction and operational phases. If necessary, intervention to arrest erosion will be carried out.	Being Complied Shoreline monitoring for a stretch of 40 km (20 km on both sides of the project site) is being done and reports are being regularly submitted to MoEF&CC as a part of the HYCR. Shoreline Monitoring Report for the period October 2019 to March 2020 is enclosed as Annexure I . L&T Infrastructure Engineering Ltd. (L&T IEL) had prepared Mathematical Modelling Reports based on Shoreline Monitoring data; which were vetted by National Institute of Ocean Technology (NIOT). Three mathematical modelling reports have been prepared by L&T IEL so far and submitted to MoEF&CC; as detailed below: <ul style="list-style-type: none"> • 1st Mathematical Modelling Report for the period February 2015 to February 2017; submitted along with the HYCR for the period April 2017 to September 2017 • 2nd Mathematical Modelling Report for

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		


Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
		<p>the period March 2017 to February 2018; submitted along with the HYCR for the period April 2018 to September 2018</p> <ul style="list-style-type: none"> 3rd Mathematical Modelling Report for the period March 2018 to February 2019; submitted along with the HYCR for the period April 2019 to September 2019 <p>These mathematical modelling reports have affirmed that the shoreline change is in line with what was predicted as part of the EIA study.</p> <p>In continuation with the same practice Adani Vizhinjam Port Pvt. Ltd. (AVPPL) have submitted the shoreline data from March 2019 to February 2020 to L&T IEL for mathematical modelling to assess the impact on shoreline under the guidance of NIOT. The Mathematical modelling report for the period March 2019 to February 2020 once vetted by NIOT will be submitted along with the next HYCR.</p>
8	Water supply provision to the Vizhinjam fishing village	<p>Complied</p> <p>Water Supply Scheme for provision to the local people has been commissioned in April 2013 by VISL by expending an amount of Rs. 7.30 crores. For Operation & Maintenance (O&M) of the same an amount of Rs. 5.38 crores have been spent till date. From 04.04.2019 onwards, O&M of the scheme is being done by Kerala Water Authority (KWA).</p>
10	Railway work will be initiated after Environment Clearance (EC)	<p>Complied</p> <p>Konkan Railway Corporation Limited (KRCL) has been engaged as a consultant for turnkey execution of the project. Out of the total rail route length of 10.7 km, 9.0 km is planned to be passing through an underground tunnel to minimize the disturbance to the local population. Detailed Project Report (DPR) has been completed and has been submitted to Southern Railway for its approval. All the required clarifications have been provided to Southern Railways</p>

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		

Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
		and the approval is expected shortly.
11	Job Opportunity - Preference will be given to local people during construction stage	Being complied Preference is being given to local people based on Skill & competency during the construction stage. Out of the total persons employed at site for different construction activities during the compliance period, 175 people are from Kerala and out of them 76 are from nearby wards of the project site.
13	Take all possible measures for judicious use of lighting system as part of the Green Port concept to reduce the carbon footprint	Will be Complied Is being considered with appropriate planning.
16	Waste management is included in the EMP and C&D waste management is part of the SWMP.	Being Complied Adequate budgetary provision has been kept for waste management as part of EMP as well as CSR. As mentioned in EIA, contractors have been made responsible for management of Waste including waste from labour colony during the construction stage. All contractors working at site are following the waste management practices in line to waste management rules 2016, as amended. A dedicated integrated solid waste management facility is planned which will be constructed along with project. Adani Foundation installed "Thumboormozhi Aero Bins" in three coastal belt communities Viz Kottappuram Ward, Vizhinjam Ward and Harbour ward as a one-stop solution for the alarming issue of Solid Waste Management. It is on a tri-partite partnership model wherein Adani Foundation bears the one time installation cost for the project; Municipal Corporation ensured the maintenance and monitoring of the project whereas the Ward Councillor together with the Community leaders act as the change agent for a better waste management project. The following table depict location of bins and quantum of waste handled

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		

Compliance of the Response/Commitments made during Public Hearing																																		
S. No.	Responses/Commitments	Status as on 31.03.2020																																
		<p>through this bins:</p> <table border="1"> <thead> <tr> <th>S. No.</th><th>Location of Bins</th><th>No. of Bins</th><th>No of families Served</th><th>Quantum of Waste /day</th></tr> </thead> <tbody> <tr> <td>1</td><td>Vizhinjam Market</td><td>8</td><td>850</td><td>220 Kg</td></tr> <tr> <td>2</td><td>Harbour Mathippuram</td><td>10</td><td>1000</td><td>300 Kg</td></tr> <tr> <td>3</td><td>Kottappuram – Charuvila</td><td>3</td><td>250</td><td>100 kg</td></tr> <tr> <td>4</td><td>Puloorkonam, Vizhinjam</td><td>5</td><td>500</td><td>150 Kg</td></tr> <tr> <td colspan="2">Total</td><td>26</td><td>2600</td><td>770 kg</td></tr> </tbody> </table> <p>During the reporting period 15 new bins were constructed, wherein 10 bins are in the same location where the old bins dilapidated during Ockhi whereas 5 bins are completed at Vizhinjam ward near Krishna temple.</p> <p>In addition to this, several cleaning campaigns were jointly organized with zonal health wing under CSR activities; the cleaning activity has been carried out in the major communities of Vizhinjam especially in coastal belt jointly with the sanitation workers of Municipal Corporation of Thiruvananthapuram. The locations were identified through community interaction and mapping out of the highly sensitive receptacles of waste. Towards that a team has been formed with 38 sanitation workers from Thiruvananthapuram Municipal Corporation, volunteers from CSR team, the members of "clean-4-U" livelihood group promoted under the CSR and the respective community members (Refer Section 2.4 of Annexure II).</p>			S. No.	Location of Bins	No. of Bins	No of families Served	Quantum of Waste /day	1	Vizhinjam Market	8	850	220 Kg	2	Harbour Mathippuram	10	1000	300 Kg	3	Kottappuram – Charuvila	3	250	100 kg	4	Puloorkonam, Vizhinjam	5	500	150 Kg	Total		26	2600	770 kg
S. No.	Location of Bins	No. of Bins	No of families Served	Quantum of Waste /day																														
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Total		26	2600	770 kg																														
17	Upgradation of PHC at Vizhinjam will be carried out	<p>Being Complied</p> <p>The construction of new building at Community Health Centre, Vizhinjam is progressing. This is part of upgradation of Community Health Centre (CHC), Vizhinjam</p>																																

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		

Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
		<p>with a new three-storied building is another project initiated jointly by Government of Kerala and Adani Foundation in 2018. The building consists of basement, ground floor, first floor and second floor. As per G.O. (R)No.842/17/F&PD dated 01.11.2017, the revised estimate for the building comes to Rs. 7.79 Crores with the Government component of Rs. 4.82 Crores and CSR component of Rs. 2.97 Crores from Adani Foundation. Adani Foundation handed over the first instalment of Rs. 1.18 crores to the Harbour Engineering Department on 03.10.2018. Presently about 20% of works completed.</p> <p>As per the request from Harbour Engineering department, Architect agency has been arranged to prepare the detailed drawings of following works in CHC for Elevation drawings, Electrical drawings (Single line diagram and detailed drawings), Plumbing Drawings, Partition details, Tiling drawings, False ceiling drawings, Fire frightening system with water tank, Fire escape stair (Back side of building), Centralized oxygen/Suction storage and distribution, Generator set provision and location, Dry & wet waste storage area.</p>
19	Appropriate compensation will be given to the resort owners as per the regulatory advice of KCZMA and MoEF since the resorts are seen to be located in No Development Zone (NDZ) as per CRZ Notification 2011	<p>Being Complied</p> <p>Resort owners evicted have been compensated for land and not for the structures since they were in violation of CRZ notification. An area of 0.728 Ha has been acquired up to 31.03.2020 under negotiated purchase. Remaining land of 2.865 Ha to be acquired by Land Acquisition (LA) process for which notification has been published and action initiated by the District Collector Thiruvananthapuram.</p>
20	Rail, Road, Coastal and Inland Waterways connectivity will be ensured to the rest of Kerala and other Indian Peninsula Ports	<p>Being Complied</p> <p>This is one of the objectives of the project and this will be fully materialised once all phases of the project are implemented.</p>

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		

Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
21	Waste Management, Water Treatment plants, etc. will be part of an operational EMP	Noted for Compliance
23	VISL will ensure that appropriate dredging and reclamation methodology as suggested in EIA report will be adopted to contain the turbidity within applicable limits.	<p>Being Complied</p> <p>No dredging was carried out during the compliance period from October 2019 to March 2020. The dredged material till 31.03.2020 amounting to 2.90 Mm³ has been utilized for reclamation of 36 Ha area. The dredged material has been used for reclamation.</p> <p>Turbidity buoys at 3 locations identified by NIOT had been deployed in the month of November 2019 and continuous monitoring was carried out to assess the real time turbidity. The turbidity details for the compliance period are given in Annexure I.</p>
24	Appropriate measures relating to maintenance of health, hygiene, safety and security will be implemented as per EIA report	<p>Being Complied</p> <p>Appropriate institutional mechanism for maintenance of health, hygiene, safety, security has been put in place. An officer of VISL has been designated as Head (EHS & CSR) for effective implementation of the stipulated EHS safeguards & CSR activities. AVPPL, the concessionaire executing the project has also appointed officers for EHS & CSR, Horticulture. In addition to the above, independent environment, health and safety consultants have been appointed as required in the concession agreement signed with AVPPL. Organizational Structure for Environment, Health, and Safety (EHS) & CSR for construction phase is enclosed as Annexure VIII.</p> <p>It is also ensured that contractors working at site also deploy EHS professional to implement suggested EMP measures. Proper provisions for maintenance of health, hygiene, safety, security for workforce in labour colony has also been provided/ensured.</p>

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		

Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
25	VISL will ensure that livelihood issues of Mussel collectors are addressed as per the EIA report	Being Complied Government Orders have been issued for disbursement of Rs. 12.65 Crore for 271 mussel collectors. Till date 261 Mussel collectors have collected the compensation amount totalling to Rs. 12.34 Crore. Although they were offered alternate livelihood plan through cage fishing, they opted for one-time settlement citing the risks involved in such fishing. The remaining 10 mussel collectors have not approached VISL for compensation.
26	VISL will ensure all the project components i.e., including road/rail connectivity are implemented in time. In addition the planned CSR and EMP measures will also be implemented and monitored to ensure the socio-economic development of the region.	Being Complied AVPPL had awarded the work to Kerala State Remote Sensing and Environment Centre (KSREC) to undertake study on Groundwater impact due to construction of port approach road. KSREC has submitted the final report with recommendations and AVPPL is in the process of constructing the approach road to port taking into account the recommendation given by the report. Konkan Railway Corporation Limited (KRCL) has been engaged as a consultant for turnkey execution of the project. Out of the total rail route length of 10.7 km, 9.0 km is planned to be passing through an underground tunnel to minimize the disturbance to the local population. Detailed Project Report (DPR) has been completed and has been submitted to Southern Railway for its approval. All the required clarifications have been provided to Southern Railways and the approval is expected shortly. CSR activities are detailed in Annexure II . Status of construction stage EMP in matrix format is enclosed as Annexure VI .
27	The implementation of the EMP/RAP/CSR will be ensured through the institutional and regulatory mechanism with regular monitoring and periodic	Being Complied Refer point 24 above. Regular monitoring of Environment Parameters are being carried out. Detailed

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		


Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
	compliance reports to the MoEF	<p>Monitoring Reports for the period October 2019 to March 2020 is enclosed as Annexure III. Half yearly compliance reports are submitted to all regulatory authorities concerned. Six monthly reports on the status of compliance of the stipulated clearance conditions including results of monitored data are regularly submitted to all the concerned agencies.</p> <p>As per the MoEF&CC Notification dated 26.11.2018, wherein submission of Half Yearly Compliance Reports (HYCRs) by email/soft copy is declared acceptable, therefore the HYCR for the period April 2019 to September 2019 has been submitted to the MoEF&CC, Regional Office (Bangalore), Zonal office of the CPCB (Bangalore), KSPCB & KCZMA vide email dated 29.11.2019 (a copy of the email is enclosed as Annexure XI).</p>
28	Special care will be taken to minimise the tree felling in the backup area and to plan the development in tune with the topography.	<p>Being Complied</p> <p>Being complied with the extent possible, but in line with the technical requirements of the project. Due permission is taken for the same from concerned department (Forest Department). For carrying out compensatory afforestation in lieu of the trees felled, AVPPL in collaboration with forest department has carried out afforestation of approximately 16,000 trees on 12.05 Ha land in Sainik School, Trivandrum (at an aerial distance of 24 km from project site). The plantation is now at its Third Year.</p>
29	The livelihood restoration measures for fishermen affected during construction phase as reported in the EIA has to be implemented	<p>Being Complied</p> <p>Refer point No. 1 and point No. 25</p>
30	Dredging materials will be used for reclaiming (filling) the sea and additional materials are not required	<p>Being Complied</p> <p>Refer point No. 23</p>

