O/C

Vizhinjam International Seaport Limited

(A Government of Kerala Undertaking)

VISL/2016-17/EE&EI-19/176

27th May 2019

To
Additional Principal Chief Conservator of Forests (C),
Ministry of Environment Forest and Climate Change (MoEF&CC),
Regional Office (SZ), KendriyaSadan, 4th Floor, E&F Wings, 17th Main Road,
Koramangala II Block, Bangalore-560034 (Karnataka)

Sir,

Sub: Half yearly Compliance report of Environmental and CRZ clearance for Vizhinjam International Multipurpose Deepwater Seaport for the period of **October 2018 to March 2019** – Reg.

Ref: 1) F.No.11-122/2011-IA.III dated 3rd January 2014 of MoEF issuing Environmental Clearance
2) No.1285/A3/13/KCZMA/S&TD dated 24th August 2013
3) Our email dtd 27-May-2019

This has reference to the Environmental & CRZ Clearance (EC) issued on 3rd January 2014 (Ref 1) by the Ministry of Environment, Forest & Climate Change (MoEF&CC) to 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 reference cited for the half yearly period from **October 2018 to March 2019** is enclosed herewith in soft copy for record and reference.

Yours Sincerely
For Vizhinjam International Seaport Ltd

Managing Director& CEO

Encl: Compliance Report (soft copy)

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, 1st& 2nd Floors, NisargaBhavan, A Block, Thimmiah Main Road, 7th D Cross Shivanagar, Opp. Pushpanjalai Theatre, Bengluru – 560 010.
(3)**The Member Secretary**, Kerala State Pollution Control Board, Thiruvananthapuram Regional Office, Plamoodu, 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), 2nd Floor, Vipanchika Tower, Near Govt. Guest House, Thycaud P.O., Thiruvananthapuram- 14

9th Floor, KSRTC Bus Terminal Complex, Thampanoor, Thiruvananthapuram 695 001, Kerala, India
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CIN: U45309KL2004SGC017685

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 2018 to March 2019

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 2019

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
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.	**Complied** 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. The CTE was renewed vide Consent No. PCB/HO/TVM/ICE-R/02/2018 dated 19.07.2018 valid up to 31.07.2023. Copy of the CTE was submitted to MoEF&CC with the compliance report for the period April 2018 to September 2018 dated 29.11.2018 (Ref No: VISL/2016-17/EE&EI-19/1132).
(ii)	Project Proponent shall carry out intensive monitoring with regulatory reporting six monthly on shoreline changes to the Regional Office, MoEF.	**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 regularly submitted to MoEF&CC as a part of the six monthly compliance report. Report for the period October 2018 to March 2019 is enclosed as **Annexure I** in CD. L&T Infrastructure Engineering Pvt. Ltd. (LnTIEL) had prepared the Mathematical Modelling Reports based on Shoreline Monitoring data; which were vetted by National Institute of Ocean Technology (NIOT). The 1st (for the period February 2015 to February 2017) and 2nd (March 2017 to February 2018) modelling reports had been submitted with the compliance report for the period April 2017 to September 2017 and April 2018 to September 2018 respectively. 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 practise Adani Vizhinjam Port Pvt. Ltd. (AVPPL) have submitted the shoreline data from March 2018 to February 2019 to LnTIEL for mathematical modelling to assess the impact on shoreline under the guidance of NIOT. The Mathematical modelling report for the period March 2018 to February 2019 once vetted by NIOT will be submitted along with the

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
		Compliance Report for the period April 2019 to September 2019.
(iii)	The capital dredged material (7.6 Mm^3) shall be utilized for reclamation of berths.	**Being Complied** The dredged material till 31.03.2019 amounting to 2.90 Mm^3 has been utilized for reclamation of 36 Ha area. The dredged material has been used for reclamation only.
(iv)	Additional fish landing centre shall be developed as part of the proposed Vizhinjam port for upliftment of fisheries sector.	**Being Complied** The work for construction of the fish landing centre and the fishery breakwater has been initiated as part of the funded work component of the concession agreement with AVPPL. A budgetary provision of Rs. 16.00 crores for Fish Landing Centre and Rs. 131.12 crore for fishery breakwater has been allotted. Fishing boats have been docked in the proposed area affecting the progress of fishery berth. GoK has initiated discussions with fishermen representatives for removal of the boats to facilitate construction work; these discussions are ongoing. In the meantime, the EPC contactor for development of aforesaid activity has been finalized and work orders has been issued.
(v)	The project shall be executed in such a manner that there is minimum disturbance to fishing activity.	**Being Complied** Following is being practiced to ensure minimum disturbance to fishing activity: • 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 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

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
		formed by the local church representatives adjoining to the port area, who in turn pass on port project execution information to the fishermen.  **Meeting between AVPPL CSR Team and Church Committee** • Turbidity buoys at 3 locations identified by NIOT have been deployed and continuous monitoring is carried out to assess the real time turbidity. The turbidity details are given in **Annexure I** Table 13 of Reports on Oceanographic & Bathymetry Data Collection for Assessment of Shoreline Change (PSR 32-37). • 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 IX**).   **Buoy-1** **Buoy-2**

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
		 **Buoy-3**
(vi)	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 (4crores) (iii) skill development centre (4crores) (iv) environmental sanitation (3crores) and (v) solid waste management (2crores).	**Being Complied** As per the EIA report Rs. 7.1 crores was set apart as compensation for livelihood affected fisherman. However the amount was enhanced by GoK for the benefit of the affected fishermen. Till date an amount of Rs. 80.93 crores have been disbursed to a total number of 2593 Livelihood Affected Persons (LAP's) (including kerosene disbursal on account of breakwater construction) whose verification has been completed in all respects. This includes 2116 numbers of boat owners as well to whom kerosene is supplied free of cost during the port construction period. Verification of the documents of balance LAP's is in progress. The status of the CSR activities envisaged in the fisheries sector is as follows: **Water supply**: Scheme has been commissioned in April, 2013 by VISL by spending an amount of Rs. 7.3 crores. For O&M of the same an amount of Rs. 5.20 crores has been spent till date. **Fish Landing centre**: Construction of the fish landing centre (Rs. 16 crores) and the fishery breakwater (Rs. 131.12 crores) has been initiated as a part of funded work of the phase 1 project. 565 meter length of breakwater has been completed which forms part of the new fishing harbour. Fishing boats have been docked in the proposed area affecting the progress of fishery berth. GoK has initiated discussions with fishermen representatives for removal of the boats to

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
		facilitate construction work; these discussions are ongoing. In the meantime, the EPC contactor for development of aforesaid activity has been finalized and work orders has been issued. **Existing fishing harbour**: Tenders for modernization of the existing fishing harbour was invited by HED and work awarded. However the works could not be initiated due to sectoral protests among different fishermen groups. **Seafood park**: Procurement of land for seafood park (Rs. 26 crores) by VISL has been completed. Actions for development of seafood park are planned so as to commission the same along with the completion of the new fishing harbour. **Skill Development:** 1.5 Acre of land (Rs. 3.50 Cr.) is under the process of transfer to Additional Skill Acquisition Program (ASAP), a Government of Kerala initiative, aimed at imparting skill courses to student to improve their employability. ASAP is planning to construct a community skill park in this land for conducting training programs. Activities carried out by Concessionaire (AVPPL) for skill development, environmental awareness, sanitation and solid waste management etc. for the period of October 2018 to March 2019 are given in **Annexure II**.
(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.	**Will be Complied** The 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.
(viii)	Compensation packages in accordance with the Central/State Government norms shall be given to all the authorized-cum-affected	**Will be Complied** Based on G.O.(Rt) No.2021/2017/RD dated 27.04.2017 and modified by G.O.(Rt) No.17/2018/F&PD dated 09.06.2018, government ordered to pay compensation for

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
	(having valid clearances as applicable) resort owners.	land and not for the structures since they were in violation of CRZ notification. Action in this respect is being taken and an area of 72.79 Ares is acquired up to 31.03.2019.
(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 village 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 3.05 Crore has been initiated for CSR activities mainly in the fields of education, community health, sustainable livelihood and community infrastructure development during the compliance period. Details on CSR activities carried out by AVPPL during compliance period (October 2018 to March 2019) 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 Response Plan (OSRP). They have submitted the draft OSRP for Vizhinjam Port and the same is under review and finalization. After finalization the OSRP will be submitted to regulatory agencies for approval.

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
(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 half yearly EC/CRZ compliance reports are also being sent to KCZMA. Compliance to the recommendation/ conditions of KCZMA for the period October 2018 to March 2019 is enclosed as **Annexure III**.
(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 EC/CRZ half yearly compliance reports to all the authorities concerned. The compliance status of the commitments made during Public Hearing & actions on the same during the compliance period October 2018 to March 2019 is enclosed as **Annexure IV**.
(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 V**.
(xv)	The project proponent shall bring out a special tourism promotion package for the area in consultation with the State Government and implement the same along with the project.	**Being Complied** The final Integrated Area Development Plan prepared through CEPT university, in consultation with Town Planning, Tourism, Industry and other line departments was reviewed by the expert committee constituted by Govt. of Kerala. 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 128th meeting held on	**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

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
	23rd November 2013, for information of the general public.	
(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 Coastal Regulation Zone (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 225 KLD of water is being consumed for construction related activities. Necessary discussions have been initiated with Kerala Water Authority (KWA) for alternative supply.
(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** Presently M/s. AFCONS and M/s. B&R are the contractors working at site, under the EPC Contractor M/s. Howe Engineering Projects India Pvt. Ltd. (HEPIPL). Both the contractors have obtained separate consent from KSPCB for handling Hazardous Waste. During this compliance period (October 2018 to March 2019) 4 KL of used oil is 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	**Complied**

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
	shall be stored in the Coastal Regulation Zone area.	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. As per the requirements of KSPCB, HEPIPL is in the process of finalizing of a contractor for detailed engineering and construction of the STP.
(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.	**Complied** 18 DG sets are present at site. 14 DGs are operational and 4 DGs are standby. These are compliant to CPCB guidelines. A brief summary of DG sets present at site along with Pollution Control mechanism provided is attached as **Annexure VI**.
(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 Coastal Regulation Zone Notification.

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
(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**: In lieu of 1572 tress cut till now, AVPPL in collaboration with Forest department, compensatory afforestation has been carried out on 12 Ha land as identified by social forestry department in Sainik School, Trivandrum (at an aerial distance of 24 km from project site). As on March 31, 2019, 15524 Nos. of trees have been planted. 

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
		 **Afforestation at Sainik School**
(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 breakup of EMP fund activity wise for the compliance period October 2018 to March 2019 is enclosed as **Annexure VII**. An amount of INR 2.27 Cr has been utilized towards implementation EMP measures during compliance period October 2018 to March 2019.
(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, the concessionaire executing the project 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 with AVPPL. It is also ensured that contractors executing the work also deploy qualified and competent EHS personnel for effective implementation of EMP measures

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
		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 concerned Statutory Departments / Agencies.	**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 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.
(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	**Complied** On an average 792 Nos. of construction workers were engaged in the port construction activities on a daily basis during the compliance period October 2018 to March 2019. Labours are housed in a labour camp near to the project site as well as nearby resorts.

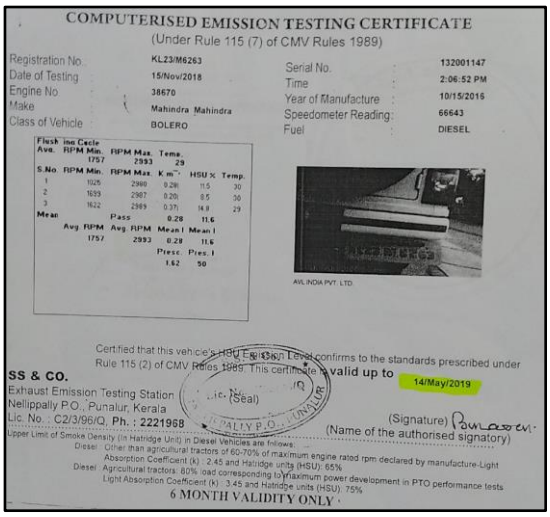
Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
	to the environment.	Labours are provided with all the necessary infrastructure facilities including water, electricity, fuel, sanitation, etc. and the details of the same were submitted in the compliance report for the period April 2018 to September 2018.
(iii)	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	**Complied** Digging activities were undertaken during the compliance period in a limited way in the port area. Mitigation measures are being followed such as water sprinkling on roads, ensuring PUC certificate for all vehicles, etc. 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 IX**. There are no significant changes observed in the water quality during the compliance period.
(iv)	Borrow sites for each quarry sites for road construction material and dump sites must be identified keeping in view the following: (a) No excavation or dumping on private property is carried out without written consent of the owner. (b) No excavation or dumping shall be allowed on wetlands, forest areas or other ecologically valuable or sensitive locations. (c) Excavation work shall be done in close consultation with the Soil Conservation and Watershed Development Agencies working in the area, and (d) Construction spoils including bituminous material and other hazardous materials	**Complied** Quarry material is being obtained from approved quarry sites only. The road so far constructed (a temporary road for construction purpose) has been made with material available on site and earth cutting generated from road corridor construction at present are dumped in Truck terminal area. • 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. • No bituminous or hazardous material has been used.

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
	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.	
(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.	**Complied** The construction material was obtained only from approved quarries. During the compliance period, AVPPL has obtained Environmental Clearance (EC) from the State Environmental Impact Assessment Authority (SIEAA) for the building stone quarry project in Survey No. 555/2 at Nagaroor Village, Chirayinkeezhu Taluk, Thiruvanathapuram District vide Order No. 1200/EC2/2018/SEIAA dated 01.03.2019 (enclosed as **Annexure X**). Subsequently Consent to Operate (CTO) has also been obtained from KSPCB vide Consent No. PCB/TVM-DO/ICO/QRY/103/2019 dated 05.03.2019 valid up to 27.02.2021 (Enclosed as **Annexure XI**). Mining operations are yet to start. In case of new quarries, necessary approvals will be obtained from the competent authority.
(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	**Being Complied** • 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. • 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 2018 – March 2019 at 5 monitoring locations is mentioned below.

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)

S. No.	Conditions	Compliance Status as on 31.03.2019
	(Protection) Act, 1986, whichever are more stringent.	<table><tr><th>Parameter</th><th>Unit</th><th>Max</th><th>Min</th><th>Perm. Limit</th></tr><tr><td>PM_{10}</td><td>$\mu g/m^3$</td><td>98</td><td>50</td><td>100</td></tr><tr><td>$PM_{2.5}$</td><td>$\mu g/m^3$</td><td>46</td><td>11</td><td>60</td></tr><tr><td>SO_2</td><td>$\mu g/m^3$</td><td>9.82</td><td>4.26</td><td>80</td></tr><tr><td>NO_2</td><td>$\mu g/m^3$</td><td>12.85</td><td>3.48</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> • Detailed Monitoring Reports for the period October 2018 to March 2019 is attached as **Annexure IX**). • All the monitored parameters were found within the prescribed limit.
(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 Board before commissioning of the project and a copy of each of these shall be sent to this Ministry.	**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.
(viii)	Adequate precautions shall be taken during transportation of the construction material so that it does not affect the environment adversely.	**Complied** Following precautionary measures are undertaken during transportation of the construction material as environment safeguard: • 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

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)

S. No.	Conditions	Compliance Status as on 31.03.2019
		ensuring adherence to speed limit  **Water Sprinkling in Progress**  **Tarpaulin Cover on Trucks**  COMPUTERISED EMISSION TESTING CERTIFICATE (Under Rule 115 (7) of CMV Rules 1989) Registration No. KL23/M6263 Date of Testing 15/Nov/2018 Engine No. 38670 Make Mahindra Mahindra Class of Vehicle BOLERO Serial No. 132001147 Time 2:06:52 PM Year of Manufacture 10/15/2016 Speedometer Reading: 66643 Fuel DIESEL Certified that this vehicle's HSU Emission Level confirms to the standards prescribed under Rule 115 (2) of CMV Rules 1989. This certificate is valid up to 14/May/2019 SS & CO. Exhaust Emission Testing Station Nellippally P.O., Punalur, Kerala Lic. No.: C2/3/96/Q, Ph. : 2221968 (Seal) (Signature) (Name of the authorised signatory) 6 MONTH VALIDITY ONLY **PUC Certificate**
(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.	**Noted** NGT appointed committees reviewed the compliance condition of EC & CRZ on 12.02.2019 and 13.02.2019, with a site visit on 12.02.2019. However there was no visit by officers of Ministry/Regional Office at Bangalore during the compliance period. 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.
(x)	Ministry of Environment & Forests or any other competent authority may	**Noted for Compliance**

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
	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** Adani Vizhinjam Port Private Ltd (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 (Prevention and Control of Pollution) Act,	**Noted for Compliance**

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
	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.	**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 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.
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	**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

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
	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.	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 http://www.adaniports.com/ports-downloads?port=Vizhinjam-Port
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.
18.	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, ZilaParishad/Municipal Corporation, Urban Local Body and the Local NGO, if	**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.

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
	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.	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 http://www.adaniports.com/ports-downloads?port=Vizhinjam-Port
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, SO2, NOx (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 2018 to September 2018 including the results of six monthly monitoring data (April 2018 to September 2018) has been uploaded on VISL website http://www.vizhinjamport.in and also on APSEZ website http://www.adaniports.com/ports-downloads?port=Vizhinjam-Port. Hard copies have been submitted to the MoEF & CC Regional Office (Bangalore), Zonal office of CPCB (Bangalore), KSPCB, KCZMA vide letter No. VISL/2016-17/EE&EI-19/1132 dated 29th November 2018 in hard copy as well as through e-mail on 30th November 2018. 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 IX**. Additionally summary of monthly Environment monitoring results are also uploaded on the APSEZ website http://www.adaniports.com/ports-downloads?port=Vizhinjam-Port. In addition, AVPPL had installed a Continuous Ambient Air Quality Monitoring Station (CAAQMS) along with weather monitoring station at site in the month of May 2018, subsequently the CAAQMS was integrated with the servers of CPCB and KSPCB and the data is being uploaded since 20.07.2018. The results are also displayed at the port site.

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
		 **CAAQMS and Weather Monitoring Station**
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.	**Complied** 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. The Six Monthly Compliance Report for the period April 2018 to September 2018 has been submitted to the MoEF&CC, Regional Office (Bangalore), Zonal office of the CPCB (Bangalore), KSPCB & KCZMA vide letter No. VISL/2016-17/EE&EI-19/1132 dated 29.11.2018 in hard copy as well as through e-mail on 30th November 2018.
21.	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned Kerala State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986 as amended subsequently, shall also be put on the website of	**Will be Complied** The project is in construction phase. The same shall be complied post commissioning during operational phase.

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: October 2018 to March 2019)		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
	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.	

Enclosures:

Annexure Number	Details of Annexure
Annexure I:	Report on Shoreline monitoring October 2018 to March 2019 (in CD)
Annexure II:	CSR Activities by AVPPL (October 2018 to March 2019)
Annexure III:	Compliance of Conditions of KCZMA Recommendation for EC/CRZ Clearance
Annexure IV:	Compliance of the Response/Commitments made during Public Hearing
Annexure V:	Status of Environment Management Plan
Annexure VI:	DG Set Details
Annexure VII:	EMP Budgetary Provision and Expenditure (October 2018 to March 2019)
Annexure VIII:	Organizational Structure-EMP Implementation
Annexure IX:	Environment Monitoring Report (October 2018 – March 2019)
Annexure X:	EC for the Nagaroor Building Stone Quarry Project Survey No. 555/2
Annexure XI:	CTO for the Nagaroor Building Stone Quarry Project Survey No. 555/2

Annexure I

Report on Shoreline Monitoring

October 2018 to March 2019 (in CD)

Annexure II

CSR Activities by AVPPL

(October 2018 to March 2019)

The CSR intervention during the reporting period focused on community development intervention in the following five major heads.

1. Education
2. Community Health
3. Sustainable Livelihood Development
4. Community Infrastructure Development &
5. Others

The CSR intervention focused to make a Clean, Green, Healthy and Prosperous Vizhinjam.

1. EDUCATION

The intervention in Education promotion focused on improvidng the quality of education and providing better facilities for children. Follwoing are the major activites are conducted under Education during the period.

Sl. No.	Programme organized	Participation	Key Activity
1.1	LITERATURE MEET	264	• Promotion of reading habits and creative writings among students
1.2	OPEN HOUSE	331	• Developed soft skills to meritorious students and career orientation to parents.
1.3	ENGLISH LANGURAGE COURSE	305	• Provided 60 hour English language module for selected 305 students. Enhanced the skills in organizing ideas, vocabulary, grammatical clarity and body Language in written and oral English
1.4	EVENING CLASS	150	• Career guidance for the children
	TOTAL	1050	

1.1 LITERATURE MEET

The monthly literature meet followed by the successful completion of summer literature camp was started at CV Smaraka library on 9th June 2018. Thereafter on every seconda Saturday from 2 p.m. to 5.p.m is scheduled for the literary camp. It is guided by 6 voluntary writers and selected students. Following table depicts the monthly sessions and participation of children for the literary meet from October 2018 to March 2019.

Month & Date	Activities	Output
October 13.10.18	**Topic** "Values leanred from the life of Mahathma Gandhi." • The topic was presented by Mr. P. Retnakaran, Retired teacher and poet, as part of150th birth centenary of Mahatma Gandhi. • The journey of Gandhiji in South Africa and the struggles faced due to untouchability and colour discrimination were discussed besides his important role in freedom struggle.	• Participated by 5 writers and 22 students. • **Kumari Rajalekshmi** - one of the students presented his story '**Munvidhi** (Prejudice)' and a poem '**Nirangal** (Colours)'. • **Kumari Arathi**, presented her story '**Sathyam**(truth)' & poem named '**Kuruvi** - sparrow'. • Students felt the importance of Gandhian values to be practiced in life.
Nov 10.11.19	**Topic** Vizhinjam and its culture – a historical journey. • Mr. Reaches Fernandez, teacher and poet, explained the cultural heritage, history and the fact behind the	• Participated by 6 writers and 18 students. • **Kumari Arathy** presented her poem **'Pathaka (Flag)'** and

	derivation of names of various localities in Vizhinjam. • Thereafter a quiz programme was conducted by Mr. Retnakaran, one of the poets.	Kumari Nandana presented her poems '**Chilanerangalil** (Sometimes)' and "**Juliyanayude Sankadam** (the worries of Juliyan elephant).
Dec 15.12.18	**Topic** Review of novels "Maha-bharatham Kadakal kuttikalku & Karnanu kittiya sapam" • The meet started with the presentation on reviews made by the students on books they read in the last four weeks. • Thereafter a quiz programme conducted by Mr. Rajamoni, on current affairs during the period 1st Nov 2018 to 15th Dec 2018. • Thereafter **Kumari. Bijitha**, and **Master Vignesh Mohan**, presented the theme of two famous child literature novels "**Mahabharatha Kadakal Kuttikalk'** wrote by **Shri. V.N Prabhakaran Nair** and '**Karnanu Kittiya Shapam'** wrote by **Mrs. Sumangala**.	• 22 students and five poets participated. • Master Abhijith, Kumari.Saniya and Master Sarath presented the reviews of famous poem '**Kannada** (Specs) written by the poet Murugan Kattakada. • It is planned for an exposure visit to Adani Port on 27th December 2018.
Jan 10.01.19	**Topic:** "The life of Swami Vivekananda – lessons" • The meet started with the presentation on creative writings by the students on their visit to the construction site of Adani Vizhinjam Port	• Participated by 6 writers and 25 students. • Students shared that the visit to Vizhinjam Port constructin site on 27.12.2018 helped

	on 27.12.2018. • Thereafter Mr. Rajamony presented the theme "The life and lessons of Swami Vivekananda" on his 156th birth anniversary on 12.01.19. • The important current affairs discussed in the month of January 2019 are i. Union Budget 2019-20 ii. Bharat Ratna Award, iii. Padma Awards 2019, iv. Kumbha Mela 2019, v. 10 % reservations for weaker sections and vi. CBI-AlokVerma Dispute. Prof. Retnakaran presented the importance and back ground of Folk songs, folk games, folk poems and folk stories in the life of common men.	to realise the mega port project • The key points about Swami Viviekananda liked by studnets are *i. Introduction of Indian philosophies of Vedanta and yoga to the western world.* *ii. Contributed to the concept of nationalism in colonial India.* *iii. Founder of Ramakrishna Math and Ramakrishnan Mission.* The students are much awakened by the prominent quote of Swami's "Arise, awake, and stop not till the goal is reached.
Feb 9-02-19	**Topic:** My Mother • The meet started with the presentation of poem by Mr. Adolf Jerome, one of the Resource Persons for the day. • Shri. P. Retnakaran presented the main theme 'Origin of Malayalam literature and the contribution of modern triumvirate poets in Malayalam namely Shri.N. Kumaran Asan, Vallathol Narayana Menon and Ulloor S Parameswara Iyer.	• Participated by 6 writers and 21 students • Maters Jefrin and Jipson presented their poems and were well appreciated by the mentors. • Quiz competition conducted provided deep input on the topics of Geneva Convention, Personal Laws, PM -

	• Important current affairs are discussed thereafter.	KISAN, Seoul Peace Prize 18, Vande Bharat Express, Padma Awards 2019, Pulvama attack
09.03.19	**Topic** **"**Thinkalum Tharangalum (Moon and Stars)" • A debate cum mentoring conducted to improve the writing skills. • A poem on **'Oramma Petta Makkal'** was presented by Mr. Adolf Jerome, one of the Resource Persons. • Shri. P. Retnakaran presented the main theme "Thinkalum Tharangalum". • Mr. Rajamoni explained some of the important current affairs in March 2019 such as General Election - 2019, India the 4th largest space power, Minimum Income Guarantee Scheme. International Women's day and Nari Shakhi Puraskar 2019, Padma Awards	• It was participated by 6 writers and 25 students. • Master. Jefrin John, Kumari. Jeeva Kennady, Kumari. Jefina Rose, Kumari. Saniya, Kumari. Aparna and Master. Jipson presented their poems. • Summer programme decided to conduct from 9th to 12th standard students from 13th April 2019 to 257th April 2019.

1.2 MONTHLY OPEN HOUSES MONTHLY OPEN HOUSES

Monthly open houses conducted for scholarship students to ensure better advancement in the academic performance and career selection. Every second Saturday 2 p.m. to 5.00 p.m is set apart for the monthly open houses. Following table gives the topics given for monthly open houses in the last six months.

Month & Date	Topic for the day	Output
October 13.10.2018	• Career Positioning	• 21 students participated • Conducted two hour session

		on "career positioning" for the students to link Career with higher studies. • Thereafter, discussed the challenges and possibilities of careers proposed. • Students have concretized their path for higher education.
November 10.11.2019	• English for empowerment	• 26 students participated. • Enhanced the level of confidence in communicative English in building their career. • The session made the students to become comfortable through participatory English language games and sentence games. • Thereafter performed "One minute nonstop" English speaking exercise was performed based on the theme given by the faculty. • The session provided input on using English during social gathering.
December 15.12.2018	• Overcoming barriers	• 16 students participated • The session focused on four main points a) Self-confidence i b) Self-esteem c) Self-belief and d) Belief in others. • There is a need of seriousness, initiative and self-drive to be generated among students.
January 10.01.19	• Public Speaking & Presentation Skills"	• 22 students participated • Equipped the students on **"Public Speaking & Presentation Skills"**.

		• Equipped the students to overcome stage fear and provided an effective framework with confidence to face the audience.
Feb 9-02-19	• Career Assessment Test (CAT)	• 49 Newly Selected students participated • A **Career Assessment Test (CAT)** has been conducted, in the following 3 areas. i. FACE, which threw light on core personality of students in four elements- Fact, Action, Concept and Emotion. • MTI - Marston's Type Indicator to assess the attitude • MIO (Multiple Intelligence Orientation): To know the intelligence inclination of students.
March 09.03.19	• Individual counselling and briefing of Career Assessment Test	• 49 newly selected students participated. • Based on Career Assesment Test, one to one briefing provided to the students on the personalised assessment report on Linguistic Logical, Musical, Visual, Kinaesthetic, Interpersonal, Natural and Metaphysical intelligence. • Six suitable career options provided. • Smart cards to the students for free access to career information

Benefit of the programme

1.3. EVENING CLASS. (SDG-4)

The evening classes under the CSR for the students from fishing community and weaker sections to prepare for final examination of SSLC was completed at Kottappuram School. The selected 150 students stayed back in the school from Monday to Friday from 4.00 pm to 7.00 pm and prepared for their public exam under the guidance of teachers. There were 8 batches having a mentor teacher for each batch from the school and a supplementary teacher from the nearby locality having BED qualification. Special classes are conducted for English, Chemistry and Physics. Career guidance and counselling support provided to students and their parents. Weekly test papers and Pre-model exams were conducted during the reporting period. The classes gave confidence to the students to win over the final SSLC exams in March 2019. From the school 169 studens with majority from

fishing community attended the exam, of which 168 have passed with good marks. That means almost 100% result could be achieved by the school in the last SSLC exam.



1.4 ENGLISH LANGUAGE COURSE (SDG No.4: Quality Education)

The students from Vizhinjam particularly from fishing community lacks the required confidence to compete with mainstream students in higher education. Poor communication skills in English language, lack of parental support and poor socio-economic background are the buildking blocks in their career path.

Inorder to overcome this issue, Adani Foundation conducted English Language course to 305 students from Kottappuram and Venganoor Schools during the year 2018-19. The topics covered for English language modules are (1) Ethics, (2) Principles (3) Communication Skills, (4) Vocabulary, (5) Articulation of words, (6) Articulation of ideas, (7) Feelings and emotions, (8) Critical listening and reading (9) Critical thinking (10) Creativity – oral, (11) Creativity–written and (12) Self confidence.

The English language skill course started in the month of November 2018 and was completed by end of March 2019. A total of 305 students cleared their assessment test. The following are the school wise details of students.

School	No of students	Status
Girls Higher Secondary School	175 students	• 60 hours training completed • Project Work of students completed. • Final Assessment of students on their written and oral communication skills carried out. • Assessment report submitted (attached as annexure -1)
Venganoor Boys Higher Secondary School	80 students	• 60 hours training completed on 28.02.2019 • Final assessment completed. • Assessment report submitted
St. Mary's High School Kottappuram	50 students	• 60 hours training completed • Project Work of students completed. • Final Assessment of students on their written and oral communication skills carried out. • Assessment report submitted

Outcome

The students had demonstrated improved interest in valuing the importance of English in their daily life and consciously became aware of pronunciation, articulation and critical thinking. A session wise evaluation was condcuted to understand the improvement made in listening and writing skills based on the parameters of Grasping capacity, Organizing ideas, Vocabulary, Grammatical clarity, Body Language and Confidence level.

The session outcome is tabled herewith.

Sl.No	Session Objective	Lesson # / Activity Name	Session Outcome
1.	Improving confidence and their speaking	Importance of project	The students were able to: • Know the actual importance of improving their language and how the project is going to help them.

Sl.No	Session Objective	Lesson # / Activity Name	Session Outcome
	skills.	Self-Introduction	• Give a self- introduction very clearly and confidently using simple words.
2.	Public Speaking - Assessment	Self-Introduction Presentation	The Students were able to: • Introduce themselves confidently • Give a neat presentation on the topic favourite food. • Present a topic confidently with some logical ideas
3.	Public Speaking	Pick and Talk	The students were able to talk confidently on the chosen topic to a certain time frame with their own language skills
4.	Greeting	How to Greet people	The students were able to learn the basic etiquette and the ways to greet people when they come across certain situations in their life.
5.	Connecting Sentences	What happened Next	The students were able to make a coherent paragraph with the jumbled sentences given by understanding the idea behind it.
6.	Vocabulary	Guess the word	The students were able to understand and spot the meaning of the new vocabularies and to get familiar with its usage in a conversation.
7.	Presentation Skills	Story Presentation	The students were able to narrate a story on their own on certain incidents that happened in their life confidently in their own way.
8.	Writing Skills	Writing a short story	on giving certain sentence structures and with required grammar.
9.	Reading skills	Reading a Passage	The students were able to read the passage which is given to them and can read aloud with right pronunciation.
10.	Sense of humour in a conversation	Cooling swim	The students were able to understand the conversation well and can recognise the humorous ideas in a topic.
11.	Framing Sentences	Sentence Construction	The students were able to frame simple sentences in English with right grammar.
12.	Creative writing	Story Creation	The students were able to write a story based on certain creative ideas given to them.
13.	Observe and Improve	How the Elephant got its trunk	The students were able to spot and react accordingly based on the situations they come
14.	Spotting Errors	Locate , erase and Correct	The students were able to locate the

Sl.No	Session Objective	Lesson # / Activity Name	Session Outcome
15.	Reading Comprehension	Reading Skill Enhancement	The students were able to read the given passage and can understand the in-depth meaning of it and answer the follow up questions effectively.
16.	Assessment	Progress Tracker	The students were asked to write an assessment to check their progress during the training and mild improvements were observed.
17.	Importance of Waste Management	Garbage	The students learned the importance of waste management and also how it could be used in
18.	Interaction	Discussion	The students are asked to discuss among
19.	Pronunciation	Pick and Pronounce	The students were able to choose some random difficult words wherein they find it difficult to pronounce and got ideas on how to make it sound clearly.
20.	Story Writing	Father and Son	The students could be able to write a story on their own with some connective pictures given on relating with a theme behind.
21.	Spelling	Spelling Bee	The students were able to think on their own
22.	Comparing the Story Listening	Compare and Learn Check your Level	The students were able to make up the theme behind the stories given and can spot
23.	Inspirational Stories of famous Personalities	Henry Ford	The students were able to follow up the life path of various personalities which in-turn make their life cherished
24.	Vocabulary	Gutenberg	The students were able to understand the difficulties in achieving the goal without hard work.
25.	Character Traits	Characterisation	The students were able to make up some specific character traits of A-Z and they learned how it could be used effectively.
26.	Life Incidents Reading and Story Telling	After the Flood	The students were able to understand the ideas given and can develop a story of their own and can deliver a speech to an extent.
27.	Grammar, Behaviour	Phrasal Verbs	The students were able to use sentences in a conversation effectively and learnt to use phrasal verbs and

Sl.No	Session Objective	Lesson # / Activity Name	Session Outcome
		At the school Interview	learnt how to behave with people at school and done a mock video session on how an interview and a formal conversation moves on.
28.	Writing Methodology	Favourites	The students were given relevant ideas on how to write sentences clearly and asked to write few sentences about their favourites and observed mild improvements.
29.	Speaking Skills Enhancement	Speak - Spoke-Spoken	The students were able to use the right verb and tense forms in the conversation effectively.
30.	Speech Training	Real Life Situational Talk	The students were able to react and speak well according to the situation they are going to experience later on.
31.	Language Improvement	How to Improve the Language?	The students were given necessary footsteps to improve the language which can be used even more further to improve their language everyday which in turn makes them more and more confident.
32.	Ideas to improve language	Tips and Techniques	The students were able to improve their language with the ideas given and can effectively implement the ideas well.
33.	Assessment	Evaluate	Assessment has been done which shows moderate improvement in some students which shows the success rate in the project. They improved their language to certain extent and can improve even more from the practical ideas delivered.
34.	Project Closure	Happy Moments	The students were very happy about this project and promised to improve their skills.

Girls High School, Venganoor

Total Strength:	175 students
Duration :	60 hours
Outcome	

Written Evaluation:

- Marginal Improvement (3%)

Oral Evaluation:

- Improved Confidence
- Improvement in the ability to connect words
- Minimal improvement in grammatical proficiency

Feedback from Trainer

VPHSS for Boys, Venganoor

Total Strength:	80 students
Duration :	60 hours
Outcome	

Written Evaluation:

- Marginal Improvement (4%)

Oral Evaluation:

- Improved Confidence
- Improvement in the ability to connect words
- Minimal improvement in grammatical proficiency
- Overall improvement in manners.

Feedback from Trainer

St. Mary's School, Kottapuram

Total Strength:	50 students
Duration :	60 hours
Outcome	

Written Evaluation:

- Slight Improvement (6%)

Oral Evaluation:

- Improved Confidence
- Slight improvement in grammatical usage
- Greater self-esteem
- Overall improvement in manners.

2. COMMUNITY HEALTH

During the reporting year, following important activities are carried out under Community Health

i. Mobile Health Care Unit (MHCU) & Medical Camps
ii. Solid Waste Management
iii. Clean Campaign
iv. Swachhagraha
v. Suposhan

2.1 MOBILE HEALTH CARE UNIT (SDG No.3: Good Health and Well Being)

Geographical area of operation:

Kottappuram, Harbour, Vizhinjam, Mulloor and Venganoor wards of Vizhinjam village

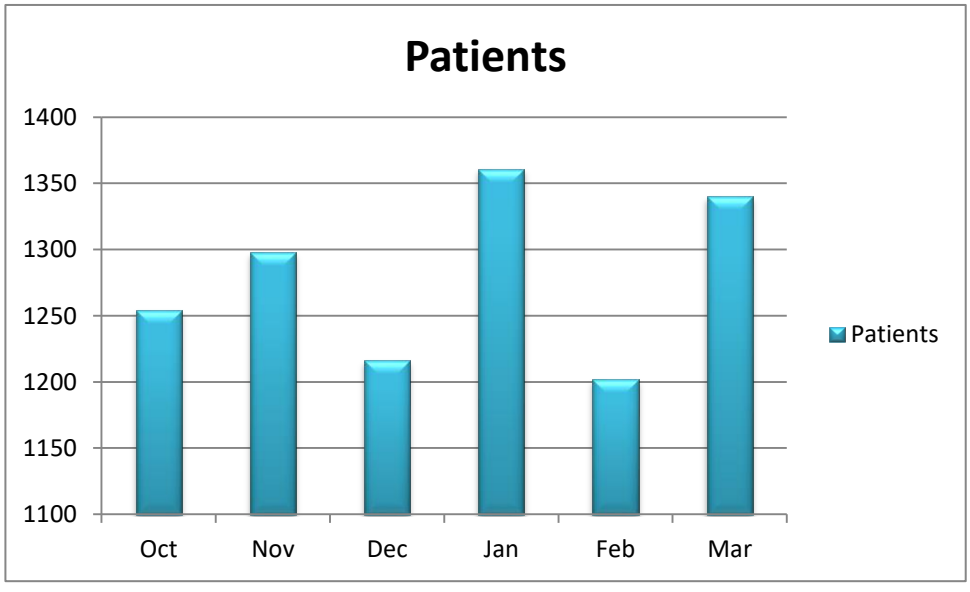
- From the month of October 2018 to month March 2019 the Vizhinjam MHU has visited 11 sites weekly.
- The team has provided 7671 check ups/ treatments during the time.
- Conducted 9 special camps during the period covering 422 patients
- The Vizhinjam team has done 35 house visits for the bedridden patient and done the BP Check-up and provided necessary medicines and being followed.
- Awareness conducted on Seasonal diseases, hypertension, Diabetes, skin disease, and sanitation were conducted in each sites.
- Done special medical camp at attukal ponkala.

The services provided by MHU included free treatment and provided free medicines for all common ailments including Hypertension, Diabetes, Arthritis, etc.

Monthly break-up of patients supported

	2018			2019			
SITES	Oct	Nov	Dec	Jan	Feb	Mar	Total
Newchurch	156	126	144	126	146	142	840
Kadaykulam	83	68	96	94	81	91	513
Karayadivila	139	97	107	136	108	131	718
kadaykulam	113	94	101	128	112	118	666
Theruvu	205	199	175	224	147	178	1128
SNDP	113	95	104	144	92	100	648
Gateway	100	135	103	119	118	112	687
Township	156	193	152	172	150	147	970
Maryanagr	103	156	120	103	120	152	754
ICDS	86	135	114	115	128	169	747
Kidarakuzhi							
Flood Area							
TOTAL	1254	1298	1216	1361	1202	1340	7671

Treatment chart



Regular camp details of the months

SN	Date	Camp site	Total treatments
1	19/10/2018	Nellimoodu	42
2	17/11/2018	Kappachal	32
3	15/12/2018	Vayalinkara	62
4	22/12/2018	Kadaykulam	43
5	26/1/2019	Kadaykulam	47
6	2/2/2019	Kidarakuzhi	65
7	9/2/2019	Vayalinkara	51
8	2/3/2019	kidarakuzhi	61
9	16/3/2019	Mulloor	19
		Total	422

Disease specific pattern reported in the months

Disease	2018	2018	2018	2019	2019	2019
	Oct	Nov	Dec	Jan	Feb	Mar
Acid Peptic Disorder	279	284	260	304	162	466
Aplastic and Anemia	79	79	120	92	58	150
Asthma	309	319	300	342	222	564
Bronchiectasis	2	3	3	2	1	3
Cancer / Neoplasms	3	4	5	3	1	4
Candidiasis/ Fungal infection	68	70	60	79	37	116
Cataract	61	60	60	67	37	104
Chronic Obstructive Pulmonary	160	157	152	185	80	265
Conjunctivitis	28	22	26	25	16	41
Corns and Calluses	0	0	0	0	0	0
Coronary Artery Diseases/Stroke/ Cardio vascular diseases	237	249	243	271	152	423
Dental Caries/Gingivitis	91	94	109	102	55	157
Diabetes Mellitus	554	622	390	682	342	1024

Diarrhea/ Dysentery/ Gastroenteritis	47	51	48	55	26	81
Disability	0	2	0	2	0	2
Fever/Pyrexia	196	209	199	219	115	334
Glaucoma	0	0	0	0	0	0
Hypertension	632	743	711	819	229	1048
Hyperthyroid	0	0	0	0	0	0
Hypothyroid	213	214	247	230	167	397
Injury/Burn	43	41	47	46	28	74
Jaundice	1	1	1	1	0	1
Leucorrhoea	0	0	0	0	0	0
Malnutrition/ Obesity	66	66	54	75	37	112
Mental disorder	7	8	6	7	4	11
Neuropathy/ peripheral nervous system	0	0	0	0	0	0
Osteo-Arthritis/ Joint Pain	522	538	546	598	378	976
Otitis Media	0	0	0	0	0	0
Refractive Error	0	0	0	0	0	0
Skin Diseases	96	103	109	108	56	164
Tuberculosis	0	0	0	0	0	0
Respiratory Tract Infection	83	89	91	96	51	147
Urinary Tract Infection	76	86	65	87	35	122
Weakness - Generalized	8	12	8	12	4	16
Worms Infestation	25	27	22	31	17	48
Other	918	942	896	999	620	1619

Regular MHU activities

Consultation

Receiving the op sheets

Doctor consulting

Doctor consulting the beneficiaries

Health awareness camps

Awareness on Hypertension

Visit to the colony for giving the awarness

Home visits

Name: Fathima beevi
Age: 80
Place: icds
Id:4195

Name: Fathima beevi Age: 80 Place: icds Id:4195	

Gluco check

	
Gluco checup	**Bp checking**

Other activities

	
Regular camp	Awareness flex

The MHU van is equipped with basic diagnostic equipment such as stethoscope, BP apparatus, thermometer, weighing machine etc. for checking the vital signs. In addition to this there is a glucometer for blood sugar testing.

2.2. SOLID WASTE MANAGEMENT (SDG No.11)

Solid Waste is one of the most complex issues faced by the people and the municipal authorities at Vizhinja

Scene of waste at Public Library, Vizhnjam junction

was a normal scene at Vizhnjam till 2016. These wastes composed of heterogeneous mixture of food items, paper, plastics, clothes and different types of organic matter generated form households, commercial establishments and markets. Although the management of waste is the responsibility of Health division of Thiruvananthapuram Corporation, it is ill equipped with the required facilities.

Inorder to overcome the issue of waste management, Adani Foundation signed a memorandum of Understanding with the Municipal Corporation of Thiruvananthapuram on 26 June 2016. As per the MoU, Adani Foundation, the CSR arm of Adani Vizhinjam Port Pvt ltd has agreed to install and hand over Thumboormozhi Model Aerobic Bin for Solid Waste Management and Material Recovery Facility Centers (MRF) with in the local limits of Vizhinjam Zonal Region of Municipal Corporation. Whereas Trivandrum Municipal Corporation agreed that the management of the Aerobic Bins and Material Recovery Facility (MRF) centers after its installation would vest with Municipal Corporation of Thiruvananthapuram.

Based on the agreement Adani Foundation has installed 26 "**Thumboormozhi Aero Bins**" in communities Viz Kottappuram Ward, Vizhinjam Ward and Harbour ward as a one-stop solution for the alarming issue of Solid Waste Management. This proposal is developed based on the frequent and intensive discussions carried out with Ward Councilors,

Community Leaders, Corporation Mayor and the Officials of Municipal Corporation including Corporation Secretary and Health Officials.

In this model, aerobic compost treatment facility known as "Aerobin" is made with proper aeration and protection from water to convert the degradable waste into compost. The model as shown in the picture is developed in a place known as Thumboormozhi in Alleppy district, and thus the name derived. It contains rectangular bins enclosed in a room. The composting unit includes a box-like structure with ferro-cement floor, and waste materials are subjected to composting in presence of oxygen. The garbage is dumped into a four feet high rectangular bin (4X4X4 feet volume). Inoculum sprayed will hasten composting. All this happens in the presence of air and thus there is no foul smell.

Each cube has the capacity to store 1 ton of food waste. Once the cube is filled, it may be kept closed for another 40 to 50 days sprayed with inoculum to convert it into compost. There is huge demand for the compost made out of it. Vizhinjam being close to agricultural area, there could have a potential compost business.

Presently, there are 26 Aerobins installed in the three divisions, of which 5 are erected in the month of March 2019.

Sl No	Location of Bins	No of Bins	No. of families served	Approx. quantum of waste collected/day
1.	Vizhinjam Market	8	750	200 kg
2.	Harbour – Madhippuram	10	1000	300 kg
3.	Kottappuram –			

	Charuvila	3	250	100 kg
4.	Pulloorkonam-Vizhnjam	5	500	Stated March 2019

The Aerobins are opened for the public from morning 7 a.m. to evening 5 p.m. The residents bring segregated waste to the locations every day. Three sanitation workers are engaged in each location by the Corporation to manage and monitor it. In the last two years of time, there has been tremendous improvement in the management of waste. Littering has been reduced substantially in all identified locations. This model of decentralized waste management is creating a successful and replicable model for other divisions.

