



Vizhinjam International Seaport Limited

(A Government of Kerala Undertaking)

VISL/2016-17/EE&EI-19/1132

29th November 2018

To

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

Dear Sir,

Sub: Half yearly Compliance report of Environmental and CRZ clearance for Vizhinjam International Multipurpose Deepwater Seaport for the period of April 2018 to September 2018 – 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

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 cited reference for the half yearly period from April 2018 to September 2018 is enclosed herewith, in both hard and soft copy for record and reference.

Yours Sincerely

For Vizhinjam International Seaport Ltd

Managing Director & CEO

Encl: Compliance Report (hard & 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



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**

Period: April 2018 to September 2018

December 2018

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Status of conditions stipulated in Environmental and CRZ clearance.		




Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: April 2018 to September 2018)		
Sl. No.	Conditions	Compliance Status as on 30-09-2018
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" has 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. Subsequently the consent renewal application was submitted to KSPCB vide application number 7298974 dated 25 th April 2018, and it was renewed vide Consent No. PCB/HO/TVM/ICE-R/02/2018 dated 19.07.2018 valid up to 31.07.2023. Copy attached as Annexure I .
(ii)	Project Proponent shall carry out intensive monitoring with regulatory reporting six monthly on shoreline changes to the Regional Office, MoEF.	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 part of Six monthly compliance report. Report for the period April 2018 to September 2018 is enclosed as Annexure II in CD. The 1 st Mathematical Report prepared by L&T Infrastructure Engineering Pvt. Ltd. (LnTIEL) based on Shoreline Monitoring data for the period Feb'15-Feb'17 has been submitted with compliance report (April'17-September'17) in November'17. In continuation with the same practise AVPPL has submitted the shoreline data from March 2017 to February 2018 to LnTIEL for mathematical modelling to assess the impact on shoreline under the guidance of National Institute of Ocean Technology (NIOT). Mathematical modelling report prepared is vetted by NIOT and attached as Annexure III . The mathematical modelling report has affirmed that the shoreline change is in line to the prediction done as part of the EIA report. Long term shoreline change monitoring employing satellite images has been initiated through NIOT, 4 quarterly reports on shoreline changes have been submitted to KCZMA.
(iii)	The capital dredged material (7.6 Mm ³) shall be utilized	Being Complied No dredging was carried out during the


	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
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Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: April 2018 to September 2018)		
Sl. No.	Conditions	Compliance Status as on 30-09-2018
	for reclamation of berths.	compliance period from April to September 2018. The dredged materials till 30 th September 2018 amounting to 2.26Mm ³ has been utilized for reclamation of 30 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.	<p>Being Complied</p> <p>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.</p> <p>The EPC contactor for development of aforesaid activity has been finalized and work orders has been issued. A budgetary provision of 16 crores for Fish Landing Centre and 131.12 crore for fishery breakwater has been kept. At present fishing boats are docked in the proposed area affecting the progress of fishery berth. The GoK has initiated discussions with fishermen representatives for removal of the boats to facilitate construction work.</p>
(v)	The project shall be executed in such a manner that there is minimum disturbance to fishing activity.	<p>Being Complied</p> <p>Following is being practiced to ensure minimum disturbance to fishing activity</p> <ul style="list-style-type: none"> • Works are planned in such a way that the movement of fishing boats is not hindered due to project construction. • Signboards have been placed for demarcation of construction area • For mutual understanding of the developmental activities with the local fishing community an exclusive CSR team has been assigned, details are given in Annexure IV. • Using the technological advancement/digital media a dedicated whatsapp group has been formed by CSR team for fisherman/fishing community members to facilitate the flow of various project related information/updates as necessary/useful • Turbidity buoys at 3 locations identified by NIOT have been deployed and


**Vizhinjam International Deepwater Multipurpose Seaport
Status of conditions stipulated in Environmental and CRZ clearance.**

**Half yearly Compliance report on conditions stipulated in Environmental & CRZ
Clearance (Period: April 2018 to September 2018)**