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		

Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
31	The number of fishermen who will be temporarily affected in the Adimalathura stretch have been assessed and livelihood restoration measures have been framed for the construction period	Being Complied Earlier it was proposed that the fishermen at Adimalathura will be compensated for the construction period of three years, treating them as temporarily affected. However, based on the request of the fishermen (stating that demarcation of the shipping channel and movement of ships would affect them permanently) their compensation has been enhanced considering seven years of livelihood loss. The GoK order to this effect has been issued on 31.05.2018 and compensation has been disbursed to 600 eligible fishermen amounting to a total of Rs. 35.13 Crore. Verification of the document of balance fishermen is in progress.
33	An Area Development Plan (ADP) is being prepared by CEPT University (Ahmedabad) for planned development of the region to avoid haphazard development.	Being Complied The final Integrated Area Development Plan prepared through CEPT University, Ahmadabad in consultation with Town Planning, Tourism, Industry and other line departments was reviewed by the expert committee constituted by GoK. The Master Plan will be forwarded to Joint Planning Committee (JPC) for further action.
34	Maximum 3 ships are expected per day in phase I. Appropriate traffic mechanism to cross the ship channel for fisherman with first priority will be practised as is happening in Cochin Port where fishing harbour, container berth, navy, shipyard, inland water transport etc are co-existing	Will be Complied During the Operation Phase
36	Implementation of CSR measures and planned development of the region through well designed area development plan will arrest the formation of slums and the like.	Being Complied Details of CSR activities carried out during the compliance period are given in Annexure II . Refer point 33 above for area development plan.
37	"Inconvenience Allowances" during construction period of	Being Complied An amount of Rs. 27.18 Crores have been

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		

Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
	three years to the fisherman (As per EIA Report)	sanctioned by the GoK as inconvenience allowance in the form of kerosene in November 2017. Rs. 12.48 Crore has been given till 31.03.2020 to the disbursal agency identified for the work.
38	As per the Entitlement Framework, Hardship Allowance is suggested in the EIA/EMP for resort workers who lost their job due to acquisition of the resort	Complied Compensation for livelihood loss; Rs 6.08 Crores out of allocated Rs. 6.11 Crores has been disbursed to 211 out of 211 number of resorts workers and settled completely.
40	Ensure that all EMP related aspects are properly implemented during construction and operational phase	Being Complied As the project is in construction stage, construction stage EMP is being implemented. Operation stage EMP will be implemented during operation stage. Refer Annexure VI for status of Construction stage EMP.
41	A dedicated port road directly connecting to NH-47 bypass is envisaged.	Being Complied This is part of the concession agreement signed with AVPPL and is in the process of being developed.
43	The port project will not affect the inflow of Neyyar river and AVM canal	Noted for Compliance Not affected, since both are away from the project site.
44	The port road will be access controlled for the exclusive use of container and related port movements. The suggestion for a new approach road can be considered on technical feasibility and subject to surrendering of adequate land by the beneficiaries	Not Applicable The port road will not be access controlled and connectivity for the local residents will not be affected.
46	Reconstruction of Roads in the nearby area- Adequate provisions have been made for the old fishing harbour and its linkage roads as it will be adopted as a part of best practice and beautification process	Being Complied Being complied on a routine basis through HED; the maintenance agency for the fishing harbour and the coastal road network.
47	The development of the warehouse area will be taken up	Will be Complied This is part of the proposed port estate development.

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		

Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
49	CSR activity suggested a skill development centre to equip the local people to adapt to the industrial needs of port/tourism and fisheries so that they can be appropriately employed based on their merit. However during construction period the EIA study has suggested to adequately employ local population to the maximum extent possible	<p>Being Complied</p> <p>Additional Skill Acquisition Program (ASAP) is a GoK initiative aimed at imparting skill courses to students for improving their employability. No Objection Certificate (NoC) has been granted to ASAP to proceed with the construction of a Community Skill Park (CSP) in an area of 1.5 acres of land at Vizhinjam. It is a PPP project wherein 25000 sq. ft. building with facilities for students' hostel are being constructed by GoK under ASAP, whereas the operation of the centre with logistics and other high-end courses is vested with Adani Skill Development Centre. Preference is being given to local people based on skill and competency during the construction stage.</p> <p>Preference is being given to local people based on Skill & competency during the construction stage. Out of the total persons employed at site for different construction activities, an average of 175 people are from Kerala and out of them 76 are from nearby wards of the project site.</p>
51	Only prohibited area for fishing is inside the breakwater. However fishing will be restricted along ship channel and port limits subject to safety norms and operational requirements.	<p>Will be Complied</p> <p>During operation phase.</p>
52	The existing notification of the Vizhinjam Port includes the Vizhinjam Fishing harbour. The revised Notification will include the Vizhinjam Deep Water Port based on revised Port limit provided in the EIA report. Except inside the breakwater of the Deep Water Port in all other areas of the port limit fishing is allowed with all safety and operational restrictions.	<p>Being Complied</p> <p>GoK notified the limits of the Vizhinjam International Deepwater Multipurpose Seaport and altered the limits of the existing Vizhinjam Port (Vizhinjam Fishing harbour) vide G.O. (P) No. 22/2019/F&D dated 21.05.2019.</p> <p>Restrictions on fishing will be as per the applicable laws.</p>

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Compliance of the Responses/Commitments made during Public Hearing		

Compliance of the Response/Commitments made during Public Hearing		
S. No.	Responses/Commitments	Status as on 31.03.2020
53	There will only be a movement of 8 barges per day during the construction period of 3 years and the same will not be a hindrance for the fisherman to cross since this is far less than the number of ships being crossed by them daily in the international ship channel.	Noted
56	The cruise terminal proposed in the project, will promote tourism in the Kovalam-Poovar belt and the region may become the cruise hub/tourism gate way of India in future	Noted for Compliance Once the first phase of port becomes operational, it would naturally attract cruise tourism. Based on the development of cruise business, dedicated cruise berths will be planned in a phased manner. Action is also being taken in consultation with the State tourism department, to design port linked tourism packages covering the Kovalam-Vizhinjam-Poovar tourism corridor.

Annexure VI

Status of Environment Management Plan

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan		

Annexure VI

Status of Environment Management Plan-Port Site-Construction Stage Potential Impacts and Mitigation Measures of Various Project Activities				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
1	Capital dredging	Marine water quality Marine ecology	<ul style="list-style-type: none"> Check turbidity levels with baseline levels as reference during entire monitoring programme Preparation of Dredge/reclamation Management plan Discharge of waste into sea will be prohibited Oil Spill control measures will be adopted Ensure that slop tanks will be provided to barges/ workboats for collection of liquid/ solid waste Marine environmental monitoring as per environmental monitoring programme 	<p>Being Compiled</p> <ul style="list-style-type: none"> No dredging was carried out during the compliance period from April 2019 to September 2019. The dredged material till 31.03.2020 amounting to 2.90 Mm³ has been utilized for reclamation of 36 Ha area. The dredged material has been used for reclamation. Turbidity buoys at 3 locations identified by NIOT had been re-deployed in the month of November 2019 and continuous monitoring was carried out to assess the real time turbidity. Dredging Management plan has been prepared Discharge of waste into sea is prohibited Work has been awarded to M/s. KITCO for developing a facility Level Oil Spill Disaster Contingency Plan (OSDCP) in line with the National Oil Spill-Disaster Contingency Plan (NOS-DCP) requirements. The Final OSDCP for Vizhinjam Port was submitted to Indian Coast Guard (ICG) for vetting on 24.09.2019. The same had been scrutinized by the ICG and the observations were forwarded to AVPPL on 20.02.2020. The observations of ICG are being

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
				<p>incorporated accordingly and the OSRP shall be resubmitted to ICG for approval.</p> <ul style="list-style-type: none"> Marine Environmental Monitoring at 5 locations as per the Environment Monitoring Plan prescribed in EIA has commenced since August 2016, one additional marine water monitoring location has been added from October 2017 after suggestion from NGT committee and the parameters are within permissible limits. Six monthly monitoring reports are regularly submitted to regulatory authorities as a part of Environmental & CRZ clearance compliance.
2	Material transport and construction activities	Air Quality	<ul style="list-style-type: none"> Most of the Breakwater stones will be transported from the quarries to the nearest harbour. From there through Barges it will be transported to project site. This is will avoid substantiate flow of Heavy Vehicles during construction Phase thereby minimizing impact on Air and Noise Quality in the project region. To reduce impacts from exhausts, emission control norms will be enforced / adhered. 	<p>Being Complied</p> <ul style="list-style-type: none"> Rock placing for breakwater construction was initiated using the stones brought through barges from nearby harbours. It is ensured that all vehicles entering the Port have a valid PUC certification Adequate sized construction yard has been provided for storage of construction materials, equipment tools, earthmoving equipment, etc. The dumpers have speed governors ensuring adherence to speed limit Signage for speed control are displayed inside port area

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			<ul style="list-style-type: none"> ○ All the vehicles and construction machinery will be periodically checked to ensure compliance to the emission standards ○ Construction equipment and transport vehicles will be periodically washed to remove accumulated dirt ○ Providing adequately sized construction yard for storage of construction materials, equipment tools, earthmoving equipment etc. ○ Provide enclosures on all sides of construction site ○ Movement of material will be mostly during non-peak hours. ○ On-site vehicle speeds will be controlled to reduce excessive dust suspension in air and dispersion by traffic ○ Water sprinkling will be carried out to suppress fugitive dust ○ Environmental awareness program will be provided to the personnel involved in developmental works 	<ul style="list-style-type: none"> ○ Water sprinkling is carried out for suppressing dust ○ It is ensured that all trucks transporting material are covered by tarpaulin. ○ Regular awareness programme on various Environment aspects is being imparted to workers and employees.

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
		Noise	<ul style="list-style-type: none"> Use of tarpaulin covers and speed regulations for vehicles engaged in transportation Noise levels will be maintained below threshold levels stipulated by Central/Kerala State Pollution Control Board (CPCB)/KSPCB Procurement of machinery / construction equipment will be done in accordance with specifications conforming to source noise levels less than 75 dB (A) Well-maintained construction equipment, which meets the regulatory standards for source noise levels, will be used Any equipment emitting high noise, wherever possible, will be oriented so that the noise is directed away from sensitive receptors Noise attenuation will be practiced for noisy equipment by employing suitable techniques such as acoustic controls, insulation and vibration dampers High noise generating activities such as 	<p>Being Complied</p> <ul style="list-style-type: none"> Noise levels are being monitored every fortnight and are found to be well within the permissible limits within the project area. Contractors are also monitoring the Noise level in their work area and results are within the stipulated limits. Protective gear like earplugs, muffs are provided to workers exposed to noise level beyond threshold limits.

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			<p>piling and drilling will be scheduled at daytime (6.00 am to 10pm) to minimise noise impacts</p> <ul style="list-style-type: none"> Personnel exposed to noise levels beyond threshold limits will be provided with protective gear like earplugs, muffs, etc. Ambient noise levels will be monitored at regular intervals 	
		Disturbance to Natural Drainage pattern	<ul style="list-style-type: none"> Port development is mostly on reclaimed land Rainwater/surface water harvesting pond included in design Existing drainage near port boundary (backup area) will be integrated with port storm water drainage & management plan Existing drains / Streams that are passing in ware house area will not be closed/ diverted. And these streams will be de-silted and enhanced to improve their carrying capacities 	<p>Being Complied</p> <ul style="list-style-type: none"> Measures have been taken for maintaining the natural flow of the streams debouching in the construction site, by laying drain pipes beneath the temporary road. A study has been conducted to assess the rainwater harvesting potential and recommend for planning and implementation of rainwater harvesting structures within the proposed sites for the sustainable development of existing groundwater resources Provision for installing Sewage Treatment Plant (STP) facility of adequate capacity in phased manner is being planned and will be implemented in line to CRZ Notification along with the commissioning of the project in consultation with

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
				<p>KSPCB. AVPPL had submitted relevant documents including Location Plan, Process, Design, Capacity, Layout and other details to KSPCB seeking approval from the board as per the CTE obtained for the project. KSPCB had conducted a site visit on 21.08.2019. During the site visit additional details were sought and the same were submitted to KSPCB. Thereafter, KSPCB had called for a meeting and presentation on the proposed STP on 15.11.2019. KSPCB have suggested AVPPL to change the technology from MBBR to MBR. AVPPL is in the process of modifying the technical documents in line with KSPCB suggestion. Additionally, in order to arrive at the capacity of the STP, KSPCB is to obtain details of discharge of sewage in the two streams flowing through the project site; since there are no estimates on the flow rate of these two streams and considering that the STP would need to treat the wastewater/storm water and sewage flowing from the streams. AVPPL are awaiting details of the same from KSPCB.</p> <ul style="list-style-type: none"> ○ No work has started in warehouse area and drains/streams passing through the area are not closed/ diverted.