OUTCOME

- 600 kg of waste from the communities of Vizhinjam, Kottappuram and Habour divisions are treated daily.
- The project brought ownership of Municipal Corporation by engaging 12 Municipal workers at four Thumboormozhi locations to manage and monitor the treatment of waste.
- Nearly 2500 families are benefitted by bringing waste from their houses to the nearby Thumboormozhi bins.
- The households started practices segregation and bringing degradable and non-degradable waste separately.

Bins at Harbour Area

Bins at Vizhinjam Area

- The compost is sold to the farmers from the nearby areas by the sanitation workers.
- The leachate coming out of Thumboormozhi bins are used for kitchen garden near to the bins.

The micro study conducted in the three wards of Vizhinjam and the subsequent interventions on waste management carried out at Kottappuram, Vizhinjam and Harbour divisions set a good example of community based waste management system at Vizhinjam. The interventions reduced the issues of littering of waste to a large extend. The Thumboormozhi Aerobins installed has taken care of waste generated from more than 2000 families. The awareness campaign on Solid Waste has reached to more than 10,000 families. This has created a culture to stop throwing of waste in to public places. The places which were accumulated with wastes are now been cleaned by the joint effort of Adani Foundation, Municipal Corporation and Community at large. While moving forward, following recommendations are suggested to ensure better waste management system in all the three divisions of Vizhinjam. The output based on the intervention of Adani Foundation in the proposed three divisons are detailed in the below table

OUTPUT

S. No.	Particulars	Activities Planned	Output against Indicators
1.	Stakeholder analysis	• Stakeholder identification • Assessment	**Quantitative** • No of major stakeholder groups identified - 27 • No of meetings with Municipal Stakeholders – 12

S. No.	Particulars	Activities Planned	Output against Indicators
		• Participation	• No of meeting with community stakeholders - 100 **Qualitative** • SWM Action Plan prepared • Engaged TVMC for operation of waste management • Community people equipped for awareness creation
2.	Compost Treatment & Plastic processing	• Identification of site. • Installation of Bins • Signing MoU • Operational management through TVMC	**Quantitative** • No of sites identified - 4 locations in three wards • No of Aerobins – 26 bins • Capacity - Each bin has 1 ton capacity to compost **Qualitative** • No people using - 2500 • Percent of Reduction in litter – reduced to half.
3.	Awareness Programme	• Awareness classes. • IEC Campaigns.	**Quantitative** • No of Trainers : 35 Resource Persons from three divisions • No of people : 10,117 • No of programs : 570 **Qualitative** • No of people started practicing segregation - About 1000 houses • Proper storage – Around 1000 houses • Disposal in Aero bins- 2500 houses • Reduced littering – Reduced almost 60% - trivial observation.
4.	Beautifying waste locations	• Train the team to do waste mapping exercise • Conduct FGDs • Do waste mapping in all three divisions	**Quantity** • No of FGDs - 50 • No of participants - 850 • No of maps prepared - 22 • Approx. quantum of waste mounts identified – 27,000 kg **Quality** • Waste locations marked - 22 • Prioritization of vulnerability – 8 locations
5.	Clean Campaign	• Stakeholder consultation • Waste disposal areas • Execution of cleaning camp • Monitoring	**Quantity** • No. of campaigns with all stakeholders - 20 • Area covered – 3 divisions • Institutions covered - 10 • Average no of stakeholders involved - 46 **Quality** • No of site declared zero waste - 6 • Reduction in open disposal- Almost 60%

S. No.	Particulars	Activities Planned	Output against Indicators
6.	Operation Support	• Ensure the timing of operation • Ensure community participation .	**Quantity** • Timing; 7 am to 5 p.m. • No of days : Every day • No sanitation workers ; 12 **Quality** • No of people bringing waste – 2500 • Better awareness on waste handling – 10,000

RECOMMENDATIONS

- Every domestic unit shall declare their mode of disposal of solid waste. Here a system needs to be evolved to ensure that at-house treatment is practiced in the households having minimum 2cents of land in their surroundings.
- Plastic and waste reduction and diversion strategy has to be promoted at door to door to reduce the quantity of waste reaching the plant with decentralized solid waste management.
- Public are not showing much interest in at-house treatments, because they hesitate to handle the waste. Hence need to evolve a comprehensive community based Information, Education, Communication (IEC) campaign with a strategic plan informing how the public has to participate in the issues of solid waste management to keep the area clean and to improve the quality of life with the active participation of local women groups, resident associations and all other voluntary organisations.
- The law seeks to ban public burning of waste, because the Nitrous Oxide (N2O) released from solid waste combustion has 310 times the global warming potential. As the burning is now happening in all these wards, an effective mechanism to monitor such illegal activities with the participation of community people and civil society organization need to be introduced.

- The welfare measures to the waste collectors are very important and the municipal corporations should take steps to provide atleast the health insurance to these waste collectors.
- A reward and felicitation for those waste collectors who perform their task efficiently would not only create an interest to perform the task diligently but also will add on to the efficiency of the waste collectors.
- Enforcement of guidelines and penal provisions need to be improved in the cities by the local self-government institutions. Guidelines/norms has to published and issued to all waste generating sources indicating when, where and how to dispose the garbage from houses/establishments. Mechanism to impose fines for throwing out garbage by the residents/establishments also needs to be strengthened.
- Strengthen the practices on recycling / composting of garbage. Proper segregation of biodegradable and non-biodegradable materials should be made mandatory at it source of generation.
- Recycling units have to be started by the municipal corporations at circle level or some collection points at specific locations, for the potential recovery of the recyclable materials segregated and transported to the disposal site.
- It is also recommended to introduce the topics on 'solid waste management and environmental protection' in school curriculum as children are the idealist agents to change their home and the world for better. Social Clubs, National Cadet Corps (NCC), National Social Service, (NSS), Students' police and Scouts need be directed to get involved in the effort of state and local self-government institutions in the awareness and mass education programmes for better solid waste management practices.
- Promote community participation in waste reduction, diversion, promotion of at-house treatment and recovering value from the waste. The system should also be made conducive for community

participation with facilities for segregation, promotion of at-house treatment and in recovering values from waste.

- Efforts and campaigns needs to be accelerated on reducing plastics and promoting eco-friendly bags towards a sustainable tomorrow.
- It is recommended to start a Plastic Shredding unit at Vizhinjam jointly by Trivandrum Municipal Corporation and Adani Foundation to reduce plastic waste and to stop plastic pollution.
- There should be a monthly MIS system with indicator value of solid waste practices in the divisons. This may be displayed monthly for the information of all stakeholders as in the given table.

2.3 CLEAN CAMPAIGNS

The focus group discussion with the community members and oen to one discussion with elected representatives in the intervenitng wards shared that their divisions mostly comprise of poor squatters and fishermen huts on the shore of sea. They throw waste openly in the shore side, as they have no other option. The leachate from the decayed items mixed with rain water is flowing in to the narrow path causing increased breeding of mosquitoes. The local residents near the area reported that the increased spread of diseases as a result of unscientific disposal of waste is a burning issue in their day to day life. The Health Inspectors of this area opined that major waste accumulating locations are "Karimapllikkara, Cheriya Palam, Valiyapalam, near Urusila convent, Thulavila, neat St.Mary's School, Valiyakadappuram, behind St.Philomina church, Kadaikulam colony, and Charuvula colony.

The waste accumulated behind Port construction area at Karimpallikkara is laying there for the last several years. Being a thickly populated coastal belt, the people throw away waste in polythene bags is a common practice. The CSR team has done more than 50 Focus Group Discussions

and Waste Mapping Exercise in the three divisions. This has resulted in identifying the major waste dumping location in the three divisions.

Following are the major locations and approximate quantum of waste accumulated in each location identified by the team.

Waste Accumulation Points		
Kottappuram Division		
Sl. No	Area	Approx waste (kg)
1	Karimpallikkara	1000
2	Charuvila	1000
3	Valiya Kadappuram(Behind Community Hall)	5000
4	Kadaikulam Colony	500
5	Mariyan Nagar	1000
6	Kottappurm-mekkotta	500
7	Descent mukku	500
8	Near Urusline Convent	1000
9	Near St.Mary's HSS	2000
10	Mukkola-Vizhinjam Road	300
11	Mukkola Market	500
Vizhinjam Division		
12	Vizhinjam Market	500
13	Opp KSRTC Bus Station	400

14	Old Vizhinjam Market	300
15	Township colony	4000
16	Kovalam Road	500
17	Near Theathre Junction	500
18	Pulloorkonam	2000
Harbour Division		
19	Madhippuram	3000
20	Near HALP School	1000
21	Harbour road, Opp to Mosque	500
22	Kovalam, Near SNDP Hall	500
23	Kovalam-Neelakanda Colony	700

Waste dumping places in Vizhinjam, Kottappuram and Harbour divisions

Harbour area

Kottappuram area

Vizhinjam

Vizhinjam

Kottappuram Harbour

CITIZEN LED CAMPAIGN ON SWM

The community people have less understanding on the health and environmental issue due to the poor disposal of waste. Hence, it is imperative to have concerted efforts to provide systematic education campaign on solid waste management. Further, the level of understating on different phases on solid waste such as segregation, storage, at-house treatment and recovery of wealth also differ from household to household. Hence it is planned to have a proper citizen lead awareness campaigns to address all these concerns.

TEAMING OF COMMUNITY RESOURCE PERSONS

A total of 35 Community Resource Persons are slected from a team Of 150 volunteers trained on better waste handling practices. For that a total of 150 volunteers were trained intensively on volunteerism and community development. From that, 35 active members are selected as full time community Resource Persons. Priority was given to the key community leaders from Kottappuram, Vizhinjam and Harbour wards. Trainer's Training programme was provided to the Resource Persons to organize systematic citizen-led awareness programmes at community level. Thereafter a plan with calendar of training programme has been prepared for community level awareness programmes.

- The main output of the training is that majority of community resource persons are from Kottappuram, Vizhinjam and Harbour divisions.
- All Community Resource Persons are women, which helped to reach out to the programme to house-wives in all the wards.

AWARENESS CLASSES

A total of 570 awareness classes were organized effectively by the community resource persons in the respective wards participated by 10,117 community people till date. All these sessions were happened in communities, public places and community halls available in the three divisions. The sessions focused on the importance of waste treatment, various decentralized modes of waste treatment with focus on Thumboormozhi, importance of segregation and the need to bring the segregated waste to the Thumboormozhi site. The training directly benefited in making community people aware on Thumboormozhi bins placed close to their community and how to segregate the waste and disposed it in to the Aerobins. Further the careful storage of waste, segregation of plastic wastes and stoppage on littering are the direct benefit of awareness programmes. The awareness classes have come up with a plan to dispose the existing waste by the community itself.

Table – 6.1: Ward wise coverage of awareness programme

S. No.	Name of RP	Behalf of	Session	Participants
1	Raichel Benny	Kottappuram	15	242
2	Rexy John	Kottappuram	16	250
3	Santhy	Kottappuram	15	262
4	Sherly	Kottappuram	15	249
5	Ajitha	Kottappuram	13	221
6	Sijitha. C	Kottappuram	10	159
7	Anu. C	Kottappuram	7	142
8	Aneesh. J	Kottappuram	10	174
9	Anitha Arogyadas	Kottappuram	20	398
10	Selvam Stellas	Kottappuram	17	342

S. No.	Name of RP	Behalf of	Session	Participants
11	Beena	Kottappuram	17	323
12	Mary Leena	Kottappuram	19	373
13	Mary Simi	Kottappuram	15	364
14	Cyril	Kottappuram	10	169
15	Umaiba	Vizhinjam	34	528
16	Soudamini	Vizhinjam	11	188
17	Suja. A	Vizhinjam	11	165
18	Jareena	Vizhinjam	28	491
19	Kalfiya	Vizhinjam	10	161
20	Haseena	Vizhinjam	26	446
21	Sudheera. N	Vizhinjam	10	200
22	Shameena. R	Vizhinjam	6	77
23	Jyothifa	Harbor	25	489
24	Jasmin Rose	Harbor	25	426
25	Chandri. D	Harbor	25	467
26	Shaila	Harbor	25	500
27	Vrinda	Harbor	7	124
28	Sheeja	Harbor	9	158
29	Suja. C	Mulloor	10	200
30	N.K. Maheswari	Mulloor	10	144
31	Surya. V.S	Mulloor	10	177
32	Resmi R. Mohan	Mulloor	10	181
33	Sarabindhu. J	Venganoor	15	247
34	Sreekala. UM	Venganoor	9	127
35	Suraja.T.K	Venganoor	15	250
36	Raji. S. C	Venganoor	9	147
37	Rejitha. G	Venganoor	16	288
38	Bindhu S. Kumar	Venganoor	15	268
Total			570	10117

PARTICIPATORY MAPPING OF WASTE LOCATIONS.

The third programme was to map the locations which have become the receptacles of waste and clean such places jointly by CSR team, municipal sanitation workers and community members. Thereafter declare such locations as non-waste disposal areas. The mapping exercise has been done by the community resources persons through Kudumbashree groups and SHGs in all the three divisions. Towards that 50 Focus Group

Discussions were carried out. This has resulted in identifying following waste dumping areas in the three divisions

Waste Accumulation Points		
Kottappuram Division		
Sl. No	Area	Approx waste (kg)
1	Karimpallikkara	1000
2	Charuvila	1000
3	Valiya Kadappuram(Behind Community Hall)	5000
4	Kadaikulam Colony	500
5	Mariyan Nagar	1000
6	Kottappurm-mekkotta	500
7	Descent mukku	500
8	Near Urusline Convent	1000
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10	Mukkola-Vizhinjam Road	300
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Vizhinjam Division		
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13	Opp KSRTC Bus Station	400
14	Old Vizhinjam Market	300
15	Township colony	4000
16	Kovalam Road	500
17	Near Theathre Junction	500
18	Pulloorkonam	2000
Harbour Division		
19	Mathipuram	3000
20	Near HALP School	1000
21	Harbour road, Opp to Mosque	500
22	Kovalam, Near SNDP Hall	500
23	Kovalam-Neelakanda Colony	700

ONE TIME CLEAN CAMPAIGN

The cleaning activity has been planned immediately after the mapping exercise. 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.

Table depict the outcome of different community cleaning

S. No.	Location	Date of cleaning	Average quantum of waste cleaned
1.	13.09.2019	Chenavilakom, Vizhinjam	• A total of 65 persons including 32 sanitation workers of Trivandrum Municipal Corporation and 33 community volunteers participated in the clean campaign. • The team cleaned up the vegetation, pathways, drains and narrow roads close to Vizhinjam Harbour. • Close to 1500 kg of waste removed from the area
2.	28.11.2018	Vayalinkara	• Fourteen member team from Corporation Health wing and ten member team from Community-CSR came together cleaned and disposed 1500 kg of waste at Vayalinkara
7	31.03.2019	Karimpallikkara	• Twenty member team from Corporation Health wing and ten member team from Community-CSR came together cleaned and disposed close to 1000kg of waste at Karimpallikkara.
8	22.12.2018	Valiyakadappuram	• Twelve sanitary workers from Municipal Corporation of Thiruvananthapuram, 10 localites from Vizhinjam, representatives from HOWE and community volunteers have joined with AVPPL-AF to clean the wastes accumulated in the area close to 1 k.m. at Kottappuram ward and disposed waste close to 2500 kg. The cleaning campaign again continued on 14.07.2017 for clearing the waste at Valiyakadappuram.

9	14.07.2018		Five sanitary workers from Municipal Corporation of Thiruvananthapuram and representatives from HOWE and community volunteers have joined the cleaning campaign for clearing 1000kg of waste at Valiyakadappuram
10	09.03.2019	Harbour area	• Intensive campaign conducted with CSR volunteers, clean 4 U livelihood group, 26 municipal workers, ward councilors, institutional staff and the community at large. Cleaned about 2000 kg of waste.

Waste Awareness

Clean-4-U Group on action

PTA members supporting clearing the work

Clean campaign at Mukkola Public Health Centre


Arogya Jagratha Programme (Clean Campaign Porgramme)

2.4 SWACHHAGRAHA

Adani Foundation initiated another important project viz "**Swachhagraha** to create a culture of cleanliness among students through schools. The project is aimed to inculcate a behaviour change education in cleanliness, sanitation, personal hygiene and civic consciousness amongst young minds. The activities under Swachhagraha included formation of **a Swachhagraha unit** with 20 school students and a nodal teacher. The students have been provided workbooks to prepare Self-Improvement Plan to become Swachhagrahi. The programme was formally launched by the hon'ble Minister for Ports shri.Ramchandran Kadannappalli on 01.12.2.19.

The activities included promoting personal hygiene, preventing littering behaviour, identifying littering pockets in schools and premises, making a consumption checklist and finalise a plan and intervention to improve the culture of cleanliness. Permission has been accorded from DPI to conduct the programme in selected 131 UP/HS of Thiruvananthpuram district.

As part of Swachhagraha, Adani Foundation is conducting 21 different programmes over a period of one year starting from creating a group of students named as "Dal Members", creating awareness on importance of cleaning, creating Swachhagraha wall for display of important news and creatives, preparing schools maps, promoting hand wash, litter graph activity, performance by students on the theme of cleanliness, making crafts from waste materials, making compost pits...etc.

Progress of Swachhagraha in schools

S. No.	Activities	Nos.
1	No of Swachhagraha School	130
2	No of Swachhagraha Preraks (Nodal teachers)	133
3	No of Swachhagraha Dals (20 member students group)	129
4	No of Swachhagraha Dal Members	2566
5	No of schools created swachhagraha walls (Walls with creatives of children on cleanliness and information)	65
6	No of schools prepared School Map	22
7	No of schools prepared Litter Graph	5
8	No of schools prepared Skit/ Drama on cleanliness	4
9	No of schools prepared Toilet Signage	30
10	No schools trained on Hand Washing	42
11	No of schools conducted Toilet etiquette Survey	30

Swachhagraha walls

Swachhagraha corner

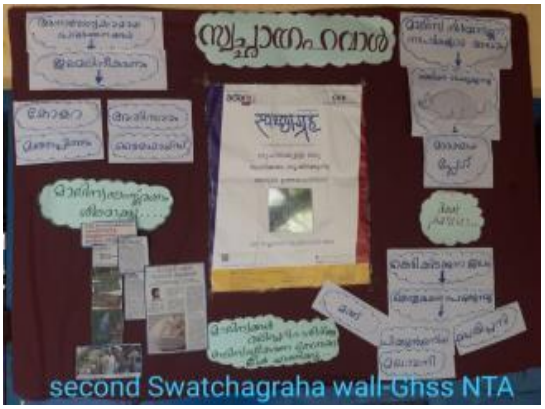
Swachhagraha wall and School Map prepared by students

Dal groups have been formed in all 130 schools under the selected Nodal teachers (Prerak). Among 130 schools, eighty percent schools cleaned their class rooms, compound, toilets and surrounding areas of school as part of Swachhagraha and made a plan for keeping regular cleanliness. No litter graph, promotion of hygiene practices, importance of banning plastics, recognizing sanitary workers, reaching messages to the communities are the ongoing activities under Swachhagraha.

PLASTIC FREE CAMPAIGN

With the motto of ending Plastic Pollution from earth, Adani Foundation started a new campaign on Plastic Free Vizhinjam. The worldwide statistics shows that close to 500 billion plastic bags used each year, wherein 13 million tons of plastic leak into the ocean each year. The news reports and the studies showed that the fishing people are getting more plastics than fish from the sea.

As part this campaign 25 community resource persons are identified from the intervention area of Vizhinjam, Harbour, and Kottappuram. A one day orientation on all NGOs and CBOs participated by 52 members was conducted on 11.03.2018. Orientations, bike rally and street plays will be conducted as part of the programme. Awards shall be distributed for those institutions and individual handling the better.



World Water Day – 2019

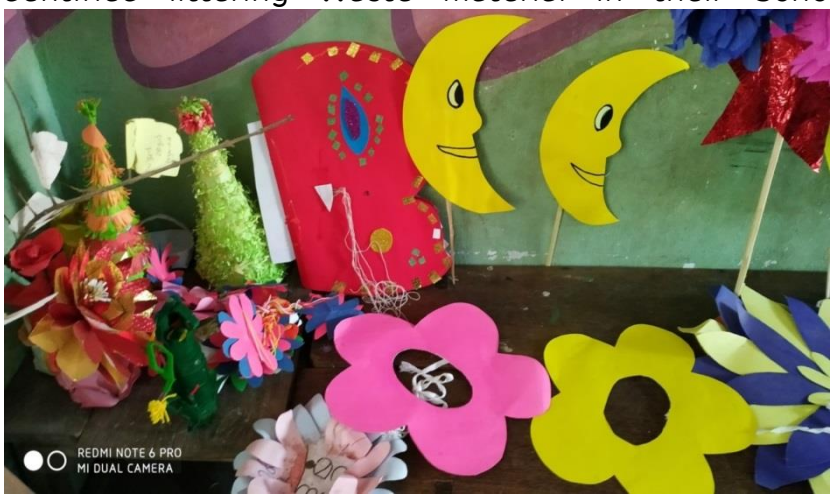
Pledge on "Save Water" at Venganoor Girls School

World Water Day was observed in 20 schools under Swachhagraha and communities under SuPoshan on 22nd March 2019. The schools took pledge on water conservation, saving water, sesible consumption, judicious use and not wasting water. 2500 students were participated in the event from all the schools. The schools organised special assemblies, Poster paintings, Poster awarenesses, special speeches watering Plants and awareness quotes etc on the day.

Mime on No plastics perfomed by students of Vivekananda Vidyapeedam

THOUGHTS FOR INNOVATION IN WASTE TO CRAFT

Swachhagraha Dal Members of Govt Upper Primary School Venganoor Bhagavathinada identified littering Waste material in their School Premises. One of the main activities are to make crafts out of waste. Students collected all waste materials in the school and made beautiful products by adding artistic and creative elements. Posters and Signage were also put up in the school to encourage to not littering in school area. More students participated the waste to craft work activity. The school Head Mistress, Principal and Prerak teacher decided to display the students' creativity by exhibiting the school annual day. All parents and teachers appreciated the craft works in team members.



Water Day-Save Water Everyday

Mount Carmel Residential School Kanjiramkulam Celebrated water day. Under Swachhagraha for world water day on 22 March. A special assembly on water day where the students took the water day pledge. The activities related to water conservation, saving water, collecting water, not

wasting water were carried out. Students started the activities from March 18 to March 22. In the Special Assembly, 620 students took the water day pledge, speech, activities; Poster Pasting, Watering Plants, quotes etc were performed. Finally Dal member reported the event. Approximately 20 schools and 2500 students attended the program. School Management prerak and Dal members created a swachhagraha corner.

SCHOOL VEGETABLE GARDEN

Dal members of St. Paul's CSI WF Uchakkada developed terrace garden at the top of their school building. A garden offers opportunities to teach life skills such as gardening and cooking. The garden setting helped broaden the way teachers look at both curriculum and their students. The garden provided a connection for the students to their school. It was a great way for children to learn about where their food comes from and to get them excited about eating fresh vegetables.

Don't forget to bring a Towel

Swachhagraha Dal members of Govt Higher Secondary School Cotton hill, Trivandrum conducted awareness classes in the school as part of the swachhagraha program. The benefits of keeping cloth towel under their lunch boxes to keep the place neat and clean was the idea behind the exercise. This is also part of personal hygiene and how to remain clean away from deadly diseases.

Safai Ke Sitare Campaign-A small hands for a big change

The campaign is conceptualized to appreciate and acknowledge the endless efforts and labor of the cleaning personnel in the Govt Higher Secondary School Vattiyoorkavu School. It aims to highlight the prominence of their contribution in keeping our surroundings clean. It also highlights the plight of a person who cleans, where they are forced to clear-out time and again if littering and dirtying is rampant in the school

campus, home and in public spaces.It lays emphasis on sensitizing students towards the task of cleaners so that the students become more empathetic .This helps to bring a positive behavioral change in the students towards littering and they also learn to respect the cleaners.

Activity: The students are suggested to talk to the cleaning personnel in the school, home and society and know about them in detail. Once the students learn about the issues they face, will get sensitized and try to develop anti littering habits. This can reduce the burden on the Safaikaramcharis/ cleaners and provide some respite to them.

In this contest 37 schools participated from that shortlisted 5 best entries and are to be recognized with awards.

2.7 SUPOSHAN PROGRAMME (Sustaining Health and Nutrition)

SuPoshan is a community intervention programme executed under the CSR of Adani Foundation to curb Malnutrition and Anaemia among Children, Adolescent Girls and Women. Adani Foundation, Vizhinjam has been conducting this programme since October 2016. The project is executed intensively in all the five wards with specific objectives to reduce the occurrence of malnutrition amongst children by 95 % in three years, reduce malnutrition and anaemia amongst adolescent girls and pregnant & lactating women by 70%, create awareness about the issue of malnutrition and anaemia and related factors amongst all stakeholders, create a pool of resources to be utilised for combating the issue of Malnutrition and Anaemia and to support efforts in reducing IMR and MMR. During the reporting period, SuPoshan programme has reached to the community at-large as detailed below.

a. Community reach-out

Monthly breakup of Community Engagement programmes

Sl. No	Programme	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	March 2019	Total
1	House hold visits	926	938	507	1036	1011	895	5313
2	Family based counselling	134	164	41	10	30	0	379
3	Anganwadi visits	40	80	27	42	37	54	280
4	FGDs	40	31	33	44	49	45	242
5	Village Level Events	11	7	7	9	6	14	54
6	Anthropometric Measurements	590	810	416	390	460	200	2866
7	HB screenings	403	261	142	243	155	66	1270
	Total	2144	2291	1173	1774	1748	1274	10404

As depicted in the table, the total community reach out during the period of last 6 months is 10404 out of the total reach out 25042 since October 2016

b. Monthly breakup of Qualitative Change (Outcome)

Sl.No	Programme	Oct	No	Dec	Jan	Feb	March 2019	Total
1	Conversion from SAM to MAM[1]	0	0	0	10	12	0	22
2	Conversion from MAM to Healthy	0	0	0		10	0	10
3	Anaemia cases from Severe to Moderate	0	0	0	36	15	0	51
4	Anaemia – from Moderate to Mild	0	0	0		15	0	15

5	Anaemia – from Mild to No Anaemia	0	0	0		10	1	11
	Total	**0**	**0**	**0**	**46**	**62**	**1**	**109**

As indicated in the table, the total number of children having malnutrition and mothers having Anaemia, convereted from Severe to Moderate and then to healthy are 109. Whereas the total number of qualitative changes observed since October 2016 is 205.

c. Monthly breakup of awareness through FGDs and Village Level Meetings

Sl. No	Awareness Programme	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	**March 2019**	Total
1	**FGD for Adolescent girls**							
1.1	No. of Programmes	15	13	14	19	17	**24**	102
1.2	No. of Participants	162	91	119	228	78	**192**	870

2	**FGD for Mothers**							
2.1	No. of Programmes	25	18	19	25	32	**21**	140
2.2	No. of Participants	263	182	232	325	154	**252**	1408
3	**Village Level Meeting**							
3.1	No. of Programmes	11	7	7	9	6	**14**	54
3.2	No. of Participants	412	330	129	158	105	**210**	1344
	Total No. of Programmes	51	38	40	53	55	59	296
	Total No. of Participants							3918

During the last 6 months SuPoshan activities reached to 3918 families in the five wards of CSR intervention with focus on creating awareness on malnutrition and anaemia.

- There were 296 community awareness / training programmes conducted during the 6 months period. A total of 3918 community people participated in the programme. Following are the main topics covered for outreach.

a. Human growth during Adolescence: - Physiological, Mental and Emotional Changes.
b. Body Mapping
c. Different types of physical and mental changes during adolescent.
d. Scio-cultural Ethos: Changing perceptions about relationship with parents, peer group and opposite sex

e. Life Skills: Self Awareness, Communicating Assertively, Healthy Interpersonal Relationships
f. Importance of nutrition during pregnancy
g. Importance of anti-natal care & relevant Govt. services
h. What is nutrition and how to get it
i. International women's day






3. SUSTAINABLE LIVELIHOOD DEVELOPMENT

The important programmes undertook under Sustainable Livelihood Development during the period are

i. Livelihood Development Programme and
ii. Skill Development Programme.
iii. Digital Lteracy
iv. International Women's Day Celebration

3.1 LIVELIHOOD DEVELOPMENT PROGRAMME (SDG No.1 : No Poverty)

Livelihood development is one of the clearly demystified on-going projects under CSR, as it gives a source of livelihood and makes the people self-reliant. 1230 women from the communities of Vizhinjam are trained soafr on four basic entrepreneurial modules of business management covering Self-management, Cash Management, Debt Management and Leadership. Seventeen innovative livelihood projects with groups of 5-10 women formed in the intervention in the areas of High-tech Cleaning, High-tech poultry, Tasty foods, Eco-shop unit, Data Plus unit, Big shopper unit, Laundry unit, Event management etc. The efforts paved the way for making the poor community people self-reliant. The funding pattern followed as 10% beneficiary contribution, 40% bank loan, 25% subsidy from VISL and 25% subsidy from AVPPL.

The last two years of intervention in Livelihood development has changed the life of many especially the women from lower economic strata. During the reporting period, the programme has undergone following methodological process to streamline the interveniton.

Step-1: Awareness Generation and Registration for Livelihood Training.

Step-2: Basic Management Training and formation of groups.

Step-3: Preparation of bankable project proposals.

Step-4: Mobilizing Resources & linking groups to financial institutions for the project finance on the following ratio

i. Beneficiary contribution : 10% of project cost

ii. Bank loan : 40% of project cost

iii. Subsidy from Adani Foundation : 25% of project cost

iv. Subsidy from Govt through VISL : 25% of project cost

Step-5: Product Training

Step-6: Extend hand-hold support / Follow-up support

Status on Livelihood groups as on March 2019.

Sl No	Name of Group	Type of Business	Status till January	Status
1	Clean 4 U	Hi Tech Cleaning for Houses, Flats, Hospitals, Offices, water tank, Vehicle	• Cleaning of CSR Office Mukkola • Cleaned 20 houses and cleaned yogiraj Hospital • Cleaned 30 Wheelers	• Monthly Cleaning of CSR Office Mukkola • Cleaned Yogiraj Hospital • Cleaned 2 Wheelers and car • The Group ahs average turnover of Rs.50,000 per month
2	Anaswara Poultry Unit	Hitech poultry cages of two with a capacity of 45 chicken for each cage with waste collection system	• Getting 60-70 eggs per day for each group member a consolidated of 420-500 eggs for the group • Each member gets a revenue of 8000-10,000 per month	• Getting 60 eggs per day for each group member a consolidated of 420 eggs for the group • Each member gets a revenue of 8000 per month
3	Thripti Polutry Unit	Hitech poultry cages of two with a capacity of 45 chicken for each cage with waste	• Getting 45-60 eggs per day for each group member a consolidated of 315 -280eggs for the group • Each member gets a revenue of	• Getting 45 eggs per day for each group member a consolidated of 315 eggs for the group • Each member gets a revenue of 5,300 per month

		collection	5,300-7000 per month	
4	Harbour Canteen Unit	Canteen unit specially for traditional seafood's	• Daily turnover of Rs.8,000 to Rs.12,500 and gets a profit of Rs.7,00-2,000 • Beautification process on going	• Daily turnover of Rs.8,000 to Rs.8,500 and gets a profit of Rs.700 due to off season • Beautification process on going
5	Sreebhadra Big Shopper Unit	Big shopper Unit	• Provided an average of 1,500-2500 cloth bag to local shops • The group has made a turnover of Rs.15,000-25,000	• Provided an average of 1,500 cloth bag to local shops • The group has made a turnover of Rs.15,000
6	Vizhinjam Karshika Karmasena	Running of Eco shop, preparation of growbags & Agri. works	• Started selling organic vegetables from the farmers and sell it to the community • The group get a daily turnover of Rs.2,500-3,000	• Started selling organic vegetables from the farmers and sell it to the community • The group get a daily turnover of Rs.2,500-3,000
7	Prime Events	Event Management & Marketing Team	• Proposal finalized, Shop Identified • Vendor registered • Subsidy of VISL under process	• Proposal finalized, Shop Identified • Vendor registered • Subsidy of VISL under process
8	Happy Days Napkin distribution Unit	Sanitary Napkins distribution in tie up with HLL	• Pan Card received • Proposal under progress	• Pan Card received • Proposal under progress
9	Data Plus	Data entry related works, Photostat, project works, designing	• Shop commenced on 17.10.2018 • The group get a monthly turnover of Rs.15,000	• Shop commenced on 17.10.2018 • The group get a monthly turnover of Rs.18,000

10	Thattukkada Unit	Shop for preparation & Selling of steam based snacks	• The Shop runs from morning 4:30 AM to 9:30 AM • Providing fast food for the localities • The shop earns a turnover of Rs.2000/day	• The Shop runs from morning 4:30 AM to 9:30 AM • Providing fast food for the localities • The shop earns a turnover of Rs.2500/day
11	Health Pro	Home based medical test and providing low cost specs	• Proposal ready • Group formed	• Proposal ready • Group formed
12	Ooruvilakam Karshaka sangham	Vegetable cultivation	• Proposal under process • Group formed	• Proposal under process • Group formed
13	Jojo Bakery & Stitching Centre	Tailoring and Snack bar	• Group Formed • Proposal under process	• Group Formed • Proposal under process

Vizhinjam market outlet – Livelihood Handhold support

A market outlet under the CSR of Adani Foundation is planned for the Livelihood Development groups at Vizhinjam. The work for setting of the mart in a building of 2000 squarefeet has been started on 15 March 2019. The work is progressing. This center has facility to provide space for 14 livelihood units. The rent of the building and the operational expense of the building shall be managed by the group themselves, wherein the necessary training, infra faiclites and other handhold support are provided under the CSR. The units planned in the mart included café canteen, eco-shop, agri-clinic, laundry, marinated fish unit, organic spcie powdering shop, vergin coconut oil, healthy sancks unit, fancy stores, kitchen store, spot stiching unit, health test unit and a juice stall.

3.2 SKILL DEVELOPMENT – STATUS

Adani Foundation started Skill Development programmes since November 2017 through Adani Skill Development Center (ASDC). Till date, ASDC has trained 554 numbers of youth from Vizhinjam on employability skill courses with NSDC/SSC certificates in the trades of General Duty Assistant (Nursing Asst.), Asst. Beauty Therapist, Asst. Plumber, Fitness Trainers, Mobile Technician, AC Mechanic, Data Entry operator, organic grower, Automobile service technician, consignment booking assistant, and Finance and Accounting – Tally. Adani Foundation spent an amount of Rs.14,000/- to Rs.20,000/- per student for training though NSDC partners as per NSDC guideline with a mandate of 70% placement. All the trained candidates are offered placements in minimum three industries having salary range from 8,000 to 15,000. Many of these stundets Credence Hospital, Asha Home Care, Airport, S J Hospital, Aster Medicity, Andra Bank, A J Hospital, Aster Medicity, Sititics Logistics, 3Line Décor, Sititics Logistics.

Activities done till March

Sl No	Name of Course	No of Student	Month of starting	End Date	Exam Date	Activities
1	General Duty Assistant	30	03.10.2018	22.12.18	16-3-19	Batches started after mobilization, orientation and those enrolled had undergone entry gate assessment, periodic internal assessments are done to all batches and conducted PTA meetings for all batches to give a better idea to parents and students to about the placement plan and career opportunities in the concerned sector.
2	Consignment Booking Assistant	25	03.10.2018	22.12.18		
3	Fitness Trainer	25	22.11.2018	01.01.19		
4	Automotive ServiceTechnician 2 & 3-wheeler	27	22.11.2018	23.01.19		
5	General Duty Assistant(Batch 2)	30	03.12.2018	10.02.19	17.3.19	
6	Trainee Associate Retail	30	03.12.2018	31.01.19	30.3.19	
7	Trainee Associate Retail	25	15.01.2019	On Going		

Trainee Associate Retail

The Skill Development Course on Trainee Associate Retail for women group of the Livelihood Trade mart is continuing at Adani Skill Development Centre, Adani Foundation CSR Office, Mukkola. The Batch started with 25 students. The course is intended for a period of 60 days under level-3 of NSQF (National Skill Qualification Frame Work) under NSDC. The completed students would get ASDC certification. As part of the training the team went for an exposure visit and OJT to Santhigiri Ashram market on 21.03.2019, one of the successful example for Retail livelihood.





General Duty Assistant

The assessment for Skill Development Course for the first and second batch of General Duty Assistant for the youth of was conducted on 16th and 17th of

march at HLL management academy, wherein 42 out of 60 students attended the final assessment, the result is expected to come during the month of April. wherein 29 out of 60 students has placed in Asha Homecare, Aster Medicity and further going on.





Retail Trainee Associate

The assessment for Skill Development Course for the batch of Retail Trainee Associate for the youth of was conducted on 30th of march at ASDC centre, wherein 18 out of 30 students attended the final assessment, the result is

expected to come during the month of April. currently the batch is undergoing placemnet process,and 13 students where offered in various organisations.




Automotive Service Technician (Two & Three Wheeler)

The Skill Development Course on Automotive Service Technician (Two & Three Wheeler) for the youth has completed and waiting for the assessment. The Batch started with 27 students wherein the exam is expected to conduct during the mid of April 2019. However, 14 out of 27 students got placed in different shops.

Consignment Booking Assistant

The batch of Consignment Booking Assistant is continuing at Jawahar Smaraka Grandhashala, KidaraKuzhy,Mulloor. The batch consists of 25 students, wherein the course curriculam has already ended and waiting for exam. Currently the batch is undergoing placement process in which 15 out of 25 students has placed in Sitics Logistics, Qatar Airways, Safe express and further going on.

Fitness Trainer

The Skill Development Course on Fitness Trainer for the youth has

completed and waiting for assessment. The course is conducted at Ash 2 Fitness centre, Kanjiramkulam. The Batch started with 25 students, the assessment is expected in April 2019. In that group, 10 out of 25 students got placed in various fitness training centres.

Digital Literacy Programme

One of Successful Skill training happened at vizhinjam is the Digital literacy Programme, which has got a wide reach and good platforms to cover 1200 community people in 44 batches during the last 6 months time. The programme has been executed through community structures and Voluntary Development Organizations like TSSS, NSS, SNDP, Local NGO's and residence association. The significant achievement is Digital literacy helped to reach to the community deeply and more than 90% of the beneficiaries are women from the community itself. Out of 1200 trained on Digital Literacy 575 started using Digi Locker for linking aadhar and more than 700 people, especially house wives started using e-payment platform for paying electricity bill and water bills.

Vizhinjam being a coastal belt, where peope are engaged largely in fishing and associated works, they have limited access to digital world. However, in their day to day buniness and related activities they lack the accessibility towards digital platforms. ASDC under Saksham targeted this community woman to bring a new change in them by introducing the various digital platforms to the community people by conducting the Digital Literacy programmes. In order to execute the programme, a team of 25 youth have been selected from the nearby 5 wards of Vizhinjam. The programme provided a platform to make a clear transformation in availing many digital services to the common people. After successful completion of each batch, the resource persons had collected the feedback form to understand the knowledge they gained from the programme and

changes that the trainees acquired during this programme in their daily life.

Batch wise details of Digital Literacy

Sl No	Location	Supporting Organization	Number of Participants
Batches commenced Sincer October 2018			
1	SNDP,Kovalam	SNDP	30
2	Sneha Counselling centre	TSS	15
3	Snehaswatanam residence association	Snehaswatanam residence association	15
4	Snehaswatanam residence association	Snehaswatanam residence association	15
5	Muduparuvila Area	Localities	13
6	Punchakkari	Localities	16
7	Mulloor	NSS	23
8	Thulavila	TSS	13
9	Osavila	TSS	24
10	Punnakulam	Localities	26
11	SNDP,Kovalam	SNDP	11
12	NSS, Venganoor	NSS	19
13	Muttakaud	Localities	28
14	Punnakulam	Localities	31
15	SNDP,Vellar	SNDP	54
16	Cheenavila	Literacy Mission	29
17	Perumkattuvila	Localities	20
18	Karumkulam	Literacy Mission	18
19	NSS, Chavadinada	NSS	14
20	NSS,maruthurkonam	NSS	46
21	Azhakulam	Localities	41
22	Nedumom	Localities	25
23	Adimalathura	Localities	43
24	SNDP Mulloor	SNDP	28
25	Piravilakom	Localites	24
26	Puliyoorkonam	Localites	27
27	Maruthoorkonam	Localites	36

28	Kanjiramvila	Localites	20
29	Kadaikulam	Localites	30
30	Aazhimala	Localites	25
31	Kidarakuzhi	Localites	24
32	Mukkuvamkuzhi	Localites	24
33	Muttakaud	NSS	20
34	Panangode	NSS	24
35	Ambedkar	Literacy Mission	48
36	K S Road	Library	33
37	Kadavinmoola	Localites	28
38	Veniyoor	Localites	41
39	Thozhichal	NSS	32
40	Vazhamuttom	SNDP	30
41	Panathura	SNDP	30
42	Manacaud	Localites	30
Batches Started during the month of March			
43	Harbour	Localites	20
44	karayadivila	Localites	11
45	Kottappuram	Localites	25
Total			**1200**

Features of Digital literacy

- The programme was executed within the community by taking concurrence from the community people to identify and finalizing the venue, which was instrumental to their whole hearted participation.
- The programme executed in 50-70 hours depending on the cognitive level of trainees.
- Out of the total programme 17% of students are in an age category of 50 and above, in which they showed a high level of interest to attend the programme and they learnt this course to make their life easy by using the digital platforms in their day to day life, especially in bank transaction and bill payments.

- Out of total programme 54% are in an age group of 28-48, who are mothers group. They had shown their willingness towards this programme, as they want to know how their children are using their social media platforms and how best that positively used in the career development of their children.
- **Payment of Electricity bill and water bill:** Before this programme, the whole community people used to go to electricity board for payment of electricity bill and Corporation zonal office/water authority office/Akshaya centres for payment of water bill. After completion of courses, the community women started paying these bills through online in respective payment gateways through their mobiles. And also based on the training the community people started using various e-payment platforms such as mobile recharge, DTH recharge etc.
- **Online Banking:** The community people learned how to access online banking and how to create an online banking Id and also they learned to add and delete a payee and to do fund transfer via online banking

Social Media: The mothers told that this course helped them to identify how positively their children can use social media with effective control measures for their better prospects. They had opinioned that this helped them to understand the security measures that have to look into while using the social media applications. This also helped the trainees to understand about the social medias such as Facebook, WhatsApp, Twitter and how to create G-mail ID, Twitter ID, Facebook ID. Futher classes about cyber security helped to know the pros and cons prevailing in the society

Digilocker: After the recent flood happened in kerala, the people are more conscious to protect their personal files and certificates from damaging. The training on Digilocker helped majority of trainees especially housewives to install Digilocker application and linked it with Aadhar. They even linked it with Pan card, Driving license and uploading their educational certificates in Digilocker.

Mobile Banking: The community people learned on how to get their respective mobile banking application for doing mobile banking 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 has installed Bhim Application supported by Govt. of India

E-Shopping: The community people started purchasing their required products through online with reduced prices than its market rate. They changed the conventional model of going to 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 service and schemes through online. The trainine helped them, especially housewives, to know about the various schemes and services offered by the Govt and to get a direct connect to the schemes.

The Digital literacy programme has also encouraged three of the trainers namely Mrs. Brijit F, Mrs. Santha Kainson and Mrs. Divya S to start a livelihood unit namely "**Data Plus**" by inculcating the opportunities in the digital world and started

serving the community to support with various e-payment services, utility services, passport e-sewa facilities etc.

3.4 International Women's Day Celebrations #BalanceforBetter

The International Women's Day-2019 under the theme #Balance for Better, was celebrated at Vizhinjam in Kerala by Adani Foundation along with SuPoshan team, Livelihood group members, Digital Literacy members, Saksham team, Swachhagraha teams and the Mobile Health Care Unit with a participation of 508 people.

List of events organized as part of IWAD

Sl No	Project and Venue	No. of participants	Activities in brief
1.	**Organized By: SuPoshan** **At** Adani Livelihood Centre, Mukkola Vizhinjam	75	• Women's day message • Nutritious food Competition. • Exhibition of nutritious food • Prize distribution & • Cultural programme of SuPoshan Sanginies, Adolescent girls.

Evaluation of Nutritious food competition by Health Inspectors of Trivandrum Corporation

Sl No	Project and Venue	No of participants	Programme	Session based photos

2.	**ASDC** Adani Livelihood Centre, Mukkola Vizhinjam	30	• Women's day theme presented • Cultural programmes of Livelihood Group members & Retail Trainee Associates	
3	**Digital Literacy Venues** Udaya Rani, Kidarakuzhi,	35	Organized at four locations with • Women's Day theme presentation • Cultural programme • Debate on the theme "balance for better"	
4.	Muriyathottom NSS Hall	40		
5.	Muttaikkad NSS Hall	38		
6.	NSS Hall Thozhichal	45		
7	**Swachhagraha** St. Paul's CSI WF, HSS, Uchhakkada	150	• Women's day theme presented. • Debate, Skit & speech by students on the theme • Pledge and cultural programs of students teachers and parents	
8	Vivekananda Vidhapeedom Pachhallor, Trivandrum	60		
9	**MHCU** Pattani Colony, Harbour Ward Vizhinajm	35	• Women's day message for community people	
	Total	**508**		

Events in Detail

1. SuPoshan

The international women's day celebrations under the theme "balance for better" by SuPoshan started at 10 am on 8th March 2019 at Adani

Livelihood Centre, Mukkola, Vizhinjam. The following programmes were organized as part of the celebrations

a) Nutritious Recipe & Food Preparation Competition

A nutritious recipe and food preparation competition was organized as part of IWD celebrations for the mothers of SAM, MAM children and Sanginies. The competition was participated by 20 contestants and prepared 69 different varieties of nutritious foods with the locally available vegetables and other resources. A team of 4 Food Inspectors viz Mrs. Raji VS, Mr. Shinu S. Das, Mr. U. Raheem Khan and Mr. Rajesh from the health wing of Trivandrum Municipal Corporation judged the recipes.