Sl. No.	Conditions	Compliance Status as on 30-09-2018
		<p>continuous monitoring is carried out to assess the real time turbidity. The turbidity details are given in Table 13 of Annexure II (OSaS/P21716/ AVPPL /PSR-(26, 27, 29, 30, 31)/118 in Table – 13, PSR-28 in Table 14. The turbidity results are comparable with the baseline</p> <ul style="list-style-type: none"> Marine Water Quality is being monitored regularly and reports are submitted as part of compliance report. No abnormal results were observed during the monitoring period. (Refer Annexure XII). <div>   </div> <div> <p align="center">Buoy -1</p> <p align="center">Buoy -2</p> </div> <div>  </div> <p align="center">Buoy -3</p>
(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.	<p>Being Complied</p> <p>As per the EIA report 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. 70.52 crores have been disbursed to a total number of 2593 Livelihood Affected Persons (LAP's) (including kerosene disbursement on account of breakwater construction) whose verification has been completed in all respects. Verification of the documents of balance LAP's is in progress.</p> <p>The status of the CSR activities envisaged in the fisheries sector is as follows.</p> <p>Water supply: Scheme has been</p>

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
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Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: April 2018 to September 2018)		
Sl. No.	Conditions	Compliance Status as on 30-09-2018
	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).	<p>commissioned in April, 2013 by VISL by spending an amount of Rs. 7.3 crores. For O&M of the same an amount of 4.40 crores has been spent till date.</p> <p>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. At present fishing boats are docked in the proposed area affecting the progress of fishery berth. The GoK has initiated discussions with fishermen representatives for removal of the boats to facilitate construction work.</p> <p>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.</p> <p>Seafood park: Procurement of land for seafood park (Rs.26 crores) by VISL has been completed. Actions for development of sea food park are planned so as to commission the same along with the completion of new fishing harbour.</p> <p>Skill Development: 1.5 Acre of land (Rs. 19.50 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.</p> <p>Activities carried out by Concessionaire (AVPPL) for environmental awareness, sanitation and solid waste management etc. are enclosed with Annexure IV for the period of April 2018 to September –2018.</p>
(vii)	Rail connectivity shall be parallel to the harbour road on elevated structures at +4/5.00 m level without affecting the entry to the	<p>Will be complied</p> <p>The Konkan Railway Corporation has been engaged as a consultants for turnkey execution of the project, the option of tunnel is being looked into to minimize the</p>

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Sl. No.	Conditions	Compliance Status as on 30-09-2018
	existing harbor.	disturbance. Draft Detailed Project Report (DPR) has been completed and submitted to VISL for review.
(viii)	Compensation packages in accordance with the Central/State Government norms shall be given to all the authorized-cum-affected (having valid clearances as applicable) resort owners.	Will be complied Based on G.O.(Rt) No.2021/2017/RD dated 27-04-2017, was modified with G.O (MS) No. 17/2018/F&PD dated 09-06-2018 government ordered to pay compensation for land and not for the structure since they were in violation of CRZ notification. Action in this respect is being taken
(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 demand 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 2Km 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 5.05 Crore has been utilized for CSR activities during the compliance period mainly in the field of Education, community health, sustainable livelihood, and Urban Infrastructure Development during the compliance periods. Details on CSR activities carried out by AVPPL during compliance period (April 2018 to September 2018) are enclosed as Annexure IV .
(xi)	Oil Contingency	Will be complied


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Sl. No.	Conditions	Compliance Status as on 30-09-2018
	Management Plan shall be put in place.	KITCO has been identified for preparing Facility Level Oil Spill Contingency Plan the work on the same has started, after finalization of the same it will be submitted to regulatory agencies.
(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 Kerala Coastal Zone Management Authority (KCZMA). Copy of Six monthly compliance reports is also being sent to KCZMA. Compliance report to the recommendation/conditions of KCZMA is enclosed as Annexure V .
(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 Six monthly 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 is enclosed as Annexure VI .
(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). Recommendations of the Construction stage EMP for these areas are being implemented. No work took place in warehouse area, road/ rail stretch during the compliance period. Status of construction stage EMP in matrix format is enclosed as Annexure VII .
(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 An integrated Area Development Plan is being prepared through the CEPT university, in consultation with Town Planning, Tourism, Industry and other line departments. Draft plan was submitted and discussed before the working group and modifications suggested by the working group are being implemented.
(xvi)	The project proponent shall place on its website its response to the Public	Complied All the relevant details pertaining to EIA, ToR, EAC meetings, Public Hearing, etc. related to