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
		Vegetation and Strain on existing infrastructure	<ul style="list-style-type: none"> Port development is planned mostly on reclaimed land; Land use at backup area, PAF Zone and warehouse area will be mostly coconut plantation and low mixed plantation Adequate green belt will be developed in port and its associated (backup area, PAF, warehouse and road & rail connectivity). Temporary workers camp with self-sufficient infrastructure facilities. 	Being Complied <ul style="list-style-type: none"> Care is taken to limit the felling of trees to the bare minimum. Plantation of saplings along the road margins, road medians and port boundary are planned as part of the master plan development. Temporary Worker camp has been provided with all necessary infrastructure facilities (Water, Electricity, Sanitation, Fuel, etc.)
		Existing Traffic	<ul style="list-style-type: none"> NH-47 bypass under construction around 2.0 km from the proposed Port site and the Transportation of construction materials will be carried out during non- peak hours. Hence a dedicated road of 45 M RoW is proposed to connect site with NH Bypass Regularization of truck movement Majority of rock for breakwater construction will be transported through sea route via barges from nearby quarry sites A dedicated rail network of 	Being Complied <ul style="list-style-type: none"> Traffic monitoring & regularization is being carried out for maximum efficiency. Trial run of rock placing for breakwater construction was initiated using the stones brought through barges from nearby harbours. Konkan Railway Corporation Limited (KRCL) has been engaged as a consultant for turnkey execution of the project. Out of the total rail route length of 10.7 km, 9.0 km is planned to be passing through an underground tunnel to minimize the disturbance to the local population. Detailed Project Report (DPR) has been completed and submitted to Southern Railway for its approval. All

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			approximately 15 km is proposed from port to Nemom railway station	the required clarifications have been provided to Southern Railways and the approval is expected shortly.
3.	Land Reclamation	Existing Water Resources like Groundwater and surface water	<ul style="list-style-type: none"> Land to be reclaimed will be separated from adjoining land by creating containment bund. Return sea water will be sent back to sea through appropriate channels. 	Being Complied <ul style="list-style-type: none"> No dredging was carried out during the compliance period from April 2019 to September 2019. The dredged material till 31.02.2020 amounting to 2.90 Mm³ has been utilized for reclamation of 36 Ha area. The dredged material has been used for reclamation. During dredging return sea water is sent back to sea through appropriate channels. The existing drains are maintained for unhindered disposal of surface drainage water.
4.	Solid Waste Management	Soil quality	<ul style="list-style-type: none"> Construction waste will be used within port site for filling of low lying areas. Composted bio-degradable waste will be used as manure in greenbelt. Other recyclable wastes will be sold. Excavated soil at backup, PAF Zone and ware house area will be stockpiled in a corner of the site in bunded area to avoid run off with storm water. General refuse generated on-site will be collected in waste skips and 	Being Complied <ul style="list-style-type: none"> Construction waste is used within port site for filling of low lying areas in line to C&D Waste Management Rules 2016, as amended. No burning of refuse at construction sites is being done. Contractors working at the site have been made responsible for management of Solid Waste during construction stage. They are complying with the provisions pertaining to management of Solid Waste in line to Solid Waste Management Rules

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			<ul style="list-style-type: none"> separated from construction waste. Burning of refuse at construction sites will be prohibited. All control measure will be taken to avoid the contamination of groundwater during construction phase 	<p>2016, as amended.</p> <ul style="list-style-type: none"> There is no disposal of waste in the project area which may lead to groundwater contamination.
5.	Handling of hazardous wastes	Human safety and property loss	<ul style="list-style-type: none"> Adequate safety measures as per OSHA standards will be adopted Construction site will be secured by fencing with controlled/limited entry points. Hazardous materials such as lubricants, paints, compressed gases, and varnishes etc., will be stored as per the prescribed/approved safety norms. Construction site will be secured by fencing with controlled/ limited entry points Medical facilities including first aid will be available for attending to injured workers. Handling and storage as per statutory guidelines. 	<p>Being Complied</p> <ul style="list-style-type: none"> Adequate safety measures as per OSHA standards are adopted as and when necessary as per the HSE Plan. Construction site is being secured by fencing with controlled/limited entry points. Medical facilities including first aid are available for attending to injured workers. Ambulance is also available at site for shifting the injured to the nearby hospitals. Handling and storage is as per statutory guidelines. Hazardous waste is disposed through approved KSPCB/CPCB vendors.

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			<ul style="list-style-type: none"> Positive isolation procedures will be adhered Hazardous wastes will be disposed through approved KSPCB/CPCB vendors. 	
6.	Water Resources	Water scarcity / Pollution	<ul style="list-style-type: none"> Water requirement during the construction is expected to be around 0.10 MLD Water will be sourced from Vellayani lake Avoid/minimise the loss during conveyance Optimized utilization of the water Care will be taken to prevent the runoff from the construction site to the nearby natural streams, if any 	Being Complied <ul style="list-style-type: none"> A 3.00 MLD water supply scheme for the project had been commissioned with the source of water being Vellayani Lake whose raw water will be available for treatment. The net availability of treated water from this supply scheme is 2.49 MLD of potable water out of which 1.49 MLD of water shall be distributed to the local people as part of social welfare measures of VISL. The balance 1.0 MLD would be used for port related activities. However, at present, the entire treated water from the scheme is being utilised by the community. Due to this reason, the water for construction purposes for the port is being sourced from the open market/private suppliers. On an average about 37 KLD of water is being consumed for construction related activities.
7.	Fishing	Fishermen and fishing	<ul style="list-style-type: none"> Signboards will be placed at the construction activities in order to 	Being Complied <ul style="list-style-type: none"> Signboards have been placed for demarcation of

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
		villages	<p>make fishermen aware of the ongoing construction activities</p> <ul style="list-style-type: none"> Necessary marker buoys will be installed Interactions will be initiated with the fishing community before commencement of construction works 	<p>construction area.</p> <ul style="list-style-type: none"> Using the technological advancement the dedicated CSR team of AVPPL are in constant touch with the fishermen/fishing community members to facilitate the flow of various project related information/updates. AVVPL CSR team also provides regular updates to the committee which has been formed by the local church representatives adjoining to the port area, who in turn pass on port project execution information to the fishermen.
8.	Tourism	Effect on tourism	<ul style="list-style-type: none"> Tourism activity is observed at Kovalam located about 2.0 km towards the North of Proposed Port. Mathematical Modelling studies on shoreline changes show the insignificant impact due to the port development on the existing coastline. However, the Shoreline monitoring during construction as well as operation Phases were proposed. A cruise terminal and related facilities is part and parcel of the project. This is to largely compensate the losses made For all acquired properties and land 	<p>Being Complied</p> <ul style="list-style-type: none"> The tourism activity in the nearby Kovalam area is not impacted by the construction of the port. Shoreline monitoring for a stretch of 40 Km (20 Km on both sides of the project site) is being done and reports are regularly submitted to regulatory authorities. Once the first phase of port becomes operational, it would naturally attract cruise tourism. Based on the development of cruise business, dedicated cruise berths will be planned in a phased manner. Action is also being taken in consultation with the State tourism department, to design port linked tourism packages covering the Kovalam-

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			adequate compensation will be provided based on legally valid documents	Vizhinjam-Poovar tourism corridor <ul style="list-style-type: none"> Resort owners evicted have been compensated for land and not for the structures since they were in violation of CRZ notification. An area of 0.728 Ha has been acquired up to 31.03.2020 under negotiated purchase. Remaining land of 2.865 Ha to be acquired by Land Acquisition (LA) process for which notification has been published and action initiated by the District Collector Thiruvananthapuram.
9	Breakwater	Change in shoreline	<ul style="list-style-type: none"> Shoreline monitoring shall be carried out Suitable Shoreline protection measures will be implemented based on the observations 	Being Complied Comprehensive Shoreline Monitoring is being carried out under the technical Guidance of NIOT and Six monthly monitoring reports are being submitted regularly as part of EC & CRZ Compliance. The existing Shoreline Monitoring arrangement consists of: <ul style="list-style-type: none"> Cross Shore Beach Profiling perpendicular to the shoreline 20 KM on either side of the port at 500 m intervals which includes bathymetry survey up to CD -10 and landside survey up to HTL + 100 m and photographic documentation of morphological changes, seasonal beach sediment sampling and analysis at 81 locations, bathymetry survey of 40 km x 15 km twice in a year, monthly

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				<p>monitoring of littoral zone, seabed sediment sampling per sq.km in 80 sq.km, current measurement with ADCP at four locations for 3 seasons, tide measurement, continuous wave measurement by wave rider buoy, water sampling and analysis, continuous turbidity monitoring at 3 locations, bathymetry and cross section survey of 6 rivers debouching into the sea in 40 Km stretch study area, continuous weather monitoring by Automatic Weather Station.</p> <ul style="list-style-type: none"> ○ L&T Infrastructure Engineering Ltd. (L&T IEL) had prepared Mathematical Modelling Reports based on Shoreline Monitoring data; which were vetted by National Institute of Ocean Technology (NIOT). <ul style="list-style-type: none"> ○ Three mathematical modelling reports have been prepared by L&T IEL so far and submitted to MoEF&CC; as detailed below: ○ 1st Mathematical Modelling Report for the period February 2015 to February 2017; submitted along with the HYCR for the period April 2017 to September 2017 ○ 2nd Mathematical Modelling Report for the period March 2017 to February 2018; submitted along with the HYCR for the period April 2018 to September 2018 ○ 3rd Mathematical Modelling Report for the

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				<p>period March 2018 to February 2019; submitted along with the HYCR for the period April 2019 to September 2019</p> <p>These mathematical modelling reports have affirmed that the shoreline change is in line with what was predicted as part of the EIA study.</p> <p>In continuation with the same practice Adani Vizhinjam Port Pvt. Ltd. (AVPPL) have submitted the shoreline data from March 2019 to February 2020 to L&T IEL for mathematical modelling to assess the impact on shoreline under the guidance of NIOT.</p>
10	Effect on existing fishing harbour	Movement of fishing boats	<ul style="list-style-type: none"> Detailed modelling studies have been carried out on tranquillity conditions in the fishing harbour with port development. The studies reveal that the tranquillity conditions will be improved in fishing harbour with construction of the port. Further minor accretion happening within the fishing harbour will be arrested Traffic of Marine vessel/ fishing boats will be planned without affecting each other Adoption of fishing harbour to 	<p>Being Complied</p> <ul style="list-style-type: none"> Wave, current and tide data are being monitored along with the shoreline monitoring of 40 km stretch. Based on the above, the modelling studies done at the EIA stage has been further evaluated. L&T Infrastructure Engineering Ltd. (L&T IEL) had prepared Mathematical Modelling Reports based on Shoreline Monitoring data; which were vetted by National Institute of Ocean Technology (NIOT). <ul style="list-style-type: none"> Three mathematical modelling reports have been prepared by L&T IEL so far and submitted to MoEF&CC; as detailed below: 1st Mathematical Modelling Report for the

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			<p>manage it to perform as per International standard</p> <ul style="list-style-type: none"> ○ A new fishing harbour provided under CSR initiatives because of additional tranquillity creator. ○ Loss of livelihood will be either taken care of in the new port premises or adequately compensated mostly in the form of employment 	<p>period February 2015 to February 2017; submitted along with the HYCR for the period April 2017 to September 2017</p> <ul style="list-style-type: none"> ○ 2nd Mathematical Modelling Report for the period March 2017 to February 2018; submitted along with the HYCR for the period April 2018 to September 2018 ○ 3rd Mathematical Modelling Report for the period March 2018 to February 2019; submitted along with the HYCR for the period April 2019 to September 2019 <p>These mathematical modelling reports have affirmed that the shoreline change is in line with what was predicted as part of the EIA study. In continuation with the same practice Adani Vizhinjam Port Pvt. Ltd. (AVPPL) have submitted the shoreline data from March 2019 to February 2020 to L&T IEL for mathematical modelling to assess the impact on shoreline under the guidance of NIOT.</p> <ul style="list-style-type: none"> ○ During operation phase traffic of Marine vessel/fishing boats will be planned without affecting each other as per the applicable laws. ○ The work for construction of the fish landing centre (Rs. 16.00 crores) and the fishery breakwater (Rs. 131.12 crores) has been initiated

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
				<p>as part of the funded work component of the concession agreement with AVPPL in the form of a new fishing harbour. The EPC Contractor is finalising the design for the fishing berth. However, AVPPL is unable to start the construction activities since the proposed site is blocked by fishermen with their fishing boats. The proposed area needs to be cleared for the commencement of works. GoK has initiated discussions with fishermen representatives for removal of the boats to facilitate construction work and discussions underway.</p> <ul style="list-style-type: none"> ○ In consultation with the fishermen, enhanced livelihood compensation of Rs. 101.86 Cr was sanctioned by Government of Kerala (GoK), instead of Rs. 7.10 crores suggested earlier in the EIA stage. Out of this amount, Rs. 83.32 crores have been disbursed till 31.03.2020 for a total number of 2625 Livelihood Affected Persons (LAPs) whose verification was complete in all respects; this includes boat owners to whom kerosene is supplied free of cost as well during the port construction period. Verification of the documents of balance LAPs is in progress.