Winners of competition are

- Mrs. Shari, Harbour ward and Mrs. Mini Mol, Pulloorkonam, Vizhinjam got first and second prize respectively for the category of mothers of SAM, MAM children.
- Mrs. Sreekala from Venganoor ward and Mrs. Jasmine Rose from Harbour ward got first and second prize respectively for the category of SuPoshan Sanginis'.

b). Exhibition

Followed by the competition, an exhibition was arranged with all 69 varieties of food along with recipe. Sanginies and adolescent health club members briefed the participants on how to prepare each food items. Almost 75 people benefited the exhibition, tasted the food and learned the recipes. SuPoshan team, Kerala has prepared a recipe book with details of 100 nutritious foods that can be prepared using locally available vegetables and other resources.

c). Inauguration and prize distribution

After the exhibition, a gathering was organized, wherein the unit CSR head delivered a message based on the IWD theme 'balance for better' along with Adani group theme of 'growth with goodness'. He explained the historical journey to reach 'balance for better' and the importance of International Women's Day celebrations.

Mr. Shinu S. Das, Health Inspector, Mrs. Raji VS, Health Inspector, Mr. U. Raheem Khan, Health Inspector and Mr. Rajesh, Assistant Health inspector, Smt. Suraja, Convener, Adani Livelihood groups, Smt. Jasmine, Sangini representative, Mr. Sebastian Britto, Project Officer, Mr. George Zen, consultant, Ms. Maya Mohan, SuPoshan have delivered women's day messages. Prizes were distributed to the winners of nutritious food recipe competitions.

d). Cultural programmes

A cultural extravaganza was organized by the Sanginies, Adolescent club members, and Livelihood group members. The programme concluded by 12.30 pm with a vote of thanks by Ms. Maya Mohan, SuPoshan, Kerala.

Adani Skill Development Centre

Adani Skill Development Centre, Vizhinjam, Kerala organized a series of events as part of the international women's day at five locations. The following are the details of the programme.

a) Adani Livelihood Centre, Mukkola, Vizhinjam

An event was organized for the students of Retail Trainee Associate skill course at Adani Livelihood Centre, Mukkola, Vizhinjam. The programme started at 2.00 pm, wherein Mr. Sebastian Britto, Project Officer conveyed the Women's Day message. Others participated are Mr. George Zen, Mr. Jithin Kumar, Mr. Stephen Vinod, Mrs. Gayathri, Mrs. Suraja. After the deliberations, a two hour long cultural event with Folksongs and dances were performed by the RTA Students. .

b) Community level gatherings

As part of the international women's day celebrations, Adani Skill Development Centre organized 4 community level gatherings at the following sites for Digital Literacy Course participants.

- Residence of Smt. Udaya Rani, Kidarakuzhi, Mulloor, Vizhinjam
- SNDP Hall, Muriyathottom, Kottukal Panchayat
- NSS Hall, Muttaikkad, Venganoor Gram Panchayat
- NSS Hall, Thozhichal, Venganoor Gram Panchayat

All the events were inaugurated by the eldest women in the gathering. Women's day messages have also been delivered by the elected representatives of the respective localities. Mr. Jithin Kumar, Coordinator, Skills, Mr. George Zen, Consultant and key community people were felicitated on that occasion. Cultural programmes were performed by the digital literacy students after the formal gathering.

2. Swachhagraha

Swachhagraha, Vizhinjam organized two events as part of the international women's day celebrations. The details of the programme are as follows

a) St. Paul's CSI WF, HSS, Uchhakkada, Vizhinjam

The programme was well arranged by the Swachhagraha club members in the school. It was inaugurated by the principal Dr. K.G Mohanan participated by Mrs. Maya, Prerek Teacher, Mr. Kumar Das, Vidhyalaya committee member. Swachhagraha Coordinator Mrs. Maya G. delivered the IWD message. A debate on the topic 'gender status of women in society' was conducted among the students. It was a thought provoking session for all students and teachers. Folk songs related to women empowerment have also been presented by the students.

b) Vivekananda Vidhapeedom , Pachhallor, Trivandrum

The second programme was at Vivekananda Vidhaypeedom, Pachhalloor. The programme was arranged by the Swachhagraha club members of the school. The programme was inaugurated by the principal Mrs. Shuba and participated by Prerek Teachers Mrs. Sreeja, Mrs. Athira and other teachers of the school Mrs. Nayana, Mrs. Aswathy, Mrs. Sreelatha. Mrs. Maya G, Swachhagraha Coordinator conveyed the IWD messages. Followed by that, Dal members presented a beautiful skit based on women's day theme which was appreciated by all

teachers and parents. Thereafter 3 students made speeches on the theme "balance for better."

Mobile Health Care Unit

The mobile health care unit, Vizhinjam organized a women's day programme on the theme at Pattani Colony, Harbour Ward, Vizhinajm. Dr.Aneesh inaugurated the programme. Mr. Rajan John coordinator, Mrs. Sayana, Pharmacist and Mr. Stephen Vinod, Community Mobiliser, Adani Foundation conveyed the IWD messages.

Output

- 508 community people were made aware on the theme of IWD "balance for better"
- 9 different events with community people are organized as part of IWD

Outcome

- Importance of women's day and the journey to achieve it, has been able to make a feel of proud among the community people especially the women.
- A feel of togetherness created among all group members
- Supported to strengthen the existing community networks with more visibility and presence of Adani Foundation for a good cause.

4 COMMUNITHY INFRASTRUCTURE DEVELOPMENT

Urban Infrastructure Development is another important visible activity undertook under the CSR of Adani Foundation. Underpinned by SDG No. 9 to build resilient infrastructure, 5 infrastructure projects are completed during the last 6 months time

1. Two storied building to Government UP School, Panavila, Mulloor

Sl No	Item	
1.	Name of the school	GOVERNMENT – UP SCHOOL MULLOOR, PANAVILA.
2.	Category	Upper Primary School
3.	Numebr of students	184 students
4.	Number of class rooms	
5.	Request	• The school is not having good building and other facilities for the children. • This is the only Government school with UP Classes, whereas other schools are only up to LP. • The school is located at a dstance of one kilometer from the Port.
6.	Rationale	The old building is asbestos sheeted, certified not fit for studying. There is no Governement schools have
7.	Support provided from Adani Foundation	Adnai Foundation has constructed new two storied building with ten class rooms

This is one of the oldest schools established at Mulloor ward in the year 1888. It is the only Upper Primary School within five wards of CSR of

intervention. The work has been undertaken based on the request from the Harbour Department of Government of Kerala, SMC of Mulloor School, Ward Councillor, School Authories and Education department to provide a building support under the CSR. The building is ready for functioning for the coming academic year.

2. Completed upgradation of public bathing facility at Karimpallikkara.

Karimpallikkara is a fishermen colony in the ward of Kottappuram close to Adani Vizhinjam Port Pvt. Ltd. There exist an open natural pond at Karimpallikkara, which both men and women use for

Public bathing before

washing and bathing. There are more than 150 houses near this pond, using it on a day to day basis. To save the pond Adani Foundation under its CSR renovated it with separate bath rooms for men and women and washing facilities. The work has been completed and handed over to the people on 22.11.2018 by Adv.Rakhi Ravi, Dy Mayor of Trivandrum Corporation.

3. Developed a Playground at Kottappuram.

Playing Football, Crickect or Volley ball is a routine entertainment of youth and kids of Coastal Community especially the fishing community. Considering the need for having a good Play ground, Adani Foundation under CSR developed the ground at Kottappuram St Mary's Higher Secondary School

having length of about 150 mtrs and breath of 110 mtrs. The work included Football ground, Basket Ball ground, and space for Athletic items.

4. New Hospital building for CHC-Vizhinjam

Upgradation of CHC with one floor and equipment's in the new building at Vizhinjam, using a CSR component of 297 lakhs. Vizhinjam is one of the

high risk areas in Thiruvananthapuram district with large number of communicable diseases reported in the last few years. Improving the existing health facilities is one of the immediate requirements of Vizhinjam. Towards that Government of Kerala has planned to upgrade the Community Health Centre – Vizhinjam and based the request a concept plan has been prepared by Adani Foundation under the guidance of Dr.Pankaj Doshi, Head, Adani Health Care Services. The new building plan for CHC consist of basement, ground floor, first floor and second floor, wherein the understanding was that the cost for the construction of second floor would meet from the CSR of AVPPL-AF. As per the revised plan the 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 1.18 crore to HED as the first instalment for the construction activities.

5. Toilet and urinals for students and teachers at Ayyankali School.

The work at Ayyankali school is to construct separate urinals with toilet for boys and girls and renovate the toilet of teachers. Among that, the work for constructing urinals and toilets for boys and girls have been completed. However, the work for renovating existing toilet for teachers has been changed and as per the request decided to construct new toilet for teachers.

NEW CONSTRUCTION PROJECTS UNDER PREPARATION

Sl No	Project	
1	Drainage facilities at Kottappuram, Vizhinjam and Mulloor. (This is the work requested by the District Collector) • Renovation of small drains from Kottappuram to Port. • Drainage facility from Vayalinkara to Port. • Renovation and Repair work of Gangayar river	
2	Community City Centre with Solar Lights & small parks (5 nos. of Community Parks are proposed for public seating at various locations in & nearby villages.) 1. Harbour Road, Valiyaparambu, Vizhinjam 2. Veganoor ward (Nr. Nehru samarak grandhasala) 3. Mukkola Junction Vizhinjam, Bus Stop. 4. Vizhinjam, Harbour (Fisherman) 5. Vizhinjam Junction, Nr. Zonal office	
3	Mudippura Nada LP School, Venganoor	Follwing are works to be done inside the school i. Stage Platform ii. Washing Facility
4	HALP School, Harbour Road, Vizhinjam.	**Follwing are works to be done inside & outside** 1. Side roofing to prect from rain water 2. A toilet block is proposed for boys (urinals) & staff with hand wash facility. 3 Water supply to be taken from old existing old builiding. (tapping point around 50 mtrs) 4 New pump is to be considered for water supply.
5	LPS School, Kidarakuzhi	Follwing are works to be done outside the school:- • Toilet block for boys & staff is to be made out from existing unused kitchen block. • To 8 urinals for boys, Soak pit & septic tank at right side of the existing block.
6	Model Anaganwadi, Vizhinjam (Nr. Police Station)	• 1500 Sqft Montessori model Aganwadi at Govt. Vizhinjam LP School compound. Following are the facilities requried in model anganwadi (Bala model)
7	Palliative Care Center	• Approx 7500 Sqft building for Palliative Care Center
8	Electrification and Water Connection to all anganwadi's.	Water and Electricity Connection to 30 Anganwadis: 1. Provide lighting facility & fan 2. Water connection with drinking tap, sanitation tap and wash-tap

9	Oldage Home (Ambranchi villa, Andoorkonam, Vizhinjam)	• Kitchen platforms, Toilet /wash rooms (2 nos,) refurbishment of existing building, Cloth Washing facility & bathrooms separetly (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:-

5. OTHERS

5.1 Local Employment

Considering the request from the nearby communities to provide job opportunities during port construction, a total of 213 Keralite including 110 localities have been provided jobs in different construction activities at Port. This has been initiated on a regular basis through HOWE and the contractors of Port. Towards that meeting of contractors is specifically called and monitored on every 15 days. They engaged localites in different sections like construction, helpers, security, office assistant and even in supervisory cadres.

5.2 Employee Volunteering Porgramme (EVP)

"Employee Volunteering Programme" is a programme desgined by Adani Foundaton to provide better voluntary service of Employees for the community at large.

Annexure III

Compliance of Conditions of KCZMA Recommendation for EC/CRZ Clearance

Annexure III

Half yearly compliance report of conditions stipulated in KCZMA recommendation for Environment and CRZ Clearance		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
(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.	**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 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	**Complied** All safety measures are being

Half yearly compliance report of conditions stipulated in KCZMA recommendation for Environment and CRZ Clearance		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
	facilities, dredging of the lake and kayals proper environmental safety measures must be ensured.	adopted. Full time Environment & Safety professionals are employed by AVPPL, contractors & subcontractors to oversee the implementation of environmental safety measures. Third party IMS audit is being carried out by principal contractor and the report is shared with AVPPL. All work plans are executed after assessing the defined HSE plans. It is also submitted that dredging of lakes or kayals are not envisaged as part of this project.
(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.	**Complied** 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.
(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.	**Not Applicable** There is no mangrove in the vicinity of the project area.
(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.	**Being Complied** 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

Half yearly compliance report of conditions stipulated in KCZMA recommendation for Environment and CRZ Clearance		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
		waste management facility is planned which will be constructed along with project. • 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.
(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.	**Being Complied** KCZMA officials inspected the project location during their site visit on 12.02.2019 along with NGT appointed committee and reviewed the compliance condition of Environmental & CRZ Clearance on 12.02.2019 and 13.02.2019. All necessary facilities/support was 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. Additionally we are also meeting Member Secretary & officials of KCZMA from time to time for suggestion and to apprise them of various project related work/ component. Copy of half yearly Environmental & CRZ Clearance compliance report is being sent to KCZMA regularly. The same will be continued in future.
(vii)	The KCZMA may be duly informed of any construction/developmental works/major activities undertaken in the CRZ area of the project	**Complied** • Member Secretary KCZMA is also the member secretary of NGT appointed committee; the

Half yearly compliance report of conditions stipulated in KCZMA recommendation for Environment and CRZ Clearance		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
		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. Following construction activities have taken place during the compliance period October 2018 to March 2019: • The dredged material till 31.03.2019 amounting to 2.90 Mm^3 has been utilized for reclamation of 36 Ha area. The dredged material has been used for reclamation only. • As per the directions of NGT, various quarterly and half yearly reports are being furnished to KCZMA including the details of the development works. • Trial run of rock placing for breakwater construction was initiated during the compliance period. • Work on Port Operation Building (POB), Substation, RMU yard and RMU Wharf, workshop building, toilet block, canteen, driver restroom in the back up areas are in progress. • Work on DG Building, gate complex, Port User Building (PUB) and Security Building in the backup areas have been initiated during the compliance period October 2018 to March 2019 and are ongoing.

Half yearly compliance report of conditions stipulated in KCZMA recommendation for Environment and CRZ Clearance		
S. No.	**Conditions**	**Compliance Status as on 31.03.2019**
		• Jetty construction work is in progress; piling work has been completed as on 31.03.2019.
(viii)	Environmental clearance must be obtained from the Ministry of Environment & Forests.	**Complied** 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).
(ix)	An adequate financial provision has to be made for environmental protection measures.	**Complied** A total of Rs. 40 Crore has been set aside for environmental protection measures as per the EIA report. Activity wise Fund Break up and expenditure during the compliance period October 2018 to March 2019 is attached as **Annexure VII**.
(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.	**Not Applicable** The condition is not applicable since the application for Environmental & CRZ clearance was submitted by Vizhinjam International Seaport Ltd. (VISL), a Government of Kerala undertaking.

Annexure IV

Compliance of the Response/Commitments made during Public Hearing

Annexure IV

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
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	**Being Complied** In consultation with the fishermen, enhanced livelihood compensation of Rs. 99.75 Cr was sanctioned by GoK, instead of Rs. 7.10 crores suggested earlier in the EIA stage. Out of this amount, Rs. 80.93 crores have been disbursed till 31.03.2019 for a total number of 2573 Livelihood Affected Persons (LAPs) whose verification was complete in all respects; this includes boat owners as well to whom kerosene is supplied free of cost during the port construction period. Verification of the documents of balance LAPs is in progress.
2	Land under the Jamaath which includes Karimppaly, Magham, Varuthari Pally, etc. need to be protected and should not be acquired.	**Complied** These lands have not been acquired.
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.	**Complied** 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 also.
4	Additional fish landing centre will be constructed	**Being Complied** The work for construction of the fish landing centre (Rs.16 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. At present fishing boats are docked in the proposed area and steps are being taken for removal of the boats to facilitate construction work. In the meantime, the EPC contactor for development of aforesaid activity has been finalized and work orders has been issued.
5	Existing harbour will be improved	**Being Complied**

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
	under the CSR provisions of the project	Tenders for modernization of the existing fishing harbour was invited by 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 regularly submitted to MoEF&CC as a part of the six monthly compliance report. Report for the period October 2018 to March 2019 is enclosed as **Annexure I** in CD. L&T Infrastructure Engineering Pvt. Ltd. (LnTIEL) had prepared the Mathematical Modelling Reports based on Shoreline Monitoring data; which were vetted by National Institute of Ocean Technology (NIOT). The 1st (for the period February 2015 to February 2017) and 2nd (March 2017 to February 2018) modelling reports had been submitted with the compliance report for the period April 2017 to September 2017 and April 2018 to September 2018 respectively. 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 practise Adani Vizhinjam Port Pvt. Ltd. (AVPPL) have submitted the shoreline data from March 2018 to February 2019 to LnTIEL for mathematical modelling to assess the impact on shoreline under the guidance of NIOT. The Mathematical modelling report for the period March 2018 to February 2019 once vetted by NIOT will

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
		be submitted along with the Compliance Report for the period April 2019 to September 2019.
8	Water supply provision to the Vizhinjam fishing village	**Complied** Water Supply Scheme has been commissioned in April 2013 by VISL by expending an amount of Rs. 7.30 crores. For O&M of the same an amount of Rs. 5.20 crores has been spent till 31.03.2019 by VISL. AVPPL had installed 20 water tanks in the water scarce areas in the project neighbourhood for water to be supplied on a daily basis on mobile water tankers.
9	Construction of the new fishing harbour will be simultaneously completed with the port project	**Being Complied** Refer Point No. 4
10	Railway work will be initiated after Environment Clearance (EC)	**Complied** The 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.
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, 213 are from Kerala and 110 out of them are from nearby wards from the project site.
12	Rehabilitation measures ensures employment opportunities for fishermen	**Being Complied** Refer point No. 1
13	Take all possible measures for judicial use of lighting system as part of the Green Port concept to reduce the carbon footprint	**Will be Complied** Will be considered with appropriate planning.

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
14	Appropriate action like providing compensation or alternate employment etc to fishermen will be implemented wherever applicable after the Environment Clearance	**Being Complied** Refer point No. 1
15	Compensation, Resettlement and Rehabilitation benefits to all the livelihood affected and displaced fisherman will be implemented after the Environment Clearance	**Being Complied** Refer point No. 1
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. For SWM of local community 26 Thumboormozhi Aero Bins were installed under CSR; of which 5 were erected during the compliance period. Three sanitation workers are engaged in each location by the Corporation to manage and monitor the Aero Bins. In addition to this through awareness classes people were educated on importance of segregation of solid waste.
17	Upgradation of PHC at Vizhinjam will be carried out	**Being Complied** Upgradation of Community Health Centre (CHC) – Vizhinjam with one floor and equipment's in the new building at Vizhinjam is being planned. The

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
		total project cost for is Rs. 7.79 crore out of which Rs. 2.97 crore will be contributed by Adani Foundation. The construction of building is entrusted with Harbour Engineering Department (entrusted to another contractor). Adani Foundation handed over the first instalment of Rs. 1.18 crore to HED as the first instalment for the construction activities. The new building plan for CHC consists of basement, ground floor, first floor and second floor; wherein the cost for the construction of second floor would be met from the CSR of AVPPL-Adani Foundation.
18	New fishing harbour with all the infrastructural facilities will be constructed with reserved rights to mooring/berthing the boats	**Being Complied** Refer point No. 9
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	**Being Complied** Based on G.O.(Rt) No.2021/2017/RD dated 27.04.2017 and modified by G.O.(Rt) No.17/2018/F&PD dated 09.06.2018, government ordered to pay compensation for land and not for the structures since they were in violation of CRZ notification. Action in this respect is being taken and an area of 72.79 Ares is acquired up to 31.03.2019.
20	Rail, Road, Coastal and Inland Waterways connectivity will be ensured to the rest of Kerala and other Indian Peninsula Ports	**Being Complied** This is one of the objectives of the project and this will be fully materialised once all phases of the project are implemented.
21	Waste Management, Water Treatment plants, etc. will be part of an operational EMP	**Noted for Compliance**
22	Shoreline monitoring on 15 km both sides on regular basis during construction and operation as	**Being Complied** Refer point No. 7

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
	suggested in EIA report will be carried out	
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.	**Being Complied** The dredged material till 31.03.2019 amounting to 2.90 Mm^3 has been utilized for reclamation of 36 Ha area. The dredged material has been used for reclamation only. 3 Continuous turbidity monitoring station are installed to measure turbidity on real time basis. Turbidity results are comparable with baseline.
24	Appropriate measures relating to maintenance of health, hygiene, safety and security will be implemented as per EIA report	**Being Complied** 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. 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.
25	VISL will ensure that livelihood issues of Mussel collectors are addressed as per the EIA report	**Being Complied** Till date 271 Mussel collectors have been compensated for Livelihood loss expending an amount of 12.65 crores. Although they were offered alternate livelihood plan through cage fishing they opted for one time settlement citing the

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
		risks involved in such fishing.
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** The construction activities related to port access road construction has been stopped by local villagers since 08.01.2018 from chainage 500 to 1700. 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. KSREC has submitted the final report. Status of construction stage EMP in matrix format is enclosed as **Annexure V**. CSR activities are detailed in **Annexure II**.
27	The implementation of the EMP/RAP/CSR will be ensured through the institutional and regulatory mechanism with regular monitoring and periodic compliance reports to the MoEF	**Being Complied** Refer point 24 above. Regular monitoring of Environment Parameters is being carried out. Half yearly compliance reports are submitted to all regulatory authorities concerned.
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.	**Being Complied** Being complied to 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 on 12 Ha land in Sainik School, Trivandrum.
29	The livelihood restoration measures for fishermen affected during construction phase as reported in the EIA has to be implemented	**Being Complied** Refer point No. 1 and point No. 25
30	Dredging materials will be used for reclaiming (filling) the sea and additional materials are not required	**Being Complied** The dredged material till 31.03.2019 amounting to 2.90 Mm^3 has been utilized for reclamation of 36 Ha area. The dredged material has been used for

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
		reclamation only.
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 580 eligible fishermen. Verification of the document of balance fishermen is in progress.
32	There will be no erosion on the shoreline on account of dredging the deep sea at (-) 18m to (-) 20m	**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 regularly submitted to MoEF&CC as a part of the six monthly compliance report. Report for the period October 2018 to March 2019 is enclosed as **Annexure I** in CD. L&T Infrastructure Engineering Pvt. Ltd. (LnTIEL) had prepared the Mathematical Modelling Reports based on Shoreline Monitoring data; which were vetted by National Institute of Ocean Technology (NIOT). The 1st (for the period February 2015 to February 2017) and 2nd (March 2017 to February 2018) modelling reports had been submitted with the compliance report for the period April 2017 to September 2017 and April 2018 to September 2018 respectively. These mathematical modelling reports have affirmed that the shoreline change is in line with what was predicted as part of

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
		the EIA study. In continuation with the same practise Adani Vizhinjam Port Pvt. Ltd. (AVPPL) have submitted the shoreline data from March 2018 to February 2019 to LnTIEL for mathematical modelling to assess the impact on shoreline under the guidance of NIOT. The Mathematical modelling report for the period March 2018 to February 2019 once vetted by NIOT will be submitted along with the Compliance Report for the period April 2019 to September 2019.
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, in consultation with Town Planning, Tourism, Industry and other line departments was reviewed by the expert committee constituted by Govt of Kerala. 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**
35	An additional fish landing centre has been suggested at Vizhinjam to decongest the existing harbour, and to cater to the needs of the fisherman in the 15 km vicinity including Pozhiyur & Poovar, considering the suitability of the site having natural bay, increased tranquillity and operational / infrastructural convenience than	**Being Complied** Refer point No. 1

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
	location like Pozhiyur–Poovar estuary	
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 three years to the fisherman (As per EIA Report)	**Being Complied** An amount of Rs. 27.18 Crores have been sanctioned by the GoK as inconvenience allowance in the form of kerosene in November 2017. Rs. 12.48 Crore has been given till 31.03.2019 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 6.11 Crores has been disbursed to 211 out of 211 number of resort workers and settled completely.
39	During the construction period of three years livelihood assistance to the shore seine fisherman in the 2km ship channel foot print beach has been suggested although they can move further southward and continue with their activity.	**Will be Complied** Refer point No. 31.
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 V** 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.
42	Rail connectivity is proposed along the outer side of the stream running parallel to the harbour road and that too on elevated structures	**Will be Complied** The Konkan Railway Corporation Limited (KRCL) has been engaged as a consultant for turnkey execution of the project. Out

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
	without affecting the entry to the fishing harbour	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.
43	The port project will not affect the inflow of Neyyar river and AVM canal	**Noted for Compliance** This is a fact, 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	**Will be Complied** Scope of providing connectivity for the local residents to the nearest Vizhinjam-Poovar road will be considered subject to surrendering of adequate land by the beneficiaries.
45	Where ever possible and based on eligibility, local people will be employed	**Will be Complied** Refer Point No. 11
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.
48	Livelihood Compensation considered for those who were affected at Adimalathura during construction phase and those affected in the project foot print area at Mulloor and Valiyakadappuram during construction/ operation phase	**Will be Complied** Refer point No. 1 Refer point No. 31
49	CSR activity suggested a skill development centre to equip the local people to adapt to the industrial needs of port/tourism	**Being Complied** Additional Skill Acquisition Program (ASAP), a Government of Kerala initiative, aimed at imparting skill courses to

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
	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	students to improve their employability, is planning to construct a community skill park in 1.5 Acre of land at a cost of Rs. 3.50 Crore for conducting training programs.
50	Loss of livelihood to the traditional fishermen who do shell fishing in the Mulloor beach area is a real issue/impact. All necessary provisions for livelihood assistance have been considered in the EIA Report.	**Being Complied** Refer point No. 25
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.	**Will be Complied** During operation phase.
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.	**Will be Complied** Revised port limits for (i) fishing harbour/minor port and (ii) Vizhinjam seaport will be notified. Restrictions on fishing will be as per the applicable laws.
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**
54	The maximum rate of accretion at southern side of the harbour will be 21.6 m/year in the 1st year and by	**Being Complied** Refer Point 32

Compliance of the Response/Commitments made during Public Hearing		
S. No.	**Responses/Commitments**	**Status as on 31.03.2019**
	the end of tenth year it reduces to 0.5 m/year. The shoreline evolution along the south side of the port will get stabilized in the initial years. On stabilization, the maximum net increase in the shoreline accretion would be around 27m immediately south of the port which reduces to negligible levels within 2.3km alongshore. There will not be any impact on the shoreline along Poovar-Pozhiyar sector which is about 7km away from the proposed port.	
55	The 8 resorts affected will be compensated in line with R&R package in place but subject to the advice of the KCZMA/MoEF considering that all these resorts are in NDZ as per CRZ Notification, 2011	**Being Complied** Refer point No. 19
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.
57	CSR activity considers training the local people to adapt to the new economic development of the area	**Being Complied** Refer point No. 50

Annexure V

Status of Environmental Management Plan

Annexure V

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 31.03.2019
1	Capital dredging	Marine water quality Marine ecology	○ 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	**Being Compiled** ○ The dredged material till 31.03.2019 amounting to 2.90 Mm^3 has been utilized for reclamation of 36 Ha area. The dredged material has been used for reclamation only. ○ Turbidity level is being monitored continuously at three locations by establishing 3 Real Time Turbidity buoys. Results obtained were found comparable to baseline figures. ○ 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 Response Plan (OSRP). They have submitted the draft OSRP for Vizhinjam Port and the same is under review and finalization. After finalization the OSRP will be submitted to regulatory agencies for approval. ○ Marine Environmental Monitoring at 5 locations as per the Environment Monitoring Plan prescribed in EIA has

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 31.03.2019**
				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. o 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	o 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. o To reduce impacts from exhausts, emission control norms will be enforced / adhered. o All the vehicles and construction machinery will be periodically checked to ensure compliance to the emission standards o Construction equipment and transport vehicles will be periodically washed to remove accumulated dirt o Providing adequately sized construction yard for storage of construction materials,	**Being Complied** o Trial run of rock placing for breakwater construction was initiated using the stones brought through barges from nearby harbours. o It is ensured that all vehicles entering the Port have a valid PUC certification o Adequate sized construction yard has been provided for storage of construction materials, equipment tools, earthmoving equipment, etc. o The dumpers have speed governors ensuring adherence to speed limit o Signage for speed control are displayed inside port area o Water sprinkling is carried out for supressing dust

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 31.03.2019**
			equipment tools, earthmoving equipment etc. o Provide enclosures on all sides of construction site o Movement of material will be mostly during non-peak hours. o On-site vehicle speeds will be controlled to reduce excessive dust suspension in air and dispersion by traffic o Water sprinkling will be carried out to suppress fugitive dust o Environmental awareness program will be provided to the personnel involved in developmental works o Use of tarpaulin covers and speed regulations for vehicles engaged in transportation	o It is ensured that all trucks transporting material are covered by tarpaulin. o Regular awareness programme on various Environment aspects is being imparted to workers and employees.
		Noise	o Noise levels will be maintained below threshold levels stipulated by Central/Kerala State Pollution Control Board (CPCB)/KSPCB o Procurement of machinery / construction equipment will be done in accordance with specifications conforming to source noise levels less than 75 dB (A) o Well-maintained construction equipment, which meets the regulatory standards for source noise levels, will be used o Any equipment emitting high noise, wherever	**Being Complied** o Noise levels are being monitored every fortnight and are found to be well within the permissible limits within the project area. o Contractors are also monitoring the Noise level in their work area and results are within the stipulated limits. o Protective gear like earplugs, muffs are provided to workers exposed to noise level beyond threshold limits.

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 31.03.2019**
			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 10pm) 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	
		Disturbance to Natural Drainage pattern	○ 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	**Being Complied** ○ 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 access 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 ○ No work has started in warehouse area and

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 31.03.2019
				drains/streams passing through the area are not closed/ diverted.
		Vegetation and Strain on existing infrastructure	○ 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** ○ 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	○ 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 approximately 15 km is proposed from port to Nemom railway station	**Being Complied** ○ 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. ○ The 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

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 31.03.2019**
				completed and has been submitted to Southern Railway for its approval.
3.	Land Reclamation	Existing Water Resources like Groundwater and surface water	○ 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** ○ The dredged material till 31.03.2019 amounting to 2.90 Mm^3 has been utilized for reclamation of 36 Ha area. The dredged material has been used for reclamation only. ○ 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	○ 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 separated from construction waste. ○ Burning of refuse at construction sites will be	**Being Complied** ○ 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 2016, as

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 31.03.2019
			prohibited. ○ All control measure will be taken to avoid the contamination of groundwater during construction phase	amended. ○ 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	○ 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. ○ Positive isolation procedures will be adhered ○ Hazardous wastes will be disposed through approved KSPCB/CPCB vendors.	**Being Complied** ○ 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.
6.	Water Resources	Water scarcity / Pollution	○ Water requirement during the construction is expected to be around 0.10 MLD	**Being Complied** ○ A 3.00 MLD water supply scheme for the

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 31.03.2019**
			○ 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	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 225 KLD of water is being consumed for construction related activities in an optimized manner, ○ Necessary discussions have been initiated with Kerala Water Authority (KWA) for alternative supply.
7.	Fishing	Fishermen and fishing villages	○ Signboards will be placed at the construction activities in order to make fishermen aware of the ongoing construction activities ○ Necessary marker buoys will be installed ○ Interactions will be initiated with the fishing	**Being Complied** ○ Signboards have been placed for demarcation of construction area. ○ Using the technological advancement the dedicated CSR team of AVPPL are in

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 31.03.2019
			community before commencement of construction works	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	○ 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 adequate compensation will be provided based on legally valid documents	**Being Complied** ○ 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

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 31.03.2019**
				port linked tourism packages covering the Kovalam-Vizhinjam-Poovar tourism corridor ○ Based on G.O.(Rt) No.2021/2017/RD dated 27.04.2017 and modified by G.O.(Rt) No.17/2018/F&PD dated 09.06.2018, government ordered to pay compensation for land and not for the structures since they were in violation of CRZ notification. Action in this respect is being taken and an area of 72.79 Ares is acquired up to 31.03.2019.
9	Breakwater	Change in shoreline	○ 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: ○ Engaging of M/s. Ocean Science & Surveying for 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

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 31.03.2019**
				meter 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 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. ○ LnTIEL had prepared the Mathematical Modelling Reports based on Shoreline Monitoring data; which were vetted by NIOT. The 1st (for the period February 2015 to February 2017) and 2nd (March 2017 to February 2018) modelling reports had been submitted with the compliance report for the period April 2017 to September 2017 and April 2018 to

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 31.03.2019**
				September 2018 respectively. 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 2018 to February 2019 to LnTIEL for mathematical modelling to assess the impact on shoreline under the guidance of NIOT. The Mathematical modelling report for the period March 2018 to February 2019 once vetted by NIOT will be submitted along with the Compliance Report for the period April 2019 to September 2019.
10	Effect on existing fishing harbour	Movement of fishing boats	○ 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	**Being Complied** ○ 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. ○ LnTIEL had prepared the Mathematical Modelling Reports based on Shoreline Monitoring data; which were vetted by

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 31.03.2019**
			be planned without affecting each other ○ Adoption of fishing harbour to manage it to perform as per International standard ○ 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	NIOT. The 1st (for the period February 2015 to February 2017) and 2nd (March 2017 to February 2018) modelling reports had been submitted with the compliance report for the period April 2017 to September 2017 and April 2018 to September 2018 respectively. 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 2018 to February 2019 to LnTIEL for mathematical modelling to assess the impact on shoreline under the guidance of NIOT. The Mathematical modelling report for the period March 2018 to February 2019 once vetted by NIOT will be submitted along with the Compliance Report for the period April 2019 to September 2019. ○ During operation phase traffic of Marine vessel/fishing boats will be planned without affecting each other

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 31.03.2019**
				○ The work for construction of the fish landing centre and the fishery breakwater has been initiated as part of the funded work component of the concession agreement with AVPPL. A budgetary provision of Rs. 16.00 crores for Fish Landing Centre and Rs. 131.12 crore for fishery breakwater has been allotted. ○ Fishing boats have been docked in the proposed area affecting the progress of fishery berth. GoK has initiated discussions with fishermen representatives for removal of the boats to facilitate construction work; these discussions are ongoing. In the meantime, the EPC contactor for development of aforesaid activity has been finalized and work orders has been issued. ○ In consultation with the fishermen, enhanced livelihood compensation of Rs. 99.75 Cr was sanctioned by GoK, instead of Rs. 7.10 crores suggested earlier in the EIA stage. Out of this amount, Rs. 80.93 crores have been disbursed till 31.03.2019 for a total number of 2573 Livelihood Affected Persons (LAPs) whose

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 31.03.2019**
				verification was complete in all respects; this includes boat owners as well to whom kerosene is supplied free of cost during the breakwater construction period. Verification of the documents of balance LAPs is in progress.
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** ○ 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. ○ LnTIEL had prepared the Mathematical Modelling Reports based on Shoreline Monitoring data; which were vetted by NIOT. The 1st (for the period February 2015 to February 2017) and 2nd (March 2017 to February 2018) modelling reports had been submitted with the compliance report for the period April 2017 to September 2017 and April 2018 to

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 31.03.2019**
				September 2018 respectively. 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 2018 to February 2019 to LnTIEL for mathematical modelling to assess the impact on shoreline under the guidance of NIOT. The Mathematical modelling report for the period March 2018 to February 2019 once vetted by NIOT will be submitted along with the Compliance Report for the period April 2019 to September 2019.

Environmental Management Plan – Rail*/Road# Corridors
***No Construction work was carried out during the compliance period for rail corridor**
#Only pipeline laying in the median of the road corridor (for initial 500 m stretch) had taken place during the compliance period

S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2019
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** ○ An Environment Management Cell has been established to look after day to day affairs like Monitoring, Training ○ 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. In addition to the above, independent environment, health and safety consultants have been being appointed as required in the concession agreement signed with AVPPL. ○ Necessary equipment will be purchased. ○ Third party environmental monitoring has commenced since August 2016 and the monitoring results are satisfactory
2	Altered Road embankment	Retaining walls and gabions should be provided	**Noted for Compliance** ○ 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.
3	Dust	○ Water should be sprayed during the construction	**Will be Compiled**

Environmental Management Plan – Rail*/Road# Corridors
***No Construction work was carried out during the compliance period for rail corridor**
#Only pipeline laying in the median of the road corridor (for initial 500 m stretch) had taken place during the compliance period

S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2019
		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.	
4	Air Pollution	○ 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** ○ 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 have Pollution Under Control (PUC) Certificate.
5	Noise	○ 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	**Being Compiled** ○ 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

Environmental Management Plan – Rail*/Road# Corridors
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S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2019
		per the Environmental Monitoring Plan.	limit at port site.
6	Loss of low lying land and ponds	○ 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** ○ 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. ○ The Konkan Railway Corporation has been engaged as consultant for turnkey execution of the project. The option of tunnel is being looked into to minimize the impacts.
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	○ 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	**Will be Complied**

Environmental Management Plan – Rail*/Road# Corridors *No Construction work was carried out during the compliance period for rail corridor #Only pipeline laying in the median of the road corridor (for initial 500 m stretch) had taken place during the compliance period			
S. No.	**Environmental Impacts and Issues**	**Mitigation Measures**	**Status as on 31.03.2019**
		drainage at streams and canals or existing irrigation and drainage systems in conformity to the Contractors visual integration and management plan and EMP.	
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.	**Will be Complied**
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	○ Quarrying will be carried out at approved and licensed quarries only.	**Will be Complied**
12	Soil Erosion and Soil Conservation	○ 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**
13	Loss of agricultural topsoil	○ 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	**Will be Complied**

Environmental Management Plan – Rail*/Road# Corridors
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S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2019
		land.	
14	Compaction of Soil and Damage to Vegetation	Construction vehicles should operate within the Corridor of Impact avoiding damage to soil and vegetation.	**Will be Complied**
15	Loss of trees and Avenue Planting	○ 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 Compiled** ○ 12 Ha of land was identified by forest department to carry out compensatory afforestation activities (at an aerial distance of 24 km from project site). AVPPL in collaboration with forest department has carried out afforestation on 12 Ha land in Sainik School, Trivandrum.
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** ○ 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** ○ 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 session is being given to the construction workers regarding importance of natural resources and

Environmental Management Plan – Rail*/Road# Corridors
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S. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 31.03.2019
			animals. o 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 with the co-operation of the traffic police.	**Will be Complied**
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 Compiled** o All the workers are provided with Personal Protective Equipment's (PPE) and it is ensured that they wear it all the time o 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.	**Will be Complied**
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**

Environment Management Plan – Warehouse Area* (Construction Phase)

***No work 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 31.03.2019
WAREHOUSE AREA (Construction Phase)				
1	Material transport and construction activities	Air Quality/Dust	○ 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.	**Complied** ○ 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

Environment Management Plan – Warehouse Area* (Construction Phase) *No work 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 31.03.2019**
			○ Vehicles delivering materials should be covered to 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	○ 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	**Complied** ○ 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)

Environment Management Plan – Warehouse Area* (Construction Phase) *No work 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 31.03.2019**
			and drilling will be scheduled at daytime (6.00 am to 10 pm) to minimize noise impacts. o Personnel exposed to noise levels beyond threshold limits will be provided with protective gear like earplugs, muffs, etc. o Ambient noise levels will be monitored at regular intervals	
2	Construction of Buildings, Roads, Sheds, etc.	Vegetation and Strain on existing infrastructure	o 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** At present no trees are cut in the warehouse area
		Water Environment	o The streams 1 and 2 will be made to avoid entering the warehouse area by diverging them into the Karichal River. o 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. o Another option is to divert the stream through the boundary o An application has been filed with the irrigation department for permission.	**Will be Complied** Will be appropriately planned in consultation with the concerned departments

Environment Management Plan – Warehouse Area* (Construction Phase) *No work 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 31.03.2019**
			○ 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
			○ 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	○ 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	**Will be Complied**

Environment Management Plan – Warehouse Area* (Construction Phase) *No work 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 31.03.2019**
			rivers and streams, thereby preventing any adverse impact on water quality. o 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	o Transportation of construction materials will be carried out during non- peak hours. o Regularization of truck movement. o Existing roads shall be strengthened and shall be used for the construction material transportation.	**Will be Complied**
3	Solid Waste Management	Soil quality	o Construction waste will be used within warehouse site for filling of low lying areas. o Composted bio-degradable waste will be used as manure in greenbelt. Other recyclable wastes will be sold. o Excavated soil will be stockpiled in a corner of the site in bunded area to avoid run off with storm water. o General refuse generated on-site will be collected in waste skips and separated from construction waste. o Burning of refuse at construction sites will be prohibited.	**Will be Complied**

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 31.03.2019**
1	Material transport and construction activities	Air Quality/Dust	○ 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.	**Complied** ○ 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 programme is provided to the personnel engaged in development work

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 31.03.2019**
			○ Vehicles delivering materials should be covered to 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	○ 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	**Complied** 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)

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 31.03.2019**
			dampers. o High noise generating activities such as piling and drilling will be scheduled at daytime (6.00 am to 10 pm) to minimise noise impacts. o Personnel exposed to noise levels beyond threshold limits will be provided with protective gear like earplugs, muffs, etc. o Ambient noise levels will be monitored at regular intervals	
2	Construction of Buildings, Roads, Parking features, etc.	Vegetation and Strain on existing infrastructure	o 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. o 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	o Transportation of construction materials will be carried out during non-peak hours. o Regularization of truck movement. o The existing roads shall be strengthened and shall	**Will be Complied**

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 31.03.2019**
			be used for the construction material transportation.	
		Solid Waste	○ 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 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**

BACK UP AREA* – Construction Phase *Construction of buildings has commenced in only reclaimed area during the compliance period				
Sl. No.	**Activity**	**Relevant Environmental Components likely to be impacted**	**Proposed Mitigation Measures**	**Status as on 31.03.2019**
1	Material transport and construction activities	Air Quality	○ 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** ○ 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 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

BACK UP AREA* – Construction Phase *Construction of buildings has commenced in only reclaimed area during the compliance period				
Sl. No.	**Activity**	**Relevant Environmental Components likely to be impacted**	**Proposed Mitigation Measures**	**Status as on 31.03.2019**
				carried out for contractors working at site.
		Noise	○ 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	**Being Compiled** ○ 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

BACK UP AREA* – Construction Phase *Construction of buildings has commenced in only reclaimed area during the compliance period				
Sl. No.	**Activity**	**Relevant Environmental Components likely to be impacted**	**Proposed Mitigation Measures**	**Status as on 31.03.2019**
			threshold limits will be provided with protective gear like earplugs, muffs, etc. ○ Ambient noise levels will be monitored at regular intervals	
2	Construction Activities	Water Environment	○ 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** ○ 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.
		Land Environment	○ 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**
			○ Arable land should not be used for topsoil borrowing.	**Will be Complied**

BACK UP AREA* – Construction Phase *Construction of buildings has commenced in only reclaimed area during the compliance period				
Sl. No.	**Activity**	**Relevant Environmental Components likely to be impacted**	**Proposed Mitigation Measures**	**Status as on 31.03.2019**
			○ Topsoil will be kept and reused after excavation is over. ○ Any surplus to be used on productive agricultural land.	
			○ Construction vehicles should operate within the Backup Areas avoiding damage to soil and vegetation.	Will be complied alongside the road and port boundaries
			○ 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
			○ 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 VI

DG Sets Details

adani	Adani Vizhinjam Port Private Ltd	From : October 2018 To : March 2019
Vizhinjam International Deepwater Multipurpose Seaport D.G Set Details		

Annexure VI

S. No.	P & M Number	Working Status	Capacity KVA	Location	Pollution Control Measure
In Use					
1	3H.8302/ 1720624	In use	25 KVA	Near Shrine site office	Adequate Stack Height
2	4H.7906/1720916	In use	125KVA	Batching Plant	Adequate Stack Height
3	AL6DTIDG4	in use	160KVA	Paver block yard	Adequate Stack Height
4	AL4CTIDG3	In use	82.5	Paver block yard	Adequate Stack Height
5	CP62.5D5P/F41	In use	62.5	Near B&R site office	Adequate Stack Height
6	DG/125/1819	In use	125	CBM Batching Plant	Adequate Stack Height
7	CP40D5P/F40	in use	40	PUB AREA	Adequate Stack Height
8	G17I30803	In use	62.5	POB	Adequate Stack Height
9	SGL40/14/5182	In use	40	PUB AREA	Adequate Stack Height
10	20034	Back up	40	Loading Jetty 01	Adequate Stack Height
11	15890	In use	250	Substation Area (Near to CPE W/S)	Manufacturer certificate with up-flow type exhaust
12	22655	In use	160	Substation Area (Near to CPE W/S)	Adequate Stack Height
13	22208	In use	20	Labour Camp	Adequate Stack Height
14	G00 5040/15492	In use	40	Labour camp	Adequate Stack Height
Not In Use					
1	G005082/9125	Not In use	82.5	CPE workshop	Not in Use
2	G00125/10622	Not In use	125	NEAR B&R OFFICE	NIL
3	4535	Back up	125	Loading jetty 02	Adequate Stack Height
4	-	Back up	30	Office area	Adequate Stack Height with up-Flow type exhaust

Annexure VII

EMP Budgetary Provision and Expenditure

(October 2018 to March 2019)

adani	Adani Vizhinjam Port Private Ltd	From : October 2018 To : March 2019
Vizhinjam International Deepwater Multipurpose Seaport EMP Budgetary Provision & Expenditure		

Annexure VII

S. No.	Environmental Management Plan Commitment	Cost Provision in EIA (INR Crores)
1.	Cost of Contractors EMP for all planned EMP implementation measures (Action plan report)	1.00
2.	Cost of Capacity building- Training and Institutional strengthening (Training workshop)	0.20
3.	Compensatory afforestation for the green cover lost for the port and its associated facilities (2500 plants per Ha for 25 Ha area)	1.25
4.	Air quality monitoring at sensitive locations	0.252
5.	Water quality monitoring at major water bodies	0.054
6.	Noise monitoring at sensitive locations	0.009
7.	Soil quality monitoring at sensitive locations	0.002
8.	Marine water quality and sediment and marine biology	1.08
9.	Shoreline changes	0.30
10.	Cost of Median planting with a suitable species of creepers and metallic wire mesh fencing along the road (2000 m long median planting)	0.83
11.	Solid waste management (sector wise)-Collection disposal system	2.50
12.	Storm water Management	5.00
13.	Marine Life Protection out of Oil Spill(Provision for scavenger boat)One tugboat with booms and skimmer and dust exhausting equipment	20.00
14.	Cost of scavenger boat including manpower(Cost of boat)	0.20
15.	Dust Sweeper (2 nos)	0.60
16.	Air Pollution Control (Four water tankers for wetting of road surface and springing system)	1.00
17.	Water and waste water treatment plants	4.00
18.	Battery of toilets with bimonthly maintenance provision	1.00
19.	Desilting and strengthen of Streams	0.50
20.	Enhancement of water bodies (ponds along road & rail)	0.10
21.	Enhancement of religious structures (Temple)	0.05
22.	Cultural property rehabilitation cost for sacred grove	0.01
Total		**39.937 (Rounded off to 40 Crores)**

Expenditure (October 2018 to March 2019):

S. No.	Activity	Expenditure (October 2018 to March 2019) (INR Crores)
1.	Comprehensive Shoreline Monitoring	0.85
2.	Continuous Turbidity Monitoring	0.24
3.	Air, Noise, Surface Water, Ground Water & Marine Water Monitoring	0.27
4.	Modelling Studies	0.28
5.	Study on shoreline using Satellite Images	0.16
6.	Consultancy fee for expert on shoreline	0.12
7.	Water Sprinkling for dust suppression	0.03
8.	Rainwater Harvesting and Hydrogeological Studies	0.08
9.	Oil Spill Preparedness Response and Management Plan	0.24
	Total	**2.27**

Annexure VIII

Environment Health, Safety & CSR Organizational Structure

adani	Adani Vizhinjam Port Private Ltd	From : October 2018 To : March 2019

Vizhinjam International Deepwater Multipurpose Seaport
Environment Health, Safety & CSR Organizational Structure

Annexure VIII

S. No.	Name	Designation	Experience	Qualification	Organization
1.	Narayanan M	Chief Project Coordinator & Engineer (Infra) Coordinator Environment and Welfare Measure	30 Years	B Tech (Civil Engg.)	VISL
2.	Anil Balakrishnan	Head – CSR	19 Years	MSW, Phd.	AVPPL
3.	Y D Manmohan	Environment Specialist	28 Years	PG in Env. Engg.	STUP
4.	Sebastian Britto	Project Officer	20 Years	MA, Economics	AVPPL
5.	Stephen Vinod	Community Mobilizer	12 Years	BA, Economics	AVPPL
6.	George Zen	Community Mobilizer	31 Years	BA, Sociology	AVPPL
7.	Maya Mohan	Community Mobilizer	5 Years	MSW	AVPPL
8.	Hebin C	Head – Environment	11 Years	MS, Oceanography & Coastal Area Studies	AVPPL
9.	Harsh Yadav	Deputy Manager – Environment	7 Years	B Tech (Chem. Engg.); M Tech. in Environment process design, NEBOSH	AVPPL
10.	Jesse Benjamin Fullonton	Assistant Manager - Environment	7 Years	BSc. Chemical Technology; Msc. Environmental Technology	AVPPL
11.	Kanwar P Malik	Head-Horticulture	13 Years	BSc - Agriculture	AVPPL
12.	Amrendra Sinha	Head – Safety	17 Years	Diploma in Industrial Safety and Fire Safety	HOWE
13.	Shaji Joseph	Safety Executive	8 Years	Diploma in mechanical & Diploma in fire and safety	HOWE

Annexure IX

Environment Monitoring Report

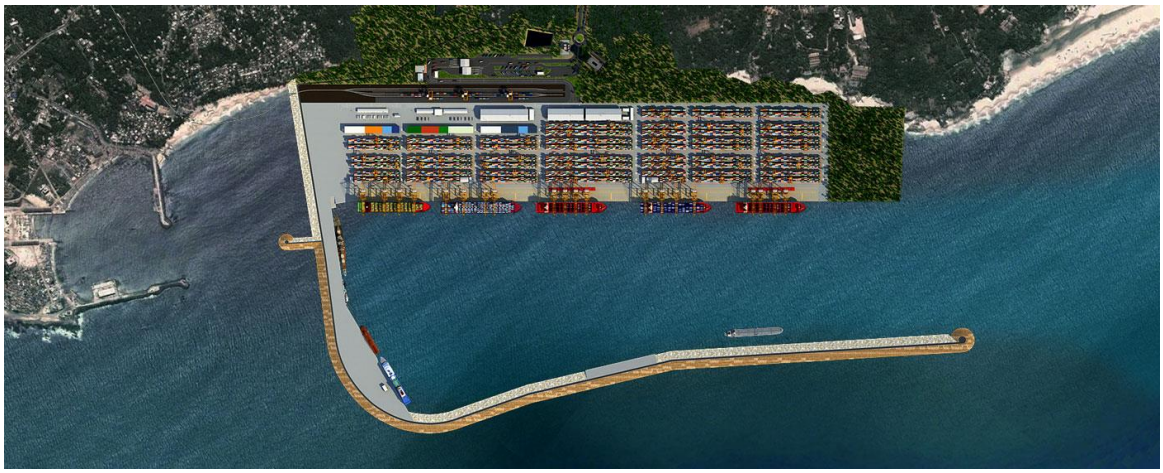
(October 2018 to March 2019)

Annexure IX

HALF YEARLY ENVIRONMENT MONITORING REPORT

For the period

October 2018 to March 2019



Adani Vizhinjam Port Pvt. Ltd.