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Sl. No.	Conditions	Compliance Status as on 30-09-2018
	Hearing, and representations as presented to the EAC in the 128 th meeting held on 23 rd November 2013, for information of the general public.	the project have been placed on VISL website http://www.vizhinjamport.in/eia-30-5-13.php
(xvii)	There shall be no withdrawal of groundwater in Coastal Regulation Zone Area, for this project. In case any groundwater is proposed to be withdrawn from outside the CRZ area, specific prior permission from the concerned State/Central Groundwater Board shall be obtained in this regard.	Noted There will not be any withdrawal of groundwater in CRZ Area. In case of requirement of groundwater withdrawal outside CRZ area, specific prior permission will be obtained from State/Central Groundwater Board. The water supply scheme for the project had already been commissioned with the source as Vellayani Lake.
(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 HEPIPL. Both the contractors have obtained separate consent from KSPCB for handling Hazardous Waste. During this compliance period (April 2018 to September 2018) 6 KL of used oil is generated and after discussions with KSPCB officials during their visits it has been stored as per Hazardous Waste Rules at site, and will be disposed to authorized (CPCB/SPCB) waste oil handlers.
(xix)	No hazardous chemicals shall be stored in the Coastal Regulation Zone area.	Complied No hazardous chemical is being stored in the Coastal Regulation Zone 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 The detailed port facility layout planning is under progress. Provision for installing sewage treatment facility of adequate capacity in phased manner has been kept and will be implemented in line to CRZ Notification along with the commissioning of


adani	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
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Sl. No.	Conditions	Compliance Status as on 30-09-2018
		the project in consultation with Kerala State Pollution Control Board (KSPCB).
(xxii)	No solid waste will be disposed of in the Coastal Regulation Zone area. The solid waste shall be properly collected, segregated and disposed as per the provision of Solid Waste (Management and Handling) Rules, 2000.	<p>Being Complied No solid waste is being disposed of in the Coastal Regulation Zone area. Solid waste is being properly collected, segregated and disposed as per the Solid Waste Management Rules, 2016 as amended. As mentioned in EIA, contractors working at the site have been made responsible for management of Solid Waste during construction stage. They have obtained Consent of Kerala State Pollution Control Board and complying with the provisions pertaining to management of Solid Waste in line to Solid Waste Management Rules 2016 as amended.</p>  <p>Solid Waste Management at Labour Camp</p>
(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.	<p>Complied 25 DG sets are present at site. 22 DGs are operational and 3 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 VIII.</p>
(xxiv)	No construction work other than those permitted in Coastal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.	<p>Being Complied Construction of the project is as per the approvals obtained.</p>
(xxv)	The approach channel shall be properly demarcated with lighted buoys for safe navigation and adequate traffic control guidelines shall be framed.	<p>Will be complied The project is in construction phase. The same shall be complied during operational phase</p>
(xxvi)	The project proponent shall	Will be complied


**Vizhinjam International Deepwater Multipurpose Seaport
Status of conditions stipulated in Environmental and CRZ clearance.**

**Half yearly Compliance report on conditions stipulated in Environmental & CRZ
Clearance (Period: April 2018 to September 2018)**