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
11	Shoreline changes	erosion/accretion	Final shoreline Impact management plan will be prepared in consultation with agencies like CESS/INCOIS, NGO and local bodies and will implemented.	Being Complied <ul style="list-style-type: none"> NIOT has been engaged to give technical advice on aspects related to shoreline monitoring & shoreline evolution. Comprehensive Shoreline Monitoring is being carried out under the technical Guidance of NIOT and six monthly monitoring reports are being submitted regularly as part of EC & CRZ Compliance. Wave, current and tide data are being monitored a 40 km stretch. L&T Infrastructure Engineering Ltd. (L&T IEL) had prepared Mathematical Modelling Reports based on Shoreline Monitoring data; which were vetted by National Institute of Ocean Technology (NIOT). <ul style="list-style-type: none"> Three mathematical modelling reports have been prepared by L&T IEL so far and submitted to MoEF&CC; as detailed below: 1st Mathematical Modelling Report for the period February 2015 to February 2017; submitted along with the HYCR for the period April 2017 to September 2017 2nd Mathematical Modelling Report for the period March 2017 to February 2018; submitted along with the HYCR for the period April 2018 to September 2018

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S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
				<ul style="list-style-type: none"> 3rd Mathematical Modelling Report for the period March 2018 to February 2019; submitted along with the HYCR for the period April 2019 to September 2019 <p>These mathematical modelling reports have affirmed that the shoreline change is in line with what was predicted as part of the EIA study.</p> <p>In continuation with the same practice Adani Vizhinjam Port Pvt. Ltd. (AVPPL) have submitted the shoreline data from March 2019 to February 2020 to L&T IEL for mathematical modelling to assess the impact on shoreline under the guidance of NIOT.</p>

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Environmental Management Plan – Rail*/Road Corridors			
*No Construction work was carried out during the compliance period in the rail corridor			
S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2020
1	Environmental Management and Monitoring Facility Equipment for EMP (Meters, Vehicles and Buildings)	This will include institutional requirements, training, environmental management and monitoring. Provision for purchasing required equipment.	Noted for Compliance <ul style="list-style-type: none"> ○ An Environment Management Cell has been established to look after day to day affairs like Monitoring, Training ○ Appropriate institutional mechanism for maintenance of health, hygiene, safety, security has been put in place. An officer of VISL has been designated as Head (EHS & CSR) for effective implementation of the stipulated EHS safeguards & CSR activities. AVPPL, the concessionaire executing the project has also appointed officers for EHS & CSR, Horticulture. In addition to the above, independent environment, health and safety consultants have been appointed as required in the concession agreement signed with AVPPL. Organizational Structure for Environment, Health, and Safety (EHS) & CSR for construction phase is enclosed as Annexure VIII. ○ It is also ensured that contractors working at site also deploy EHS professional to implement suggested EMP measures. Proper provisions for maintenance of health, hygiene, safety, security for workforce in labour colony has also been provided/ ensured. ○ Necessary equipment will be purchased. ○ Third party environmental monitoring has

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Environmental Management Plan – Rail*/Road Corridors			
*No Construction work was carried out during the compliance period in the rail corridor			
S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2020
			commenced since August 2016 and the monitoring results are satisfactory.
2	Altered Road embankment	Retaining walls and gabions should be provided	Noted for Compliance <ul style="list-style-type: none"> AVPPL had awarded the work to Kerala State Remote Sensing and Environment Centre (KSREC) to undertake study on Groundwater impact due to construction of port approach road. KSREC has submitted the final report with recommendations and AVPPL is in the process of constructing the approach road to port. Suitable mitigation measures as suggested in the KSREC report will be adopted during construction.
3	Dust	<ul style="list-style-type: none"> Water should be sprayed during the construction phase, at mixing sites, and temporary roads. In laying sub-base, water spraying is needed to aid compaction of the material. After the compaction, water spraying should be carried out at regular intervals to prevent dust. Vehicles delivering materials should be covered to reduce spills and dust blowing off the load. 	Being Compiled <ul style="list-style-type: none"> Regular Water Sprinkling is done on the approach road by water tankers. Water spraying is carried out at regular intervals after compaction Tarpaulin cover is used in vehicles delivering materials.
4	Air Pollution	<ul style="list-style-type: none"> Vehicles and machinery are to be maintained so that emissions conform to National and State standards. All vehicles and machineries should obtain Pollution Under Control Certificates (PUC). 	Being Complied <ul style="list-style-type: none"> Ambient air quality monitoring is carried out at 5 locations as per the Environment Monitoring Plan prescribed in EIA and has commenced since August 2016, the results obtained are within the limits prescribed by National Ambient Air Quality

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Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan		

Environmental Management Plan – Rail*/Road Corridors			
*No Construction work was carried out during the compliance period in the rail corridor			
S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2020
			Standards (NAAQS) ○ It is ensured that all vehicles entering port have Pollution Under Control (PUC) Certificate.
5	Noise	<ul style="list-style-type: none"> ○ Machinery and vehicles will be maintained to keep their noise to a minimum. ○ Construction of noise barriers of an average length of 100m and eight feet height wherever necessary. ○ Proper maintenance of the rail track and rail wagon, by frequent lubrication to avoid frictional noise. ○ Regular monitoring shall be carried out as per the Environmental Monitoring Plan. 	Being Complied <ul style="list-style-type: none"> ○ All the machinery and vehicles are maintained to keep the noise at minimum ○ Noise monitoring is being done since August 2016, and the readings are within the limits at port site ○ Regular monitoring of ambient Noise is carried out since August 2016 as per the Environmental Monitoring Plan prescribed in EIA and results are within the prescribed limit at port site.
6	Loss of low lying land and ponds	<ul style="list-style-type: none"> ○ Impacted ponds can be enhanced by constructing bridged structures like Gabions to avoid plugging of springs. ○ Mitigation/Compensation shall be affected for the completely impacted ponds. ○ At Chainage km 6.500 the Railway alignment goes below the Existing NH and then at km 6.600 it will hit pond. The pond will be excavated partially and the soil material shall be used to fill in the western part and an equivalent area lost may be excavated to compensate the loss of effective pond area. 	Will be complied <ul style="list-style-type: none"> ○ AVPPL had awarded the work to Kerala State Remote Sensing and Environment Center (KSREC) to undertake study on Groundwater impact due to construction of port approach road and also suggest mitigation measures. ○ For impacted ponds in road alignment suitable mitigation measure as suggested in the KSREC report will be adopted during construction. ○ Konkan Railway Corporation Limited (KRCL) has been engaged as a consultant for turnkey execution of the project. Out of the total rail route length of 10.7 km, 9.0 km is planned to be passing

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Environmental Management Plan – Rail*/Road Corridors			
*No Construction work was carried out during the compliance period in the rail corridor			
S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2020
			through an underground tunnel to minimize the disturbance to the local population. Detailed Project Report (DPR) has been completed and has been submitted to Southern Railway for its approval. All the required clarifications have been provided to Southern Railways and the approval is expected shortly.
7	Flood Impacts and Cross Drainage Structures	Formation level should be raised according to the design and the cross drainage structures suitably planned for the flood events.	Will be Complied
8	Alteration of drainage	<ul style="list-style-type: none"> ○ In sections along watercourses, earth and stone will be properly disposed of so as not to block rivers and streams, thereby preventing any adverse impact on water quality. ○ All necessary measures shall be taken to prevent earthworks and stone works from impeding cross drainage at streams and canals or existing irrigation and drainage systems in conformity to the Contractors visual integration and management plan and EMP. 	Will be Complied <ul style="list-style-type: none"> ○ AVPPL had awarded the work to Kerala State Remote Sensing and Environment Center (KSREC) to undertake study on Groundwater impact due to construction of port approach road and also suggest mitigation measures. ○ For impacted on water quality, suitable mitigation measure as suggested in the KSREC report will be adopted.
9	Contamination from Wastes	All justifiable measures will be taken to prevent the wastewater produced during construction from entering directly into rivers and irrigation systems.	Being Complied Measures are being taken up to prevent the wastewater produced during construction from entering directly into rivers and irrigation systems. STPs are set by contractors for treating the wastewater

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Environmental Management Plan – Rail*/Road Corridors			
*No Construction work was carried out during the compliance period in the rail corridor			
S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2020
			generated during construction and at the labour camps. The treated wastewater is used for sprinkling purpose to suppress dust emission.
10	Borrow pits	Borrow pits are to be identified, opened and closed after consultations and proper documentation.	Will be Complied as and when required
11	Quarrying and Material sources	<ul style="list-style-type: none"> Quarrying will be carried out at approved and licensed quarries only. 	Will be Complied The road constructed so far has been made with material available on site.
12	Soil Erosion and Soil Conservation	<ul style="list-style-type: none"> On slopes and other suitable places along the two proposed corridors, trees and grass should be planted. On sections with filling and deep cutting their slopes should be covered by sod, or planted with grass, etc. If existing irrigation and drainage system, ponds are damaged, they will be suitably repaired. Retaining walls and gabions shall be suitably provided. 	Will be Complied <ul style="list-style-type: none"> AVPPL had awarded the work to Kerala State Remote Sensing and Environment Centre (KSREC) to undertake study on Groundwater impact due to construction of port approach road. KSREC has submitted the final report with recommendations and AVPPL is in the process of constructing the approach road to port. Suitable mitigation measures as suggested in the KSREC report will be adopted during construction.
13	Loss of agricultural topsoil	<ul style="list-style-type: none"> Arable land should not be used for topsoil borrowing. Topsoil will be kept and reused after excavation is over. Any surplus to be used on productive agricultural land. 	Being Complied <ul style="list-style-type: none"> Arable land is not being used for topsoil borrowing The topsoil excavated is being stored and will be reused during development of greenbelt.
14	Compaction of Soil	Construction vehicles should operate within the	Will be Complied

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Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan		

Environmental Management Plan – Rail*/Road Corridors			
*No Construction work was carried out during the compliance period in the rail corridor			
S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2020
	and Damage to Vegetation	Corridor of Impact avoiding damage to soil and vegetation.	
15	Loss of trees and Avenue Planting	<ul style="list-style-type: none"> Areas of trees cleared will be replaced according to Compensatory Afforestation Policy under the Forest Conservation Act - 1980. Landscaping shall be done at major junctions. 	Being Complied <ul style="list-style-type: none"> AVPPL, in collaboration with Forest department, have carried out compensatory afforestation in 12.05 Ha land as identified by social Forest Department in Sainik School, Trivandrum (at an aerial distance of 24 km from project site). The plantation is now at its Third Year.
16	Vegetation clearance	Tree clearing within the ROW should be avoided beyond that which is directly required for construction activities and/ or to reduce accidents. Especially in plantation and house garden areas both along road and rail alignment.	Will be complied <ul style="list-style-type: none"> Special care is taken to minimize the tree felling to the extent possible, but in line with the technical requirements of the project. Due prior permission is taken for tree felling from Forest Department.
17	Fauna	Construction workers should protect natural resources and animals. Hunting of birds and other local animals is prohibited.	Being Complied <ul style="list-style-type: none"> Construction workers are housed in labour camp near the project site and are provided with all the basic amenities such as drinking water, proper sanitation, canteen etc. Regular awareness sessions are conducted for the construction workers regarding importance of natural resources and animals. Hunting of birds & other local animals is strictly prohibited
18	Traffic Jams and congestion	If there is traffic congestion during construction, measures should be taken to relieve it as far as possible	Being Complied In order to avoid traffic congestion during the

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Environmental Management Plan – Rail*/Road Corridors			
*No Construction work was carried out during the compliance period in the rail corridor			
S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2020
		with the co-operation of the traffic police.	construction of the road, the contractor has developed a bypass as advised by Traffic police
19	Health and Safety	All contractors' staff and workers must wear high visibility purpose made overalls or trousers/waist coat at all times. All operators working with any materials above head height (even in trenches) must wear hard hats all at times on the worksite.	Being Complied <ul style="list-style-type: none"> ○ All the workers are provided with Personal Protective Equipment's (PPE) and it is ensured that they wear it all the time ○ Also all the contractors working at site have a dedicated health and safety person to oversee the work carried out.
20	Pollution of Streams parallel or along the alignments	Construction material/waste should be disposed of properly so as not to block or pollute streams or ponds with special attention to confining concrete work.	Being Complied Construction materials/waste are being disposed properly; so as not to block or pollute streams or ponds.
21	Cultural Remains	Construction should be stopped until authorised department assess the remains to preserve Archaeological relics and cultural structures like Temples, mosques and churches. Archaeologists will supervise the excavation to avoid any damage in the relics.	Will be Complied