Vizhinjam, Kerala

CONTENTS

CHAPTER 1

Introduction

Ashwamedh Engineers and Consultants (AEC) were engaged by Adani Vizhinjam Port Pvt. Ltd. (AVPPL) for the Post EIA Environmental Monitoring as per Environmental Monitoring Plan (EMP) mentioned in the Environmental Impact Assessment and Environmental Clearance accorded for the Vizhinjam International Multipurpose Seaport vide service order no. 5700182233 dated: 31.05.2016; which mentioned the matrix, parameters and frequency of environmental monitoring.

AEC were established in May 1986. The company is engaged in providing Environmental pollution testing, Food and agriculture testing and Consultancy Services and their affiliates are established all over India and overseas. The well-equipped analytical laboratory and office set up of about 28000 sq. ft. is at Nashik, Maharashtra and AEC has also with several branch offices. The strength of the organization is the years of hard work, dedication and contribution made by our staffs who are experts in their respective fields and they produce innovative ideas for the growth of the organization.

AEC has made itself capable of testing of water, waste water, air, food, noise monitoring, hazardous and non-hazardous waste testing, fuel and agriculture testing. They have a state-of-art Laboratory set-up for Chemical, Mechanical and Microbiological Analysis at Nashik. The company is accredited by NABL in accordance with ISO/IEC 17025:2005 in the Chemical, Biological and Mechanical Testing fields (Certificate numbers: T-5509). AEC is recognized by the Ministry of Environment, Forests & Climate Change (MoEF&CC), Govt. of India (GoI), New Delhi under Environment (Protection) Act, 1986. AEC is also an ISO 9001:2015, ISO 14001:2015 and OHSAS 18001:2007 certified organization.

Additionally, AEC is recognized by Bureau of Indian Standard for Packaged Drinking Water and Packaged Natural Mineral Water also recognised by APEDA. AEC is also approved by Food Safety & Standards Authority of India (FSSAI) for food testing also approved by AGMARK and State Agriculture Department.

AEC carried out said environmental monitoring strictly as per above mentioned service order. As per the service order Ambient Air Monitoring (twice in a week),

Ambient Noise Monitoring (fortnight), 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 consolidated report 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. AEC is also submitting a half yearly monitoring report consolidating the data of the monthly monitoring reports for which the same is presented in this report.

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.

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 w.r.t. parameters analysed is followed and samples are transported with due care to laboratory.

2. Chain of Custody:

After receiving the samples in the laboratory, first 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 got 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:

As per the scope of work, all physiochemical and biological analysis 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 follow the following procedures:

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

Item	Yes or No	If No, reason and Justification for acceptance
maintained at required storage condition?		
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 Checklist 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 Checklist 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	

Item	Yes or No	If No, reason and Justification for acceptance
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 2.4 Checklist 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 Checklist 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.

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 locations including Venganoor, Proposed Port Estate Area, Port Site, Chani and Balaramapuram during October 2018 to March 2019.

Table 3.1 Ambient Air Quality Monitoring Locations

Sr. No.	Location	Latitude	Longitude
1.	Venganoor	8^0,23',55.10" N	77^0,00',11.30" E
2.	Proposed Port Estate Area	8^0,22',41.47" N	77^0,01',02.94" E
3.	Port Site	8^0,22',06.03" N	77^0,00',17.03" E
4.	Chani	8^0,20',56.86" N	77^0,03',16.19" E
5.	Balaramapuram	8^0,25',37.60" N	77^0,02',43.80" E

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, WI/SAP-AA/5/1
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, WI/SAP-AA/5/1,
3.	Sulphur Dioxide (SO_2)	µg/m^3	4.0	IS 5182 (Part 2): 2001,Reaffirmed 2006, WI/SAP-AA/5/2,
4.	Nitrogen Dioxide (NO_2)	µg/m^3	3.0	IS 5182 (Part 6): 2006, WI/SAP-AA/5/3
5.	Carbon Monoxide (CO)	mg/m^3	0.5	By portable CO meter
6.	Hydrocarbon (HC)	ppm	1.0	By portable HC meter

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	-	-	-

4. Ambient Air Quality Monitoring Results for the period October 2018 to March 2019:

Table 3.4 - Location: Venganoor

Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
01.10.2018	81	26	5.12	5.22	BDL	BDL
04.10.2018	78	21	6.11	6.1	BDL	BDL
08.10.2018	84	27	5.68	5.41	BDL	BDL
11.10.2018	73	20	5.71	5.11	BDL	BDL
15.10.2018	68	18	4.82	4.27	BDL	BDL
18.10.2018	52	15	4.52	4.12	BDL	BDL
22.10.2018	61	17	5.58	4.89	BDL	BDL
25.10.2018	55	14	4.86	4.20	BDL	BDL
29.10.2018	50	12	4.51	3.48	BDL	BDL
01.11.2018	64	22	5.62	5.31	BDL	BDL
05.11.2018	70	26	6.22	6.10	BDL	BDL
08.11.2018	58	20	4.89	4.62	BDL	BDL
12.11.2018	80	30	6.35	6.20	BDL	BDL
15.11.2018	62	21	5.62	5.32	BDL	BDL
19.11.2018	68	24	6.11	5.89	BDL	BDL
22.11.2018	56	16	5.42	5.13	BDL	BDL
26.11.2018	51	14	4.62	4.32	BDL	BDL
29.11.2018	63	22	4.51	5.85	BDL	BDL
03.12.2018	84	21	5.76	7.47	BDL	BDL
06.12.2018	69	18	5.48	6.55	BDL	BDL
10.12.2018	90	32	6.11	8.46	BDL	BDL
13.12.2018	62	14	5.42	6.47	BDL	BDL
17.12.2018	68	19	6.8	8.46	BDL	BDL
20.12.2018	88	24	5.51	9.31	BDL	BDL
24.12.2018	78	22	6.72	7.45	BDL	BDL
27.12.2018	92	35	7.45	9.21	BDL	BDL
31.12.2018	70	20	7.11	8.46	BDL	BDL
03.01.2019	91	35	5.65	6.47	BDL	BDL
07.01.2019	75	25	5.88	6.97	BDL	BDL
10.01.2019	82	30	6.04	7.30	BDL	BDL
14.01.2019	92	38	6.11	7.97	BDL	BDL
17.01.2019	70	22	6.92	8.97	BDL	BDL
21.01.2019	78	29	7.12	9.58	BDL	BDL
24.01.2019	65	22	7.64	9.52	BDL	BDL
28.01.2019	58	20	5.82	6.22	BDL	BDL
31.01.2019	81	30	6.44	7.42	BDL	BDL
04.02.2019	78	28	6.49	7.49	BDL	BDL

Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
07.02.2019	82	30	5.53	5.97	BDL	BDL
11.02.2019	65	25	5.49	6.89	BDL	BDL
14.02.2019	70	27	5.49	6.99	BDL	BDL
18.02.2019	84	30	5.88	6.97	BDL	BDL
21.02.2019	62	24	5.87	6.72	BDL	BDL
25.02.2019	58	22	6.92	7.97	BDL	BDL
28.02.2019	74	26	5.99	6.97	BDL	BDL
04.03.2019	58	18	5.92	6.63	BDL	BDL
07.03.2019	86	27	5.53	7.52	BDL	BDL
11.03.2019	71	22	6.09	7.87	BDL	BDL
14.03.2019	72	24	5.85	7.46	BDL	BDL
18.03.2019	58	12	5.90	6.68	BDL	BDL
21.03.2019	76	21	6.25	7.46	BDL	BDL
25.03.2019	88	30	6.05	8.67	BDL	BDL
28.03.2019	85	28	5.88	8.29	BDL	BDL
NAAQS 2009	**100**	**60**	**80**	**80**	**4**	**-**

Table 3.5 - Location: Proposed Port Estate Area

Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
01.10.2018	68	20	5.64	4.92	BDL	BDL
04.10.2018	76	22	5.32	4.84	BDL	BDL
08.10.2018	80	26	6.24	6.12	BDL	BDL
11.10.2018	62	18	5.64	5.34	BDL	BDL
15.10.2018	82	28	5.81	5.42	BDL	BDL
18.10.2018	73	21	5.74	5.41	BDL	BDL
22.10.2018	52	14	4.58	3.84	BDL	BDL
25.10.2018	64	17	4.81	5.44	BDL	BDL
29.10.2018	58	15	4.62	4.32	BDL	BDL
01.11.2018	72	26	6.12	5.86	BDL	BDL
05.11.2018	64	22	5.89	5.25	BDL	BDL
08.11.2018	84	30	6.55	6.34	BDL	BDL
12.11.2018	78	25	6.12	5.81	BDL	BDL
15.11.2018	80	28	6.80	6.42	BDL	BDL
19.11.2018	68	24	5.46	5.11	BDL	BDL
22.11.2018	76	27	5.80	5.51	BDL	BDL
26.11.2018	60	20	4.65	4.45	BDL	BDL
29.11.2018	56	18	5.22	5.12	BDL	BDL
03.12.2018	62	16	6.16	7.03	BDL	BDL

Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
06.12.2018	58	15	6.80	6.77	BDL	BDL
10.12.2018	94	32	6.11	7.47	BDL	BDL
13.12.2018	89	30	5.53	6.47	BDL	BDL
17.12.2018	54	15	6.57	8.46	BDL	BDL
20.12.2018	86	27	5.51	6.58	BDL	BDL
24.12.2018	78	25	7.42	8.11	BDL	BDL
27.12.2018	68	22	6.32	7.44	BDL	BDL
31.12.2018	82	29	8.12	8.58	BDL	BDL
03.01.2019	86	34	5.76	6.97	BDL	BDL
07.01.2019	80	27	5.65	6.47	BDL	BDL
10.01.2019	94	42	7.22	8.31	BDL	BDL
14.01.2019	84	30	6.69	7.47	BDL	BDL
17.01.2019	92	37	8.29	10.4	BDL	BDL
21.01.2019	78	26	6.21	8.10	BDL	BDL
24.01.2019	66	22	6.45	9.45	BDL	BDL
28.01.2019	70	24	8.11	8.68	BDL	BDL
31.01.2019	56	20	7.22	7.99	BDL	BDL
04.02.2019	76	26	5.99	6.97	BDL	BDL
07.02.2019	80	28	6.13	7.00	BDL	BDL
11.02.2019	64	20	5.69	6.69	BDL	BDL
14.02.2019	79	25	6.11	7.47	BDL	BDL
18.02.2019	56	18	5.99	6.97	BDL	BDL
21.02.2019	83	31	5.99	7.24	BDL	BDL
25.02.2019	74	24	6.86	8.68	BDL	BDL
28.02.2019	70	22	6.69	8.42	BDL	BDL
04.03.2019	55	16	5.99	7.16	BDL	BDL
07.03.2019	87	28	5.25	7.94	BDL	BDL
11.03.2019	90	27	6.23	7.58	BDL	BDL
14.03.2019	72	16	5.79	7.22	BDL	BDL
18.03.2019	67	20	5.00	7.19	BDL	BDL
21.03.2019	81	24	5.65	7.04	BDL	BDL
25.03.2019	74	18	6.46	8.26	BDL	BDL
28.03.2019	84	26	7.18	9.24	BDL	BDL
NAAQS 2009	**100**	**60**	**80**	**80**	**4**	-

Table 3.6 - Location: Port Site

Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
01.10.2018	86	28	6.22	6.14	BDL	BDL
04.10.2018	70	20	5.82	5.62	BDL	BDL

Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
08.10.2018	72	21	5.62	5.52	BDL	BDL
11.10.2018	81	26	5.64	5.21	BDL	BDL
15.10.2018	91	29	6.25	6.13	BDL	BDL
18.10.2018	78	24	5.91	5.82	BDL	BDL
22.10.2018	68	20	4.78	4.62	BDL	BDL
25.10.2018	92	30	6.52	6.41	BDL	BDL
29.10.2018	80	25	5.46	5.18	BDL	BDL
01.11.2018	82	29	5.67	5.43	BDL	BDL
05.11.2018	85	30	6.42	6.24	BDL	BDL
08.11.2018	80	28	6.42	6.38	BDL	BDL
12.11.2018	97	35	7.12	6.84	BDL	BDL
15.11.2018	90	32	6.48	6.22	BDL	BDL
19.11.2018	76	26	5.67	5.38	BDL	BDL
22.11.2018	81	28	6.18	5.93	BDL	BDL
26.11.2018	95	34	6.62	5.27	BDL	BDL
29.11.2018	72	25	5.68	5.25	BDL	BDL
03.12.2018	94	36	5.69	6.16	BDL	BDL
06.12.2018	88	30	5.69	6.70	BDL	BDL
10.12.2018	90	32	8.11	9.79	BDL	BDL
13.12.2018	78	24	5.20	6.13	BDL	BDL
17.12.2018	96	40	6.34	8.47	BDL	BDL
20.12.2018	76	26	5.92	6.26	BDL	BDL
24.12.2018	86	28	7.62	8.25	BDL	BDL
27.12.2018	92	34	8.72	9.34	BDL	BDL
31.12.2018	74	25	9.12	10.20	BDL	BDL
03.01.2019	77	20	5.46	10.81	BDL	BDL
07.01.2019	91	34	5.60	10.06	BDL	BDL
10.01.2019	94	36	7.02	9.70	BDL	BDL
14.01.2019	93	38	7.37	10.39	BDL	BDL
17.01.2019	61	28	6.86	11.19	BDL	BDL
21.01.2019	88	32	7.25	8.87	BDL	BDL
24.01.2019	98	40	8.12	10.84	BDL	BDL
28.01.2019	81	30	8.82	9.22	BDL	BDL
31.01.2019	89	34	8.43	10.12	BDL	BDL
04.02.2019	91	35	5.82	6.67	BDL	BDL
07.02.2019	84	30	5.72	7.06	BDL	BDL
11.02.2019	66	22	5.72	7.76	BDL	BDL
14.02.2019	90	32	5.87	6.72	BDL	BDL
18.02.2019	78	26	5.58	6.97	BDL	BDL
21.02.2019	86	34	5.68	7.64	BDL	BDL
25.02.2019	76	25	5.98	6.81	BDL	BDL

Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
28.02.2019	80	28	5.89	6.75	BDL	BDL
04.03.2019	82	28	5.91	7.725	BDL	BDL
07.03.2019	96	37	5.96	8.25	BDL	BDL
11.03.2019	78	22	6.26	7.72	BDL	BDL
14.03.2019	90	31	6.29	6.69	BDL	BDL
18.03.2019	69	20	6.68	8.67	BDL	BDL
21.03.2019	60	18	6.72	7.10	BDL	BDL
25.03.2019	81	22	6.06	8.43	BDL	BDL
28.03.2019	88	30	5.12	8.29	BDL	BDL
NAAQS 2009	**100**	**60**	**80**	**80**	**4**	-

Table 3.7 - Location: Chani

Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
01.10.2018	64	20	5.62	4.82	BDL	BDL
04.10.2018	78	26	6.08	5.82	BDL	BDL
08.10.2018	56	18	5.11	4.83	BDL	BDL
11.10.2018	60	19	4.86	4.62	BDL	BDL
15.10.2018	71	22	5.42	5.22	BDL	BDL
18.10.2018	80	28	6.21	6.12	BDL	BDL
22.10.2018	58	16	4.26	3.82	BDL	BDL
25.10.2018	63	20	5.12	4.62	BDL	BDL
29.10.2018	52	16	4.82	3.67	BDL	BDL
01.11.2018	70	26	7.89	7.36	BDL	BDL
05.11.2018	78	28	6.11	5.84	BDL	BDL
08.11.2018	68	20	5.46	5.12	BDL	BDL
12.11.2018	58	18	6.52	5.25	BDL	BDL
15.11.2018	52	16	5.38	5.22	BDL	BDL
19.11.2018	82	30	6.46	6.24	BDL	BDL
22.11.2018	74	26	5.68	5.34	BDL	BDL
26.11.2018	60	20	6.13	4.89	BDL	BDL
29.11.2018	62	22	5.68	5.15	BDL	BDL
03.12.2018	66	18	6.00	7.12	BDL	BDL
06.12.2018	55	14	6.77	7.18	BDL	BDL
10.12.2018	91	28	6.11	7.47	BDL	BDL
13.12.2018	63	14	5.53	6.47	BDL	BDL
17.12.2018	81	22	6.69	7.97	BDL	BDL
20.12.2018	70	19	5.63	6.37	BDL	BDL
24.12.2018	86	26	6.24	7.85	BDL	BDL
27.12.2018	68	20	5.62	6.21	BDL	BDL

Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
31.12.2018	72	24	7.11	7.86	BDL	BDL
03.01.2019	89	26	5.68	7.83	BDL	BDL
07.01.2019	72	24	5.82	9.54	BDL	BDL
10.01.2019	90	33	6.23	9.85	BDL	BDL
14.01.2019	93	36	6.86	9.19	BDL	BDL
17.01.2019	82	30	8.01	8.61	BDL	BDL
21.01.2019	81	25	8.35	9.28	BDL	BDL
24.01.2019	78	24	7.45	9.41	BDL	BDL
28.01.2019	68	20	8.11	9.64	BDL	BDL
31.01.2019	72	22	8.34	9.34	BDL	BDL
04.02.2019	86	31	5.49	6.72	BDL	BDL
07.02.2019	64	22	5.99	6.97	BDL	BDL
11.02.2019	56	18	5.79	7.15	BDL	BDL
14.02.2019	77	26	5.99	6.97	BDL	BDL
18.02.2019	60	20	6.11	6.97	BDL	BDL
21.02.2019	81	28	5.70	6.67	BDL	BDL
25.02.2019	76	24	6.23	7.76	BDL	BDL
28.02.2019	70	26	5.98	6.58	BDL	BDL
04.03.2019	62	20	6.26	8.50	BDL	BDL
07.03.2019	54	11	6.58	7.97	BDL	BDL
11.03.2019	78	24	5.70	6.89	BDL	BDL
14.03.2019	86	28	5.82	7.68	BDL	BDL
18.03.2019	70	22	4.76	8.08	BDL	BDL
21.03.2019	82	26	5.65	7.04	BDL	BDL
25.03.2019	59	16	6.46	9.08	BDL	BDL
28.03.2019	88	30	6.46	10.30	BDL	BDL
NAAQS 2009	**100**	**60**	**80**	**80**	**4**	-

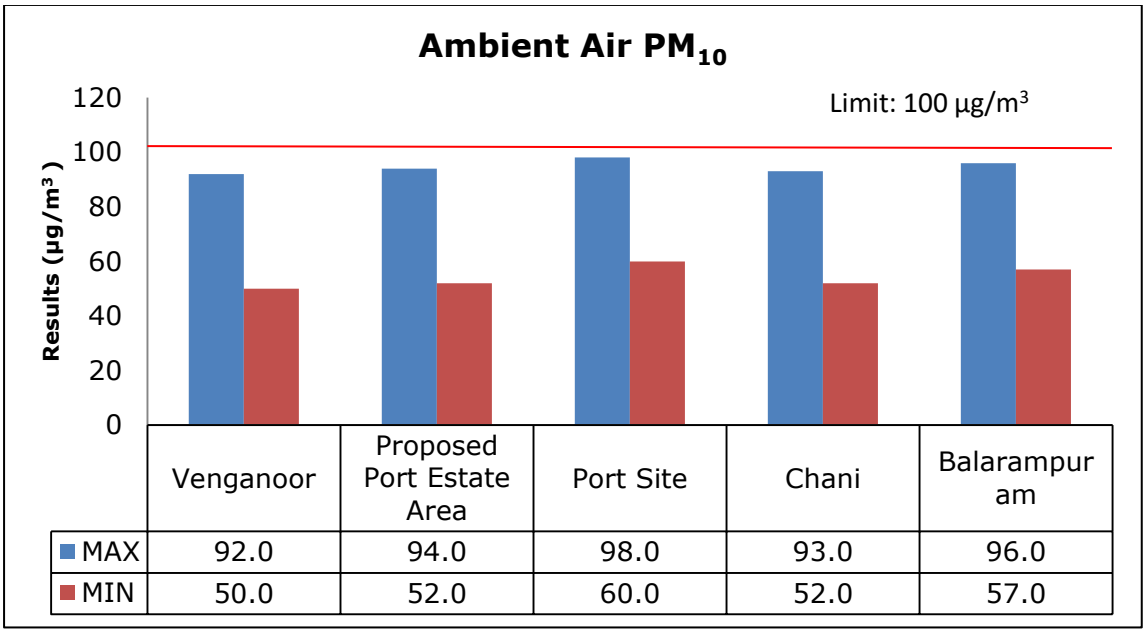
Table 3.8 - Location: Balaramapuram

Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
01.10.2018	86	27	5.86	5.74	BDL	BDL
04.10.2018	91	28	6.42	6.31	BDL	BDL
08.10.2018	78	22	5.62	5.32	BDL	BDL
11.10.2018	66	20	5.41	5.11	BDL	BDL
15.10.2018	80	24	5.68	4.98	BDL	BDL
18.10.2018	57	17	4.82	4.48	BDL	BDL
22.10.2018	62	21	5.16	5.10	BDL	BDL
25.10.2018	62	18	4.65	4.24	BDL	BDL

Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
29.10.2018	86	26	6.20	6.11	BDL	BDL
01.11.2018	78	28	8.62	5.43	BDL	BDL
05.11.2018	83	30	8.12	6.98	BDL	BDL
08.11.2018	70	26	5.46	6.12	BDL	BDL
12.11.2018	62	22	7.82	7.82	BDL	BDL
15.11.2018	89	32	6.23	7.10	BDL	BDL
19.11.2018	59	20	8.12	6.85	BDL	BDL
22.11.2018	70	25	6.62	6.32	BDL	BDL
26.11.2018	64	21	7.89	5.42	BDL	BDL
29.11.2018	66	24	6.38	6.90	BDL	BDL
03.12.2018	93	43	6.28	7.30	BDL	BDL
06.12.2018	96	46	5.63	6.21	BDL	BDL
10.12.2018	90	36	5.19	5.97	BDL	BDL
13.12.2018	79	21	5.99	7.76	BDL	BDL
17.12.2018	89	35	6.60	7.83	BDL	BDL
20.12.2018	81	26	6.98	10.40	BDL	BDL
24.12.2018	70	20	7.12	8.40	BDL	BDL
27.12.2018	92	40	8.45	9.11	BDL	BDL
31.12.2018	82	30	7.52	7.89	BDL	BDL
03.01.2019	91	40	9.12	12.82	BDL	BDL
07.01.2019	95	44	9.54	12.34	BDL	BDL
10.01.2019	86	38	7.52	12.35	BDL	BDL
14.01.2019	65	31	8.08	10.22	BDL	BDL
17.01.2019	71	35	9.64	12.27	BDL	BDL
21.01.2019	88	39	8.57	12.84	BDL	BDL
24.01.2019	78	36	9.22	12.85	BDL	BDL
28.01.2019	80	38	9.82	12.54	BDL	BDL
31.01.2019	66	28	9.58	12.66	BDL	BDL
04.02.2019	80	26	5.92	6.78	BDL	BDL
07.02.2019	78	22	6.07	6.81	BDL	BDL
11.02.2019	90	33	5.99	7.24	BDL	BDL
14.02.2019	82	29	5.79	6.64	BDL	BDL
18.02.2019	70	20	5.95	7.06	BDL	BDL
21.02.2019	66	34	5.86	7.00	BDL	BDL
25.02.2019	74	23	5.93	6.93	BDL	BDL
28.02.2019	81	25	6.20	7.72	BDL	BDL
04.03.2019	95	38	6.15	8.06	BDL	BDL
07.03.2019	89	28	5.98	6.98	BDL	BDL
11.03.2019	67	22	5.98	6.98	BDL	BDL

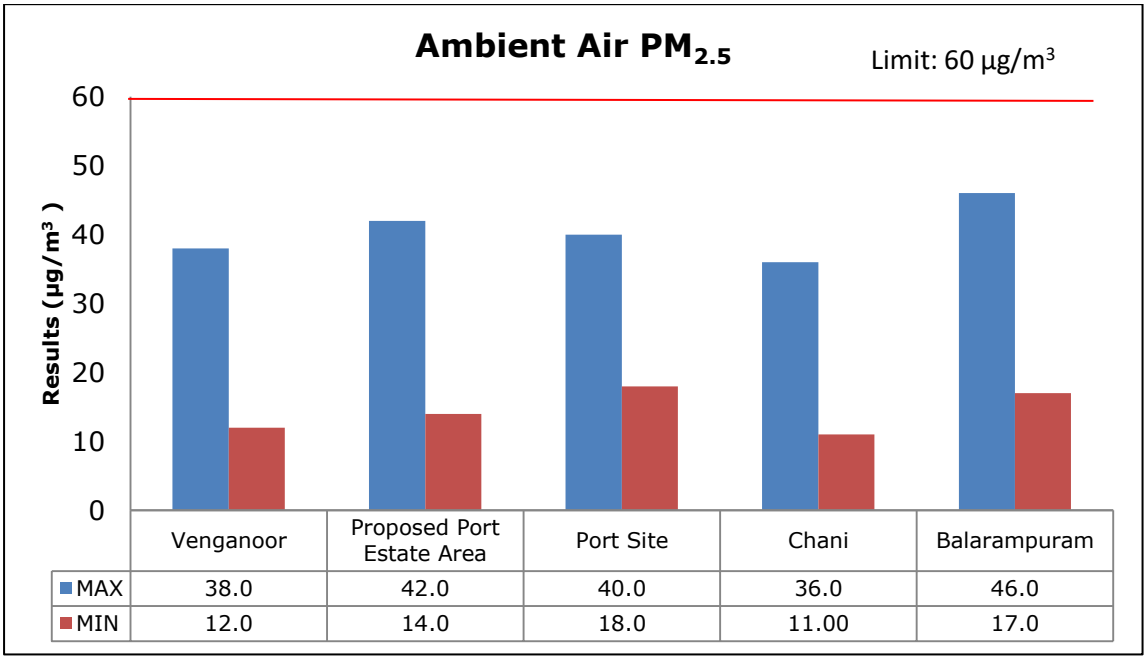
Date	Parameters					
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	HC
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	ppm
14.03.2019	92	36	5.54	7.16	BDL	BDL
18.03.2019	70	25	6.18	7.89	BDL	BDL
21.03.2019	65	20	5.51	6.71	BDL	BDL
25.03.2019	80	30	5.90	9.16	BDL	BDL
28.03.2019	92	35	6.66	9.08	BDL	BDL
NAAQS 2009	**100**	**60**	**80**	**80**	**4**	-

5. Graphical representation of Results for the period October 2018 to March 2019



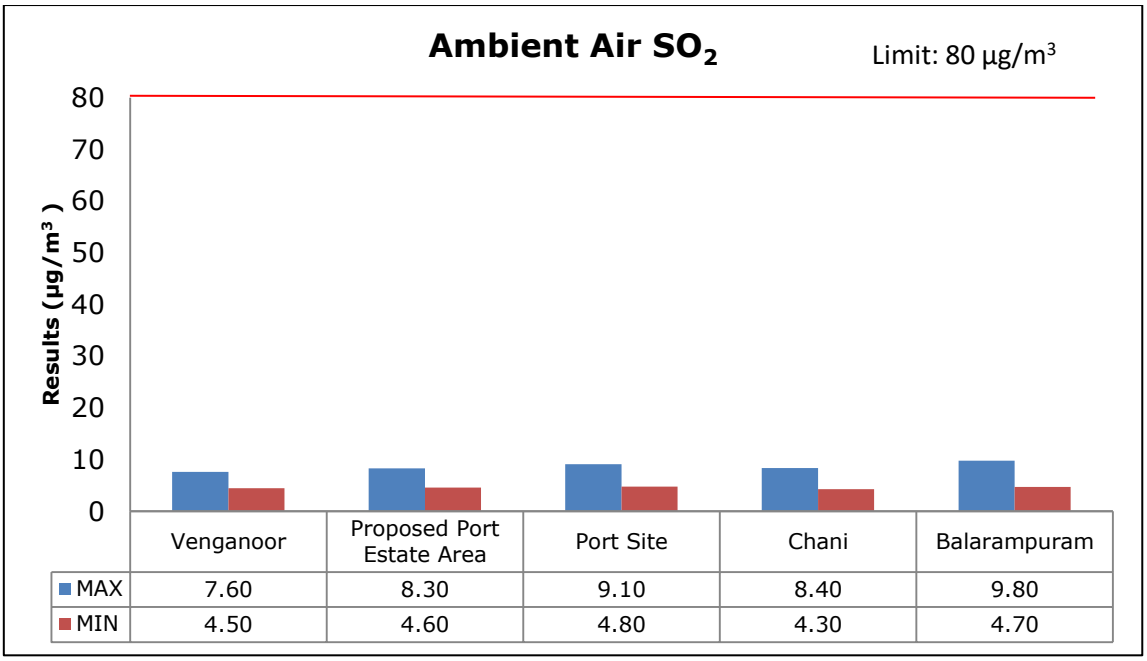
	Venganoor	Proposed Port Estate Area	Port Site	Chani	Balarampuram
MAX	92.0	94.0	98.0	93.0	96.0
MIN	50.0	52.0	60.0	52.0	57.0

Figure 3.2 Particulate matter (size less than 10µm) (PM_{10})



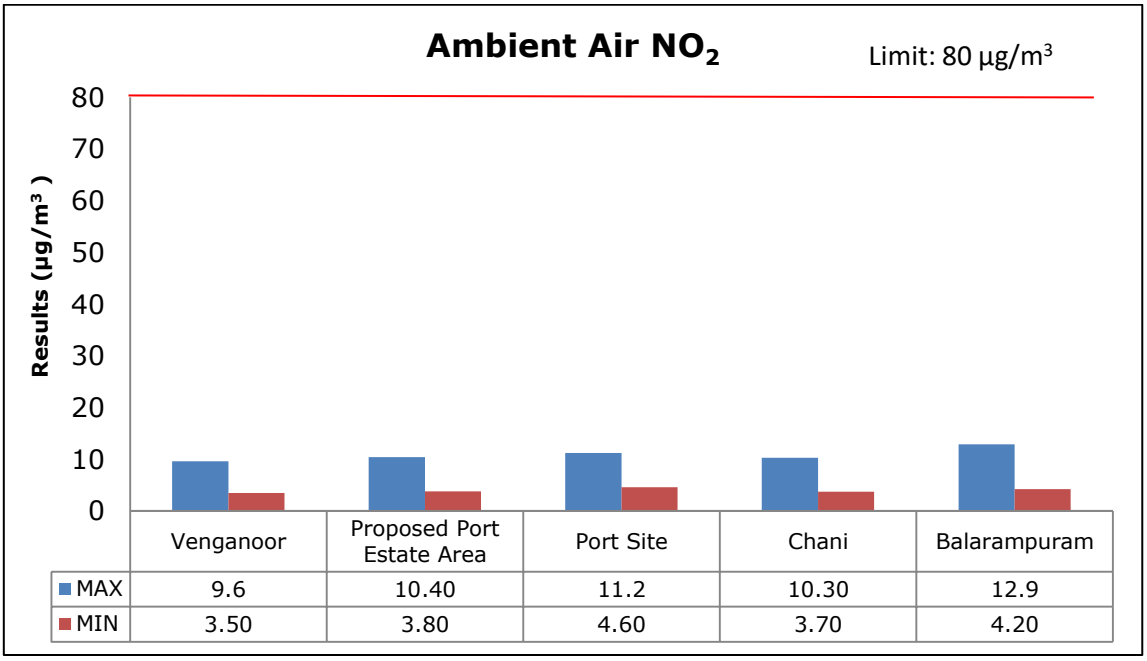
	Venganoor	Proposed Port Estate Area	Port Site	Chani	Balarampuram
MAX	38.0	42.0	40.0	36.0	46.0
MIN	12.0	14.0	18.0	11.00	17.0

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



	Venganoor	Proposed Port Estate Area	Port Site	Chani	Balarampuram
MAX	7.60	8.30	9.10	8.40	9.80
MIN	4.50	4.60	4.80	4.30	4.70

Figure 3.4: Sulphur dioxide (SO_2)



	Venganoor	Proposed Port Estate Area	Port Site	Chani	Balarampuram
MAX	9.6	10.40	11.2	10.30	12.9
MIN	3.50	3.80	4.60	3.70	4.20

Figure 3.5 Nitrogen Dioxide (NO_2)

6. Summary - Ambient Air Quality

During the period October 2018 to March 2019, at the location **Venganoor**, the concentration of PM10 was observed in the range between 50 - 92 µg/m^3, PM2.5 was observed in the range between 12 - 38 µg/m^3, SO_2 was observed in the range

between 4.50 - 7.60 µg/m^3, NO_2 was observed in the range between 3.50 - 9.6 µg/m^3, CO and HC were observed below the detection limit for all six months.

At the location Proposed **Port Colony**, concentration of PM10 was observed in the range between 52 - 94 µg/m^3, PM2.5 was observed in the range between 14 - 42 µg/m^3, SO_2 was observed in the range between 4.60 - 8.30 µg/m^3, NO_2 was observed in the range between 3.80 - 10.40 µg/m^3, CO and HC were observed below the detection limit for all six months.

At the location **Port site**, concentration of PM10 was observed in the range between 60 - 98 µg/m^3, PM2.5 was observed in the range between 18 - 40 µg/m^3, SO_2 was observed in the range between 4.80 - 9.10 µg/m^3, NO_2 was observed in the range between 4.60 - 11.2 µg/m^3, CO and HC were observed below the detection limit for all six months.

At the location **Chani**, concentration of PM10 was observed in the range between 52 - 93 µg/m^3, PM2.5 was observed in the range between 11 - 36 µg/m^3, SO_2 was observed in the range between 4.30 - 8.40 µg/m^3, NO_2 was observed in the range between 3.70 - 10.30 µg/m^3, CO and HC were observed below the detection limit for all six months.

At the location **Balaramapuram**, concentration of PM10 was observed in the range between 57 - 96 µg/m^3, PM2.5 was observed in the range between 17 - 46 µg/m^3, SO_2 was observed in the range between 4.70 - 9.80 µg/m^3, NO_2 was observed in the range between 4.20 - 12.9 µg/m^3, CO and HC were observed below the detection limit for all six months.

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

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 2018 to March 2019 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	8^0,22',06.03" N	77^0,00',17.03" E
2.	Balaramapuram	Commercial	8^0,25',37.60" N	77^0,02',43.80" E
3.	Proposed Port Estate Area	Residential	8^0,22',41.47" N	77^0,01',02.94" E
4.	Chani	Residential	8^0,20',56.86" N	77^0,03',16.19" E
5.	Venganoor	Residential	8^0,23',55.10" N	77^0,00',11.30" E

Figure 4.1 Google Earth View of Ambient Noise Monitoring Stations

2. Methodology of Sampling

Ambient Noise Monitoring is being carried out as per IS 9876: 1981, CPCB Protocol for Ambient Level Noise Monitoring, July 2015 & Manufacturer Manual, WI/S/5/35 & 36, Issue No.3, Issue date 01.09.2016

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 2018 to March 2019

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-18	04.10.2018	89.2	79.2	51.7	44.1	71.5	60.6
	25.10.2018	90.3	82.9	41.2	41.1	71.5	59.0
Nov-18	08.11.2018	94.5	83.9	52.1	45.1	74.4	65.7
	22.11.2018	93.9	75.2	45.7	41.9	68.0	59.5
Dec-18	06.12.2018	96.9	88.3	43.3	40.7	70.1	62.3
	20.12.2018	94.8	82.2	52.5	46.8	69.2	66.5
Jan-19	10.01.2019	86.4	83.4	46.6	46.3	67.7	56.9
	24.01.2019	86.8	80.2	47.4	46.5	64.3	54.9
Feb-19	07.02.2019	94.6	88.3	45.9	42.0	64.1	58.0
	21.02.2019	83.6	75.3	46.6	44.5	62.5	59.0
Mar-19	07.03.2019	93.4	79.3	60.1	47.8	74.3	67.2
	21.03.2019	87.7	83.1	52.3	47.8	74.5	67.6

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)					
As per the Noise Pollution (Regulation & Control) Rules, 2000 [Rules 3 (1) and 4(1)]						75	70

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-18	08.10.2018	83.5	67.8	44.1	41.4	60.6	51.9
	29.10.2018	88.1	82.5	42.7	41.1	62.6	53.6
Nov-18	12.11.2018	89.6	82.5	42.3	40.7	62.2	53.4
	26.11.2018	87.2	73.7	38.8	38.7	62.5	50.7
Dec-18	10.12.2018	89.2	71.9	40.1	40.1	62.5	46.9
	24.12.2018	88.1	82.5	42.7	41.1	62.6	53.6
Jan-19	14.01.2019	81.9	72.0	38.4	38.2	58.2	48.8
	28.01.2019	84.7	77.5	36.5	35.8	57.2	47.3
Feb-19	11.02.2019	90.1	83.8	37.3	38.7	61.4	53.8
	25.02.2019	83.2	78.7	38.2	38.1	59.6	53.3
Mar-19	11.03.2019	86.0	75.0	34.8	34.5	58.8	48.5
	25.03.2019	81.9	75.0	35.4	34.9	62.0	48.6
As per the Noise Pollution (Regulation & Control) Rules, 2000 [Rules 3 (1) and 4(1)]						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-18	05.10.2018	77.8	60.0	42.1	39.9	52.0	44.8
	26.10.2018	79.3	69.2	34.9	34.3	54.2	43.6
Nov-18	09.11.2018	82.6	70.2	38.7	34.9	53.8	44.7
	23.11.2018	90.1	69.6	38.0	37.9	54.8	44.6
Dec-18	07.12.2018	89.3	70.1	35.7	35.6	61.5	42.8
	21.12.2018	86.5	70.7	38.7	37.4	57.5	44.8
Jan-19	11.01.2019	85.7	76.1	38.8	37.3	57.7	44.8

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)					
	25.01.2019	81.2	75.1	37.7	37.2	58	43.4
Feb-19	08.02.2019	81.1	71.4	35.4	36.2	58.8	44.6
	21.02.2019	83.6	75.3	46.6	44.5	62.5	59.0
Mar-19	08.03.2019	82.6	75.0	34.5	34.4	56.7	45.6
	22.03.2019	81.2	74.6	40.8	34.4	54.9	44.8
As per the Noise Pollution (Regulation & Control) Rules, 2000 [Rules 3 (1) and 4(1)]						55	45

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-18	06.10.2018	80.6	67.7	44.2	38.6	54.8	44.5
	27.10.2018	82.6	77.5	390	38.7	54.5	44.8
Nov-18	10.11.2018	82.6	72.1	38.0	37.9	53.6	45.0
	24.11.2018	84.8	81.5	38.7	36.2	54.4	44.1
Dec-18	08.12.2018	87.9	66.9	34.2	34.1	58.2	41.5
	22.12.2018	82.4	79.1	37.5	34.3	54.6	44.7
Jan-19	12.01.2019	79.6	76.0	36.0	34.2	52.0	44.8
	26.01.2019	79.6	72.6	35.3	36.4	53.4	420
Feb-19	09.02.2019	79.7	64.8	36.8	35.7	54.3	41.2
	23.02.2019	77.8	66.4	37.4	37.2	52.4	40.9
Mar-19	09.03.2019	77.8	64.3	35.2	35.2	54.1	43.9
	23.03.2019	78.3	67.0	34.9	34.8	52.1	42.9
As per the Noise Pollution (Regulation & Control) Rules, 2000 [Rules 3 (1) and 4(1)]						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-18	07.10.2018	70.5	66.9	37.2	36.5	45.5	40.3
	28.10.2018	74.1	67.9	34.8	33.9	49.2	42.7

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)					
Nov-18	11.11.2018	75.4	67.9	35.0	34.2	50.4	43.0
	25.11.2018	76.8	70.4	38.0	36.1	46.0	41.7
Dec-18	09.12.2018	80.1	69.7	35.6	35.4	49.6	40.4
	23.12.2018	77.7	78.5	36.3	35.1	48.3	44
Jan-19	13.01.2019	77.2	65.8	34.3	33.8	51.1	41.9
	27.01.2019	74.6	70.8	36.2	36.1	48.9	40.9
Feb-19	10.02.2019	72.3	60.4	33.3	33.4	53.3	36.3
	24.02.2019	76.7	68.2	35.4	35.9	49.8	41.6
Mar-19	10.03.2019	75.5	66.6	35.2	35.1	49.1	41.4
	24.03.2019	71.5	59.3	34.1	35.3	49.2	38.1
As per the Noise Pollution (Regulation & Control) Rules, 2000 [Rules 3 (1) and 4(1)]						**55**	**45**

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	90.1	87.9	80.1	96.9	90.1
	Min	77.8	77.8	70.5	83.6	81.9
	Avg	83.4	81.1	75.2	91.0	86.1
L_{max} Night time dB (A)	Max	76.1	81.5	78.5	88.3	83.8
	Min	60.0	64.3	59.3	75.2	67.8
	Avg	71.4	71.3	67.7	81.8	76.9
L_{min} Day time dB (A)	Max	46.6	44.2	38.0	60.1	44.1
	Min	34.5	34.2	33.3	41.2	34.8
	Avg	38.5	37.3	35.5	48.8	39.3
L_{min} Night	Max	44.5	38.7	36.5	47.8	41.4
	Min	34.3	34.1	33.4	40.7	34.5