Sl. No.	Conditions	Compliance Status as on 30-09-2018
	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.	<p>Green Belt: Although Natural green belt exist, the Greenbelt of adequate width with suitable species in consultation with forest department as identified in EIA will be developed in all possible areas including Cargo storage areas and along the boundary of expansion project area. Currently reclamation of port back up yard is under progress. Greenbelt development plan has been considered in the Master Plan and adequate Budgetary provision has been kept for this purpose.</p> <p>Compensatory Afforestation: 12 Ha of land was identified by social forestry department to carry out compensatory afforestation activities (at an aerial distance of 24 km from project site). In lieu of 1127 tress cut till now AVPPL required 7 Ha. area for afforestation, however taking into consideration future felling of trees Forest department has carried out afforestation on 12 Ha land in Sainik School Trivandrum for AVPPL.</p> <div>     </div>
(xxvii)	The fund earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes.	<p>Being Complied</p> <p>An amount of 40 Crores has been kept solely for EMP implementation and is not diverted for any other purpose.</p> <p>The activity wise breakup of EMP fund is enclosed as Annexure IX.</p> <p>An amount of 3.19 Cr has been utilized towards implementation EMP measures during compliance period (April 18 to</p>

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Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: April 2018 to September 2018)		
Sl. No.	Conditions	Compliance Status as on 30-09-2018
		September 18).
(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 Organizational Structure for Environment, Health, and Safety & CSR for construction phase is enclosed as Annexure X .
(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. <ul style="list-style-type: none"> Consent to Establish is renewed by State Pollution Control Board vide Consent No. PCB/HO/TVM/ICE-R/02/2018, dated 19.07.2018 (Attached as Annexure I). 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 ending June 2016) As per the exemption granted by Government of Kerala (GoK) G.O No. 310/2015/LSGD dated

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Sl. No.	Conditions	Compliance Status as on 30-09-2018
		01/10/2015, AVPPL is not required to obtain any further permission to construct port related building within the port premises.
(ii)	Adequate provision for infrastructure facilities including water supply, fuel and sanitation must be ensured for construction workers during the construction phase of the project to avoid any damage to the environment.	Complied On an average 670 nos. of construction worker were engaged in the port construction activities on a daily basis, during the compliance period and were housed in a labor camp near to the project site as well as nearby resorts and were provided with all the necessary infrastructure facilities including water, electricity, fuel, sanitation etc. A brief write-up highlighting the facilities/amenities given to construction workers engaged in construction activity along with photographs is attached as Annexure XI .
(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 limited way in the port area. 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 XII . 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	Complied Quarry material is being obtained from approved quarry sites only. The road so far constructed (a temporary road for construction purposes) has been made with material available on site. <ul style="list-style-type: none"> • No excavation has been carried out in private property • No excavation or dumping has been carried out in wetlands, forest area or other ecologically valuable or sensitive locations. • No bituminous or hazardous material has been used

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
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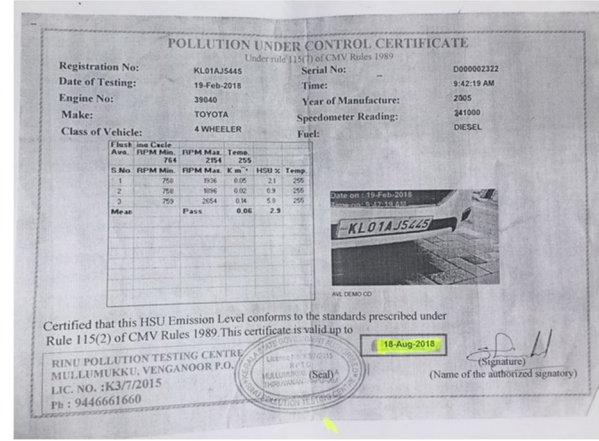
Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: April 2018 to September 2018)															
Sl. No.	Conditions	Compliance Status as on 30-09-2018													
	Soil Conservation and Watershed Development Agencies working in the area, and (d) Construction spoils including bituminous material and other hazardous materials must not be allowed to contaminate water courses and the dump sites for such materials must be secured so that they shall not leach into the ground water.														
(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 from approved quarries. No new quarries have been opened for construction materials. In case of new quarries, necessary approvals will be obtained from the competent authority, before starting the work.													
(vi)	The project authorities shall make necessary arrangements for disposal of solid wastes and for the treatment of effluents by providing a proper wastewater treatment plant outside the CRZ area. The quality of treated effluents, solid wastes and noise level etc. must conform to the standards laid down by the competent authorities including the Central/State Pollution Control Board and the Union Ministry of Environment and Forests under the Environment (Protection) Act, 1986, whichever are more stringent.	Being complied <ul style="list-style-type: none">No solid waste is being disposed of in the Coastal Regulation Zone area.Solid waste is handled as per the Solid Waste Management Rules, 2016 as amended.Sewage Treatment Plant (STP) will be installed in phased manner along with the project in consultation with Kerala State Pollution Control Board.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 duration from April 2018 – September 2018 is mentioned below. <table><tr><th>Parameter</th><th>Unit</th><th>Max</th><th>Min</th><th>Perm. Limit</th></tr><tr><td>PM₁₀</td><td>µg/m³</td><td>90.5</td><td>41.4</td><td>100</td></tr></table>				Parameter	Unit	Max	Min	Perm. Limit	PM ₁₀	µg/m ³	90.5	41.4	100
Parameter	Unit	Max	Min	Perm. Limit											
PM ₁₀	µg/m ³	90.5	41.4	100											