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Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan		

Environment Management Plan – Warehouse Area* (Construction Phase)				
*Minimal work (boundary wall construction) was carried out in Warehouse area during compliance period				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
1	Material transport and construction activities	Air Quality/Dust	<ul style="list-style-type: none"> To reduce impacts from exhausts, emission control norms will be enforced / adhered. All the vehicles and construction machinery will be periodically checked to ensure compliance to the emission standards. Construction equipment and transport vehicles will be periodically washed to remove accumulated dirt. Providing adequately sized construction yard for storage of construction materials, equipment, tools, earthmoving equipment, etc. Provide enclosures on all sides of construction site Movement of material will be mostly during non-peak hours. On-site vehicle speeds will be controlled to reduce excessive dust suspension in air and dispersion by traffic Water should be sprayed during the construction phase, at mixing sites, and temporary roads. In laying sub-base, water spraying is needed to aid compaction of the material. After the compaction, water spraying should be carried out at regular intervals to prevent dust. Vehicles delivering materials should be covered to 	Complied <ul style="list-style-type: none"> Monthly Environment Monitoring is being carried out and all the parameters are within the stipulated limit It is ensured that all vehicles entering the area have a valid PUC certification It is ensured that all the vehicles entering the site are following speed limit Tarpaulin cover is used in vehicles

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Environment Management Plan – Warehouse Area* (Construction Phase)				
*Minimal work (boundary wall construction) was carried out in Warehouse area during compliance period				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			<ul style="list-style-type: none"> reduce spills and dust blowing off the load. Environmental awareness program will be provided to the personnel involved in developmental works. Use of tarpaulin covers and speed regulations for vehicles engaged in transportation. 	
		Noise	<ul style="list-style-type: none"> Noise levels will be maintained below threshold levels stipulated by Central/Kerala State Pollution Control Board (CPCB)/KSPCB. Procurement of machinery / construction equipment will be done in accordance with specifications conforming to source noise levels less than 75 dB (A). Well-maintained construction equipment, which meets the regulatory standards for source noise levels, will be used Any equipment emitting high noise, wherever possible, will be oriented so that the noise is directed away from sensitive receptors. Noise attenuation will be practiced for noisy equipment by employing suitable techniques such as acoustic controls, insulation and vibration dampers. High noise generating activities such as piling and drilling will be scheduled at daytime (6.00 am to 10 pm) to minimize noise impacts. 	Complied <ul style="list-style-type: none"> Ambient Noise is being monitored fortnightly for Day & Night time and results are within the prescribed limit. Construction equipment machinery procurement is done in accordance with specifications conforming prescribed standard. Personnel engaged in construction activity are provided with appropriate PPE's (Earplugs/muffs)

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Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan		

Environment Management Plan – Warehouse Area* (Construction Phase)				
*Minimal work (boundary wall construction) was carried out in Warehouse area during compliance period				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			<ul style="list-style-type: none"> Personnel exposed to noise levels beyond threshold limits will be provided with protective gear like earplugs, muffs, etc. Ambient noise levels will be monitored at regular intervals 	
2	Construction of Buildings, Roads, Sheds, etc.	Vegetation and Strain on existing infrastructure	<ul style="list-style-type: none"> Most of the land is covered with coconut trees and few other trees. Trees that are cut down will be accounted for and the same no. of trees of the same or some other species will be replanted at another location to compensate for the loss of greenery. 	Will be Complied 190 trees have been cut un the warehouse area. These are included in the compensatory afforestation carried out by AVPPL, in collaboration with Forest department, at Sainik School in lieu of trees felled at the rate of 1:10 on 12.05 Ha land.
		Water Environment	<ul style="list-style-type: none"> The streams 1 and 2 will be made to avoid entering the warehouse area by diverging them into the Karichal River. A tunnel like arrangement with RCC structures will be used so as to not affect the streams (3 and 4) that will go through the warehouse area. The streams will be made to go under the warehouse areas through the tunnel. Another option is to divert the stream through the boundary An application has been filed with the irrigation department for permission. 	Will be Complied Will be appropriately planned in consultation with the concerned departments

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Environment Management Plan – Warehouse Area* (Construction Phase)				
*Minimal work (boundary wall construction) was carried out in Warehouse area during compliance period				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			<ul style="list-style-type: none"> The low lying area in the region is already made use by the local people, and has been degraded. There are no active ecological systems in the area. As far as possible, during operation phase the network of streams that add to the low lying area of the region will be diverted or channeled under the constructed buildings to avoid impact to the low lying area. Filling of low lying areas (if required) shall be done 	Will be Complied Will be appropriately planned in consultation with the concerned departments
			<ul style="list-style-type: none"> Construction waste such as cement, paint, and other construction waste will flow into the downstream parts of the streams and Karichal River. Construction will be avoided during rainy season. Good housekeeping practices, such as cement being stored in dry areas will be taken care of. Labour camps will be provided with proper support services. 	Will be Complied
		Disturbance to Natural Drainage pattern	<ul style="list-style-type: none"> As mentioned above, formidable measures will be taken to avoid the disturbance to the natural flow of water. If some structure or building comes in the way of the existing flow of water, the flow will be redirected to the closest stream in the drainage pattern. In sections along watercourses, earth and stone will be properly disposed of so as not to block rivers and streams, thereby preventing any adverse impact on 	Will be Complied

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Environment Management Plan – Warehouse Area* (Construction Phase)				
*Minimal work (boundary wall construction) was carried out in Warehouse area during compliance period				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			water quality. ○ All necessary measures shall be taken to prevent earthworks and stone works from impeding cross drainage at streams and canals or existing irrigation and drainage systems in conformity EMP.	
		Existing Traffic	○ Transportation of construction materials will be carried out during non- peak hours. ○ Regularization of truck movement. ○ Existing roads shall be strengthened and shall be used for the construction material transportation.	Will be Complied
3	Solid Waste Management	Soil quality	○ Construction waste will be used within warehouse site for filling of low lying areas. ○ Composted bio-degradable waste will be used as manure in greenbelt. Other recyclable wastes will be sold. ○ Excavated soil will be stockpiled in a corner of the site in bunded area to avoid run off with storm water. ○ General refuse generated on-site will be collected in waste skips and separated from construction waste. ○ Burning of refuse at construction sites will be prohibited.	Will be Complied

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Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan		

Project Annex Facility (PAF) Zone - Construction Phase *Construction work was carried out in a limited way during the compliance period in PAF Zone				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
1	Material transport and construction activities	Air Quality/Dust	<ul style="list-style-type: none"> To reduce impacts from exhausts, emission control norms will be enforced / adhered. All the vehicles and construction machinery will be periodically checked to ensure compliance to the emission standards. Construction equipment and transport vehicles will be periodically washed to remove accumulated dirt. Providing adequately sized construction yard for storage of construction materials, equipment tools, earthmoving equipment, etc. Provide enclosures on all sides of construction site Movement of material will be mostly during non-peak hours. On-site vehicle speeds will be controlled to reduce excessive dust suspension in air and dispersion by traffic Water should be sprayed during the construction phase, at mixing sites, and temporary roads In laying sub-base, water spraying is needed to aid compaction of the material. After the compaction, water spraying should be carried out at regular intervals to prevent dust. Vehicles delivering materials should be covered to 	Complied <ul style="list-style-type: none"> Monthly Environment Monitoring is being carried out and all the parameters are within the stipulated limit It is ensured that all vehicles entering the area have a valid PUC certification Vehicles entering the site have are following speed limit Tarpaulin cover is used for vehicles transporting the construction material Water sprinkling is carried out on the temporary roads by contractors Environment awareness program is provided to the personnel engaged in development work

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Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan		

Project Annex Facility (PAF) Zone - Construction Phase *Construction work was carried out in a limited way during the compliance period in PAF Zone				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			<ul style="list-style-type: none"> reduce spills and dust blowing off the load. Environmental awareness program will be provided to the personnel involved in developmental works. Use of tarpaulin covers and speed regulations for vehicles engaged in transportation. 	
		Noise	<ul style="list-style-type: none"> Noise levels will be maintained below threshold levels stipulated by Central/Kerala State Pollution Control Board (CPCB)/KSPCB. Procurement of machinery / construction equipment will be done in accordance with specifications conforming to source noise levels less than 75 dB (A). Well-maintained construction equipment, which meets the regulatory standards for source noise levels, will be used Any equipment emitting high noise, wherever possible, will be oriented so that the noise is directed away from sensitive receptors. Noise attenuation will be practiced for noisy equipment by employing suitable techniques such as acoustic controls, insulation and vibration dampers. High noise generating activities such as piling and drilling will be scheduled at daytime (6.00 am 	<p>Complied</p> <ul style="list-style-type: none"> Ambient Noise is being monitored fortnightly for Day & Night time and results are within the prescribed limit. Construction equipment machinery procurement is done in accordance with specifications conforming prescribed standard. Personnel engaged in construction activity are provided with appropriate PPE's (Earplugs/muffs)

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Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan		

Project Annex Facility (PAF) Zone - Construction Phase *Construction work was carried out in a limited way during the compliance period in PAF Zone				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			<p>to 10 pm) to minimise noise impacts.</p> <ul style="list-style-type: none"> Personnel exposed to noise levels beyond threshold limits will be provided with protective gear like earplugs, muffs, etc. Ambient noise levels will be monitored at regular intervals 	
2	Construction of Buildings, Roads, Parking features, etc.	Vegetation and Strain on existing infrastructure	<ul style="list-style-type: none"> Most of the land is covered with coconut trees and few other trees. Trees that are cut down will be accounted for and the same no. of trees of the same or some other species will be replanted at another location to compensate for the loss of greenery. There are very few existing buildings and infrastructure on the PAF zone area land which will be acquired and people in that area will be rehabilitated. 	Will be Complied Will be complied alongside the road and port boundaries.
		Existing Traffic	<ul style="list-style-type: none"> Transportation of construction materials will be carried out during non-peak hours. Regularization of truck movement. The existing roads shall be strengthened and shall be used for the construction material transportation. 	Will be Complied
		Solid Waste	<ul style="list-style-type: none"> Construction waste will be used within port site for filling of low lying areas. 	Will be Complied

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Project Annex Facility (PAF) Zone - Construction Phase *Construction work was carried out in a limited way during the compliance period in PAF Zone				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			<ul style="list-style-type: none"> Composted bio-degradable waste will be used as manure in greenbelt. Other recyclable wastes will be sold. Excavated soil will be stockpiled in a corner of the site in bunded area to avoid run off with storm water. General refuse generated on-site will be collected in waste skips and separated from construction waste. Burning of refuse at construction sites will be prohibited. 	

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BACK UP AREA – Construction Phase *Construction of buildings is ongoing in reclaimed area during the compliance period				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
1	Material transport and construction activities	Air Quality	<ul style="list-style-type: none"> To reduce impacts from exhausts, emission control norms will be enforced / adhered. All the vehicles and construction machinery will be periodically checked to ensure compliance to the emission standards Construction equipment and transport vehicles will be periodically washed to remove accumulated dirt Providing adequately sized construction yard for storage of construction materials, equipment tools, earthmoving equipment, etc. Provide enclosures on all sides of construction site Movement of material will be mostly during non-peak hours. On-site vehicle speeds will be controlled to reduce excessive dust suspension in air and dispersion by traffic Water sprinkling will be carried out to suppress fugitive dust Environmental awareness program will be provided to the personnel involved in developmental works Use of tarpaulin covers and speed regulations for vehicles engaged in transportation 	Being Complied <ul style="list-style-type: none"> Ambient air quality monitoring is carried out at 5 locations as per the Environment Monitoring Plan prescribed in EIA and has commenced since August 2016, the results obtained are within the limits prescribed by National Ambient Air Quality Standards (NAAQS) It is ensured that all vehicles entering the port have Pollution Under Control Certificate (PUC) Water sprinkling was carried out at regular interval over the temporary road during transportation of cut material. All the trucks transporting material are covered by tarpaulin cover. Signage's for speed control are placed within the port area Adequate storage for construction material is provided within the port area on reclaimed land Environmental awareness program was carried out for contractors working at site.