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)
time dB (A)	Avg	37.0	36.1	35.1	44.6	38.6
Leq Day time dB (A)	Max	62.5	58.2	53.3	74.5	62.6
	Min	52.0	52.0	45.5	62.5	57.2
	Avg	56.9	54.0	49.2	69.3	60.9
Leq Night time dB (A)	Max	59.0	45.0	44.0	67.6	53.8
	Min	42.8	40.9	36.3	54.9	46.9
	Avg	45.6	43.4	41.0	61.4	50.9

6. Graphical Representation of Results for the period October 2018 to March 2019

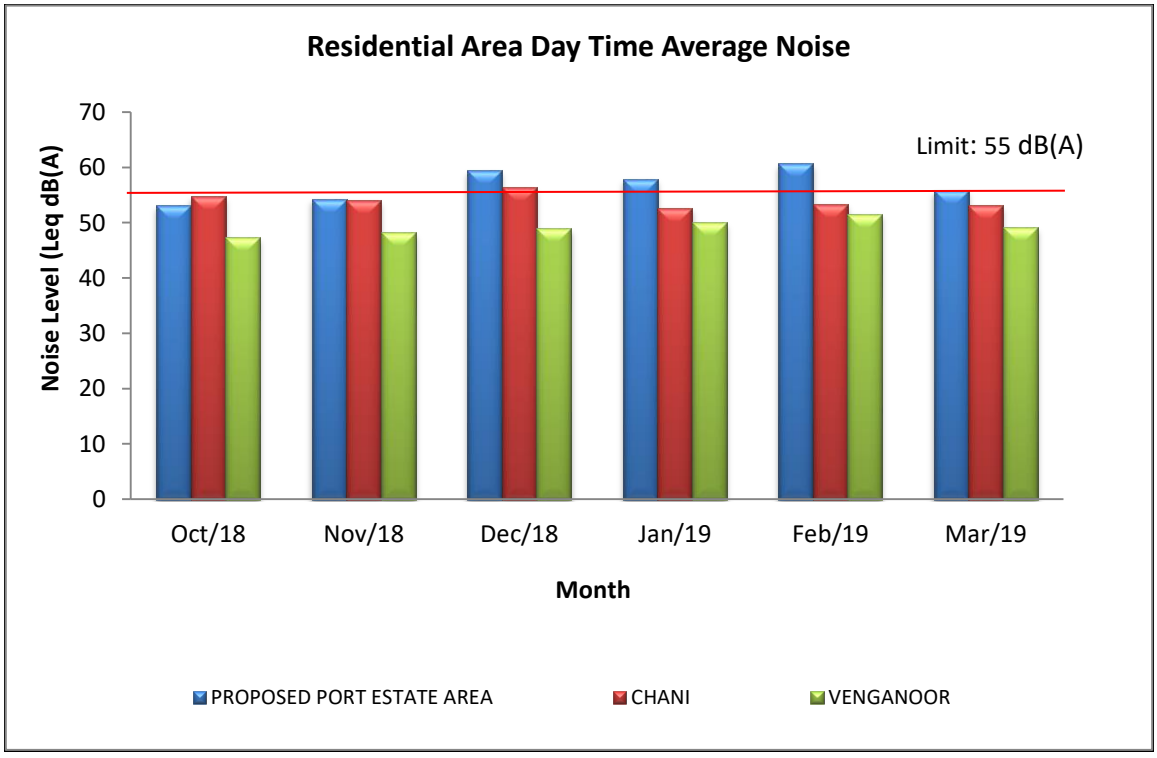


Figure 4.2 Residential Area Noise Level at Day Time

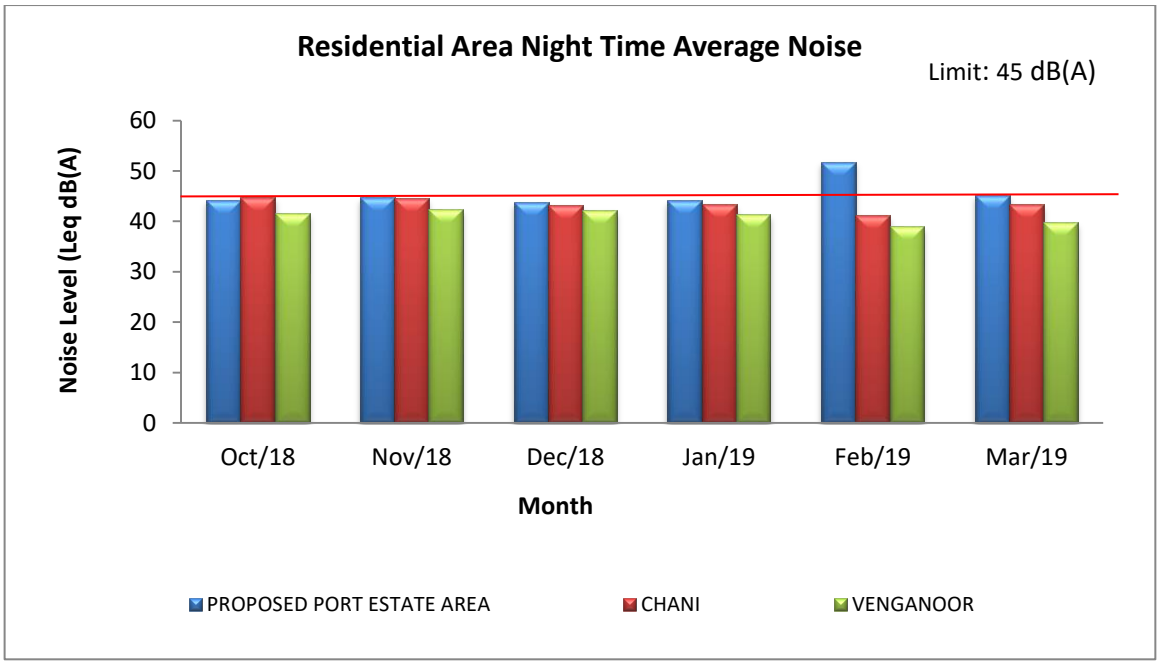


Figure 4.3 Residential Area Noise Level at Night Time

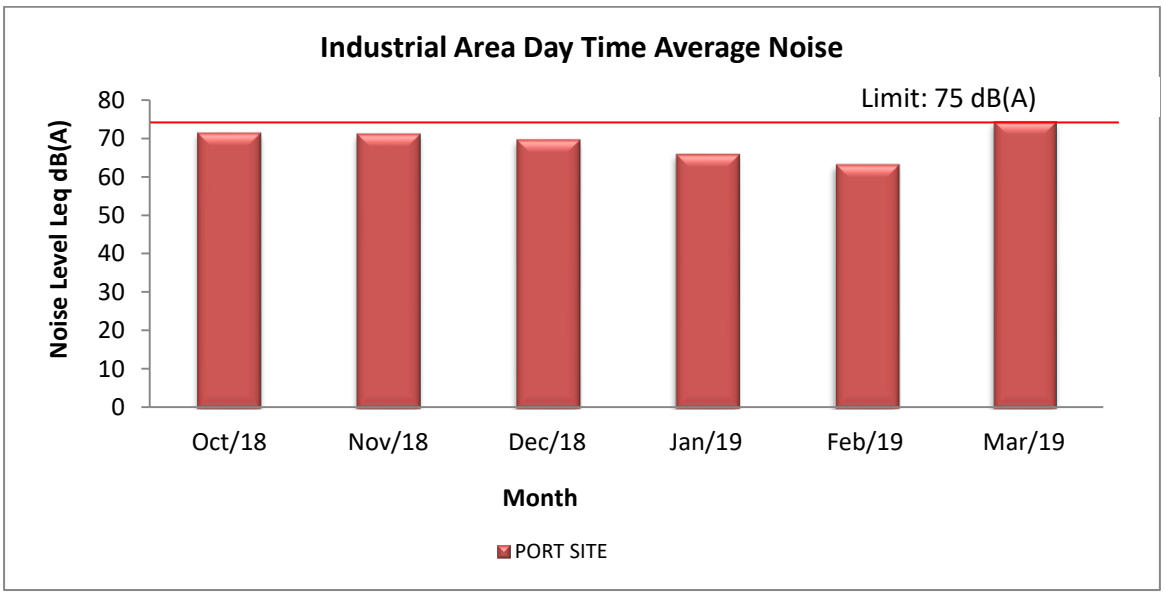


Figure 4.4 Industrial Area Noise Level at Day Time

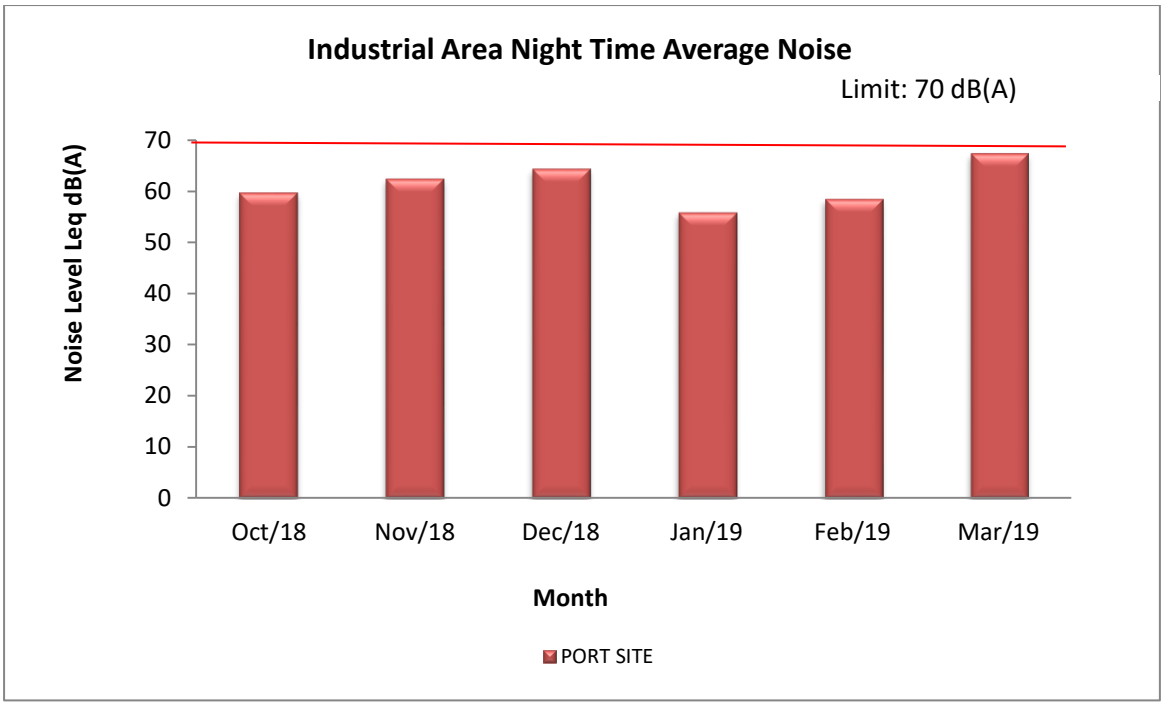


Figure 4.5 Industrial Area Noise Level at night time

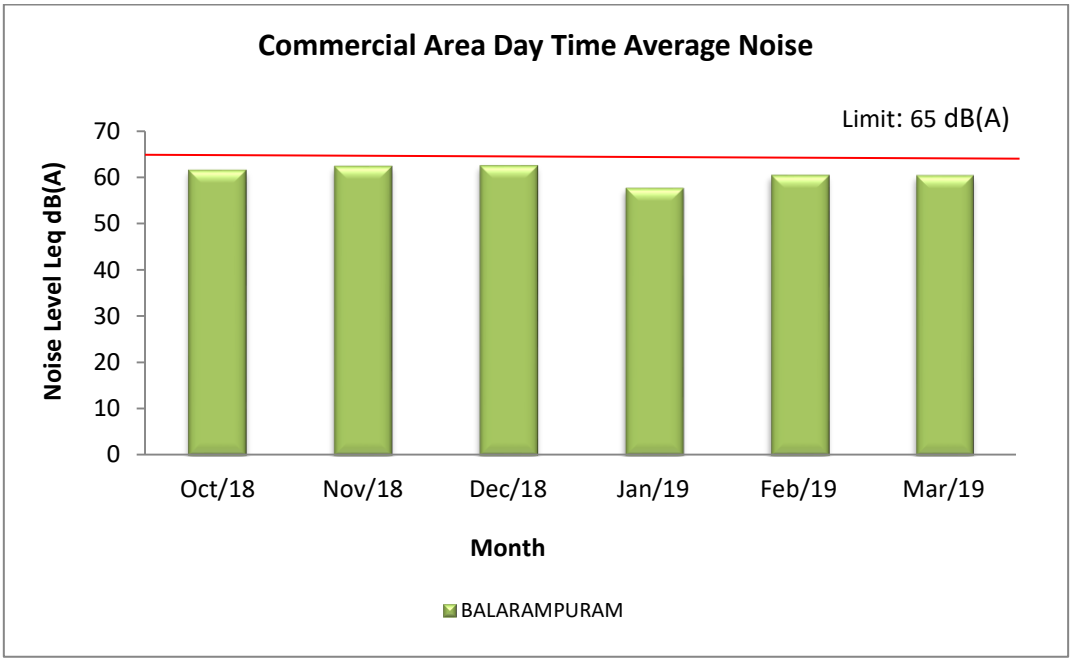


Figure 4.6 Commercial Area Noise Level at day time

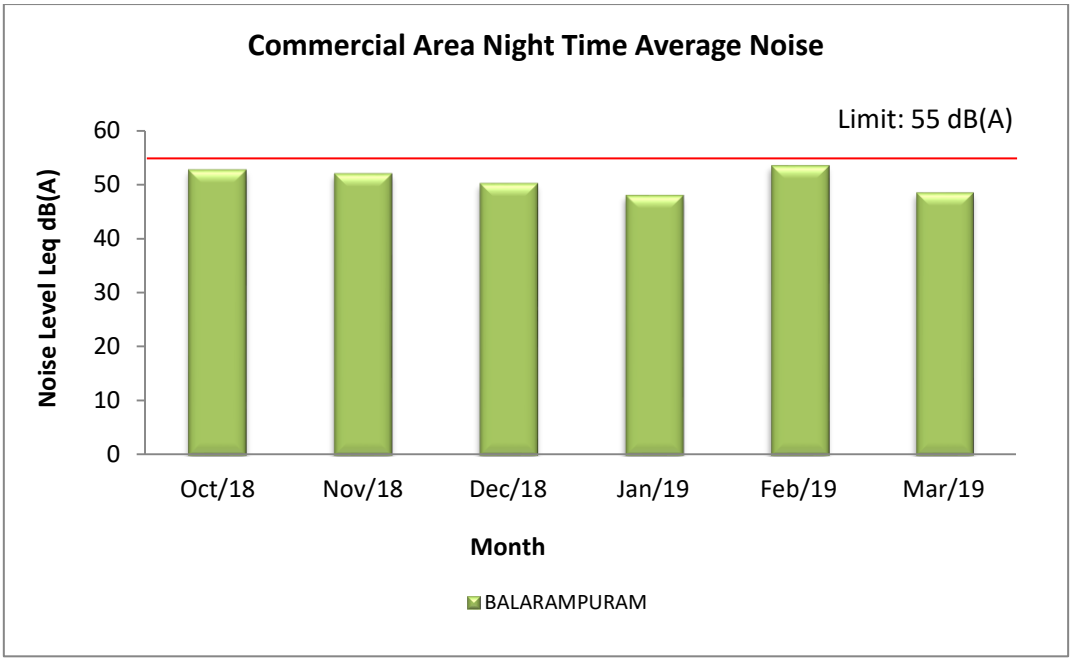


Figure 4.7 Commercial Area Noise Level at night time

7. Summary - Ambient Noise Monitoring

During the period October 2018 to March 2019, average noise levels observed at residential areas i.e. at Proposed Port Estate Area, Chani and Venganoor during day time were 56.9 dBA, 54.0 dBA and 49.2 dBA respectively and during night time 45.6 dBA, 43.4 dBA and 41.0 dBA respectively.

At industrial area i.e. at Port Site area average noise level observed at day time 69.3 dBA and at night time 61.4 dBA.

At commercial area i.e. Balaramapuram area average noise level observed at day time 60.9 dBA and at night time 50.9 dBA.

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 2018 to March 2019 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

S. No.	Location	Latitude	Longitude
1.	Near Kovalam Beach	8^0,22',28.20" N	76^0,58',48.70" E
2.	Proposed Dredge Material Disposal Site	8^0,21',54.40" N	76^0,59',27.90" E
3.	South of Break Water	8^0,22',03.20" N	76^0,59',46.50" E
4.	Port Basin	8^0,22',00.00" N	77^0,00',03.30" E
5.	Inner Approach Channel	8^0,21',05.90" N	77^0,00',40.70" E
6.	Kovalam Beach	8^0,23',03.61" N	76°,58',37.62" E

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

S. No.	Parameter	Unit	Detection Limit	Method Reference
Marine Water Analysis				
1.	Temperature	^{0}C	0	IS 3025 (Part 9):1984
2.	pH Value	-	1	IS 3025 (Part 11):1983
3.	Colour	Hazen Units	1	IS 3025(Part 4): 1983,
4.	Odour	-	Qualitative	IS 3025 (Part 5): 1983
5.	Turbidity	N.T.U.	0.1	IS 3025 (Part 10):1984
6.	Electrical Conductivity (at 25°C)	µmho/cm	0.1	IS 3025(Part 14): 1984
7.	Total Suspended Solids	mg/L	5	IS 3025 (Part 17): 1984
8.	Total Dissolved Solids	mg/L	5	IS 3025 (Part 16):1984
9.	Dissolved Oxygen	mg/L	0.05	IS 3025 (Part 38): 1989
10.	Biochemical Oxygen Demand (3 days, 27°C)	mg/L	1	IS 3025 (Part 44): 1993
11.	Floating Materials – Oil, Grease and Scum (Including Petroleum Products)	mg/L	0.005	APHA, 23rd Ed., 2017,5520-B, 5-40 and Clause 6 of IS: 3025 (Part 39): 1991, Amds.2, Sept 2013
12.	Nitrite (as NO_2)	mg/L	0.01	APHA, 23rd Ed., 2017, 4500-NO2-B,4-124
13.	Nitrate (as NO_3)	mg/L	0.2	APHA, 23rd Ed., 2017, 4500-NO3 B-4-127
14.	Phenolic Compounds(as C_6H_5OH)	mg/L	0.001	APHA, 23rd Ed., 2017, 5530- B & C, 5-49
15.	Ammonical Nitrogen (as NH_3-N)	mg/L	5	APHA, 23rd Ed., 2017, 4500 NH3, B & C, 4 -114, 4-116
16.	Total Nitrogen (as N)	mg/L	0.1	APHA, 23rd Ed., 2017, 4500 NH3, B & C, 4 -114, 4-116
17.	Total Phosphorous (as P)	mg/L	0.1	APHA, 23rd Ed., 2017 , 4500 P,E, 4-155
18.	Reactive Phosphorous	mg/L	0.1	APHA, 23rd Ed., 2017 , 4500 P,E, 4-155
19.	Polycyclic Aromatic Hydrocarbon	mg/L	0.00007	APHA, 23rd Ed., 2017,6440, 6-94

S. No.	Parameter	Unit	Detection Limit	Method Reference
20.	Salinity	‰	0.01	CPCB ADSORBS /8/1983-84
21.	Total Chlorophyll	mg/L	ND	APHA, 23rd Ed.,2017,10200 H
22.	Total Coliforms	MPN Index/100 ml	1.8	APHA, 23rd Ed., 2017, 9221-B, 9-69
23.	Faecal Coliforms	MPN Index /100ml	1.8	APHA, 23rd Ed., 2017, 9221-E, 9-77
24.	Phytoplanktons	No./100ml	ND	APHA, 23rd Ed., 2017
25.	Zooplanktons	No./100ml	ND	APHA, 23rd Ed., 2017
Sediment Analysis				
1.	Texture	-	Qualitative	WI/SAP-Soil/5/03, WL II, Page No.7
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, 22nd Ed., 2012
Note: ND: Not Detected				

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	*Max.* 10
Faecal Coliforms	/100ml	*Max.* 500
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	*Max.* 5
#: Environment (Protection) Rules, 1986, Schedule I, Table 1.4, Primary Water Quality Criteria for Class – IV Water (For Harbour Waters).		

4. Marine Water Analysis Result for the period October 2018 to March 2019

Table 5.4: Marine Water Analysis Results

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
1	Temperature		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	27.0	27.0	27.0	27.0	27.0	27.0
				Low tide	27.0	27.0	27.0	27.0	27.0	27.0
			Mar-19	High tide	29.0	29.3	29.5	29.5	29.7	29.0
				Low tide	29.0	29.3	29.5	29.5	29.7	29.0
2	Colour and Odour		Oct-18	High tide	No visible colour or offensive odour					
				Low tide	No visible colour or offensive odour					
			Nov-18	High tide	No visible colour or offensive odour					
				Low tide	No visible colour or offensive odour					
			Dec-18	High tide	No visible colour or offensive odour					

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
				Low tide	No visible colour or offensive odour					
			Jan-19	High tide	No visible colour or offensive odour					
				Low tide	No visible colour or offensive odour					
			Feb-19	High tide	No visible colour or offensive odour					
				Low tide	No visible colour or offensive odour					
			Mar-19	High tide	No visible colour or offensive odour					
				Low tide	No visible colour or offensive odour					
3	pH Value		Oct-18	High tide	7.40	7.56	7.54	7.64	7.45	7.64
				Low tide	7.50	7.45	7.62	7.52	7.54	7.52
			Nov-18	High tide	7.89	7.66	7.64	7.64	7.78	7.8
				Low tide	7.64	7.58	7.51	7.71	7.71	7.54
			Dec-18	High tide	7.78	7.80	7.63	7.69	7.78	7.79
				Low tide	7.75	7.74	7.79	7.79	7.58	7.75
			Jan-19	High tide	7.81	7.74	7.56	7.72	7.62	7.46
				Low tide	7.32	7.66	7.82	7.81	7.74	7.80
			Feb-19	High tide	8.07	7.88	8.07	8.09	8.20	8.08
				Low tide	7.16	8.16	8.08	8.16	8.19	7.99
			Mar-19	High tide	8.15	8.25	8.03	8.01	8.39	8.38
				Low tide	8.34	8.03	8.30	8.20	8.28	8.30
4	Turbidity		Oct-18	High tide	-	-	-	-	-	-

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	0.3	0.4	1.2	0.8	0.7	0.5
				Low tide	0.5	0.6	1.3	0.9	0.9	0.7
			Mar-19	High tide	0.2	0.5	0.8	0.7	0.8	0.6
				Low tide	0.6	0.8	0.6	0.8	0.5	0.6
5	Electrical Conductivity (at 25oC)		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	41464	50875	44876	50767	47108	46393
				Low tide	45285	49714	45017	45720	47571	47285

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
			Mar-19	High tide	50892	43500	52500	45500	48500	43785
				Low tide	43600	52500	43600	43500	45200	45000
6	Total Suspended Solids		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	7	6	8	8	7	7
				Low tide	8	7	6	9	9	9
			Mar-19	High tide	6	8	0.8	8	7	8
				Low tide	9	0.8	6	8	6	8
7	Total Dissolved Solids		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	23220	28490	25130	28430	26380	25980
				Low tide	25360	27840	25210	25602	26640	26480
			Mar-19	High tide	28500	24410	29400	25480	27160	24520
				Low tide	24410	29400	24410	24360	25310	25480

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
8	Dissolved Oxygen		Oct-18	High tide	5.3	5.4	5.7	5.6	5.8	5.4
				Low tide	5.2	5.2	5.5	5.4	5.6	5.2
			Nov-18	High tide	5.7	5.6	5.9	5.7	5.9	5.8
				Low tide	5.5	5.5	5.7	5.5	5.7	5.6
			Dec-18	High tide	5.9	5.8	6.1	5.9	6.2	6.0
				Low tide	5.7	5.6	5.9	5.8	5.9	5.9
			Jan-19	High tide	6.1	5.9	6.2	6.0	6.4	6.2
				Low tide	5.9	5.8	6.0	5.9	6.1	6.0
			Feb-19	High tide	5.9	5.4	5.1	5.2	5.5	5.8

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
				Low tide	5.7	5.2	4.9	5.0	5.3	5.3
			Mar-19	High tide	5.6	5.1	4.7	4.9	4.9	5.1
				Low tide	5.2	4.7	4.8	4.8	4.7	4.8
9	Biochemical Oxygen Demand (3 days, 27oC)		Oct-18	High tide	4.9	5.1	5.5	5.8	5.7	4.8
				Low tide	5.0	5.4	5.7	6.0	5.9	5.1
			Nov-18	High tide	4.7	4.9	5.1	5.5	5.6	4.5
				Low tide	4.9	5.1	5.4	5.8	5.8	4.9
			Dec-18	High tide	4.2	4.5	4.8	5.1	4.8	4.4
				Low tide	4.5	4.8	5.0	5.2	5.0	4.5
			Jan-19	High tide	4.0	4.3	4.3	4.8	4.3	4.2
				Low tide	4.2	4.5	4.8	4.9	4.5	4.3
			Feb-19	High tide	5.1	5.0	5.4	6.0	4.5	5.2
				Low tide	5.0	5.3	5.5	6.1	4.8	5.5
			Mar-19	High tide	6.1	5.5	5.8	7.0	5.2	5.3
				Low tide	6.8	5.8	6.2	7.1	5.4	5.7
10	Floating Materials (Oil, Grease and Scum) (Including Petroleum		Oct-18	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
			Nov-18	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
			Dec-18	High tide	BDL	BDL	BDL	BDL	BDL	BDL

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
	Products)			Low tide	BDL	BDL	BDL	BDL	BDL	BDL
			Jan-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
			Feb-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
			Mar-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
11	Nitrite (as NO2)		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
			Mar-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
12	Nitrate (as NO3)		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	0.8	1.1	0.9	0.8	0.9	0.8
				Low tide	0.9	1.2	0.8	0.7	0.91	1.1
			Mar-19	High tide	1.0	0.8	0.8	0.7	1.1	0.7
				Low tide	0.6	0.8	0.7	0.4	0.8	0.8
13	Phenolic Compounds (as C6H5OH)		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
			Mar-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
14	Ammonical Nitrogen (as NH3-N		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	0.16	0.12	BDL	0.10	0.12
			Mar-19	High tide	0.14	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
15	Total Nitrogen (as N)		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
			Feb-19	High tide	1.09	1.53	1.10	0.97	1.11	1.14
				Low tide	1.12	1.25	1.21	0.98	1.15	1.57
			Mar-19	High tide	1.02	1.59	0.86	0.85	1.20	1.11
				Low tide	1.25	0.86	1.27	0.66	1.24	1.56
16	Total Phosphorous (as P)		**Oct-18**	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
			Mar-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
17	Reactive Phosphorous		**Oct-18**	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
			Mar-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
18	Polycyclic Aromatic Hydrocarbon		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
			Mar-19	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
19	Salinity		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	37.9	42.4	43.3	49.6	45.1	42.4
				Low tide	42.4	43.3	40.6	43.4	45.1	45.1
			Mar-19	High tide	46.8	40.6	50.4	42.4	46.9	41.5
				Low tide	43.3	50.4	39.7	41.5	44.2	43.3
20	Total Chlorophyll		**Oct-18**	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-19	High tide	1.2	1.4	0.9	0.7	0.9	0.8
				Low tide	1.3	1.3	1.0	0.6	0.8	0.9
			Mar-19	High tide	1.4	1.2	0.8	0.6	1.1	0.7

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
				Low tide	1.1	0.8	0.7	0.5	0.7	1.2
21	Total Coliforms		Oct-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Nov-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Dec-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Jan-19	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Feb-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
			Mar-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
22	Faecal Coliforms		Oct-18	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-18	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
			Dec-18	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
			Jan-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

Sr. No.	Parameter	Limits as per E(P)A Rules, 1986	Month		Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break Water	Port Basin	Inner Approach Channel	Kovalam Beach
			Feb-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
			Mar-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

5. Graphical representation of Results for the period October 2018 to March 2019

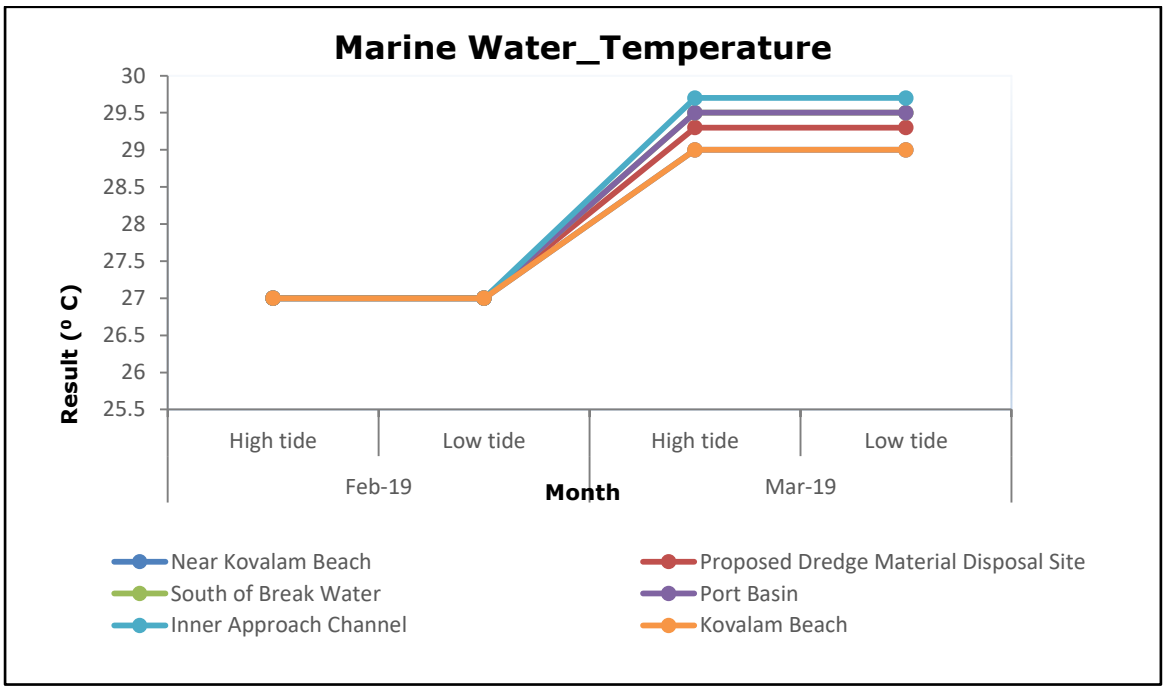


Figure 5.1 Marine Water Analysis for Temperature

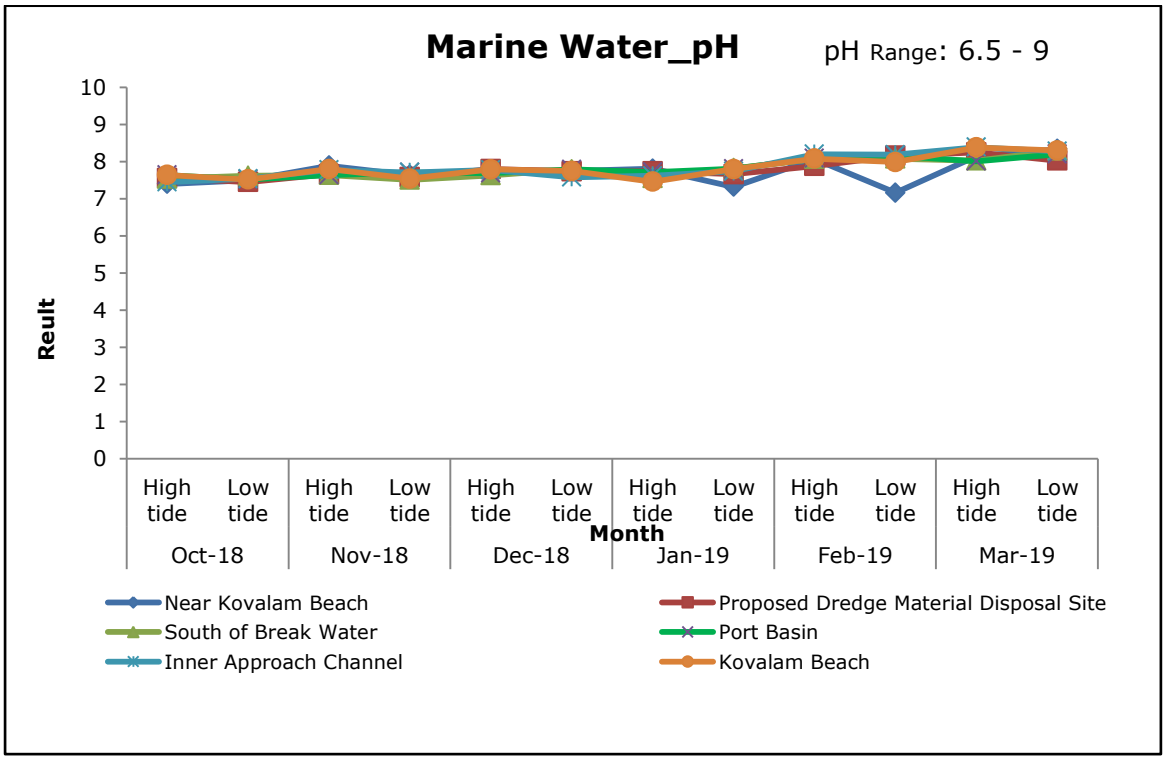


Figure 5.3 Marine Water Analysis for pH

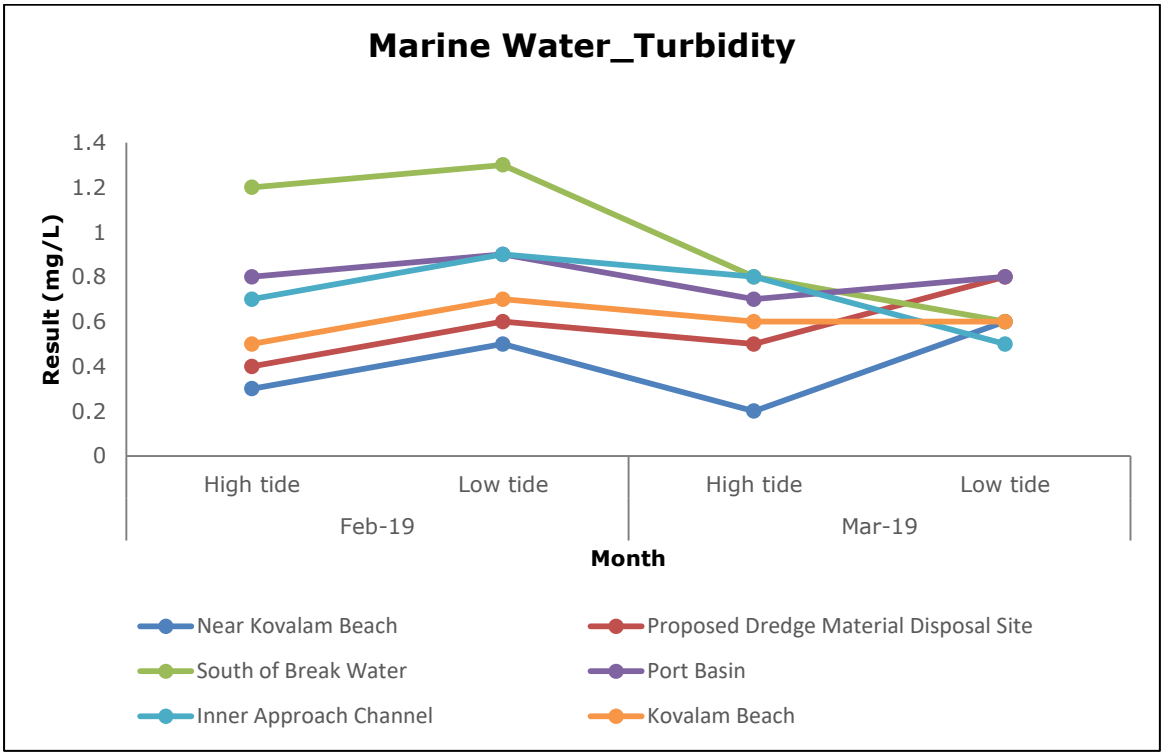


Figure 5.4 Marine Water Analysis for Turbidity

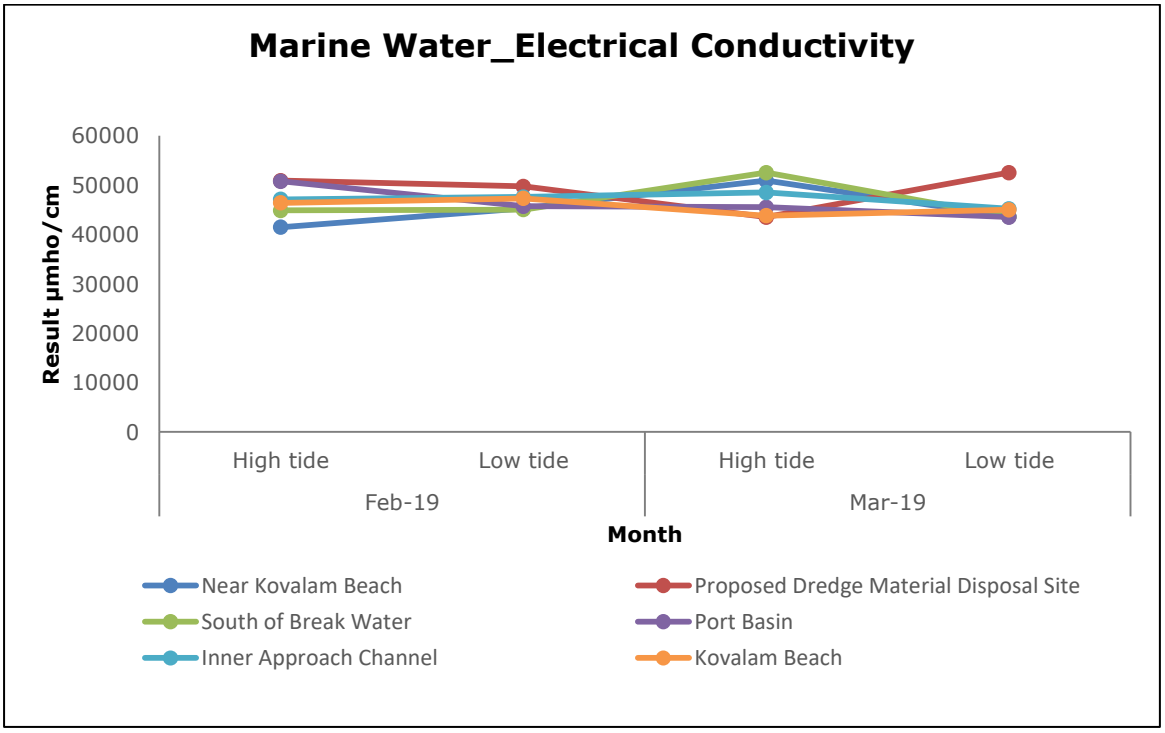


Figure 5.5 Marine Water Analysis for Electrical Conductivity

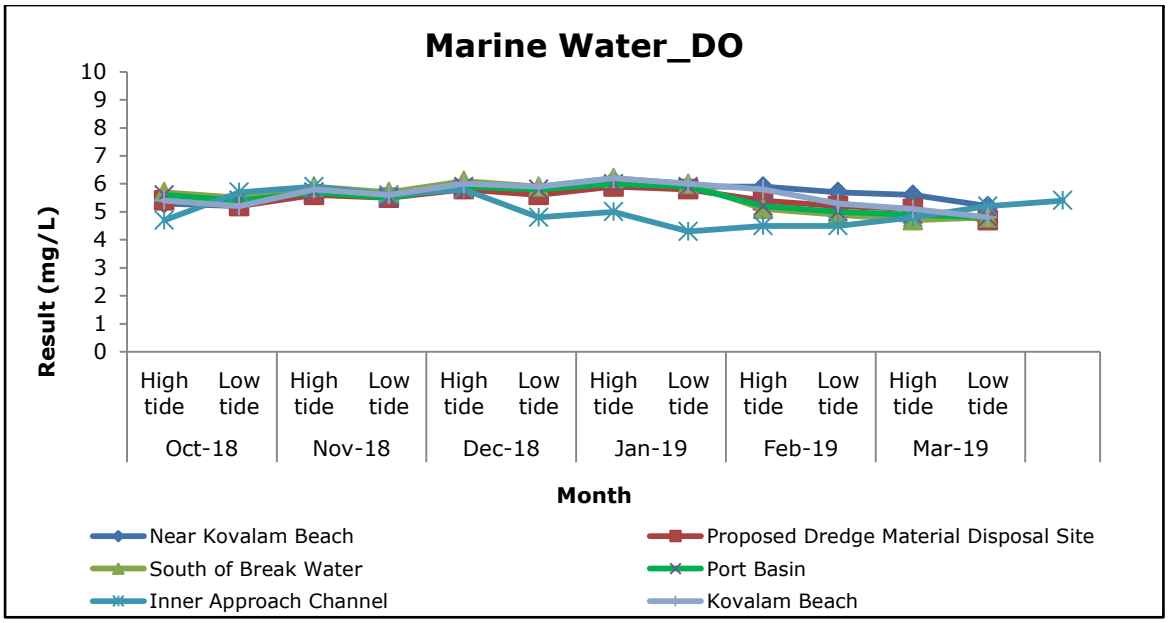


Figure 5.6 Marine Water Analysis for DO

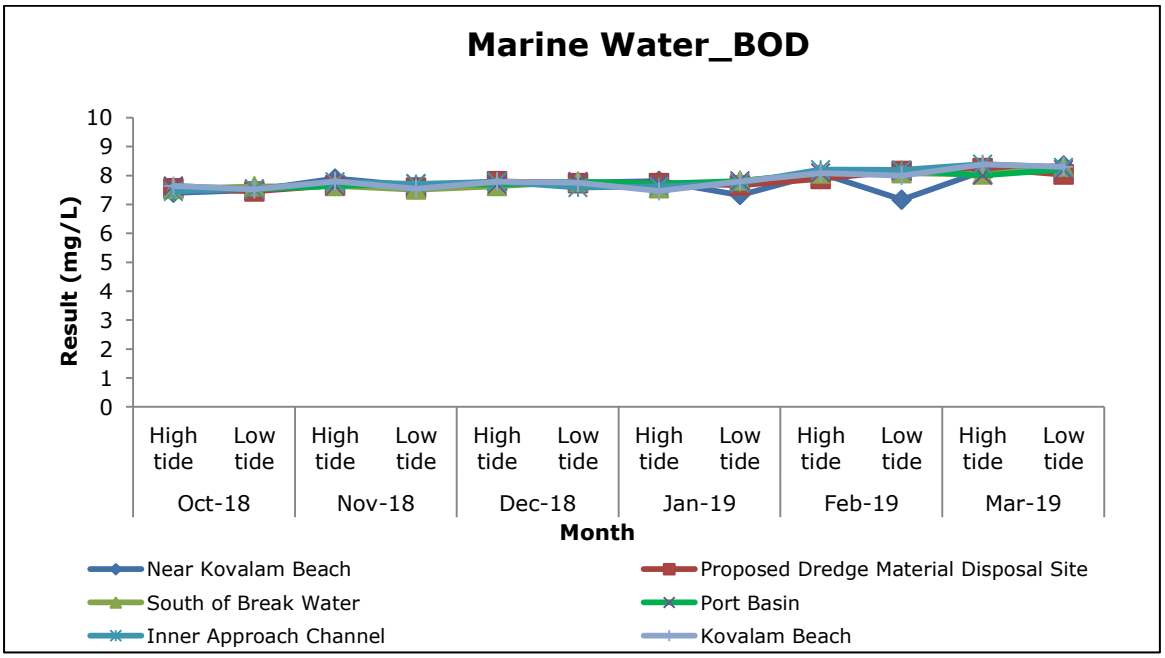


Figure 5.7 Marine Water Analysis for BOD

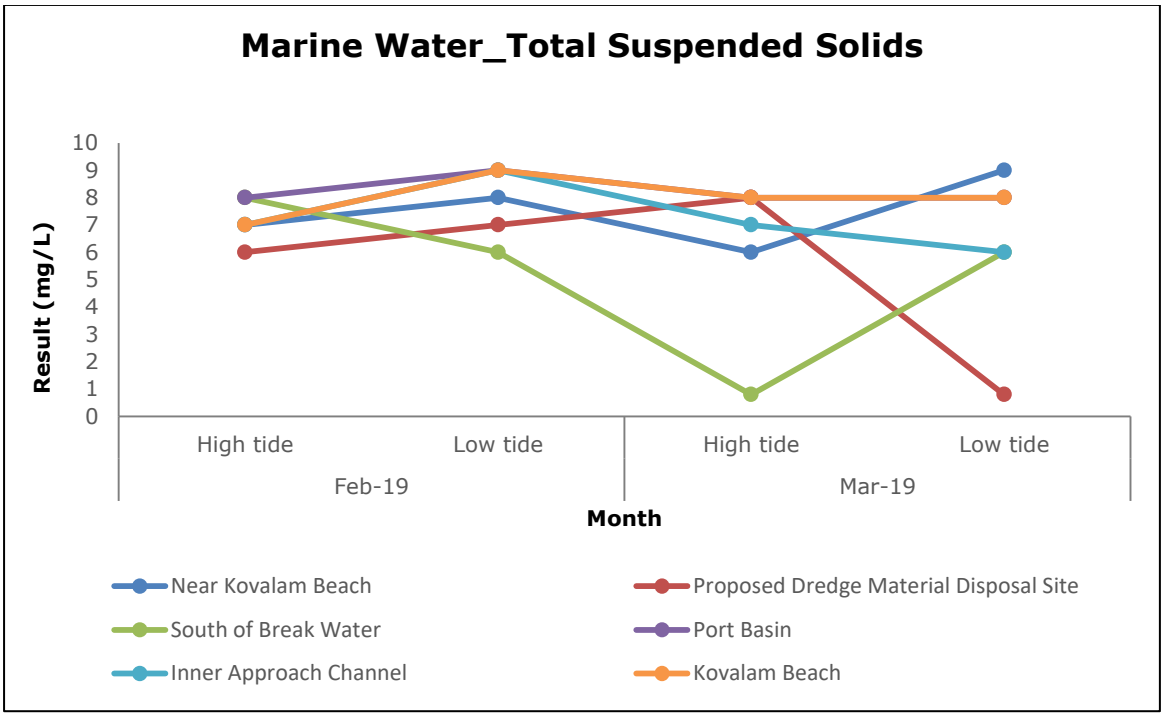


Figure 5.8 Marine Water Analysis for Total Suspended Solids

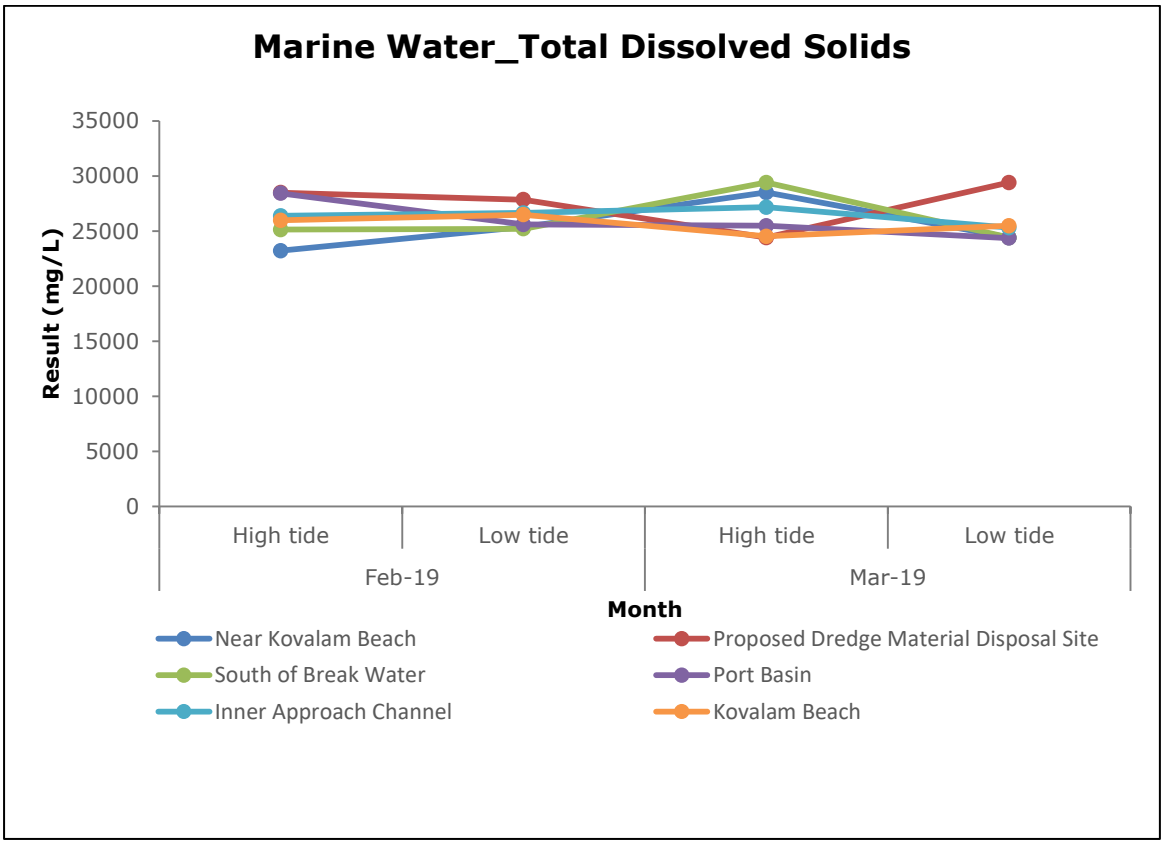


Figure 5.9 Marine Water Analysis for Total Dissolved Solids

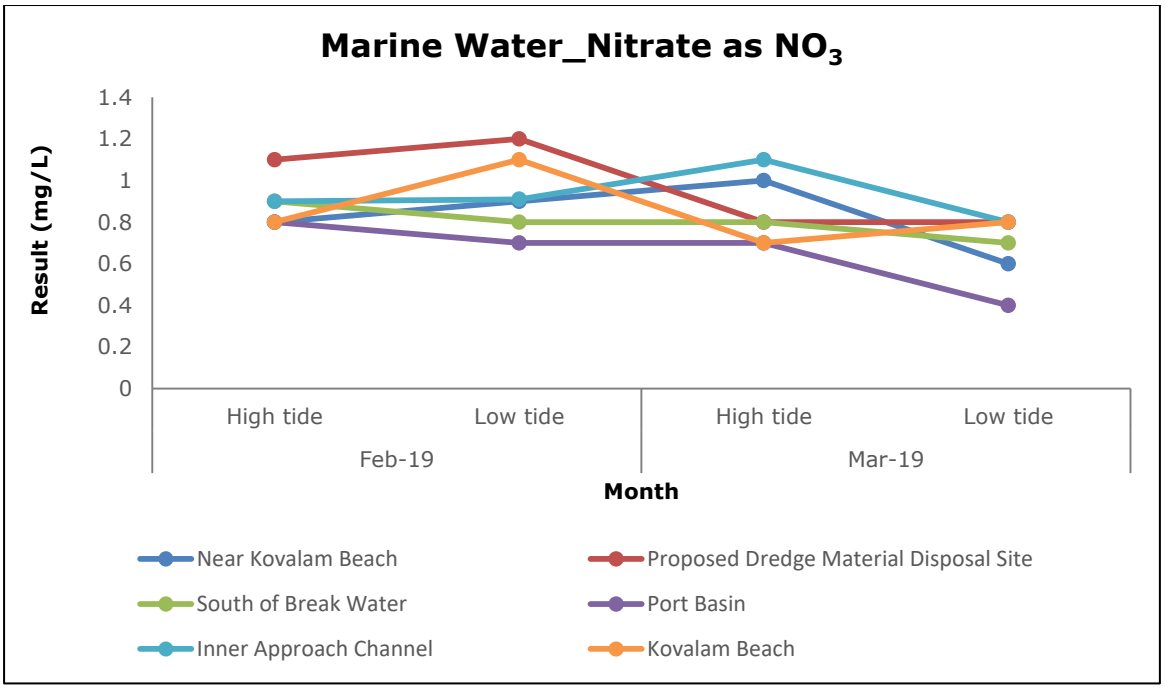


Figure 5.10 Marine Water Analysis for Nitrate as NO_3

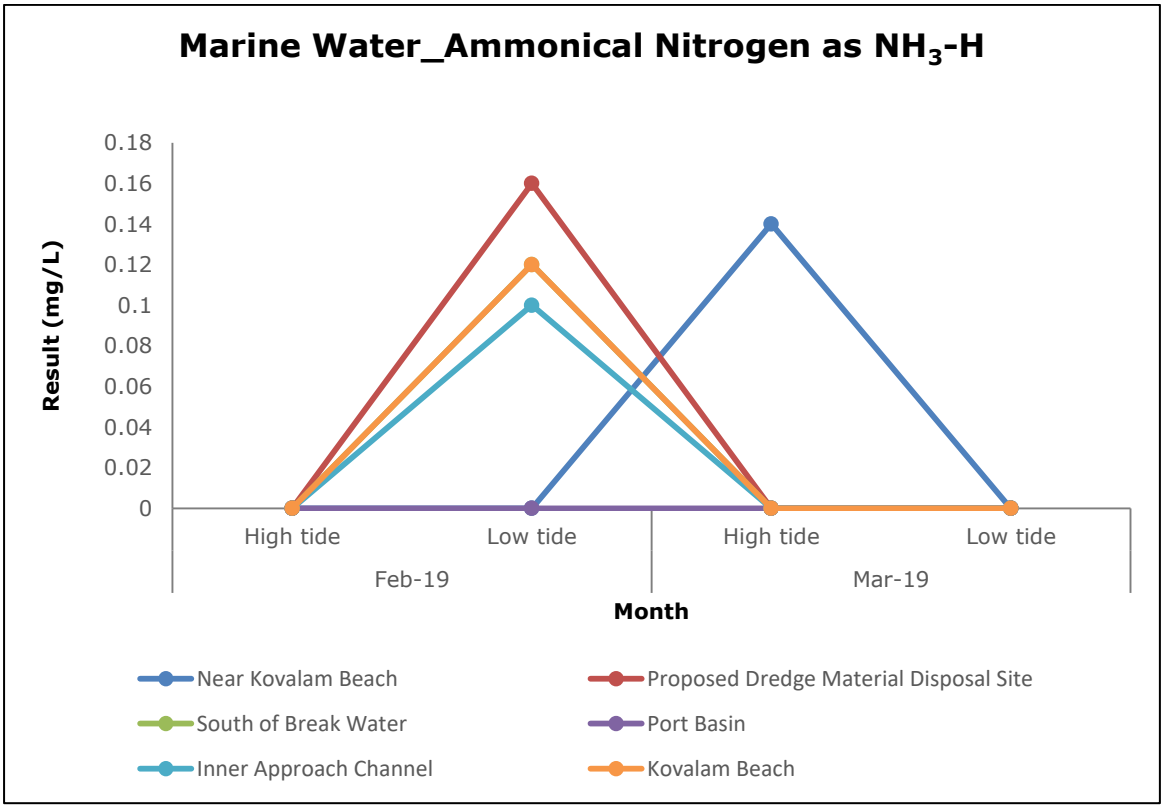


Figure 5.11 Marine Water Analysis for Ammonical Nitrogen as NH3-H

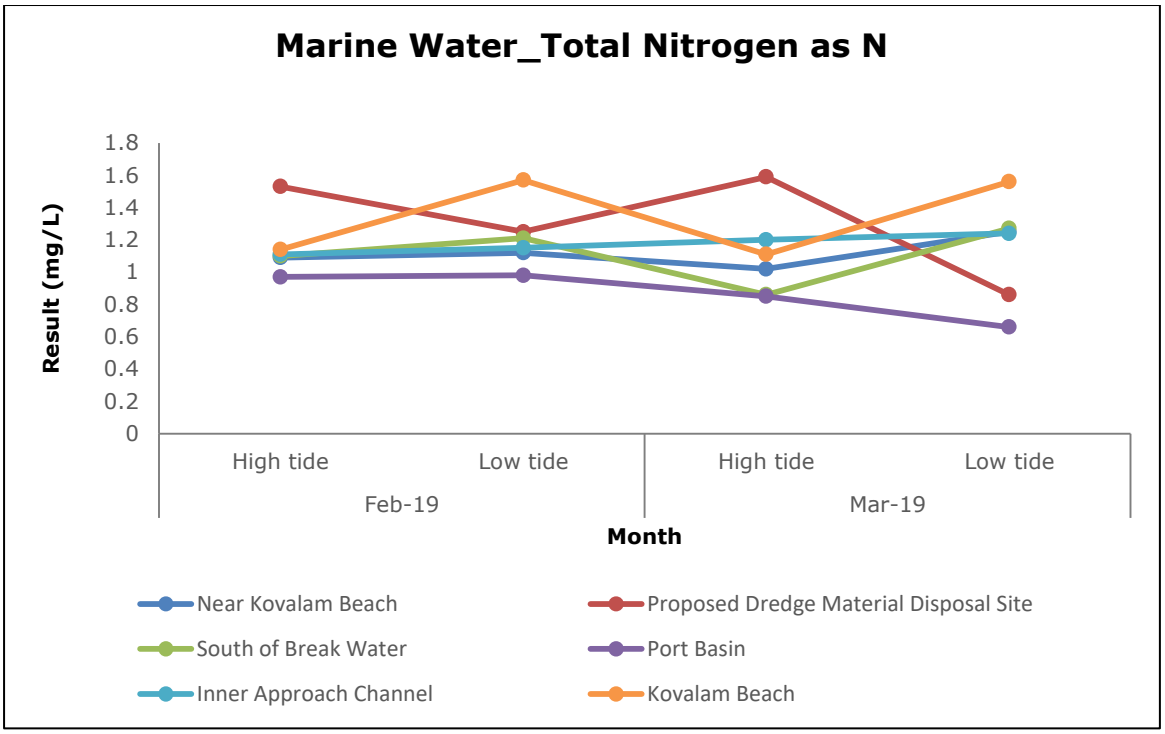


Figure 5.12 Marine Water Analysis for Total Nitrogen as N

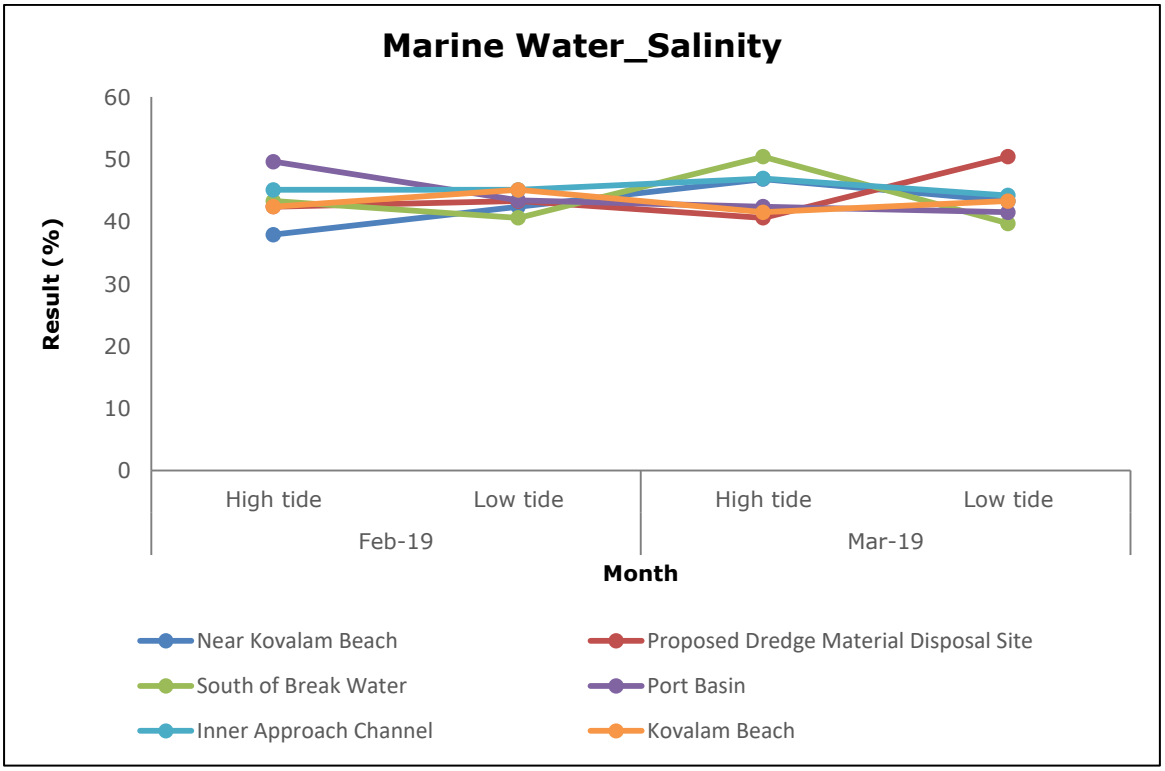


Figure 5.13 Marine Water Analysis for Salinity

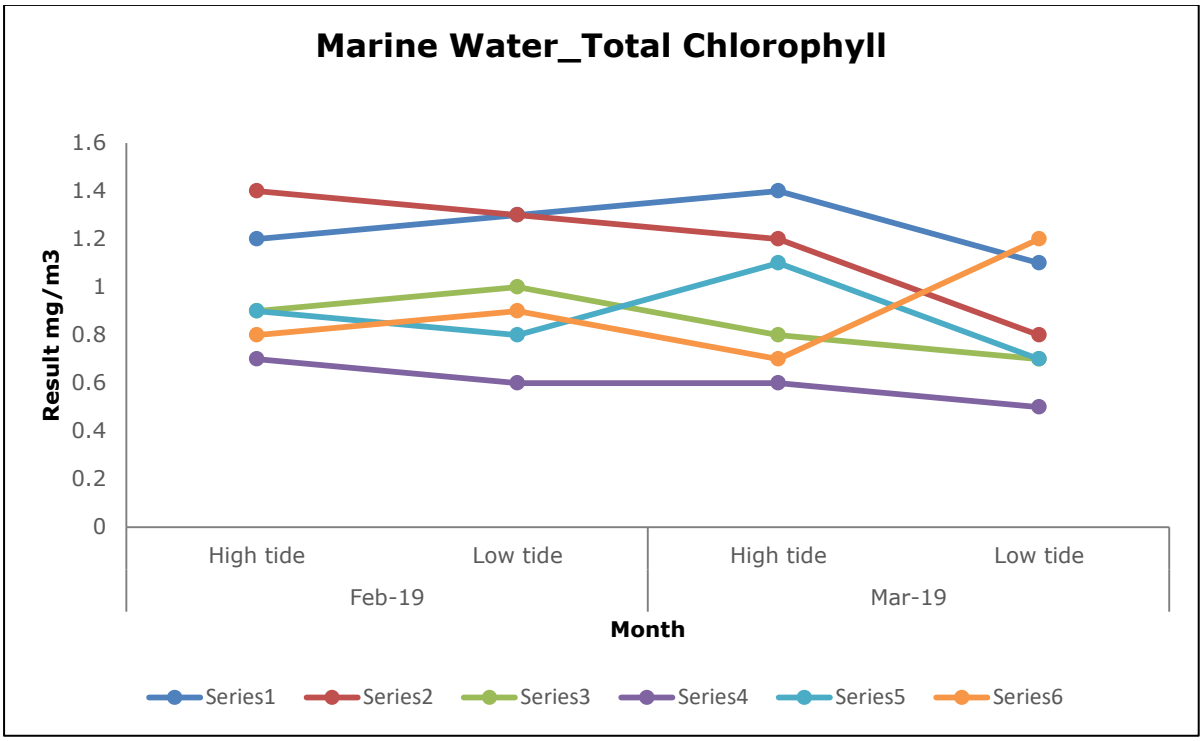


Figure 5.19 Marine Water Analysis for Total Chlorophyll

6. Summary - Marine water analysis:

During the period October 2018 to March 2018, at the location **Near Kovalam Beach**, the low tide and high tide Temperature was observed in the range between 27-29^{0}C, No visible colour or offensive odour observed, concentration of pH were observed in the range between 7.16 – 8.34, Turbidity was observed in the range between 0.20-0.60 N.T.U, Electrical Conductivity (at 25^{o}C) was observed in the range between 41460 – 50892 µmho/cm, Total Suspended Solids was observed in the range between 6 – 9 mg/L, Total Dissolved Solids was observed in the range between 23220 – 28500 mg/L, Dissolved Oxygen was observed in the range between 5.20 – 6.10 mg/L, Biochemical Oxygen Demand (3 days, 27^{o}C) was observed in the range between 4 – 6.80 mg/L, Floating materials were observed below the detection limit to <1, Nitrite (as NO_2) was observed below the detection limit to <1, Nitrate (as NO_3) was observed in the range between 0.60 – 1 mg/L, Phenolic Compounds (as C_6H_5OH) were observed below the detection limit to <1, Ammonical Nitrogen (as NH_3-N) was observed in the range between<1 – 0.14 mg/L, Total Nitrogen (as N) was observed in the range between 1.02 – 1.25 mg/L, Total Phosphorous (as P) was observed below the detection limit to <1 Reactive Phosphorous was observed below the detection limit to <1, Polycyclic Aromatic

Hydrocarbon was observed below the detection limit to <1mg/L, Salinity was observed in the range between 37.90 – 46.80 %, Total Chlorophyll was observed in the range between 1.10 – 1.40 mg/m^3, Total Coliforms were observed <1.8 /100 ml, Faecal Coliforms were observed <1.8 /100ml.

At the location **Proposed Dredge Material Disposal Site**, the low tide and high tide Temperature was observed in the range between 27-29.30 ^{0}C, No visible colour or offensive odour observed, concentration of pH were observed in the range between 7.45 – 8.25, Turbidity was observed in the range between 0.40-0.80 N.T.U, Electrical Conductivity (at 25°C) was observed in the range between 43500 – 52500 µmho/cm, Total Suspended Solids was observed in the range between 0.80 – 8 mg/L, Total Dissolved Solids was observed in the range between 24410 – 29400 mg/L, Dissolved Oxygen was observed in the range between 4.70 – 5.90 mg/L, Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 4.80 – 5.30 mg/L, Floating materials were observed below the detection limit to <1, Nitrite (as NO_2) was observed below the detection limit to <1, Nitrate (as NO_3) was observed in the range between 0.80 – 1.20 mg/L, Phenolic Compounds (as C_6H_5OH) were observed below the detection limit to <1, Ammonical Nitrogen (as NH_3-N) was observed in the range between<1 – 0.16 mg/L, Total Nitrogen (as N) was observed in the range between 0.86 – 1.59 mg/L, Total Phosphorous (as P) was observed below the detection limit to <1 Reactive Phosphorous was observed below the detection limit to <1, Polycyclic Aromatic Hydrocarbon was observed below the detection limit to <1mg/L, Salinity was observed in the range between 40.60 – 50.40 %, Total Chlorophyll was observed in the range between 0.80 – 1.40 mg/m^3, Total Coliforms were observed <1.8 /100 ml, Faecal Coliforms were observed <1.8 /100ml.

At the location **South of Break Water**, the low tide and high tide Temperature was observed in the range between 27-29.50 ^{0}C, No visible colour or offensive odour observed, concentration of pH were observed in the range between 7.51 – 8.30, Turbidity was observed in the range between 0.60-1.30 N.T.U, Electrical Conductivity (at 25°C) was observed in the range between 43600 – 52500 µmho/cm, Total Suspended Solids was observed in the range between 0.80 – 8 mg/L, Total Dissolved Solids was observed in the range between 24410 – 29400 mg/L, Dissolved Oxygen was observed in the range between 4.70 – 6.20 mg/L,

Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 4.30 – 6.20 mg/L, Floating materials were observed below the detection limit to <1, Nitrite (as NO_2) was observed below the detection limit to <1, Nitrate (as NO_3) was observed in the range between 0.70 – 0.90 mg/L, Phenolic Compounds (as C_6H_5OH) were observed below the detection limit to <1, Ammonical Nitrogen (as NH_3-N) was observed in the range between<1 – 0.12 mg/L, Total Nitrogen (as N) was observed in the range between 0.86 – 1.27 mg/L, Total Phosphorous (as P) was observed below the detection limit to <1 Reactive Phosphorous was observed below the detection limit to <1, Polycyclic Aromatic Hydrocarbon was observed below the detection limit to <1mg/L, Salinity was observed in the range between 39.70 – 50.40 %, Total Chlorophyll was observed in the range between 0.80 – 1.40 mg/m^3, Total Coliforms were observed <1.8 /100 ml, Faecal Coliforms were observed <1.8 /100ml.

At the location **Port Basin**, the low tide and high tide Temperature was observed in the range between 27-29.50 ^{0}C, No visible colour or offensive odour observed, concentration of pH were observed in the range between 7.52 – 8.20, Turbidity was observed in the range between 0.70 - 0.90 N.T.U, Electrical Conductivity (at 25°C) was observed in the range between 43500 – 50767 µmho/cm, Total Suspended Solids was observed in the range between 8.0 – 9.0 mg/L, Total Dissolved Solids was observed in the range between 24360 – 28430 mg/L, Dissolved Oxygen was observed in the range between 4.80 – 6.0 mg/L, Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 4.80 – 7.10 mg/L, Floating materials were observed below the detection limit to <1, Nitrite (as NO_2) was observed below the detection limit to <1, Nitrate (as NO_3) was observed in the range between 0.40 – 0.80 mg/L, Phenolic Compounds (as C_6H_5OH) were observed below the detection limit to <1, Ammonical Nitrogen (as NH3-N) was observed in the range between<1 – 0.10 mg/L, Total Nitrogen (as N) was observed in the range between 0.66 – 0.98 mg/L, Total Phosphorous (as P) was observed below the detection limit to <1 Reactive Phosphorous was observed below the detection limit to <1, Polycyclic Aromatic Hydrocarbon was observed below the detection limit to <1mg/L, Salinity was observed in the range between 41.50 – 49.60 %, Total Chlorophyll was observed in the range between 0.80 – 1.40 mg/m^3, Total Coliforms were observed <1.8 /100 ml, Faecal Coliforms were observed <1.8 /100ml.

At the location **Inner Approach Channel**, the low tide and high tide Temperature was observed in the range between 27-29.70 ^{0}C, No visible colour or offensive odour observed, concentration of pH were observed in the range between 7.45 – 8.39, Turbidity was observed in the range between 0.50 - 0.90 N.T.U, Electrical Conductivity (at 25°C) was observed in the range between 45200 – 48500 µmho/cm, Total Suspended Solids was observed in the range between 6.0 – 9.0 mg/L, Total Dissolved Solids was observed in the range between 25310 – 27160 mg/L, Dissolved Oxygen was observed in the range between 4.80 – 6.0 mg/L, Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 4.70 – 6.40 mg/L, Floating materials were observed below the detection limit to <1, Nitrite (as NO_2) was observed below the detection limit to <1, Nitrate (as NO_3) was observed in the range between 0.80 – 1.10 mg/L, Phenolic Compounds (as C_6H_5OH) were observed below the detection limit to <1, Ammonical Nitrogen (as NH3-N) was observed in the range between<1 – 0.10 mg/L, Total Nitrogen (as N) was observed in the range between 1.11 – 1.24 mg/L, Total Phosphorous (as P) was observed below the detection limit to <1 Reactive Phosphorous was observed below the detection limit to <1, Polycyclic Aromatic Hydrocarbon was observed below the detection limit to <1mg/L, Salinity was observed in the range between 44.20 – 46.90 %, Total Chlorophyll was observed in the range between 0.80 – 1.40 mg/m^3, Total Coliforms were observed <1.8 /100 ml, Faecal Coliforms were observed <1.8 /100ml.

At the location **Kovalam Beach**, the low tide and high tide Temperature was observed in the range between 27-29 ^{0}C, No visible colour or offensive odour observed, concentration of pH were observed in the range between 7.46 – 8.38, Turbidity was observed in the range between 0.50 - 0.70 N.T.U, Electrical Conductivity (at 25°C) was observed in the range between 43785 – 47285 µmho/cm, Total Suspended Solids was observed in the range between 7.0 – 9.0 mg/L, Total Dissolved Solids was observed in the range between 24520 – 26480 mg/L, Dissolved Oxygen was observed in the range between 4.80 – 6.20 mg/L, Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 4.20 – 5.70 mg/L, Floating materials were observed below the detection limit to <1, Nitrite (as NO_2) was observed below the detection limit to <1, Nitrate (as NO_3) was observed in the range between 0.70 – 1.10 mg/L, Phenolic Compounds (as C_6H_5OH) were observed below the detection limit to <1, Ammonical Nitrogen (as NH3-N) was

observed in the range between<1 – 0.12 mg/L, Total Nitrogen (as N) was observed in the range between 1.11 – 1.57 mg/L, Total Phosphorous (as P) was observed below the detection limit to <1 Reactive Phosphorous was observed below the detection limit to <1, Polycyclic Aromatic Hydrocarbon was observed below the detection limit to <1mg/L, Salinity was observed in the range between 41.50 – 45.10 %, Total Chlorophyll was observed in the range between 0.80 – 1.40 mg/m^3, Total Coliforms were observed <1.8 /100 ml, Faecal Coliforms were observed <1.8 /100ml.

7. Sediment Analysis Result

Table 5.5: Near Kovalam Beach

Parameter	Unit	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-18
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	2	3.52	2.44	2.75	2.84	2.2
Total Phosphorus (as P)	mg/kg	17	19	15.9	10.6	15.7	15.7
Aluminium (as Al)	mg/kg	640	540	320	376	275	303
Chromium (as Cr)	mg/kg	1.49	8.48	10.7	6.22	8.57	6.7
Copper (as Cu)	mg/kg	BDL	1.2	BDL	BDL	BDL	BDL
Iron (as Fe)	mg/kg	2633	3803	3237	3028	2660	3715
Lead (as Pb)	mg/kg	11.3	9.59	19.5	15	17.6	7.55
Manganese (as Mn)	mg/kg	10.8	25.4	9.43	8.75	8.34	11.7
Mercury (as Hg)	mg/kg	0.03	BDL	0.033	0.023	0.05	0.024
Zinc (as Zn)	mg/kg	3.98	7.83	2.6	4.05	4.6	8.3
Nickel (as Ni)	mg/kg	2.88	5.23	3.12	BDL	4.06	BDL
Benthic Organism							
Micro Benthic Organism	/m^2	92100	93800	94100	95200	90800	88900
Macro Benthic Organism	/m^2	84200	85700	86000	87900	85000	83800
Total	**/m^2**	**176300**	**179500**	**180100**	**183100**	**175800**	**172700**

Table 5.6: Proposed Dredge Material Disposal Site

Parameter	Unit	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-18
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	3	3.99	3.17	3.46	3.32	4.2
Total Phosphorus (as P)	mg/kg	11	21	10.1	10.9	10	15
Aluminium (as Al)	mg/kg	532	528	748	581	486	612
Chromium (as Cr)	mg/kg	5.22	2.39	9.96	4.61	7.76	6.2
Copper (as Cu)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL
Iron (as Fe)	mg/kg	3449	1044	2775	2996	2921	2541
Lead (as Pb)	mg/kg	10.8	8.05	17.6	12.9	22.8	18.2
Manganese (as Mn)	mg/kg	34	9.69	12.7	8.62	8.9	10.1
Mercury (as Hg)	mg/kg	0.04	BDL	0.043	0.055	0.059	0.04
Zinc (as Zn)	mg/kg	5.23	BDL	BDL	3.76	4.34	3.22
Nickel (as Ni)	mg/kg	BDL	BDL	4.74	BDL	5.48	4.12
Benthic Organism							
Micro Benthic Organism	/m^2	12500	13800	14600	15800	14400	13500
Macro Benthic Organism	/m^2	93500	94100	95800	97000	95000	92000
Total	**/m^2**	**106000**	**107900**	**110400**	**112800**	**109400**	**105500**

Table 5.7: South of Breakwater

Parameter	Unit	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-18
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	1.23	3.76	1.33	1.39	1.29	2.12
Total Phosphorus (as P)	mg/kg	21	17	22.9	21.9	22.6	23.5
Aluminium (as Al)	mg/kg	756	751	621	520	483	510
Chromium (as Cr)	mg/kg	8.3	9.01	16.2	5.26	6.35	7.1
Copper (as Cu)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL
Iron (as Fe)	mg/kg	5874	2610	3999	2933	3675	3100
Lead (as Pb)	mg/kg	9.3	11.8	19.5	16.2	21.3	18.2

Parameter	Unit	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-18
Manganese (as Mn)	mg/kg	26.1	10.8	28	8.57	9.75	7.5
Mercury (as Hg)	mg/kg	0.14	BDL	0.143	0.113	0.027	BDL
Zinc (as Zn)	mg/kg	7.76	3.99	6.67	3.67	3.99	4.5
Nickel (as Ni)	mg/kg	5.12	3.32	4.19	BDL	4.54	3.4
Benthic Organism							
Micro Benthic Organism	/m^2	32000	34000	36000	39000	37000	35000
Macro Benthic Organism	/m^2	19000	20000	22000	25000	24000	22000
Total	**/m^2**	**51000**	**54000**	**58000**	**64000**	**61000**	**57000**

Table 5.8: Port Basin

Parameter	Unit	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-18
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	0.962	4.22	0.975	0.862	0.87	0.9
Total Phosphorus (as P)	mg/kg	9	13	9.45	9.86	9.2	10
Aluminium (as Al)	mg/kg	620	432	526	454	385	510
Chromium (as Cr)	mg/kg	12.1	10.1	4.97	2.46	5.99	6.2
Copper (as Cu)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL
Iron (as Fe)	mg/kg	3749	3238	1242	848	2024	1800
Lead (as Pb)	mg/kg	14.3	14.8	14.4	8.66	17.8	14.2
Manganese (as Mn)	mg/kg	21	9.07	9.34	8.58	7.97	10.2
Mercury (as Hg)	mg/kg	0.06	BDL	BDL	0.074	0.037	BDL
Zinc (as Zn)	mg/kg	5.5	5.5	BDL	BDL	3.78	3.1
Nickel (as Ni)	mg/kg	BDL	BDL	2.98	BDL	4.34	3.4
Benthic Organism							
Micro Benthic Organism	/m^2	79100	80000	81200	83000	81000	79000
Macro Benthic Organism	/m^2	61000	62000	63000	65000	63000	62000
Total	**/m^2**	**140100**	**142000**	**144200**	**148000**	**144000**	**141000**

Table 5.9: Inner Approach Channel

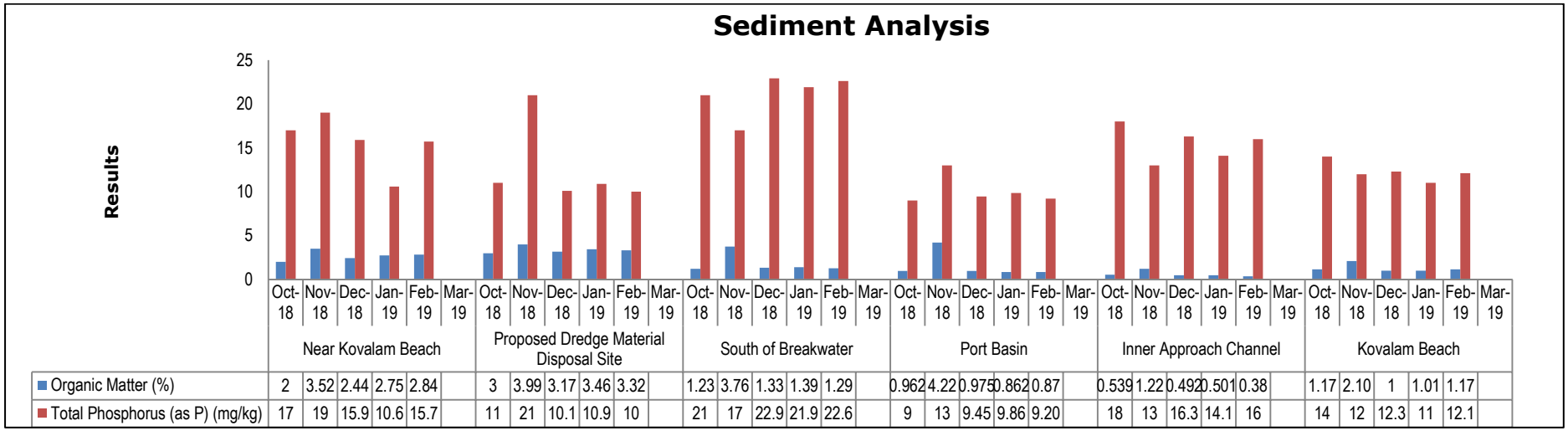
Parameter	Unit	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-18
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	0.539	1.22	0.492	0.501	0.38	0.6
Total Phosphorus (as P)	mg/kg	18	13	16.3	14.1	16	12
Aluminium (as Al)	mg/kg	430	321	281	297	203	220
Chromium (as Cr)	mg/kg	2.44	15.9	8.87	9.04	5.44	6.5
Copper (as Cu)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL
Iron (as Fe)	mg/kg	1038	3875	4276	1979	3388	2980
Lead (as Pb)	mg/kg	7.22	13.9	12.9	10.2	20.5	18.5
Manganese (as Mn)	mg/kg	8.85	23.7	28.2	8.58	8.24	7.5
Mercury (as Hg)	mg/kg	BDL	BDL	0.129	0.062	0.054	BDL
Zinc (as Zn)	mg/kg	BDL	9.62	4.51	BDL	4.35	3.1
Nickel (as Ni)	mg/kg	BDL	2.87	6.33	BDL	5.06	4.5
Benthic Organism							
Micro Benthic Organism	/m^2	29300	30000	32000	35000	32000	31000
Macro Benthic Organism	/m^2	8600	8700	8600	9200	9000	7000
Total	**/m^2**	**37900**	**38700**	**40600**	**44200**	**41000**	**38000**

Table 5.10: Kovalam Beach

Parameter	Unit	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-18
Texture	-	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
Organic Matter	%	1.17	2.1	1	1.01	1.17	1.8
Total Phosphorus (as P)	mg/kg	14	12	12.3	11	12.1	14.1
Aluminium (as Al)	mg/kg	560	498	398	296	202	310
Chromium (as Cr)	mg/kg	5.78	12.1	12.6	3.95	5.04	8.2
Copper (as Cu)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL
Iron (as Fe)	mg/kg	2711	3747	3935	1057	3514	3140

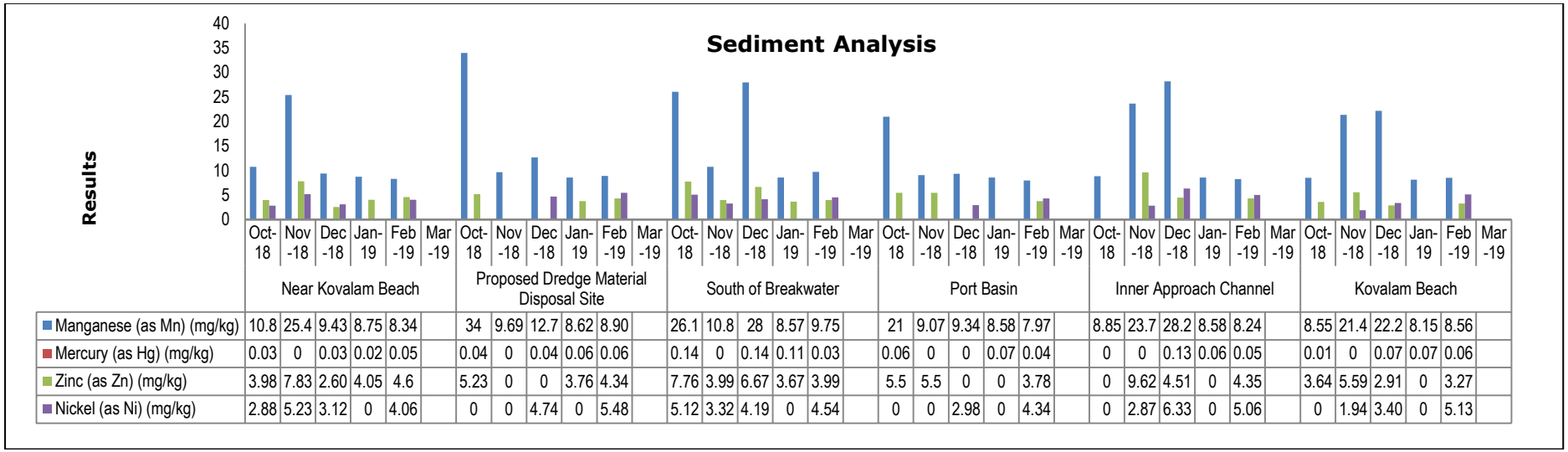
Parameter	Unit	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-18
Lead (as Pb)	mg/kg	16.7	15.1	21.4	11.8	19.4	15.2
Manganese (as Mn)	mg/kg	8.55	21.4	22.2	8..15	8.56	5.2
Mercury (as Hg)	mg/kg	0.01	BDL	0.068	0.07	0.062	BDL
Zinc (as Zn)	mg/kg	3.64	5.59	2.91	BDL	3.27	2.1
Nickel (as Ni)	mg/kg	BDL	1.94	3.4	BDL	5.13	4.2
Benthic Organism							
Micro Benthic Organism	/m^2	94100	95400	96100	98000	95000	91000
Macro Benthic Organism	/m^2	92000	93000	92400	95000	91000	90000
Total	**/m^2**	**186100**	**188400**	**188500**	**193000**	**186000**	**181000**

8. Graphical representation of Results for the period October 2018 to March 2019



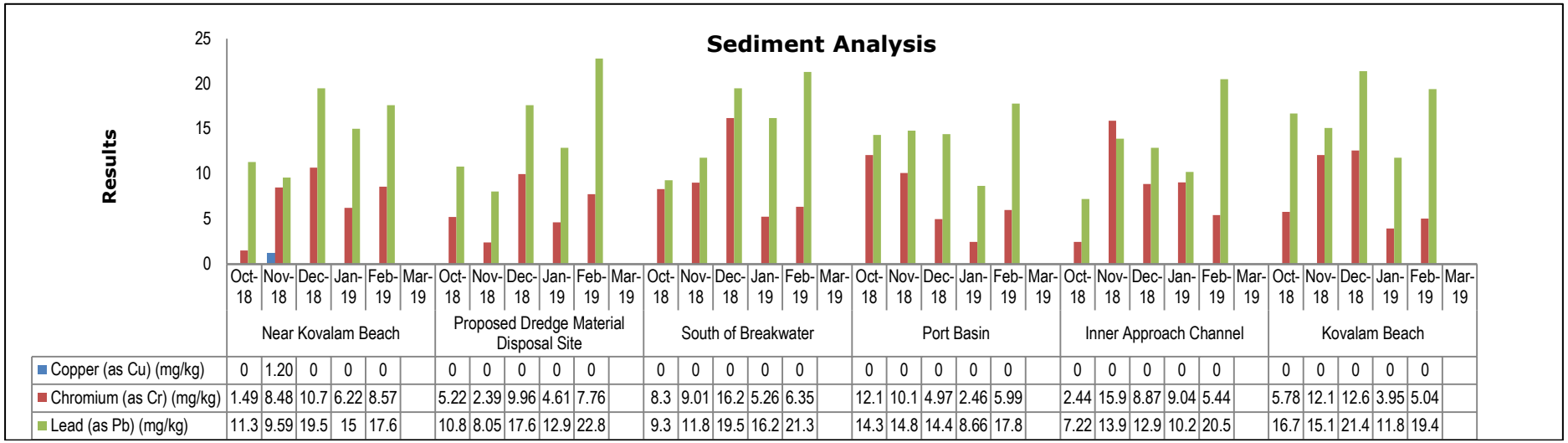
	Near Kovalam Beach						Proposed Dredge Material Disposal Site						South of Breakwater						Port Basin						Inner Approach Channel						Kovalam Beach					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Organic Matter (%)	2	3.52	2.44	2.75	2.84		3	3.99	3.17	3.46	3.32		1.23	3.76	1.33	1.39	1.29		0.962	4.22	0.975	0.862	0.87		0.539	1.22	0.492	0.501	0.38		1.17	2.10	1	1.01	1.17	
Total Phosphorus (as P) (mg/kg)	17	19	15.9	10.6	15.7		11	21	10.1	10.9	10		21	17	22.9	21.9	22.6		9	13	9.45	9.86	9.20		18	13	16.3	14.1	16		14	12	12.3	11	12.1	

Figure 5.20: Sediment analysis for Organic Matter and Total Phosphorus



	Near Kovalam Beach						Proposed Dredge Material Disposal Site						South of Breakwater						Port Basin						Inner Approach Channel						Kovalam Beach					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Manganese (as Mn) (mg/kg)	10.8	25.4	9.43	8.75	8.34		34	9.69	12.7	8.62	8.90		26.1	10.8	28	8.57	9.75		21	9.07	9.34	8.58	7.97		8.85	23.7	28.2	8.58	8.24		8.55	21.4	22.2	8.15	8.56	
Mercury (as Hg) (mg/kg)	0.03	0	0.03	0.02	0.05		0.04	0	0.04	0.06	0.06		0.14	0	0.14	0.11	0.03		0.06	0	0	0.07	0.04		0	0	0.13	0.06	0.05		0.01	0	0.07	0.07	0.06	
Zinc (as Zn) (mg/kg)	3.98	7.83	2.60	4.05	4.6		5.23	0	0	3.76	4.34		7.76	3.99	6.67	3.67	3.99		5.5	5.5	0	0	3.78		0	9.62	4.51	0	4.35		3.64	5.59	2.91	0	3.27	
Nickel (as Ni) (mg/kg)	2.88	5.23	3.12	0	4.06		0	0	4.74	0	5.48		5.12	3.32	4.19	0	4.54		0	0	2.98	0	4.34		0	2.87	6.33	0	5.06		0	1.94	3.40	0	5.13	

Figure 5.21: Sediment analysis for Manganese, Mercury, Zinc and Nickel



	Near Kovalam Beach						Proposed Dredge Material Disposal Site						South of Breakwater						Port Basin						Inner Approach Channel						Kovalam Beach					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Copper (as Cu) (mg/kg)	0	1.20	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
Chromium (as Cr) (mg/kg)	1.49	8.48	10.7	6.22	8.57		5.22	2.39	9.96	4.61	7.76		8.3	9.01	16.2	5.26	6.35		12.1	10.1	4.97	2.46	5.99		2.44	15.9	8.87	9.04	5.44		5.78	12.1	12.6	3.95	5.04	
Lead (as Pb) (mg/kg)	11.3	9.59	19.5	15	17.6		10.8	8.05	17.6	12.9	22.8		9.3	11.8	19.5	16.2	21.3		14.3	14.8	14.4	8.66	17.8		7.22	13.9	12.9	10.2	20.5		16.7	15.1	21.4	11.8	19.4	

Figure 5.22: Sediment analysis for Copper, Chromium and Lead

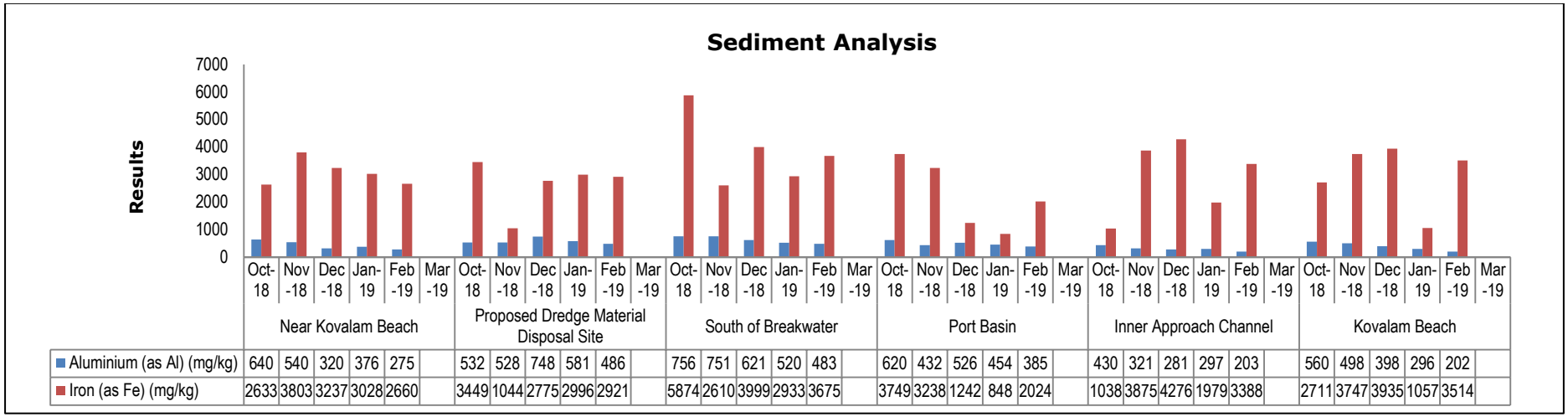


Figure 5.23: Sediment analysis for Aluminium and Iron

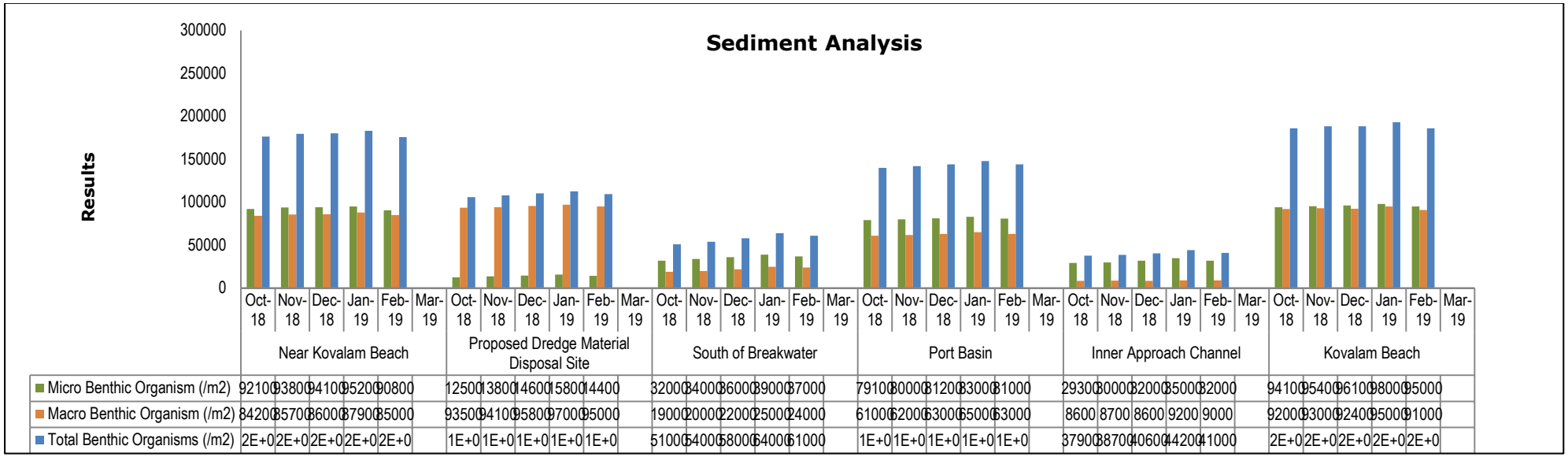


Figure 5.24: Sediment analysis for Benthic organisms

9. Summary- Sediment Analysis:

During the period October 2018 to March 2019, At the location **Near Kovalam Beach**, the observed texture was clay and sandy, Organic matter was observed in the range between 2.0 – 3.52 %, Total Phosphorus (as P) was observed in the range between 10.6 – 19.0 mg/kg. Aluminium (as Al) was observed in the range between 275 - 640 mg/kg. Chromium (as Cr) was observed in the range between 1.49 – 10.7 mg/kg. Copper (as Cu) was observed in the range between <1 – 1.20 mg/kg. Iron (as Fe) was observed in the range between 2633 - 3803 mg/kg. Lead (as Pb) was observed in the range between 7.55 – 19.50 mg/kg. Manganese (as Mn) was observed in the range between 8.34 – 25.4 mg/kg. Mercury (as Hg) was observed in the range between 0.023 – 0.05 mg/kg. Zinc (as Zn) was observed in the range between 2.60 – 8.30 mg/kg. Nickel (as Ni) was observed in the range between 2.88 –5.23 mg/kg. Micro benthic organisms were observed in the range between 88900 – 95200 /m^2 and macro benthic organisms were observed in the range between 83800 – 87900 /m^2.