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BACK UP AREA – Construction Phase *Construction of buildings is ongoing in reclaimed area during the compliance period				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
		Noise	<ul style="list-style-type: none"> Noise levels will be maintained below threshold levels stipulated by Central/Kerala State Pollution Control Board (CPCB)/KSPCB Procurement of machinery/construction equipment will be done in accordance with specifications conforming to source noise levels less than 75 dB (A) Well-maintained construction equipment, which meets the regulatory standards for source noise levels, will be used Any equipment emitting high noise, wherever possible, will be oriented so that the noise is directed away from sensitive receptors Noise attenuation will be practiced for noisy equipment by employing suitable techniques such as acoustic controls, insulation and vibration dampers High noise generating activities such as piling and drilling will be scheduled at daytime (6.00 am to 10 pm) to minimise noise impacts Personnel exposed to noise levels beyond threshold limits will be provided with protective gear like earplugs, muffs, etc. Ambient noise levels will be monitored at regular intervals 	Being Compiled <ul style="list-style-type: none"> All the machinery and vehicles are maintained to keep the noise at minimum Regular Noise monitoring is being carried since August 2016, and the readings are within the limits at port site At present only building work has commenced in limited way and barriers will be installed where ever necessary in future Regular monitoring of ambient Noise is carried out since August 2016 as per the Environmental Monitoring Plan prescribed in EIA


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BACK UP AREA – Construction Phase *Construction of buildings is ongoing in reclaimed area during the compliance period				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
2	Construction Activities	Water Environment	<ul style="list-style-type: none"> Formation level should be raised according to the design and the cross drainage structures suitably planned for the flood events. All justifiable measures will be taken to prevent the wastewater produced during construction from entering directly into the water bodies. 	Being Compiled <ul style="list-style-type: none"> The contractors working at site have obtained separate consent from KSPCB for their batching plant and they have constructed settling pond for wash water generated. No wash water is disposed into the water bodies. STPs are set by contractors for treating the wastewater generated during construction and at the labour camps. The treated wastewater is used for sprinkling purpose to suppress dust emission.
		Land Environment	<ul style="list-style-type: none"> On slopes and other suitable places along the two proposed corridors, trees and grass should be planted. On sections with filling and deep cutting their slopes should be covered by sod, or planted with grass, etc. If existing irrigation and drainage system, ponds are damaged, they will be suitably repaired. Retaining walls and gabions shall be suitably provided. 	Will be Complied
			<ul style="list-style-type: none"> Arable land should not be used for topsoil 	Will be Complied

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BACK UP AREA – Construction Phase *Construction of buildings is ongoing in reclaimed area during the compliance period				
S. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 31.03.2020
			<ul style="list-style-type: none"> borrowing. Topsoil will be kept and reused after excavation is over. Any surplus to be used on productive agricultural land. 	
			<ul style="list-style-type: none"> Construction vehicles should operate within the Backup Areas avoiding damage to soil and vegetation. 	Being Complied Construction vehicles are being operated only alongside the road and port boundaries; thereby avoiding damage to soil and vegetation.
			<ul style="list-style-type: none"> Areas of trees cleared will be replaced according to Compensatory Afforestation Policy under the Forest Conservation Act - 1980. Landscaping shall be done at major junctions. 	Refer point No.15 of Environment Management Plan – Road/Rail Corridors
			<ul style="list-style-type: none"> Tree clearing within the backup areas should be avoided beyond that which is directly required for construction activities and/or to reduce accidents. 	Will be complied to the extent possible considering the technical requirements

Annexure VII
EMP Expenditure
(October 2019 to March 2020)

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport EMP Expenditure		

Annexure VII

EMP Expenditure (October 2019 to March 2020):

S. No.	Activity	Expenditure (INR Crores)*
1.	Comprehensive Shoreline Monitoring (Tripartite Agreement with AVPPL, VISL & NIOT)	0.06
2.	Shoreline Monitoring	0.76
3.	Continuous Turbidity Monitoring	0.20
4.	Air, Noise, Surface Water, Ground Water & Marine Water Monitoring	0.29
5.	Numerical Model Studies	0.28
6.	Study on shoreline using Satellite Images	0.16
7.	Consultancy fee for expert on shoreline	0.06
8.	Water Sprinkling for dust suppression	0.15
Total		1.96

*Excluding Taxes

Annexure VIII

**Environment Health, Safety & CSR Organizational
Structure**

	Adani Vizhinjam Port Private Ltd	From : October 2019 To : March 2020
Vizhinjam International Deepwater Multipurpose Seaport Environment Health, Safety & CSR Organizational Structure		

Annexure VIII

S. No.	Name	Designation	Experience	Qualification	Organization
1.	Narayanan M	Engineer (Infra) Coordinator Environment and Welfare Measure	30 Years	B-Tech (Civil Engg.)	VISL
2.	Prasad Kurien	GM- Environment	30 years	B-Tech Civil Engg., M-Tech Env Engg., PMP	VISL
3.	Anil Balakrishnan	Head – CSR	23 Years	MSW, Phd.	AVPPL
4.	Y D Manmohan	Environment Specialist	30 Years	BE – Civil Engg ME Env. Engg.	STUP
5.	Sebastian Britto	Project Officer	21 Years	MA, Economics	AVPPL
6.	Stephen Vinod	Community Mobilizer	13 Years	BA, Economics	AVPPL
7.	George Zen	Community Mobilizer	32 Years	BA, Sociology	AVPPL
8.	Meera Mariyam Skariah	Community Mobilizer	3 Years	MSW	AVPPL
9.	Hebin C	Head – Environment	13 Years	MS, Oceanography & Coastal Area Studies	AVPPL
10.	Jesse Benjamin Fullonton	Assistant Manager - Environment	9 Years	BSc. Chemical Tech; Msc. Env. Tech	AVPPL
11.	Kanwar P Malik	Head- Horticulture	15 Years	BSc - Agriculture	AVPPL
12.	Remant Kumar	Safety Officer	12 Years	BE Mechanical PG in Health, Safety, Environment Management	AVPPL
13.	Amrendra Sinha	Head – Safety	18 Years	Diploma in Industrial Safety and Fire Safety	HOWE
14.	Shaji Joseph	Safety Executive	13 Years	Diploma in mechanical & Diploma in fire and safety	HOWE

Annexure IX
EC for Manickal Quarry



सत्यमेव जयते

Validity expires on 26.02.2025

**PROCEEDINGS OF THE ADMINISTRATOR, STATE ENVIRONMENT IMPACT
ASSESSMENT AUTHORITY, THIRUVANANTHAPURAM
(Present. SHAHER BANU)**

**Sub: SEIAA-Environmental Clearance for the proposed granite building stone quarry
in Block No. 29, Re-survey No. 120/10 in Manickal Village,
Nedumangad Taluk, Thiruvananthapuram District by M/s Adani
Vizhinjam Port Pvt. Ltd- Granted – Orders issued.**

State Environment Impact Assessment Authority, Kerala

No. 1416/EC1/2019/SEIAA

dated, Thiruvananthapuram 27.02.2020

- Ref: 1. Application received on 22.08.2019 from Shri.Rajesh Kumar Jha, Chief Executive Officer, M/s Adani Vizhinjam Port Pvt. Ltd, 2nd floor, Vipanchika Tower, Thycaud, Thiruvananthapuram – 695014
2. Minutes of the 103rd SEAC meeting held on 17th & 18th September, 2019.
3. Minutes of the 104th SEAC meeting held on 10th & 11th October, 2019.
4. Minutes of the 105th SEAC Meeting held on 28th & 29th October, 2019.
5. Minutes of the 106th SEAC meeting held on 28th, 29th & 30th November 2019.
6. Minutes of the 107th SEAC meeting held on 24th December, 2019.
7. Minutes of the 108th SEAC meeting held on 13th & 14th January, 2020.
8. Minutes of the 102nd SEIAA meeting held on 10th & 11th February, 2020.
9. G.O(Rt.) No.29/2019/Env dt.12.04.2019.

ENVIRONMENTAL CLEARANCE NO. 29/ 2020

Shri.Rajesh Kumar Jha, Chief Executive Officer, M/s Adani Vizhinjam Port Pvt. Ltd, 2nd floor, Vipanchika Tower, Thycaud, Thiruvananthapuram – 695014, vide his application received on 22.08.2019, has sought E.C under EIA Notification-2006, for the proposed granite building stone quarry in Block No. 29, Re-survey No. 120/10 in Manickal Village, Nedumangad Taluk, Thiruvananthapuram District, for an area of 1.1081 Ha. The project comes under Category B2, Activity 1(a), (i) as per the Schedule of EIA Notification 2006.



Page 1 of 6

Rajesh

2. The proposed production capacity is 70,230.00 TPA(max). The period of mining lease is 6 years. The expected project cost is Rs. 82 lakhs.

3. The proposal was placed in the 103rd SEAC meeting held on 17th & 18th September, 2019. The Committee directed the proponent to submit recent non-cluster certificate.

Proponent vide letter dated 24.09.2019 submitted the recent cluster certificate dated 26.07.2019.

4. The proposal was placed in the 104th SEAC meeting held on 10th & 11th October 2019. The Committee decided to invite the proponent for presentation

5. The proposal was placed in the 105th SEAC Meeting held on 28th & 29th October 2019. The proponent was present. The Committee directed the proponent to submit the following documents:

1. Specific CER plan
2. Revised drainage plan
3. Map showing overburden

The Committee entrusted Dr.R.Ajayakumar Varma and Shri.K.Krishna Panicker for field inspection.

The proponent submitted the documents on 23.11.2019. The Sub committee conducted the inspection on 5th November 2019.

The proponent vide letter dated 28.10.2019 stated that due to technical issues they had applied for ToR instead of EC. Since the area of the project is 1.1081 Ha and that there is no cluster situation, they requested to consider the project for EC.

6. The proposal was placed in the 106th SEAC meeting held on 28th, 29th & 30th November 2019. The Proponent is directed to submit the following documents:

- 1) Scientific plan for removal of excavated rock material from the quarry and transportation of the same
- 2) Drainage map showing feasible drains to carry the excess runoff from the project area to the nearest natural drainage
- 3) Location and design of silt trap and its maintenance



Rajesh

- 4) Plan for widening the Panchayat road on the western boundary of the quarry to absorb additional traffic due to the proposed quarry
- 5) Revise project cost considering fair value of land in accordance with revenue records.
- 6) Clarification regarding the acceptability of NOC submitted as it does not indicate time period.

The proponent submitted documents on 17.12.2019 as per the decision of 106th SEAC meeting. The proponent also stated that the letter submitted to the District Collector, Thiruvananthapuram seeking NOC will be submitted prior to the next SEAC meeting.

7. The proposal was placed in the 107th SEAC meeting held on 24th December, 2019. As per the request of the proponent dated 28.10.2019, the Committee decided to consider the application for EC rather than for ToR, since the proposed project area is 1.1081 Hectares. The proponent had promised to submit the fresh NOC from the District Collector before the SEAC meeting. But the same has not been submitted. Therefore the item was deferred.

The proponent submitted NOC from the District Collector, Thiruvananthapuram on 09.01.2020.

8. The proposal was placed in the 108th SEAC meeting held on 13th & 14th January, 2020. The Committee decided to recommend issuance of EC for ten years or completion of the construction of breakwater of Vizhinjam Port whichever is earlier and the other conditions laid down in the NOC No. 137/127325/18 dated 13.07.2018 of District Collector, Thiruvananthapuram.

9. The proposal was placed in the 102nd SEIAA meeting held on 10th & 11th February, 2020. Authority decided to issue EC for a period of 5 years for the quantity mentioned in the approved Mining Plan subject to the following specific conditions in addition to the general conditions.

1. *The Proponent shall follow the directions given by the District Collector, Thiruvananthapuram vide his NOC No. 137/127325/18 dated 13.07.2018. The copy of the NOC may also be enclosed with the EC.*
2. *Activities relating to Corporate Environmental Responsibility amounting to Rs.1.64 lakhs shall be carried out leading to protection and promotion of environment*



Rajesh

including waste management in the project district as per OM F.No.22-65/2017-IA-III dt.01.05.2018 of MoEF& CC as directed by Director, Directorate of Environment & Climate Change and supervised by District Collector.

- 3. The proponent shall carry out quarrying as per the approved Mining Plan and the proponent should strictly follow the Kerala Minor Mineral Concession Rules 2015 and amendments thereby.*
- 4. In the wake of occurrence of large scale landslides in the state, as per the information provided by the Department of Mining & Geology, it is directed to use only NONEL (Non Electrical) technology for blasting to reduce the vibration of the ground, which is one of the causative factors that triggers landslides, formation of cracks in the surrounding buildings and disturbance to human and wildlife.*
- 5. As per the directions contained in the OM F.No.22-34/2018-IA.III dated 16th January 2020 issued by MoEF &CC, in obedience to the directions of the Honourable Supreme Court the Project Proponent shall, undertake re-grassing the mining area and any other area which may have been disturbed due to his mining activities and restore the land to a condition which is fit for growth of fodder, flora, fauna etc. The compliance of this direction shall be included in the half yearly compliance report which will be monitored by SEAC at regular intervals.*

10. Environmental Clearance as per the EIA Notification 2006 is hereby accorded for the proposed granite building stone quarry project of Shri.Rajesh Kumar Jha, Chief Executive Officer, M/s Adani Vizhinjam Port Pvt. Ltd, 2nd floor, Vipanchika Tower, Thycaud, Thiruvananthapuram – 695014 in Block No. 29, Re-survey No. 120/10 in Manickal Village, Nedumangad Taluk, Thiruvananthapuram District, Kerala for an area of 1.1081 Ha for the quantity mentioned in the Mining plan, for a period of five years subject to the specific conditions in para 9 above, all the environmental impact mitigation and management measures answered to be undertaken by the project proponent in the Form I, EMP, PFR and Mining plan submitted to SEIAA. The assurances and clarifications given by the proponent will be deemed to be a part of these proceedings as if incorporated herein. Also the general conditions for projects stipulated for mining (items 1 to 48), appended hereto will be applicable and have to be strictly adhered to.