At the location **Proposed Dredge Material Disposal site**, the observed texture was clay and sandy, Organic matter was observed in the range between 3 – 4.2%, Total Phosphorus (as P) was observed in the range between 10 – 21 mg/kg. Aluminium (as Al) was observed in the range between 486 - 748 mg/kg. Chromium (as Cr) was observed in the range between 2.39 – 10 mg/kg. Copper (as Cu) was observed in the range between below the detection limit to <1 mg/kg. Iron (as Fe) was observed in the range between 1044 - 3449 mg/kg. Lead (as Pb) was observed in the range between 8.050 – 22.8 mg/kg. Manganese (as Mn) was observed in the range between 8.62 – 34.0 mg/kg. Mercury (as Hg) was observed in the range between 0.040 – 0.059 mg/kg. Zinc (as Zn) was observed in the range between 3.22 – 5.23 mg/kg. Nickel (as Ni) was observed in the range between 4.12 – 5.48 mg/kg. Micro benthic organisms were observed in the range between 12500 – 15800/m^2 and macro benthic organisms were observed in the range between 94565.66 – 92000 /m^2.

At the location **South of break water**, the observed texture was clay and sandy, Organic matter was observed in the range between 1.23 – 3.8 %, Total Phosphorus (as P) was observed in the range between 17.0 – 23.5 mg/kg. Aluminium (as Al) was

observed in the range between 483 - 756 mg/kg. Chromium (as Cr) was observed in the range between 5.26 – 16.2 mg/kg. Copper (as Cu) was observed in the range between below the detection limit to <1 mg/kg. Iron (as Fe) was observed in the range between 2610 - 5874 mg/kg. Lead (as Pb) was observed in the range between 9.30 – 21.3 mg/kg. Manganese (as Mn) was observed in the range between 7.50 – 28.0 mg/kg. Mercury (as Hg) was observed in the range between 0.027 – 0.143 mg/kg. Zinc (as Zn) was observed in the range between 3.67 – 7.76 mg/kg. Nickel (as Ni) was observed in the range between below 3.32 – 5.12 mg/kg. Micro benthic organisms were observed in the range between 32000 – 39000/m^2 and macro benthic organisms were observed in the range 19000 – 25000/m^2.

At the location **Port Basin**, the observed texture was clay and sandy, Organic matter was observed in the range between 0.862 – 4.22%, Total Phosphorus (as P) was observed in the range between 9.0 – 13.0 mg/kg. Aluminium (as Al) was observed in the range between 385 - 620 mg/kg. Chromium (as Cr) was observed in the range between 2.46 –12.1 mg/kg. Copper (as Cu) was observed in the range between below the detection limit to <1 mg/kg. Iron (as Fe) was observed in the range between 848 - 3749 mg/kg. Lead (as Pb) was observed in the range between 8.660 – 17.80 mg/kg. Manganese (as Mn) was observed in the range between 7.97 – 21.0 mg/kg. Mercury (as Hg) was observed in the range between 0.074 –11.026 mg/kg. Zinc (as Zn) was observed in the range between 3.10 – 5.25 mg/kg. Nickel (as Ni) was observed in the range between 2.98 – 4.34 mg/kg. Micro benthic organisms were observed in the range between 79000 –83000/m^2 and macro benthic organisms were observed in the range between 61000 - 65000/m^2.

At the location **Inner Approach Channel**, the observed texture was clay and sandy, Organic matter was observed in the range between 0.38 – 1.22%, Total Phosphorus (as P) was observed in the range between 12 – 18 mg/kg. Aluminium (as Al) was observed in the range between 203 - 430 mg/kg. Chromium (as Cr) was observed in the range 2.44 – 15.9 mg/kg. Copper (as Cu) was observed in the range between below the detection limit to <1 mg/kg. Iron (as Fe) was observed in the range between 1038 - 4276 mg/kg. Lead (as Pb) was observed in the range between 7.22 – 20.5 mg/kg. Manganese (as Mn) was observed in the range between 7.50 – 28.20 mg/kg. Mercury (as Hg) was observed in the range between 0.054 – 0.129 mg/kg.

Zinc (as Zn) was observed in the range between 3.10 – 9.62 mg/kg. Nickel (as Ni) was observed in the range between 2.87 – 4.69 mg/kg. Micro benthic organisms were observed in the range between 29300 – 35000/m^2 and macro benthic organisms were observed in the range between 7000 – 9200/m^2.

At the location **Kovalam Beach**, the observed texture was clay and sandy, Organic matter was observed in the range between 1.0 – 2.10%, Total Phosphorus (as P) was observed in the range between 11.0 – 14.1 mg/kg. Aluminium (as Al) was observed in the range between 202 - 560 mg/kg. Chromium (as Cr) was observed in the range 3.95 – 125.6 mg/kg. Copper (as Cu) was observed in the range between below the detection limit to <1 mg/kg. Iron (as Fe) was observed in the range between 1057 – 3935 mg/kg. Lead (as Pb) was observed in the range between 11.8 – 21.4 mg/kg. Manganese (as Mn) was observed in the range between 5.2 – 22.20 mg/kg. Mercury (as Hg) was observed in the range between 0.01 – 0.07 mg/kg. Zinc (as Zn) was observed in the range between 2.10 to 5.59 mg/kg. Nickel (as Ni) was observed in the range between 1.940 – 5.13 mg/kg. Micro benthic organisms were observed in the range between 91000 – 98000/m^2 and macro benthic organisms were observed in the range between 90000 - 95000/m^2.

10. Marine Water Analysis for Phytoplankton and Zooplankton

Table 5.10: 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-18**	651600	380100	1446100	130300	1017600	4345000
	Nov-18	664300	386900	1466800	133400	1436000	4451300
	Dec-18	662000	382200	1497200	140400	1466000	4589500
	Jan-19	681600	405500	1528800	147000	1491000	4657700
	Feb-19	654000	390200	1444500	136000	1409000	4546300
	Mar-19	4270800	379000	1403400	128000	1351000	4427000
Total Zooplankton No/ 100 mL	**Oct-18**	9057	10548	9091	8634	11061	9593
	Nov-18	9198	10938	11180	8972	11508	9637
	Dec-18	8838	10558	10548	8540	11111	9398

Parameter	Month	Near Kovalam Beach	Proposed Dredge Material Disposal Site	South of Break water	Port Basin	Inner Approach Channel	Kovalam Beach
	Jan-19	8663	10176	9812	8317	10713	9110
	Feb-19	8431	9724	9488	8092	10224	8771
	Mar-19	8589	9471	9202	4940	10451	8730

11. Graphical representation of Results for the period April 2018 to September 2018

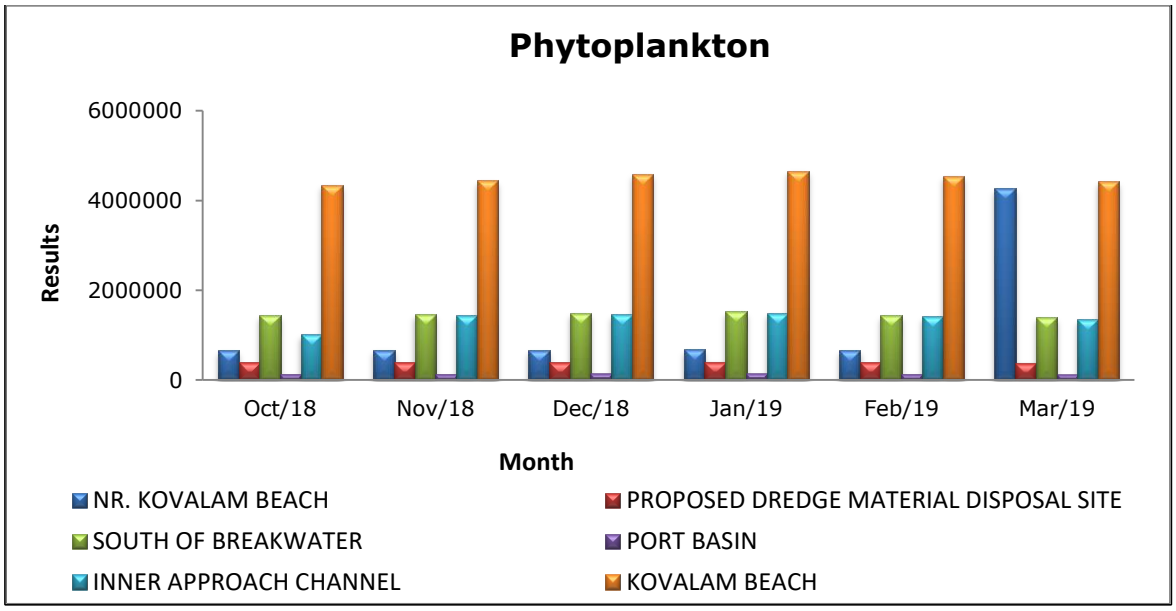


Figure 5.25: Marine Water Analysis for Total Phytoplankton

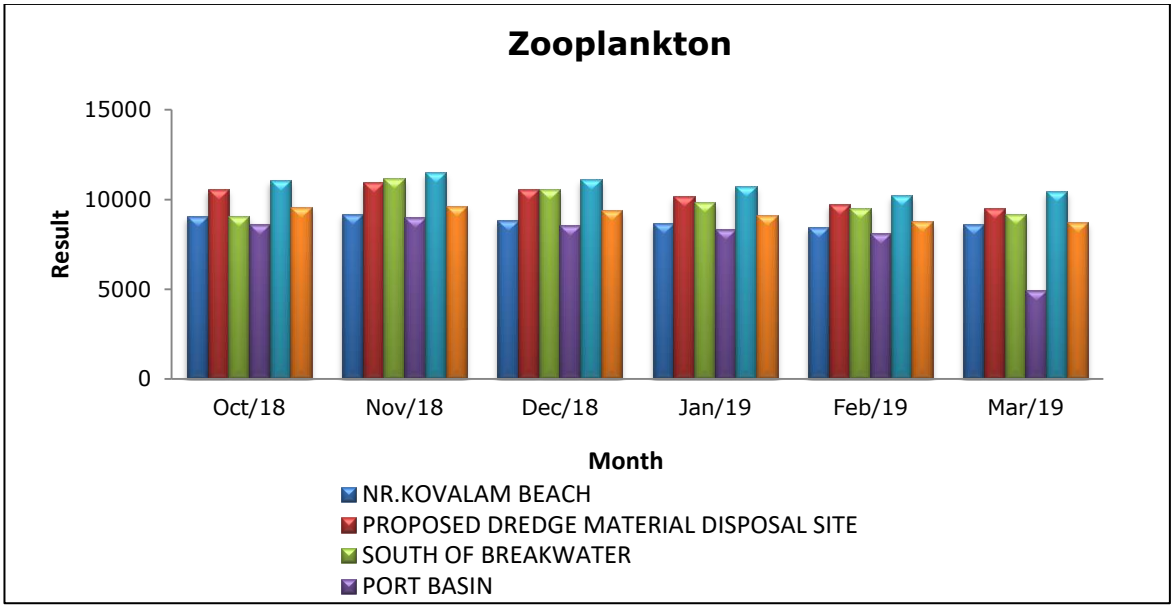


Figure 5.26: Marine Water Analysis for Total Zooplankton

12. Summary- Marine Water Analysis for Phytoplankton and Zooplanktons

During the period October 2018 to March 2019, at the location **Near Kovalam Beach**, Phytoplanktons were observed in the range between 651600 - 4270800 No/100 mL and Zooplanktons were observed in the range between 8431 - 9198 No/100 mL.

At the location **Proposed Dredge Material Disposal site**, Phytoplanktons were observed in the range between 379000 - 405500 No/100 mL and Zooplanktons were observed in the range between 9471– 10938 No/100 mL.

At the location **South of Break water**, Phytoplanktons were observed in the range between 1403400 - 1528800 No/100 mL and Zooplanktons were observed in the range between 9091 – 11180 No/100 mL.

At the location **Port Basin**, Phytoplanktons were observed in the range between 128000 – 147000 No/100 mL and Zooplanktons were observed in the range between 4940 – 8972 No/100 mL.

At the location **Inner Approach Channel**, Phytoplanktons were observed in the range between 1017600 - 1491000 No/100 mL and Zooplanktons was observed in the range between 10224 – 11508 No/100 mL.

At the location **Kovalam Beach**, Phytoplanktons were observed in the range between 4345000 - 46577000 No/100 mL and Zooplanktons was observed in the range between 8730 – 9637 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 2018 to March 2019. 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	8^0,22',06.03" N	77^0,00',17.03" E
2.	PAF Area	8^0,22',20.43" N	77^0,00',04.06" E
3.	Proposed Port Estate Area	8^0,22',24.64" N	77^0,01',46.27" E
Surface Water			
1.	Poovar West Canal	8^0,19',08.18" N	77^0,04',35.30" E
2.	Vizhinjam Branch Canal	8^0,22',49.55" N	76^0,59',35.01" E
3.	Vellayani Lake	8^0,25',30.71" N	76^0,59',37.70" E

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

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.	pH 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, 23rd 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, 23rd Ed., 2017,4500 NH3, B & C, 4 -110, 4-112,
12.	Anionic Detergents (as MBAS) Calculated as LAS mol.wt. 288.38	mg/L	**0.1**	APHA, 23rd Ed., 2017, 5540-B&C,5-518 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, 22nd 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

Sr. No.	Parameter	Unit	Detection Limit	Method Reference
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, 23rd Ed., 2017,4500-NO3,B-4-122
25.	Phenolic Compounds (as C_6H_5OH)	mg/L	**0.001**	APHA, 23rd 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_2S)	mg/L	**0.025**	IS 3025 (Part 29) 1986
30.	Total Phosphate (as PO_4)	mg/L	**0.1**	APHA, 23rd 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
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, 23rd 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

Sr. No.	Parameter	Unit	Detection Limit	Method Reference
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, 23rd Ed., 2017,,6440, 6-94
47.	Total Arsenic (as As)	mg/L	**0.005**	IS 3025(Part 2): 2004

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

3. Ground Water Analysis Results for the period October 2018 to March 2019:

Table 6.3 - Location: Port Site

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
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	6.61	6.68	6.87	7.3	6.77	6.61
Turbidity	N.T.U.	*Max.* 1	BDL	0.8	BDL	BDL	BDL	BDL
Total Dissolved Solids	mg/L	*Max.* 500	340	346	242	294	310	356
General Parameters concerning substances undesirable in excessive amounts								
Aluminium (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	16.0	36.9	33.7	30.7	38.4	35.2

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Chloramines (as Cl_2)	mg/L	*Max.* 4.0	BDL	BDL	BDL	BDL	BDL	BDL
Chloride (as Cl)	mg/L	*Max.*250	186	149	110	99	98	110
Copper (as Cu)	mg/L	*Max.*0.05	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	*Max.* 1	0.050	BDL	0.100	0.200	0.100	0.1
Iron (as Fe)	mg/L	*Max.*0.3	0.280	0.290	BDL	0.078	0.250	0.067
Magnesium (as Mg)	mg/L	*Max.* 30	12.6	15.6	21.9	14.1	13.6	12.6
Manganese (as Mn)	mg/L	*Max.*0.1	0.024	0.025	0.033	BDL	BDL	BDL
Mineral Oil	mg/L	*Max.*0.5	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO_3)	mg/L	*Max.*45	2.68	4.90	BDL	0.230	BDL	2.3
Phenolic Compounds (as C_6H_5OH)	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	43.9	56.6	66.0	60.9	45.2	29.5
Sulphide (as H_2S)	mg/L	*Max.* 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as $CaCO_3$)	mg/L	*Max.*200	25	115	105	102	115	90
Total Hardness (as $CaCO_3$)	mg/L	*Max.* 200	92	156	174	152	158	140
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
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	µg/L	30	BDL	BDL	BDL	BDL	BDL	BDL

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
acid								
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								
E. coli	MPN Index /100 mL	Not Detectable	Absent	Absent	Absent	Absent	Absent	Absent
Total Coliforms	MPN Index /100 mL	-	6.8	130	<1.8	49	7.8	Absent

Table 6.4 - Location: Proposed Port Estate Area

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Organoleptic & Physical Parameters								
Colour	Hazen Units	*Max.* 5	1	1	1	1	1	1

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH Value	-	6.5 to 8.5	6.8	6.85	6.65	6.97	6.74	6.7
Turbidity	N.T.U.	*Max.* 1	BDL	BDL	BDL	BDL	BDL	BDL
Total Dissolved Solids	mg/L	*Max.* 500	96	98	150	164	170	176
General Parameters concerning substances undesirable in excessive amounts								
Aluminium (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	8.02	8.02	10.4	14	16.1	18.2
Chloramines (as Cl_2)	mg/L	*Max.* 4.0	BDL	BDL	BDL	BDL	BDL	BDL
Chloride (as Cl)	mg/L	*Max.*250	26	34	48	56	60	64.1
Copper (as Cu)	mg/L	*Max.*0.05	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	*Max.* 1	0.3	0.3	0.2	BDL	0.3	BDL
Iron (as Fe)	mg/L	*Max.*0.3	BDL	BDL	0.066	BDL	0.243	0.13
Magnesium (as Mg)	mg/L	*Max.* 30	3.89	7.29	4.86	6.46	7.97	8.9
Manganese (as Mn)	mg/L	*Max.*0.1	BDL	BDL	BDL	BDL	BDL	0.032
Mineral Oil	mg/L	*Max.*0.5	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO_3)	mg/L	*Max.*45	5.11	7.84	14.8	12.2	3.81	1.89
Phenolic Compounds (as C_6H_5OH)	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	10.1	21.8	28.2	30.5	32
Sulphide (as H_2S)	mg/L	*Max.* 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as $CaCO_3$)	mg/L	*Max.*200	15	20	35	46	50	58
Total Hardness (as $CaCO_3$)	mg/L	*Max.* 200	36	50	46	58	62	72
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

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
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
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								

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
E. coli	MPN Index /100 mL	Not Detectable	Absent	Absent	Absent	Absent	Absent	Absent
Total Coliforms	MPN Index /100 mL	-	49	Absent	<1.8	<1.8	<1.8	Absent

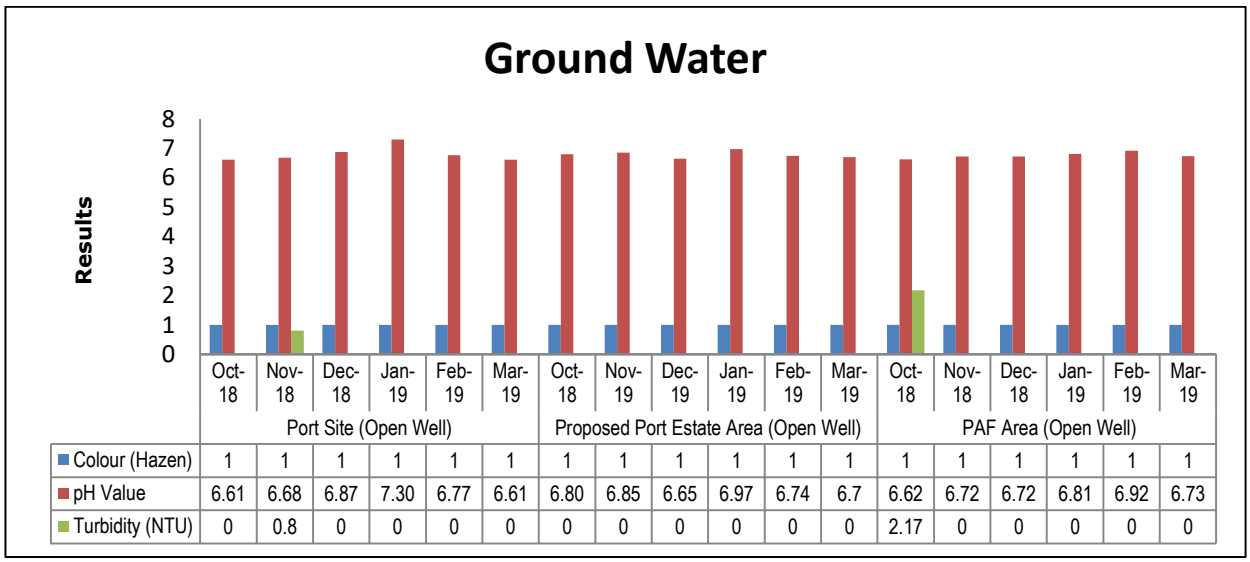
Table 6.5 - Location: PAF Area

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
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	6.62	6.72	6.72	6.81	6.92	6.73
Turbidity	N.T.U.	*Max.* 1	2.17	BDL	BDL	BDL	BDL	BDL
Total Dissolved Solids	mg/L	*Max.* 500	140	352	414	480	485	490
General Parameters concerning substances undesirable in excessive amounts								
Aluminium (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	15.2	14.4	36.8	37.7	44.9	48
Chloramines (as Cl_2)	mg/L	*Max.* 4.0	BDL	BDL	BDL	BDL	BDL	BDL
Chloride (as Cl)	mg/L	*Max.*250	42.4	160	182	190	210	220
Copper (as Cu)	mg/L	*Max.*0.05	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	*Max.* 1	0.3	0.6	0.3	0.2	0.1	BDL
Iron (as Fe)	mg/L	*Max.*0.3	BDL	BDL	BDL	BDL	0.284	0.058
Magnesium (as Mg)	mg/L	*Max.* 30	2.92	10.7	20.4	23.3	16.5	22.4

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Manganese (as Mn)	mg/L	*Max.*0.1	BDL	BDL	BDL	BDL	BDL	0.037
Mineral Oil	mg/L	*Max.*0.5	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO_3)	mg/L	*Max.*45	3.1	8.77	11.3	12	13	14.7
Phenolic Compounds (as C_6H_5OH)	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	15.3	63.5	68.6	145	140	52.5
Sulphide (as H_2S)	mg/L	*Max.* 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as $CaCO_3$)	mg/L	*Max.*200	35	30	57.5	40	42	48
Total Hardness (as $CaCO_3$)	mg/L	*Max.* 200	50	80	176	190	185	192
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
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 &	µg/L	0.4	BDL	BDL	BDL	BDL	BDL	BDL

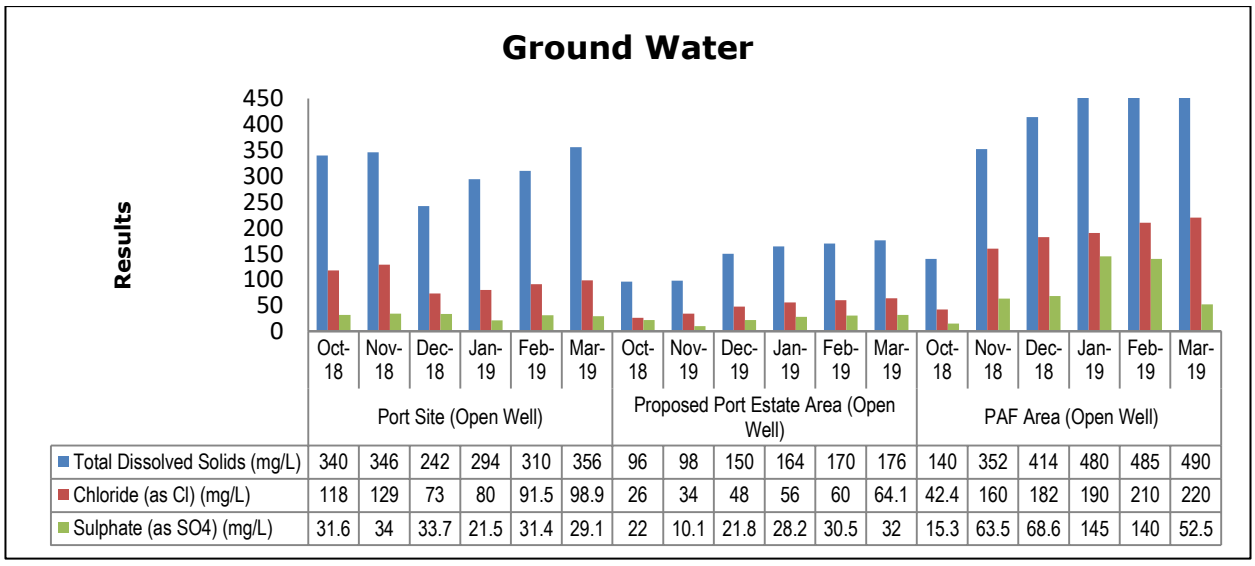
Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Sulphate)								
Ethion	µg/L	3	BDL	BDL	BDL	BDL	BDL	BDL
γ HCH (Lindane)	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Isoproturon	µg/L	9	BDL	BDL	BDL	BDL	BDL	BDL
Malathion	µg/L	190	BDL	BDL	BDL	BDL	BDL	BDL
Methyl Parathion	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								
E. coli	MPN Index/ 100mL	Not Detectable	Absent	Absent	Absent	Absent	Absent	Absent
Total Coliforms	MPN Index/100mL	-	140	Absent	22	24	<1.8	Absent

4. Graphical representation of Results for the period April 2018 to September 2018:



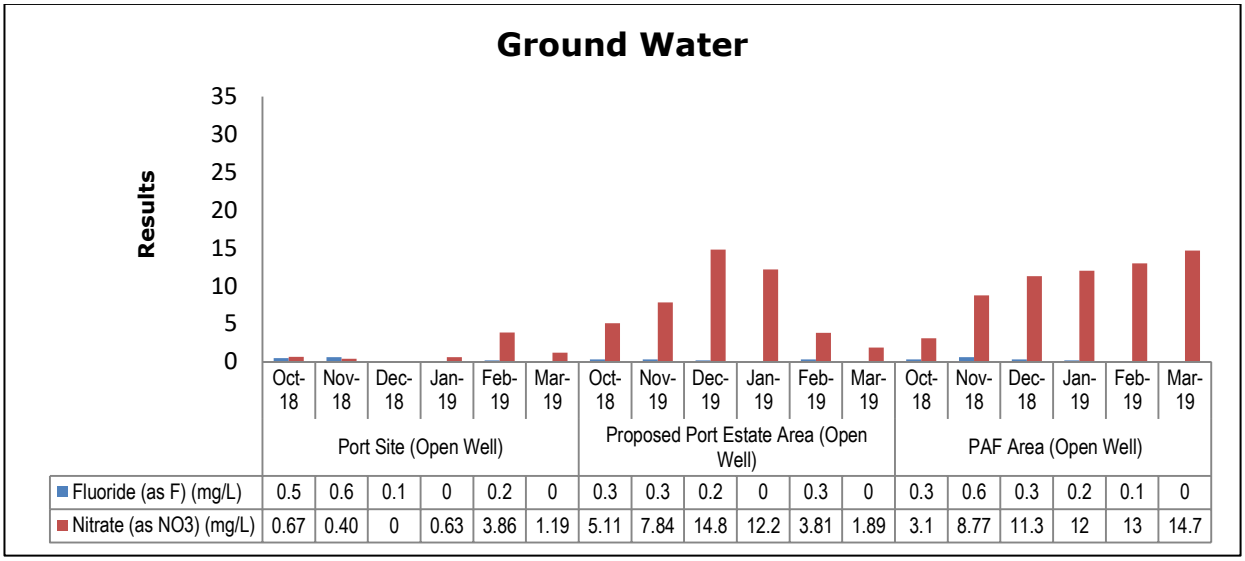
	Port Site (Open Well)						Proposed Port Estate Area (Open Well)						PAF Area (Open Well)					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-19	Dec-19	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Colour (Hazen)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
pH Value	6.61	6.68	6.87	7.30	6.77	6.61	6.80	6.85	6.65	6.97	6.74	6.7	6.62	6.72	6.72	6.81	6.92	6.73
Turbidity (NTU)	0	0.8	0	0	0	0	0	0	0	0	0	0	2.17	0	0	0	0	0

Figure 6.2: Ground Water Analysis for Colour, pH value and Turbidity



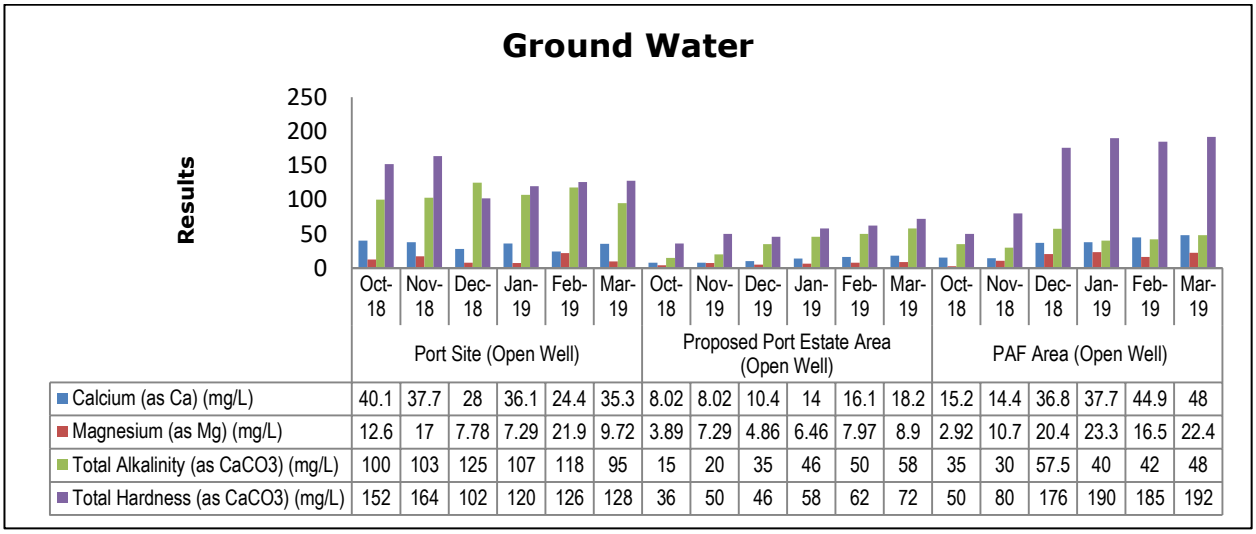
	Port Site (Open Well)						Proposed Port Estate Area (Open Well)						PAF Area (Open Well)					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-19	Dec-19	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Total Dissolved Solids (mg/L)	340	346	242	294	310	356	96	98	150	164	170	176	140	352	414	480	485	490
Chloride (as Cl) (mg/L)	118	129	73	80	91.5	98.9	26	34	48	56	60	64.1	42.4	160	182	190	210	220
Sulphate (as SO4) (mg/L)	31.6	34	33.7	21.5	31.4	29.1	22	10.1	21.8	28.2	30.5	32	15.3	63.5	68.6	145	140	52.5

Figure 6.3: Ground Water Analysis for Total Dissolved Solids, Chloride and Sulphate



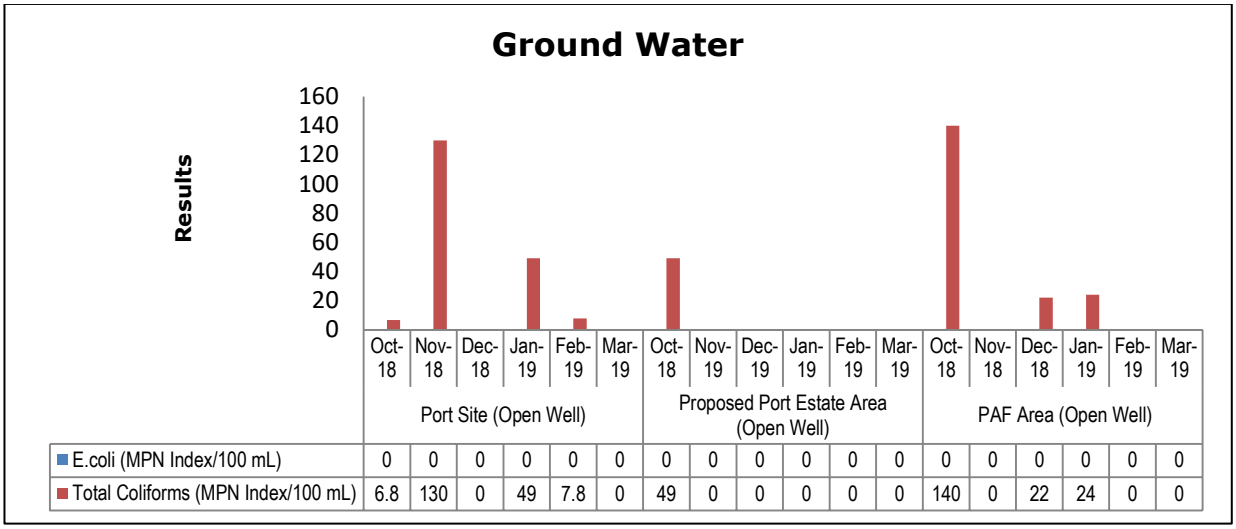
	Port Site (Open Well)						Proposed Port Estate Area (Open Well)						PAF Area (Open Well)					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-19	Dec-19	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Fluoride (as F) (mg/L)	0.5	0.6	0.1	0	0.2	0	0.3	0.3	0.2	0	0.3	0	0.3	0.6	0.3	0.2	0.1	0
Nitrate (as NO3) (mg/L)	0.67	0.40	0	0.63	3.86	1.19	5.11	7.84	14.8	12.2	3.81	1.89	3.1	8.77	11.3	12	13	14.7

Figure 6.4: Ground Water Analysis for Fluoride and Nitrate



	Port Site (Open Well)						Proposed Port Estate Area (Open Well)						PAF Area (Open Well)					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-19	Dec-19	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Calcium (as Ca) (mg/L)	40.1	37.7	28	36.1	24.4	35.3	8.02	8.02	10.4	14	16.1	18.2	15.2	14.4	36.8	37.7	44.9	48
Magnesium (as Mg) (mg/L)	12.6	17	7.78	7.29	21.9	9.72	3.89	7.29	4.86	6.46	7.97	8.9	2.92	10.7	20.4	23.3	16.5	22.4
Total Alkalinity (as CaCO3) (mg/L)	100	103	125	107	118	95	15	20	35	46	50	58	35	30	57.5	40	42	48
Total Hardness (as CaCO3) (mg/L)	152	164	102	120	126	128	36	50	46	58	62	72	50	80	176	190	185	192

Figure 6.5: Ground Water Analysis for Calcium, Magnesium, Total Alkalinity and Total Hardness



	Port Site (Open Well)						Proposed Port Estate Area (Open Well)						PAF Area (Open Well)					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-19	Dec-19	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
E.coli (MPN Index/100 mL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Coliforms (MPN Index/100 mL)	6.8	130	0	49	7.8	0	49	0	0	0	0	0	140	0	22	24	0	0

Figure 6.6: Ground Water Analysis for *E.Coli.* and Total Coliforms

5. Summary-Ground Water Analysis

During the period October 2018 to March 2019, 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 6.77 – 7.3. Turbidity was observed in the range between below detection limit to 0.8 NTU. Total Dissolved Solids was observed in the range between 242 - 356 mg/L. limit. Calcium (as Ca) was observed in the range between 24.4 – 40.1 mg/L. Chloride (as Cl) was observed in the range between 73.0 – 129 mg/L. Fluoride (as F) was observed in the range between below detection limit to 0.600 mg/L. Iron (as Fe) was observed in the range between below detection limit to 0.25 mg/L. Magnesium (as Mg) was observed in the range between 12.6 – 21.9 mg/L. Manganese (as Mn) was observed in the range between below detection limit to 0.034 mg/L. Nitrate (as NO_3) was observed in the range between 0.4 – 3.9 mg/L. Sulphate (as SO_4) was observed in the range between 21.5 – 34.0 mg/L. Total Alkalinity (as $CaCO_3$) was observed in the range between 95.0 - 125 mg/L. Total Hardness (as $CaCO_3$) was observed in the range between 102 - 164 mg/L. Aluminium (as Al), Ammonia (as NH_3- N), Anionic Detergents, Barium (as Ba), Boron, Chloramines (as Cl_2), Copper (as Cu), Mineral Oil, Phenolic Compounds (as C_6H_5OH), Selenium (as Se), Silver (as Ag), Sulphide (as H_2S), 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 below detection limit. Bacteriological parameters such as *E.coli* was observed as absent MPN Index/100 mL and Total Coliforms were observed in the range between 6.8 - 130 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 6.65 – 6.97. Turbidity was observed in the range between below detection limit to 0.200 NTU. Total Dissolved Solids was observed in the range between 96.0 - 176 mg/L. Calcium (as Ca) was observed in the range between 8.02 – 18.2 mg/L. Chloride (as Cl) was observed in the range between 26.0 – 64 mg/L. Fluoride (as F) was observed in the range between 0.200 – 0.300 mg/L. Iron (as Fe) was observed in the range between below 0.066 – 0.243 mg/L. Magnesium (as Mg) was observed in the range between 3.89 – 8.90 mg/L. Manganese (as Mn) was observed in the range between below detection limit to 0.032 mg/L. Nitrate (as NO_3) was observed in the range between 1.89 – 14.80 mg/L. Sulphate (as SO_4) was observed in the range between 10.1 – 32.0 mg/L. Total Alkalinity (as $CaCO_3$) was observed in the range between 15.0 – 58.0 mg/L. Total Hardness (as $CaCO_3$) was observed in the range between 36.0 – 72.0 mg/L. Aluminium (as Al), Ammonia (as NH_3- N), Anionic Detergents, Barium (as Ba), Boron, Chloramines (as Cl_2), Copper (as Cu), Iron (as Fe), Mineral Oil, Phenolic Compounds(as C_6H_5OH), Selenium (as Se) and Silver (as Ag), Sulphide (as H_2S) 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 below detection limit. Bacteriological parameters such as *E.coli* was observed as absent MPN Index/100 mL and Total Coliforms were observed in the range between <1.8 to 49 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 6.62 – 6.92. Turbidity was observed in the range between below detection limit. Total Dissolved Solids was observed in the range between 140 - 490 mg/L. Calcium (as

Ca) was observed in the range between 14.4 – 48.0 mg/L. Chloride (as Cl) was observed in the range between 42 - 220 mg/L. Fluoride (as F) was observed in the range between 0.100 - 0.300 mg/L. Iron (as Fe) was observed in the range between 0.058 - 0.171 mg/L. Magnesium (as Mg) was observed in the range between 2.92 – 16.037 mg/L. Manganese (as Mn) was observed in the range between below detection limit to 0.037 mg/L. Nitrate (as NO_3) was observed in the range between 3.10 – 14.70 mg/L. Sulphate (as SO_4) was observed in the range between 15.3 – 145 mg/L. Total Alkalinity (as $CaCO_3$) was observed in the range between 30.0 – 57.5 mg/L. Total Hardness (as $CaCO_3$) was observed in the range between 50 – 192 mg/L. Aluminium, Ammonia (as NH_3- N), Anionic Detergents and Barium (as Ba), Boron (as B), Chloramines (as Cl_2), Copper (as Cu), Manganese (as Mn), Mineral Oil, Phenolic Compounds (as C_6H_5OH), Selenium (as Se) and Silver (as Ag), Sulphide (as H_2S), 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 below detection limit. Bacteriological parameters such as *E.coli* was observed as absent MPN Index/100 mL and Total Coliforms were observed in the range between <1.8 to 140 MPN Index/100 mL.

6. Surface Water Analysis Results for the period October 2018 to March 2019:

Table 6.6 - Location: Poovar West Canal

Parameter	Unit	Oct-18	Nov - 18	Dec - 18	Jan - 19	Feb - 19	Mar - 19
Physical Parameters							
Colour	Hazen Units	1	1	1	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH Value	-	6.54	6.60	6.33	7.18	7.00	6.97
Turbidity	N.T.U.	BDL	1.20	1.40	0.800	BDL	2.4
Electrical Conductivity (at 25°C)	µmho/cm	327	1690	405	1220	108	289
Total Dissolved Solids	mg/L	184	946	226	682	64	162
Chemical Parameters							
Dissolved Oxygen	mg/L	7.3	6.5	6.7	6.9	6.6	6.1
Biochemical Oxygen	mg/L	1.1	1.2	1.2	1.2	1.6	2

Parameter	Unit	Oct-18	Nov - 18	Dec - 18	Jan - 19	Feb - 19	Mar - 19
Demand (3 days, 27°C)							
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	40.9	6.41	4.81	20	6.41	11.2
Chloride (as Cl)	mg/L	86	31	35.5	145	47.5	262
Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	0.1	0.4	0.05	0.05	0.1	0.1
Iron (as Fe)	mg/L	0.064	BDL	0.225	BDL	0.761	0.574
Magnesium (as Mg)	mg/L	19.9	8.16	3.4	7.29	3.4	18.5
Manganese (as Mn)	mg/L	BDL	BDL	BDL	BDL	BDL	0.301
Mineral Oil	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO_3)	mg/L	8.43	BDL	2.43	2.3	2.7	2.3
Phenolic Compounds (as C_6H_5OH)	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	58.8	17.3	9.58	17.1	8.06	33
Total Phosphate (as PO_4)	mg/L	BDL	BDL	BDL	0.1	BDL	0.12
Total Alkalinity (as $CaCO_3$)	mg/L	30	20	20	15	25	20
Total Hardness (as $CaCO_3$)	mg/L	184	40	26	80	30	104
Calcium Hardness (as $CaCO_3$)	mg/L	102	16	12	50	16	28
Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sodium (as Na)	mg/L	15.3	7.3	16.2	40.8	30.3	66.6
Potassium (as K)	mg/L	5.3	1	2.4	5.3	4.5	6.9
Sodium Absorption Ratio	-	0.489	0.45	1.37	1.97	2.4	2.83
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

Parameter	Unit	Oct-18	Nov - 18	Dec - 18	Jan - 19	Feb - 19	Mar - 19
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	7.8	49	5.6	26	49	47
Faecal Coliforms	MPN Index/ 100 mL	Absent	<1.8	<1.8	<1.8	17	22

Table 6.7 - Location: Vizhinjam Branch Canal

Parameter	Unit	Oct-18	Nov - 18	Dec - 18	Jan - 19	Feb - 19	Mar - 19
Physical Parameters							
Colour	Hazen Units	1	2	1	1	1	1
Odour	-	Agreeable	Disagreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH Value	-	7.43	6.88	7.3	7.75	7.21	7.72
Turbidity	N.T.U.	2.23	2.15	BDL	0.8	BDL	BDL
Electrical Conductivity (at 25°C)	µmho/ cm	158	285	265	280	248	202
Total Dissolved Solids	mg/L	88	158	148	184	138	112
Dissolved Oxygen	mg/L	7.5	6.5	6.6	7.2	6.5	5.8
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	1.2	2	1.4	1.1	1.7	1.9

Parameter	Unit	Oct-18	Nov - 18	Dec - 18	Jan - 19	Feb - 19	Mar - 19
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	7.21	9.62	12	36	16	10.4
Chloride (as Cl)	mg/L	33.4	42	41	44	35	30
Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	BDL	0.4	0.1	0.1	0.05	0.1
Iron (as Fe)	mg/L	BDL	0.116	0.466	0.108	0.496	0.3
Magnesium (as Mg)	mg/L	2.43	7.78	3.4	9.72	0.97	7.19
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	5.34	15.6	4.92	3.84	1.91	2.27
Phenolic Compounds (as C_6H_5OH)	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	3.81	33.7	5.38	4.47	4.57	3.9
Total Phosphate (as PO_4)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as $CaCO_3$)	mg/L	15	40	50	95	47.5	37.5
Total Hardness (as $CaCO_3$)	mg/L	28	56	44	130	44	40
Calcium Hardness (as $CaCO_3$)	mg/L	18	24	30	90	40	26
Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sodium (as Na)	mg/L	8.6	16	16.3	21.2	19	10.1
Potassium (as K)	mg/L	2.8	3.2	3.9	5.8	4.1	2.8
Sodium Absorption Ratio	-	7.07	0.93	1.1	0.81	1.26	0.59
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

Parameter	Unit	Oct-18	Nov - 18	Dec - 18	Jan - 19	Feb - 19	Mar - 19
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	23	17	27	22	79	26
Faecal Coliforms	MPN Index/ 100 mL	Absent	13	9.3	<1.8	11	<1.8

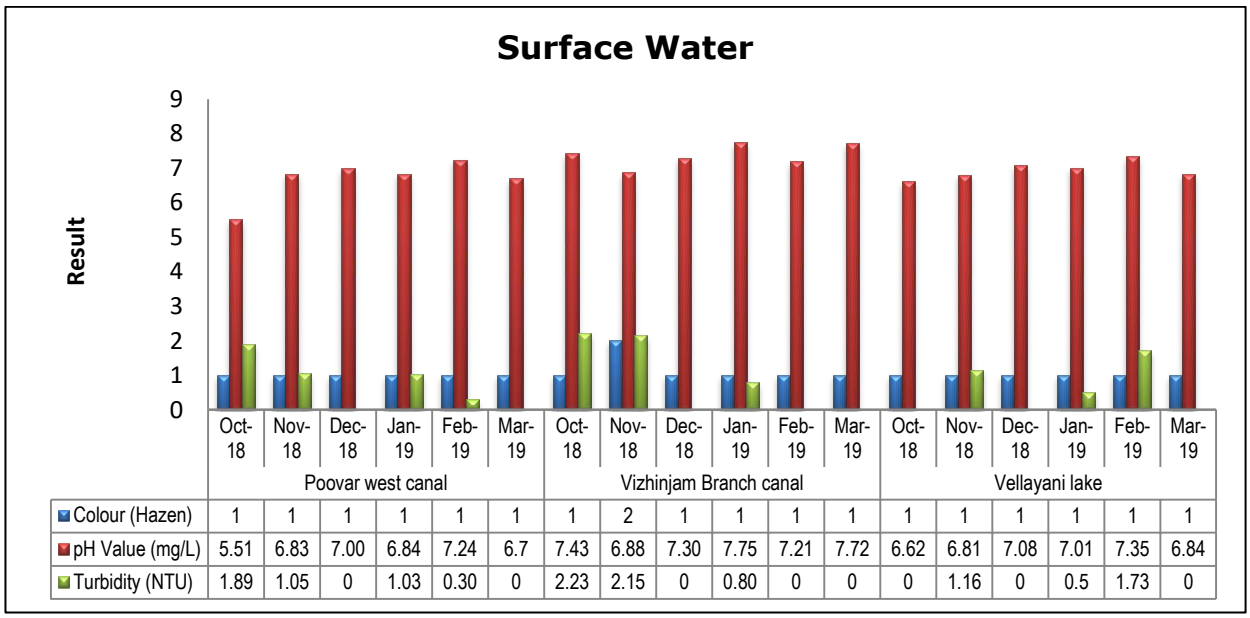
Table 6.8 - Location: Vellayani Lake

Parameter	Unit	Oct-18	Nov - 18	Dec - 18	Jan - 19	Feb - 19	Mar - 19
Physical Parameters							
Colour	Hazen Units	1	1	1	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH Value	-	6.62	6.81	7.08	7.01	7.35	6.84
Turbidity	N.T.U.	BDL	1.16	BDL	0.5	1.73	BDL
Electrical Conductivity (at 25°C)	µmho/ cm	171	188.5	196	199	204	130
Total Dissolved Solids	mg/L	98	106	110	120	114	70
Chemical Parameters							
Dissolved Oxygen	mg/L	7.3	6	6.2	6.3	6.1	5.8
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	1.4	1.3	1.6	1.5	1.8	1.9

Parameter	Unit	Oct-18	Nov - 18	Dec - 18	Jan - 19	Feb - 19	Mar - 19
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	8.02	8.82	8.82	16	12	8.82
Chloride (as Cl)	mg/L	31	27	27.5	37.5	35.5	35.5
Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	0.1	0.4	0.05	0.05	0.2	BDL
Iron (as Fe)	mg/L	BDL	BDL	0.866	0.108	0.102	0.2
Magnesium (as Mg)	mg/L	1.46	6.32	5.83	8.6	4.86	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	2.92	BDL	2	3	4.23	3.29
Phenolic Compounds (as C_6H_5OH)	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	9.87	3.32	4.89	8	4.18	3.98
Total Phosphate (as PO_4)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as $CaCO_3$)	mg/L	35	95	52.5	50	47.5	40
Total Hardness (as $CaCO_3$)	mg/L	26	48	46	68	50	36
Calcium Hardness (as $CaCO_3$)	mg/L	20	22	22	43	30	22
Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sodium (as Na)	mg/L	5.7	1.1	15.6	24.2	17.3	12.3
Potassium (as K)	mg/L	2.3	0.1	2.9	5.1	5.8	3.3
Sodium Absorption Ratio	-	0.486	0.06	1	1.21	1.07	0.6
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

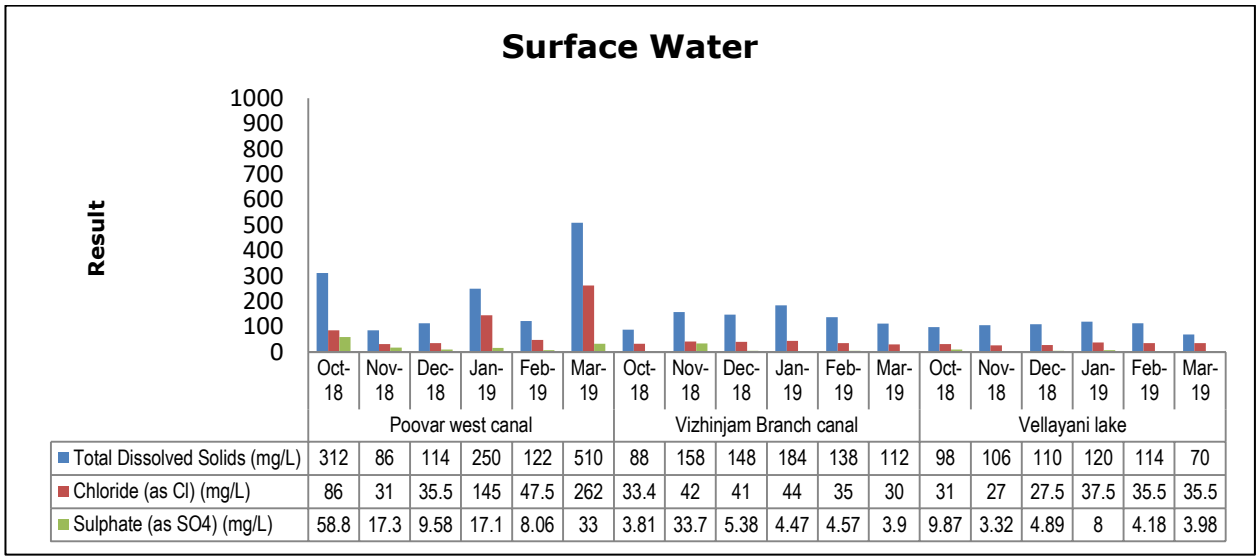
Parameter	Unit	Oct-18	Nov - 18	Dec - 18	Jan - 19	Feb - 19	Mar - 19
Chlorpyrifos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Delta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
2,4D chlorophenoxyacetic acid	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
DDT (o,p & p,p- Isomers of DDT, DDE, DDD)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Endosulfan (a,b & Sulphate)	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	240	<1.8	22	17	27	<1.8
Faecal Coliforms	MPN Index/100 mL	Absent	<1.8	5.5	<1.8	14	<1.8

7. Graphical representation of Results for the period October 2018 to March 2019:



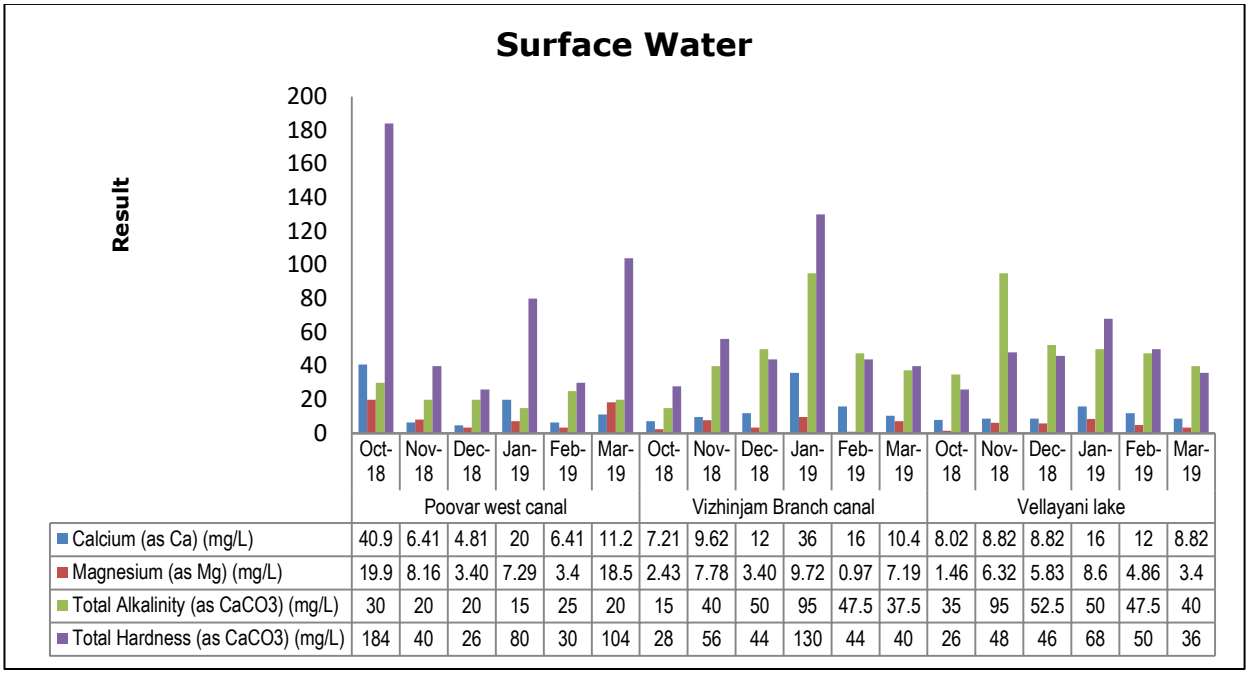
	Poovar west canal						Vizhinjam Branch canal						Vellayani lake					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Colour (Hazen)	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1
pH Value (mg/L)	5.51	6.83	7.00	6.84	7.24	6.7	7.43	6.88	7.30	7.75	7.21	7.72	6.62	6.81	7.08	7.01	7.35	6.84
Turbidity (NTU)	1.89	1.05	0	1.03	0.30	0	2.23	2.15	0	0.80	0	0	0	1.16	0	0.5	1.73	0

Figure 6.7: Surface Water Analysis for Colour, pH value and Turbidity



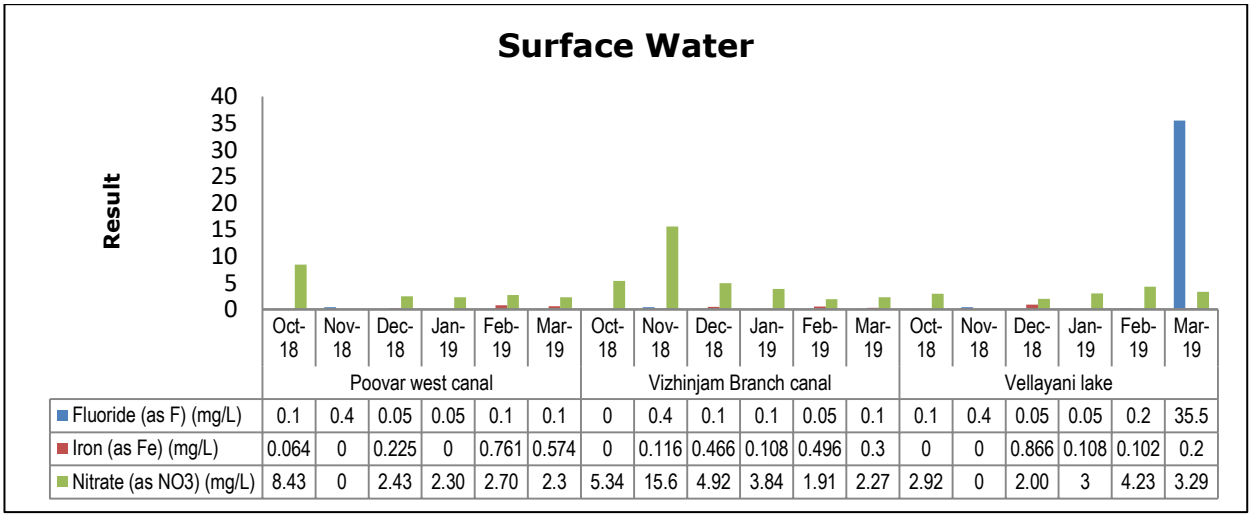
	Poovar west canal						Vizhinjam Branch canal						Vellayani lake					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Total Dissolved Solids (mg/L)	312	86	114	250	122	510	88	158	148	184	138	112	98	106	110	120	114	70
Chloride (as Cl) (mg/L)	86	31	35.5	145	47.5	262	33.4	42	41	44	35	30	31	27	27.5	37.5	35.5	35.5
Sulphate (as SO4) (mg/L)	58.8	17.3	9.58	17.1	8.06	33	3.81	33.7	5.38	4.47	4.57	3.9	9.87	3.32	4.89	8	4.18	3.98

Figure 6.8: Surface Water Analysis for Total Dissolved Solids, Chloride and Sulphate



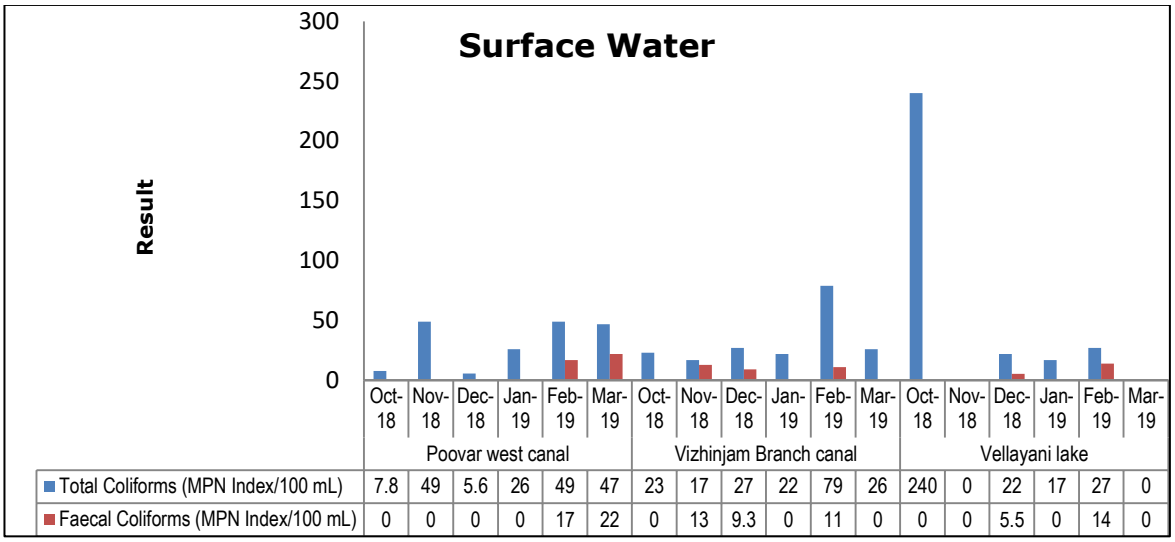
	Poovar west canal						Vizhinjam Branch canal						Vellayani lake					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Calcium (as Ca) (mg/L)	40.9	6.41	4.81	20	6.41	11.2	7.21	9.62	12	36	16	10.4	8.02	8.82	8.82	16	12	8.82
Magnesium (as Mg) (mg/L)	19.9	8.16	3.40	7.29	3.4	18.5	2.43	7.78	3.40	9.72	0.97	7.19	1.46	6.32	5.83	8.6	4.86	3.4
Total Alkalinity (as CaCO3) (mg/L)	30	20	20	15	25	20	15	40	50	95	47.5	37.5	35	95	52.5	50	47.5	40
Total Hardness (as CaCO3) (mg/L)	184	40	26	80	30	104	28	56	44	130	44	40	26	48	46	68	50	36

Figure 6.9: Surface Water Analysis for Calcium, Magnesium, Total Alkalinity and Total Hardness



	Poovar west canal						Vizhinjam Branch canal						Vellayani lake					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Fluoride (as F) (mg/L)	0.1	0.4	0.05	0.05	0.1	0.1	0	0.4	0.1	0.1	0.05	0.1	0.1	0.4	0.05	0.05	0.2	35.5
Iron (as Fe) (mg/L)	0.064	0	0.225	0	0.761	0.574	0	0.116	0.466	0.108	0.496	0.3	0	0	0.866	0.108	0.102	0.2
Nitrate (as NO3) (mg/L)	8.43	0	2.43	2.30	2.70	2.3	5.34	15.6	4.92	3.84	1.91	2.27	2.92	0	2.00	3	4.23	3.29

Figure 6.10: Surface Water Analysis for Fluoride, Iron and Nitrate



	Poovar west canal						Vizhinjam Branch canal						Vellayani lake					
	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
Total Coliforms (MPN Index/100 mL)	7.8	49	5.6	26	49	47	23	17	27	22	79	26	240	0	22	17	27	0
Faecal Coliforms (MPN Index/100 mL)	0	0	0	0	17	22	0	13	9.3	0	11	0	0	0	5.5	0	14	0

Figure 6.11: Surface Water Analysis for *E.coli.* and Total Coliforms

8. Summary of Surface water

During the period October 2018 to March 2019, at the location **Poovar West Canal**, Colour was observed 1 Hazen unit and odour was agreeable. pH was observed in the range between 5.51 – 7.24. Turbidity was observed in the range between below the detection limit to 1.89 NTU. Total Dissolved Solids was observed in the range between 86 - 510 mg/L. Electrical Conductivity was observed in the range between 156 - 905 µmho/cm. Dissolved Oxygen was observed in the range between 6.10 – 7.30 mg/L. Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 1.10 – 2.00 mg/L. Free Ammonia was observed in the range between below the detection limit mg/L. Calcium (as Ca) was observed in the range between 4.81 – 40.90 mg/L. Chloride (as Cl) was observed in the range between 31.0 - 262 mg/L. Fluoride (as F) was observed in the range between 0.05 – 0.40 mg/L. Iron (as Fe) was observed in the range between 0.06 - 0.76 mg/L. Magnesium (as Mg) was observed in the range between 3.40 – 19.90 mg/L. Manganese (as Mn) was observed below the detection limit and 0.30 mg/L. Nitrate (as NO_3) was observed in the range between 2.30 – 8.43 mg/L. Sulphate (as SO_4) was observed in the range between 8.06 – 58.80 mg/L. Total Phosphate (as PO_4) was observed in the range between below the detection limit to 0.12 mg/L. Total Alkalinity (as $CaCO_3$) was observed in the range between 15.0 – 30.0 mg/L. Total Hardness (as $CaCO_3$) was observed in the range between 26.0 – 184

mg/L. Calcium Hardness (as $CaCO_3$) was observed in the range between 12.0 – 102 mg/L. Sodium (as Na) was observed in the range between 7.30 – 66.60 mg/L. Potassium (as K) was observed in the range between 1.0 – 6.90 mg/L. Sodium Absorption Ratio was observed in the range between 0.45 – 2.83 mg/L. Oil & Grease, Anionic Detergents and Barium (as Ba), Boron (as B), Copper (as Cu), Mineral Oil, Phenolic Compounds (as C_6H_5OH), Selenium (as Se) and 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 5.6 to 49 MPN Index/100 mL and Faecal Coliforms were observed in the range between 0 to 22 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 6.88 – 7.75. Turbidity was observed in the range between 0.8 – 2.23 NTU. Total Dissolved Solids was observed in the range between 88 - 184 mg/L. Electrical Conductivity was observed in the range between 158 - 285 µmho/cm. Dissolved Oxygen was observed in the range between 5.80 – 7.50 mg/L. Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 1.10 – 2.00 mg/L. Calcium (as Ca) was observed in the range between 7.21 – 36.0 mg/L. Chloride (as Cl) was observed in the range between 30.0 – 44.0 mg/L. Fluoride (as F) was observed in the range between 0.05 - 0.400 mg/L. Iron (as Fe) was observed in the range between 0.11 - 0.50 mg/L. Magnesium (as Mg) was observed in the range between 0.97 – 9.72 mg/L. Manganese (as Mn) was observed in the range between below detection level. Nitrate (as NO_3) was observed in the range between 1.91 – 15.60 mg/L. Sulphate (as SO_4) was observed in the range between 3.81 – 33.70 mg/L. Total Alkalinity (as $CaCO_3$) was observed in the range between 15.0 – 95.0 mg/L. Total Hardness (as $CaCO_3$) was observed in the range between 28.0 – 130.0 mg/L. Calcium Hardness (as $CaCO_3$) was observed in the range between 18.0 – 90.0 mg/L. Sodium (as Na) was observed in the range between 8.60 – 21.20.0 mg/L. Potassium (as K) was observed in the range between 2.80 – 5.80 mg/L. Sodium Absorption Ratio was observed in the range between 0.59 – 7.07. Oil & Grease,

Free Ammonia, Anionic Detergents and Barium (as Ba), Boron (as B), Copper (as Cu), Mineral Oil, Phenolic Compounds (as C_6H_5OH), Selenium (as Se), Silver (as Ag), Total Phosphate (as PO_4), 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 17 to 79 MPN Index/100 mL and Faecal Coliforms were observed in the range between 0< 1.8 - 13 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 6.62 – 7.35. Turbidity was observed in the range between 0.5 – 1.73 NTU. Total Dissolved Solids was observed in the range between 70 - 120 mg/L. Electrical Conductivity was observed in the range between 130 - 204 µmho/cm. Dissolved Oxygen was observed in the range between 5.80 – 7.30 mg/L. Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 1.30 – 1.90 mg/L. Free Ammonia was observed in the range between below detection level. Calcium (as Ca) was observed in the range between 8.02 – 16 mg/L. Chloride (as Cl) was observed in the range between 27.0 – 37.50 mg/L. Fluoride (as F) was observed in the range between below detection level to 0.400 mg/L. Iron (as Fe) was observed in the range between 010 - 0.87 mg/L. Magnesium (as Mg) was observed in the range between 1.46 – 8.60 mg/L. Manganese (as Mn) was observed below detection level. Nitrate (as NO_3) was observed in the range between 2.0 – 4.23 mg/L. Sulphate (as SO_4) was observed in the range between 3.32 – 9.87 mg/L. Total Alkalinity (as $CaCO_3$) was observed in the range between 35.0 – 95.0 mg/L. Total Hardness (as $CaCO_3$) was observed in the range between 26.0 – 68.0 mg/L. Calcium Hardness (as $CaCO_3$) was observed in the range between 20.0 – 43.0 mg/L. Sodium (as Na) was observed in the range between 1.10 – 24.20 mg/L. Potassium (as K) was observed in the range between 0.10 – 5.80 mg/L. Sodium Absorption Ratio was observed in the range between 0.06 – 1.21. Oil & Grease, Anionic Detergents and Barium (as Ba), Boron (as B), Copper (as Cu), Mineral Oil, Phenolic Compounds (as C_6H_5OH), Selenium (as Se) and 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 PO_4), Pesticide Residues and Polynuclear Aromatic Hydrocarbons (PAH) were observed below detection limit. Bacteriological parameters such as Total Coliforms were observed in the range between 17 to 240 MPN Index/100 mL and Faecal Coliforms were observed in the range between < 1.8 to 14 MPN Index/100 mL.

Annexure X

EC for the Nagaroor Building Stone Quarry Project Survey No. 555/2

सत्यमेव जयते

Validity expires on 28.02.2024

Proceedings of the State Environment Impact Assessment Authority Kerala

Present: Dr.H.Nagesh Prabhu, IFS (Rtd.), Chairman, Dr. K.Jayachandran, Member & Dr.Usha Titus I.A.S Member Secretary.

Sub: **SEIAA- Environmental Clearance for the proposed building stone quarry project in Survey No. 555/2 at Nagaroor Village, Chirayinkeezhu Taluk, Thiruvanathapuram District, Kerala by Mr.Rajesh Jha, Chief Executive Officer, M/s Adani Vizhinjam Port Private Limited - Granted – Orders issued.**

STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY, KERALA

No. 1200/EC2/2018/SEIAA ***Dated,Thiruvananthapuram 01.03.2019***

Ref: 1. Application received on 31.12.2018 from Mr.Rajesh Jha, Chief Executive Officer, M/s Adani Vizhinjam Port Private Limited, 2nd floor, Vipanchika Tower, Thycaud, Thiruvanathapuram – 695014
2. Minutes of the 90th meeting of SEAC held on 4th January, 2019
3. Minutes of the 92nd meeting of SEAC held on 22.01.2019
4. Minutes of the 89th meeting of SEIAA held on 27th February 2019.
5. Affidavit received on 28.02.2019 from Sri.Manoranjan Tripathy, Deputy General Manager- Projects, Adani Vizhinjam Port Pvt.Ltd.

ENVIRONMENTAL CLEARANCE NO.02/2019

Mr.Rajesh Jha, Chief Executive Officer, M/s Adani Vizhinjam Port Private Limited, 2nd floor, Vipanchika Tower, Thycaud, Thiruvanathapuram – 695014, vide the hardcopy of application received on 31.12.2018, has sought Environmental Clearance under EIA Notification, 2006 for the quarry project in Survey No. 555/2 at Nagaroor Village, Chirayinkeezhu Taluk, Thiruvanathapuram District, Kerala for an area of 3.6630 Ha. The project comes under Category B2, Activity 1(a), (i) as per the Schedule of EIA Notification 2006.

2. The proposed project site falls within Latitude $8^0$43'42.88" N to $8^0$33'51.74" N Longitude $76^0$50'15.26" E to $76^0$50'23.24" E . The lease area consists of 3.6630 hectares,

which belongs to Government (Purambooke) land. The proposed project is for quarrying of 5,12,500 tonnes per annum. The daily water demand will be about 4 KLD, in which 2 KLD for domestic, 1KLD for plantation and 1KLD for dust suppression. The total project cost is 750 lakhs.

3. The proposal was placed in the 90th meeting of SEAC held on 4th January, 2019 and in the 92nd meeting of SEAC held on 22.01.2019. The Committee decided to recommend to issue EC subject to the following observations and conditions in addition to the general conditions.

1. *The NE and SW portion of the proposed quarry area is already mined to the localized baseline. Therefore, the area remaining to be mined out is the eastern portion of the proposed land.*
2. *On completion of the proposed mining activity, one quarter of the hillock under government land will vanish.*
3. *The geological reserve estimated is 51,96,250 tons out of which the mineable reserve is 17,78,750 tone (up to the bench level of 28m AMSL) and blocked reserve is 34,17,500 tons. The mineable reserve up to 40m AMSL is 15,07,500 tons. It means that if the total mineable quantity is allowed to be extracted, the mine will go below the present ground level of 40m AMSL by a depth of 12m creating a pit.*
4. *The reclamation and rehabilitation plan indicates that after the extraction over five years, there will a pit of 3 Ha out of which 0.95 Ha will be converted as a water pond and balance area of 2.05 Ha will be retained as pit.*
5. *The proposal for year-wise mining indicates that the extraction will be to the tune of 1,52,500 tons (1st year), 4,99,375 tons (2nd year), 5,12,500 tons (3rd year), 5,11,875 tons (4th year) and 1,02,500 tons (5th year). However, the proposal does not mention about the requirement for the next two years, during which it is understood that the breakwater construction will be over.*
6. *If we consider that the breakwater construction will be completed in two years and the quantity of stone projected for extraction in the first two years is the actual requirement for the proponent, then the quantity extracted will be 6,51,875 tons, i.e., 37% of the mineable reserve. If the mining is allowed upto the bench level of 70m as per the mine plan, the quantity extractable is 7,51,875 tons, i.e. 15% more than the requirement.*

7. *Kerala experiences intermittent micro earthquakes such as the ones in Nedumkandam in 1988 with 4.5 magnitude, Vadakkencherry in 1994 with 4.3 magnitude, Erattupetta in 2000 and 2001 with magnitudes 5 and 4.8 respectively, off the coast of Thiruvananthapuram in 2001 with magnitude 4.5 etc. Based on the studies on the causative factors of micro tremors in Kerala, it is understood that variation in hydraulic pressure in the near-surface joints and fractures, increased pore-pressure and its uncertain variations etc lead to disturbance in the subsurface rock formations. Studies also indicated that from among the micro-tremors recorded in the seismograph installed in Peechi between 2000 and 2008, 45% occurred between July and October and 29% between November and January when there is significant rainfall and groundwater recharge. It indicates that the landuse changes, hydraulic pressure build up, pore-pressure variations etc. could influence occurrence of micro-tremors. There have been micro-tremors centered around Vamanapuram in September 1988, Parippalli in December 1994, Kilimanur in August 2006 and Attingal in January 2008. It is suspected that the subsurface rock formations do not have adequate strength to absorb the high magnitude variations in the landuse pattern, landform changes, hydraulic pressure variations etc.. Therefore, there need to be utmost restraints in disturbing the natural landforms of the region.*
8. *The earlier quarrying of the hillock has left a vertical fall of 70m which is very dangerously poised. If mining is allowed as per mining rules, the vertical fall will become a bench cut which will improve the safety aspect of the frontal portion of the quarry.*
9. *Since the proposal is to extract stone from one portion of the hillock, there will not be complete removal of the hillock, thus overcoming the implications on micro-climate of the region.*
10. *There are other quarries in the vicinity of the proposed quarry, but not within 500m as per a document produced by the proponent. It may be verified whether the proponent has submitted the relevant documents along with the application for EC, so as to ensure that there are no quarries within the radius of 500m.*
11. *The mining is proposed with Non-electric detonator (NONEL) method thereby minimizing air blast, fly rock and ground vibration.*
12. *The proponent should be directed to constitute a Local Area Monitoring Committee, involving the Grama Panchayat.*

13. *No environmental management intervention could adequately mitigate the impacts caused due to the activities linked to quarrying/mining. However, the demand for building stones for essential developmental activities need to be met. Therefore, it is desirable to restrict mining to the minimum essential requirement so as to minimize the environmental impact as well as to protect the resource for future demand of development activities. Hence, mining should not be allowed for extracting the whole of mineable quantity but be permitted to meet the essential requirement. This approach will also minimize the change in landform.*
14. *The proponent may be permitted to extract a maximum of 7 lakh tons of building stone within a period of two years. Further permission for mining may be considered based on the requirement then and environmental assessment.*
15. *The proponent should be asked to comply with all mandatory environmental management conditions that are stipulated while giving EC for such mining projects.*
16. *The social and environmental needs of the locality should be assessed in consultation with the Local Governments based on which the Corporate Social & Environmental Responsibility should be exercised.*

4. The proposal was placed in the 89th meeting of SEIAA held on 27th February 2019. Authority decided to recommend for issuance of EC with general conditions in tune with KMMC Rules 2015 and its amendments and subject to the following specific conditions.

1. *The mining should be conducted with Non-electric detonator (NONEL) method thereby minimizing air blast, fly rock and ground vibration.*
2. *Extract a maximum of 7 lakh tons of building stone within a period of two years. Further permission for mining may be considered based on the requirement then and environmental assessment.*
3. *The proponent shall file an affidavit that he will expend Rs.15 lakhs as part of CER in consultation with Local Self Government.*
4. *The proponent should follow the closure plans (progressive closure and final closure) as per KMMC Rules.*

The proponent has submitted notarised affidavit committing the CSR activities vide reference 5th cited.

5. Environmental Clearance as per the EIA Notification 2006 is hereby accorded for the quarry project of Mr.Rajesh Jha, Chief Executive Officer, M/s Adani Vizhinjam Port Private

Limited, 2nd floor, Vipanchika Tower, Thycaud, Thiruvanathapuram – 695014 in Survey No. 555/2 at Nagaroor Village, Chirayinkeezhu Taluk, Thiruvanathapuram District, Kerala for an area of 3.6630 Ha, subject to the specific conditions as in para 4th above, all the environmental impact mitigation and management measures 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.

6. 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 2 (Mining) & (Blasting), Chapter 3 (Mines Drainage), Chapter 4 (Stacking of Mineral rejects and Disposal of waste) Chapter 8 (Progressive Mine Closure Plan) & EMP 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.

7. 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.

8. 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.

i. 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.

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

iii. The given address for correspondence with the authorised signatory of the project is Mr.Rajesh Jha, Chief Executive Officer, M/s Adani Vizhinjam Port Private Limited, 2nd floor, Vipanchika Tower, Thycaud, Thiruvanathapuram – 695014.

Sd/-
Dr.Usha Titus I.A.S
Member Secretary, SEIAA

To,

Mr.Rajesh Jha,
Chief Executive Officer,
M/s Adani Vizhinjam Port Private Limited,
2nd floor, Vipanchika Tower, Thycaud,
Thiruvanathapuram – 695014

Forwarded/By order

Administrator, SEIAA

Copy to,

1. MoEF Regional Office, Southern Zone, Kendriya Sadan, 4th Floor, E&F Wing, II Block, Koramangala, Bangalore-560034.
2. The Principal Secretary to Government, Environment Department, Government of Kerala.
3. District Collector, Thiruvananthapuram
4. Director, Mining & Geology, Thiruvananthapuram -4.
5. The Member Secretary, Kerala State Pollution Control Board
6. District Geologist, Thiruvananthapuram
7. Tahsildhar, Chirayinkeezhu Taluk, Thiruvananthapuram district
8. Village Officer, Nagaroor Village (Kadavila), Thiruvananthapuram
9. Chairman, SEIAA.
10. Website.
11. S/f
12. O/c

STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY KERALA

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.

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^{0}. 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 PM_{10} 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 thisimplementation 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.

42. The above conditions shall prevail notwithstanding anything to the contrary, in consistent, or simplified, contained in any other permit, license on 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.

For Member Secretary, SEIAA Kerala

STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY KERALA

Annexure XI

CTO for the Nagaroor Building Stone Quarry Project Survey No. 555/2

FILE NO : PCB/TVM-DO/ICE/10171298/2019
Date of issue : 05/03/2019

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. :10171298
Dated:02-03-2019

TO

M/s BUILDING STONE QUERY OF ADANI VIZHINJAM PORT PRIVATE LIMITED
Nagaroor Village
CHIRAYINKEEZHU

Consent No. :PCB/TVM-DO/ICO/QRY/103 /2019
Valid Upto :27/02/2021

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**	27/02/2021
2	Name and Address of the establishment	BUILDING STONE QUERY OF ADANI VIZHINJAM PORT PRIVATE LIMITED AT NAGAROOR VILLAGE 695601
3	Communication	Telephone :0-9099938893 Fax :079-25555602 E-mail:shalinm.shah@adani.com
4	Occupier Details	Rajesh Jha CEO Adani Vizhinjam Port Private Limited Adani House, Near Mithakhali Six Roads, Navrangpura, Ahmedabad-380009
5	Local Body	Nagaroor Village, Chirayinkeez taluka, Thiruvanathapuram district
6	Survey Number	555/2
7	Village	Nagroor
8	Taluk	CHIRAYINKEEZHU
9	District	THIRUVANANTHAPURAM
10	Capital Investment(Rs in Lakhs)	750 LAKHS
11	Scale	Medium
12	Category	RED
13	Annual fee(Rs) Total Fee remitted(Rs)	Rs.60000/- Rs.125000/-
14	RAW MATERIAL	PRODUCTS
	Stones Quarrying	Quarrying of maximum 7 Lakh tons of building stone with in 2 year
15	Total Power Required (HP)	NIL

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: NIL

2.3 Effluent generation:

2.4 The characteristics of effluent after treatment shall confirm to the following tolerance limits:

SI.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:

SI.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:

SI.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: 555/2
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 Quarrying shall be limited to a maximum of 7 Lakh tons of building stone with in 2 year.
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.infor 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 minutes of the State Environment Impact Assessment Authority (SEIAA) Kerala Held on 27/02/2019 (Item No:89.02),Affidavit and other documents furnished by the applicant. If any document is found false,the consent issued will be cancelled/ revoked.
5.16 The Environmental Clearance shall be submitted to this Office with in ten days, failing which the consent will be automatically cancelled.

RAMYA G

Digitally signed by RAMYA G
Date: 2019.03.05 18:10:19 +05'30'

DATE :05/03/2019

SIGNATURE & SEAL OF ISSUING AUTHORITY

ENVIRONMENTAL ENGINEER,
DISTRICT OFFICE,
THIRUVANANTHAPURAM

To

Building Stone Query of ADANI VIZHINJAM PORT PRIVATE LIMITED
AT Nagaroor Village

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.

SURVEY MAP-NAGAROOR VILLAGE (PROPOSED QUARRY OF M/s C . E . O ADANI VIZHINJAM PORT Pvt. Ltd .

DISTRICT : THIRUVANANTHAPURAM

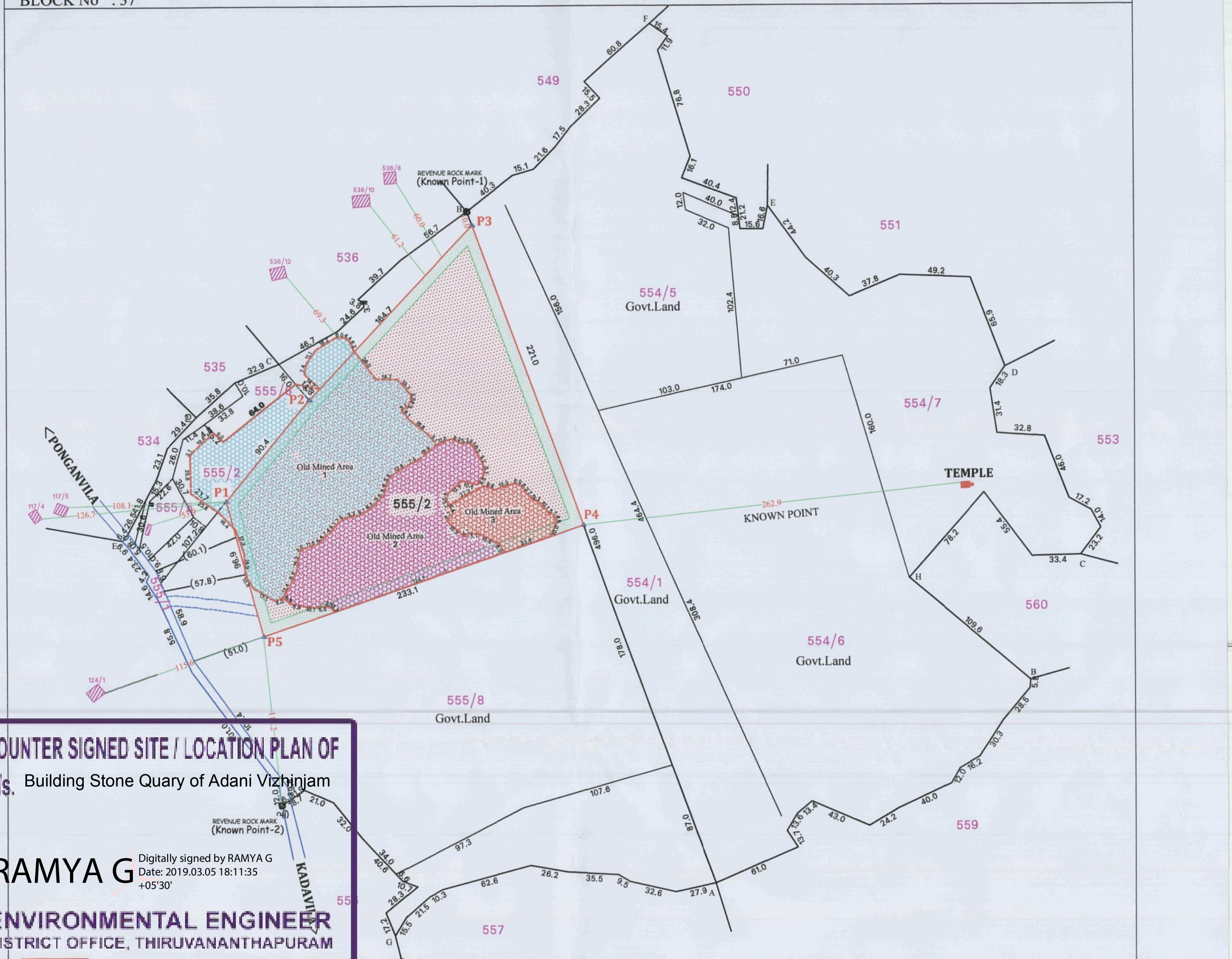
TALUK : CHIRAYINKEEZH

VILLAGE : NAGAROOR

BLOCK No : 37

FILE NO :

Re Sy No. : 555/2



റീസർവെ 555/2 ൽ ഖനനാനുമതിക്കായി ആവശ്യപ്പെടുന്ന സ്ഥലം 3.0827 Ha

റീസർവെ 555/2 ൽ ഖനനാനുമതിക്കായി ആവശ്യപ്പെടുന്ന സ്ഥലത്തിന്റെ ചുറ്റുമുള്ള ബഫർ എരിയ 0.5803 Ha

റീ സർവ്വെ 555/2 ൽ ഖനനാനുമതിക്കായി ആവശ്യപ്പെടുന്ന Lease Area =3.6630Ha

പഞ്ചായത്ത് റോഡ്

ഖനനസ്ഥലത്തിലേക്കുള്ള വഴി

പരിസര പ്രദേശത്തുള്ള വീട്

പാറ മാർക്ക് കാണുന്ന സ്റ്റേഷനുകൾ

P1 റീസർവ്വെ 555/2 ൽ ഖനനാനുമതിക്കായി ആവശ്യപ്പെടുന്ന സ്ഥലത്ത് സ്ഥാപിച്ചിട്ടുള്ള സ്റേഷനുകൾ

555/8 റീസർവ്വെ 555/2 ന്റെ ആകെ വിസ്തീർണ്ണം 4.8779 Ha

Submit before The Mining and Geology Department

1 ഖനനാനുമതിക്കായി ആവശ്യപ്പെടുന്നസ്ഥലത്തിൽ മുൻപ് ഏകദേശം 26 M താഴ്ചയിൽ ഖനനം ചെയ്തതായി കാണപ്പെടുന്ന സ്ഥലം,വിസ്തീർണ്ണം = 1.0620 H ,
ഖനനാനുമതിയ്ക്കായി ആവശ്യപ്പെടുന്ന സ്ഥലത്തിന്നു പുറത്ത് ഖനനം ചെയ്തു കാണുന്ന സ്ഥലം വിസ്തീർണ്ണം= 0.4348 H

2 ഖനനാനുമതിക്കായി ആവശ്യപ്പെടുന്നസ്ഥലത്തിൽ മുൻപ് ഏകദേശം 12 M താഴ്ചയിൽ ഖനനം ചെയ്തതായി കാണപ്പെടുന്ന സ്ഥലം, വിസ്തീർണ്ണം = 0.8508 H

3 ഖനനാനുമതിക്കായി ആവശ്യപ്പെടുന്നസ്ഥലത്തിൽ മുൻപ് ഏകദേശം 6 M താഴ്ചയിൽ ഖനനം ചെയ്തതായി കാണപ്പെടുന്ന സ്ഥലം, വിസ്തീർണ്ണം = 0.2258 H

GPS READING		
BOUNDARY PILLAR	LATTITUDE	LONGITUDE
BP1	8°43'45.98"N	76°50'15.26"E
BP2	8°43'48.12"N	76°50'17.27"E
BP3	8°43'51.74"N	76°50'21.24"E
BP4	8°43'44.83"N	76°50'23.24"E
BP5	8°43'42.88"N	76°50'15.87"E

Office Use :

Applicant Designation & Address:

M/s C.E.O ADANI VIZHINJAM PORT Pvt. Ltd.
2nd Floor, Vipanchika Tower,
Thycaud, Thiruvananathapuram.

Scale 1cm =20 m

TALUK OFFICE, CHIRAYINKEEZHU * ATTINGAL *

TAHSILDAR
CHIRAYINKEEZH

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 2018 to March 2019

May 2019