Rajesh

11. The Clearance issued will also be subject to full and effective implementation of all the undertakings given in the application form, mitigation measures as assured in the Environment Management Plan and the mining features including progressive mine closure plan as submitted with the application and relied on for grant of this clearance. The above undertakings and the conditions and the undertakings in Chapter 4 (Mining), Chapter 5 (Blasting), Chapter 6 (Mines Drainage), Chapter 7 (Stacking of Mineral rejects and Disposal of waste) Chapter 11 (Environment Management Plan) & Chapter 12 (Progressive Mine Closure Plan) of the Mining Plan as submitted will be deemed to be part of this proceedings as conditions as undertaken by the proponent, as if incorporated herein.

12. Validity of the Environmental Clearance will be five years from the date of this clearance, subject to inspection by SEIAA on annual basis and compliance of the conditions, subject to earlier review of E.C in case of violation or non-compliance of conditions or genuine complaints from residents within the security area of the quarry.

13. Compliance of the conditions herein will be monitored by the State Environment Impact Assessment Authority or its authorised offices and also by the regional office of the Ministry of Environment & Forests, Govt. of India, Bangalore.

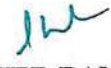
14. Necessary assistance for entry and inspection should be provided by the project proponent and those who are engaged or entrusted by him to the staff for inspection or monitoring.

15. Instances of violation if any shall be reported to the District Collector, Thiruvananthapuram

16. The Half Yearly Compliance Report (HYCRs) with its contents of a covering letter, compliance report and environmental monitoring data has to be in PDF format merged into a single document. The email should clearly mention the name of the project, EC No and date, period of submission and to be sent to the Regional Office of MoEFF & CC by email only at email ID rosz.bng-mefcc@gov.in . Hardcopy of HYCRs shall not be acceptable.



17. The given address for correspondence with the authorised signatory of the project is Shri.Rajesh Kumar Jha, Chief Executive Officer, M/s Adani Vizhinjam Port Pvt. Ltd, 2nd floor, Vipanchika Tower, Thycaud, Thiruvananthapuram – 695014


SHAHER BANU
Administrator, SEIAA

✓ To,

Shri.Rajesh Kumar Jha
Chief Executive Officer
M/s Adani Vizhinjam Port Pvt. Ltd
2nd floor, Vipanchika Tower
Thycaud, Thiruvananthapuram – 695014

Copy to,

1. MoEF Regional Office, Southern Zone, Kendriya Sadan, 4th Floor, E&F Wing, II Block, Koramangala, Bangalore-560034.(through e-mail: rosz.bng-mefcc@gov.in)
- 2.The Principal Secretary to Government, Environment Department, Government of Kerala
3. The Director, Directorate of Environment & Climate Change, 4th Floor KSRTC Bus Terminal, Thampanoor, Thiruvananthapuram, Kerala 695001.
- 4.District Collector, Thiruvananthapuram
- 5.Director, Mining & Geology, Thiruvananthapuram -4.
- 6.The Member Secretary, Kerala State Pollution Control Board
- 7.District Geologist, Thiruvananthapuram
- 8.Tahsildhar, Neyyattinkara Taluk, Thiruvananthapuram District
- 9.Village Officer, Anavoor Village, Thiruvananthapuram District
- 10.Chairman, SEIAA.
- 11.Website.
- 12.S/f
- 13.O/c





STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY KERALA
GENERAL CONDITIONS (for mining projects)

1. A separate environmental management and monitoring cell with qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.
2. Suitable avenue trees should be planted along either side of the tarred road and open parking areas, if any, including of approach road and internal roads.
3. Sprinklers shall be installed and used in the project site to contain dust emissions.
4. Eco-restoration including the mine closure plan shall be done at the own cost of the project proponent.
5. In view of the deep pits left after the excavation, stacking at maximum top level should be carried out.
6. Corporate Environment Responsibility agreed upon by the proponent should be implemented.
7. The project proponent shall comply the conditions stipulated by the statutory authorities concerned.
8. Tarring /multiple options on the access roads shall be undertaken so as to reduce dust pollution during movement of vehicle.
9. Overburden materials should be managed within the site and used for reclamation of mine pit as per mine closure plan / specific conditions.
10. Height of benches should not exceed 5 m, and width should not be less than 5 m, if there is no mention in the mining plan/specific condition.
11. Ground level should be fixed in individual cases separately
12. No mining operations should be carried out at places having a slope greater than 45°.
13. Acoustic enclosures should have been provided to reduce sound amplifications in addition to the provisions of green belt and hollow brick envelop for crushers so that the noise level is kept within prescribed standards given by CPCB/KSPCB. This condition is applicable only in such cases if a crusher is adjacent to the quarry.
14. The workers on the site should be provided with the required protective equipment such as ear muffs, helmet, etc.
15. Garland drains with clarifiers to be provided in the lower slopes around the core area to channelize storm water.
16. The transportation of minerals should be done in covered trucks to contain dust emissions. The proponent should plant trees at least 5 times of the loss that has been occurred while clearing the land for the project. SEAC should assess the number of trees in each project site before the issuance of EC so as to ensure the promptness in planting.
17. Explosives should be stored in magazines in isolated place specified and approved by the Explosives Department.
18. A minimum buffer distance of 100m from the boundary of the quarry to the nearest dwelling unit or other structures, not being any facility for mining shall be provided.
19. 50 m buffer distance should be maintained from forest boundaries.
20. Consent from Kerala State Pollution Control Board under Water and Air Act(s) should be obtained before initiating mining activity.
21. All other statutory clearances should be obtained, as applicable, by project proponents from the respective competent authorities including that for blasting and storage of explosives.
22. In the case of any change(s) in the scope of the project, extent quantity, process of mining technology involved or in any way affecting the environmental parameters/impacts as assessed, based on which only the E.C is issued, the project would require a fresh appraisal by this Authority, for which the proponent shall apply and get the approval of this Authority.
23. The Authority reserves the right to add additional safeguard measures subsequently, if found necessary, and to take action including revoking of the environment clearance under the provisions of the Environment (Protection) Act, 1986, to ensure effective implementation of the suggested safeguard measures in a time bound and satisfactory manner.
24. The stipulations by Statutory Authorities under different Acts and Notifications should be complied with, including 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, 2006.



Rajk

25. The project proponent should advertise in at least two local newspapers widely circulated in the region, one of which (both the advertisement and the newspaper) shall be in the vernacular language informing that the project has been accorded Environmental Clearance and copies of clearance letters are available with the State Environment Impact Assessment Authority (SEIAA) office and may also be seen on the website of the Authority at www.seiaakerala.org. The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same signed in all pages should be forwarded to the office of this Authority as confirmation.
26. The Environmental Clearance shall be put on the website of the company by the proponent.
27. Proponent shall submit half yearly reports in soft copy and SEIAA will upload it on the website.
28. The details of Environmental Clearance should be prominently displayed in a metallic board of 3 ft x 3 ft with green background and yellow letters of Times New Roman font of size of not less than 40. Sign board with extent of lease area and boundaries shall be depicted at the entrance of the quarry, visible to the public
29. The proponent should provide notarized affidavit (indicating the number and date of Environmental Clearance proceedings) that all the conditions stipulated in the EC shall be scrupulously followed.
30. No change in mining technology and scope of working should be made without prior approval of the SEIAA, No further expansion or modifications in the mine shall be carried out without prior approval of the SEIAA, as applicable.
31. The Project proponent shall ensure that no natural water course and/or water resources shall be obstructed due to any mining operations. Necessary safeguard measures to protect the first order streams, if any, originating from the mine lease shall be taken.
32. The top soil, if any, shall temporarily be stored at earmarked site(s) only for the topsoil shall be used for land reclamation and plantation. The over burden (OB) generated during the mining operations shall be stacked at earmarked dump site(s) only. The maximum height of the dumps shall not exceed 8m and width 20m and overall slope of the dumps shall be maintained to 45°. The OB dumps should be scientifically vegetated with suitable native species to prevent erosion and surface run off. In critical areas, use of geo textiles shall be undertaken for stabilization of the dump. The entire excavated area shall be backfilled. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self-sustaining.
33. Catch drains and siltation ponds of appropriate size shall be constructed around the mine working, mineral and OB dumps to prevent run off of water and flow of sediments directly into the river and other water bodies. The water so collected should be utilized for watering the mine area, roads, green belt development etc. The drains shall be regularly desilted particularly after monsoon and maintained properly.
34. Effective safeguard measures such as regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of PM₁₀ and PM_{2.5} such as haul Road, loading and unloading points and transfer points – it shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.
35. Fugitive dust emissions from all the sources should be controlled regularly. Water spraying arrangement on haul roads, loading and unloading and at transfer points should be provided and properly maintained.
36. Measures should be taken for control of noise levels below 85 dBA in the work environment.
37. The funds earmarked for environmental protection measures and CER activate should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the State Environment Impact Assessment Authority (SEIAA) office.
38. The Regional Office of MOEF & CC located at Bangalore shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (S) of the Regional Office by furnishing the requisite data/information/monitoring reports.
39. Any appeal against this Environmental Clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.
40. Concealing the factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986.
41. The SEIAA may revoke or suspend the order, for non implementation of any of the specific or this implementation of any of the above conditions is not satisfactory. The SEIAA reserves the right to alter/modify the above conditions or stipulate any further condition in the interest of environment protection.



Rajesh

42. The above conditions shall prevail notwithstanding anything to the contrary, in consistent, or simplified, contained in any other permit, license or consent given by any other authority for the same project.
43. The Environmental Clearance will be subject to the final order of the courts in any pending litigation related to the land or project, in any court of law.
44. The mining operation shall be restricted to above ground water table and it should not intersect ground water table.
45. All vehicles used for transportation and within the mines shall have 'PUC' certificate from authorized pollution taking centre. Washing of all vehicles shall be inside the lease area'
46. Project proponent should obtain necessary prior permission of the competent authorities for drawal of requisite quantity of surface water and ground water for the project.
47. Regular monitoring of flow rates and water quality upstream and downstream of the springs and perennial nallahs flowing in and around the mine lease area shall be carried out and reported in the six monthly reports to SEIAA.
48. Occupational health surveillance program of the workers should be under taken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.


Administrator, SEIAA





Annexure X
CTO for Manickal Quarry

FILE NO : PCB/TVM-DO/ICO/NDD-12806757/2020

Date of issue : 16/03/2020



KERALA STATE POLLUTION CONTROL BOARD

CONSENT TO

OPERATE/AUTHORISATION/REGISTRATION

ISSUED UNDER

The Water (Prevention & Control of Pollution) Act, 1974

The Air (Prevention & Control of Pollution) Act, 1981

and

The Environment (Protection) Act, 1986

As per Application No. :12806757

Dated:11-03-2020

TO

M/s BUILDING STONE QUARRY OF ADANI VIZHINJAM PORT PRIVATE LIMITED

Manickal Village,

Nedumangad Taluk

Consent No. :PCB/TVM-DO/ICO/NDD/QRY/29/2020

Valid Upto :26/02/2025

1. GENERAL

1.1. This integrated consent is granted subject to the power of the Board to withdraw consent, review and make variation in or revoke all or any of the conditions as the Board deems fit.

1	VALIDITY	26/02/2025
2	Name and Address of the establishment	BUILDING STONE QUARRY OF ADANI VIZHINJAM PORT PRIVATE LIMITED MANICKAL VILLAGE, NEDUMANGAD TALUK 695607
3	Communication	Telephone :91-9099056757 Fax :04712-2325600 E-mail:hebin.c@adani.com
4	Occupier Details	Rajesh Jha CEO Adani Vizhinjam Port Pvt Limited Second Floor, Vipanchika Tower, Thycaud, Trivandrum,
5	Local Body	MANICKAL
6	Survey Number	Re- survey Block 29 , Re survey no: 120/10
7	Village	Manickal
8	Taluk	NEDUMANGAD
9	District	THIRUVANANTHAPURAM
10	Capital Investment(Rs in Lakhs)	400
11	Scale	Small
12	Category	RED
13	Annual fee(Rs)	Rs 40000/-
	Total Fee remitted(Rs)	Rs 200000/-
14	RAW MATERIAL	PRODUCTS
	Quarrying in 1.1081 Ha	Rock @281033 Metric Tonnes
15	Total Power Required (HP)	-

2. CONDITIONS AS PER

The Water(Prevention and Control of Pollution)Act, 1974

- 2.1 In case of generation of trade effluent from the industry, effluent treatment system consisting of treatment units having adequate capacity established as per the Integrated Consent to Establish issued shall be operational at all times during which the industry is functional. Additional facilities required, if any, to achieve the standards laid down by the Board u/s 17(1) (g) of the Water Act shall also be made along with.
- 2.2 Water consumption: 2KLD
- 2.3 Effluent generation: -
- 2.4 The characteristics of effluent after treatment shall confirm to the following tolerance limits:

SL.NO.	Characteristics	Unit	Tolerance Limit	
			Sewage	Trade Effluent

2.5 Mode of disposal of treated effluent: -

3. CONDITIONS AS PER

The Air(Prevention and Control of Pollution)Act, 1981

3.1 Adequate air pollution control measures shall be operational at all times during the functioning of the industry. Additional facilities required, if any, to achieve the standards laid down by the Board shall also be made along with.

Stack No.	Sources of Emission	Emission Rate(Nm3/Hr)	Stack Height above		Control Equipment
			Ground Level	Roof Level	

3.2 Emission characteristics shall not exceed the following:

Sl.No.	Parameter	Limiting Standards (mg/Nm3)
--------	-----------	-----------------------------

4. CONDITIONS AS PER

The Environment (Protection) Act, 1986.

4.1 The operation of the industry shall be strictly in compliance with the provisions of the Noise Pollution (Regulation and Control) Rules 2000.

4.2 Used lead acid batteries shall be disposed of as per the Batteries (Management and Handling) Rules, 2001

4.3 Hazardous waste generated, if any, shall be handled as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

4.3.1 Activities for which Authorisation is granted

Collection		transport	✓
Reception		Storage	✓
Treatment		Reprocessing/Disposal	✓

4.3.2 Type, quantity and mode of storage/collection/disposal of hazardous wastes shall be as follows:

Sl.No.	Hazardous Waste	Schedule Category	Quantity Tonne/year
--------	-----------------	-------------------	---------------------

Mode of	
Storage	Disposal

4.4 E-waste shall be disposed off safely as per the E-Waste (Management)Rules, 2016.

5. SPECIFIC CONDITIONS

5.1 Quarrying is restricted to the land bearing Sy nos: 120/10.

5.2 This consent is granted subject to the power of the Board to review and make variations in all or any of the conditions as per section 21 of the Air (Prevention and Control of Pollution) Act 1981 and section 25 of the Water (Prevention and Control of pollution) Act 1974.

5.3 Any change in the particulars furnished in the references and/or in the identity of the occupier / authorized agent shall be intimated to the Board within a week.

5.4 It is the responsibility of occupier to ensure that quarrying activities are restricted to only area shown in the attached drawing and at a distance more than 50 m from the nearby residential buildings, places of worship, public buildings, public road having vehicular traffic, river or lake, railway line and bridges.

5.5 After excavation at the site is completed, the land may be reclaimed or used for rain water harvesting with protective barriers/any other suitable purpose like aquaculture approved by the authority.

5.6 All the necessary control measures provided should be maintained properly to ensure that the system is adequate to control the air and water pollution caused by the functioning of the unit within the limit.

5.7 Regular wetting of the roads in the premises of the quarry and approach roads near the quarry shall be done for avoiding excessive dust emission within and outside the boundary of the unit.

5.8 Boundary of quarrying area shall be fenced and demarcated.

5.9 Fugitive emission from the quarry premises and road leading to quarry shall be suppressed using water sprinkling.

5.10 The suspended particulate matter (SPM) at boundary of the premises of the quarry shall not exceed the following limit applicable to that area as per the National Ambient Air Quality Standards. a) The PM 10 in ambient air at the boundary shall not exceed 100 microg/m³ b) The PM 2.5 in ambient air at 1m outside the boundary shall not exceed 60 microg/m³.

5.11 The sound level measured at 1.0 m outside the boundary shall not exceed the limit as per the Ambient Air Quality Standards in respect of Noise.

5.12 The operation of the unit shall be commenced/done only after obtaining clearances from all concerned authorities.

5.13 The quarry shall be operated only from 6am to 6pm.

5.14 For renewal of the consent in case of continuance of operation of the industry, application in the

prescribed form shall be submitted through the web portal of the Board <http://krocmms.nic.in> for renewing the Consent on or before two month in advance to expiry date. Late application will be accepted with 10% (for application before expiry date) & 50% of yearly fee as late fee for application after due date.

5.15 This Consent is granted on the basis of ENVIRONMENTAL CLEARANCE DATED: 27/02/2020 and other documents furnished by the applicant. If any document is found false, the consent issued will be cancelled/ revoked.

5.16 This consent is granted subject to the Environmental Clearance No: 1416/EC1/2019/SEIAA dated 27/02/2020 issued by proceedings of State Environmental Impact Assessment Authority, SEIAA.

RAMYA G Digitally signed by
RAMYA G
Date: 2020.03.16
16:50:08 +05'30'

DATE :16/03/2020

SIGNATURE & SEAL OF ISSUING AUTHORITY
ENVIRONMENTAL ENGINEER
DISTRICT OFFICE, THIRUVANANTHAPURAM



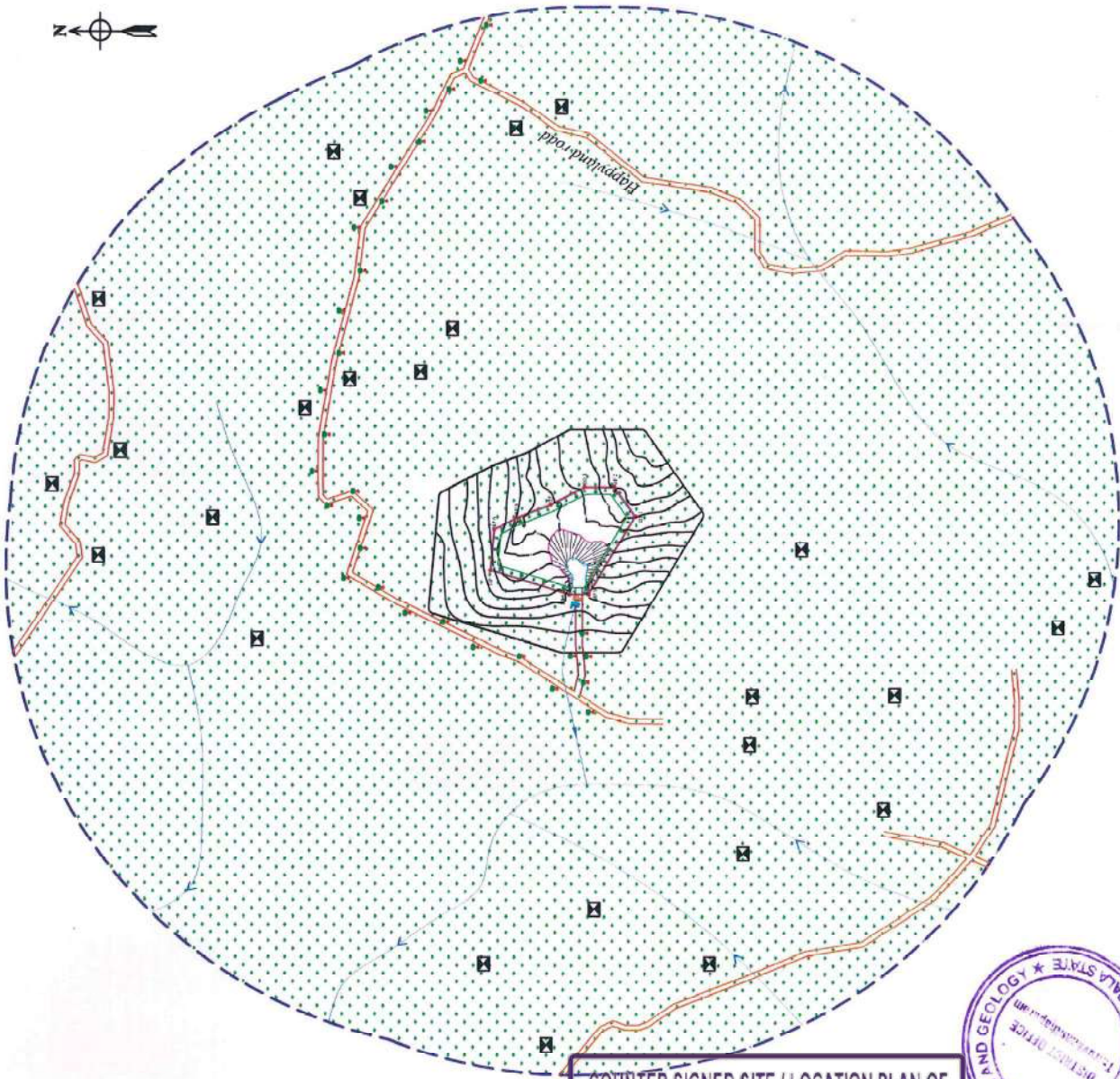
To

Building Stone Quarry of ADANI VIZHINJAM PORT PRIVATE LIMITED
Manickal Village,
Nedumangad Taluk

1. This digitally signed document is legally valid as per the Information Technology Act 2000

2. For verifying this document please go to krocmms.nic.in and search using date of issue/name of the unit/Application Number in "Consent Granted Applications" link in the home page of the Board's Online Consent Management and Monitoring System.

MAP SHOWING ALL FEATURES (SITE & SURROUNDINGS WITHIN 500m. RADIUS) - M/s. Adani Vizhinjam Port Private Limited.



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- 7.5m SAFETY BARRIER
- CONTOURS
- VILLAGE ROAD
- PRIVATE ROAD
- 60m LIMIT LINE
- 500m LIMIT LINE
- PRIVATE LAND
- PROPOSED PLANTATIONS
- GARLAND DRAIN
- SST SILT SETTLING TANK
- RWHP RAIN WATER HARVESTING POND
- NATURAL WATER COURSE
- HOUSES / SHEDS

PLATE NO.8

GRANITE BUILDING STONE QUARRY OF M/s. Adani Vizhinjam Port Private Limited.

Re-Sy. Block No. 25, Re-Sy. No. 120/10 Manickal Village, Nedumangal Taluk,
Thiruvananthapuram District, Kerala

Title	ENVIRONMENT PLAN / DRAINAGE PLAN (Not showing all features and surrounding within 500m radius)
Scale	1:5000 RF Extent: 1.1031 Ha. (2.7381 Acres)

Certified that the above plan is correct

C. Thambu Cherian
DMG/KERALA/200/017/2018

GLOBAL ENVIRONMENT & MINING SERVICES
(Consulting Engineers, Geologists & Surveyors)

COUNTER SIGNED SITE / LOCATION PLAN OF
BUILDING STONE QUARRY OF ADANI
M/s. VIZHINJAM PORT PRIVATE LIMITED
MANICKAL VILLAGE

RAMYA G

Digitally signed by RAMYA G
Date: 2020.03.16 16:50:42
+05'30'

ENVIRONMENTAL ENGINEER
DISTRICT OFFICE, THIRUVANANTHAPURAM



Annexure XI

Submission Email of HYCR for the Period

April 2019 to September 2019

Jesse Benjamin Fullonton

From: Narayanan M <narayanan@vizhinjamport.in>
Sent: Friday, 29 November, 2019 01:57 PM
To: rosz.bng-mefcc@gov.in
Cc: Santhosh Sathyapal; Sanooj A; Hebin Chenthamarakshan; Jesse Benjamin Fullonton; Ssuresh.cpcb@nic.in; tvpmro@gmail.com; Kushal.vashist@gov.in; zobangalore.cpcp@nic.in; MS KCZMA; CEO
Subject: EP12.1/7/2013-14/Ker-Apr2019-Sep2019

Sir,

MoEF&CC had issued Environmental & CRZ Clearance (EC) on 3rd January 2014 to the proposed Vizhinjam International Multipurpose Deepwater Seaport at Vizhinjam in Thiruvananthapuram District of Kerala State. [EC No. F.No.11-122/2011-IA.III].

Please find below the link to download the Half Yearly Compliance Report for the period from **April 2019 to September 2019** for record and reference.

<https://drive.google.com/file/d/15S-zJfDZ3KX6yyaL40GQaEdJEOe7dWci/view?usp=sharing>

Kindly acknowledge the receipt of this mail.

Regards
Narayanan
Engineer (infra), Vizhinjam International Seaport Ltd.



VIZHINJAM INTERNATIONAL SEAPORT LIMITED
(A Government of Kerala Undertaking)

**Vizhinjam International Deepwater
Multipurpose Seaport**

**Half Yearly Compliance Report of Conditions of
Environmental and CRZ Clearance
for the Period October 2019 to March 2020**

May 2020