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Sl. No.	Conditions	Compliance Status as on 30-09-2018					
		PM _{2.5}	µg/m ³	30.6	10.6	60	
		SO ₂	µg/m ³	5.72	4.84	80	
		NO ₂	µg/m ³	8.45	4.66	80	
		CO	mg/m ³	BDL	BDL	4	
		HC	ppm	BDL	BDL	--	
		<ul style="list-style-type: none"> Detailed Monitoring Reports for the period April 2018 – September 2018 is attached as Annexure XII). 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 Consent To Operate (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 Kerala State Pollution Control Board before commissioning of the project. 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; <ul style="list-style-type: none"> Tarpaulin Cover is being used during transportation of construction material All vehicles coming into the site are under a speed restriction of 20 kmph Regular Water Sprinkling is done on the approach road by water tankers. It is ensured that all vehicles entering the Port have a valid PUC certification The dumpers have speed governors ensuring adherence to speed limit 					


adani	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Status of conditions stipulated in Environmental and CRZ clearance.		

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: April 2018 to September 2018)

Sl. No.	Conditions	Compliance Status as on 30-09-2018
		  <div> <div>Water Sprinkling in progress</div> <div>Tarpaulin cover on trucks</div> </div>  <p align="center">PUC certificate</p>
(ix)	Full support shall be extended to the officers of this Ministry/Regional Office at Bangalore by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.	Noted. There was no visit by officers of Ministry/Regional Office at Bangalore during the compliance period. However NGT appointed committee reviewed the compliance condition of EC & CRZ on 03.08.2018 at Thiruvananthapuram. Further official from KSPCB also made visit to site in August 2018. 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 stipulate any additional conditions or modify the existing ones, if necessary in the interest of environment and the same shall be complied with.	Noted for Compliance.
(xi)	The Ministry reserves the right to revoke this	Noted.

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Status of conditions stipulated in Environmental and CRZ clearance.		


Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: April 2018 to September 2018)		
Sl. No.	Conditions	Compliance Status as on 30-09-2018
	clearance if any of the conditions stipulated are not complied to the satisfaction of the Ministry.	
(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.	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 Government of Kerala & AVPPL on 17 th August 2015. 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 M/s AVPPL was signed on 17 th August 2015. The layout of the port has been approved by Govt. of Kerala by letter No.308799/E1/15/F&PD dated 30 th October 2015 (Submitted along with the Compliance Report of the period ending June 2016).The preliminary construction activities commenced at site on 16 th November 2015 followed by official inauguration on 5 th December 2015. Financing agreement forming part of financial closure was submitted by the concessionaire on 13 th May 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 has complied with the same.
13.	These stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act, 1974, The Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification 2006, including	Noted for compliance

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Status of conditions stipulated in Environmental and CRZ clearance.		


Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: April 2018 to September 2018)		
Sl. No.	Conditions	Compliance Status as on 30-09-2018
	the amendments and rules made thereafter.	
14.	All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.	<p>Complied</p> <p>All required clearances will be obtained before start of operation. However necessary approvals from concerned Statutory Departments / Agencies have been obtained for the construction designs/drawings relating to the proposed construction as mentioned below.</p> <ul style="list-style-type: none"> Consent to Establish was obtained from pollution control board vide consent No. PCB/HO/TVM/ICE/08/2015 dated 15.09.2015 valid up to 31.07.2018. Consent to Establish 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 <p>As per the exemption granted by Government of Kerala (GoK) vide G.O No. 310/2015/LSGD dated 01/10/2015, we are not required to obtain any further permission to construct port related building within the port premises.</p>
15.	The project proponent shall advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environment Clearance and copies of the clearance letters are available with the Kerala State Pollution Control Board and may also be seen on the website of the Ministry of Environment & Forest at http://www.envfor.nic.in . The advertisement should be made within 10 days from the date of receipt of the	<p>Complied</p> <p>Complied and intimated (with copy of advertisement) to the regional office of MoEF &CC, vide letter No. VISL/EC/MoEF/2013 dated 20-01-2014.</p> <p>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</p>

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Status of conditions stipulated in Environmental and CRZ clearance.		


Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: April 2018 to September 2018)		
Sl. No.	Conditions	Compliance Status as on 30-09-2018
	Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bangalore.	
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 2 nd September 2016
18.	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad/Municipal Corporation, Urban Local Body and the Local NGO, if any from whom suggestions/representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.	Complied The Clearance Letter were 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
19.	The proponent shall upload the status of compliance of the stipulated Clearance conditions, including results of monitored data on their	Complied The copy of the last compliance report including the results of six monthly monitoring data (October 2017 - March 2018) has been uploaded in company's web site

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Status of conditions stipulated in Environmental and CRZ clearance.		

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: April 2018 to September 2018)		
Sl. No.	Conditions	Compliance Status as on 30-09-2018
	website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM, SO ₂ , NO _x (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.	http://www.vizhinjamport.in and also on Adani Ports website http://www.adaniports.com/ports-downloads?port=Vizhinjam-Port and submitted to the MoEF & CC Regional Office (Bangalore), Zonal office of CPCB (Bangalore), KSPCB, KCZMA vide letter No. VISL/2014-15/EE&EI-9/248 dated 28 th May 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, Sediment) are enclosed as Annexure XII , additionally summary of monthly Environment monitoring results are also uploaded on the website of Adani Ports website http://www.adaniports.com/ports-downloads?port=Vizhinjam-Port .
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 compliance reports are regularly submitted to all the concerned agencies. Compliance Report of the stipulated compliance conditions including results of the monitored data for the period October 2017 - March 2018 has been submitted to the MoEF&CC, Regional Office (Bangalore), Zonal office of the CPCB (Bangalore), KSPCB & KCZMA vide letter No. VISL/2014-15/EE&EI-9/248 dated 28 th May 2018 in hard copy as well as through e-mail.
21.	The environmental statement for each financial year ending 31 st March in Form-V as is mandated to be submitted by the project proponent to the concerned Kerala State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986 as amended subsequently, shall also be put on the website of the company along with the status of compliance of	Will be complied The project is in construction phase. The same shall be complied post commissioning during operational phase.

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Status of conditions stipulated in Environmental and CRZ clearance.		

Half yearly Compliance report on conditions stipulated in Environmental & CRZ Clearance (Period: April 2018 to September 2018)		
Sl. No.	Conditions	Compliance Status as on 30-09-2018
	Clearance conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail.	

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Status of conditions stipulated in Environmental and CRZ clearance.		

Enclosures:

Annexure I: Certificate of Consent to Establish – Renewal (Consent No.: PCB/HO/TVM/ICE-R/O2/2018; Dated 19/07/2018)

Annexure II: Report on Shoreline monitoring April 2018 – September 2018 (in CD)

Annexure III: Shoreline Modelling Report for March 2017 to February 2018 (in CD)

Annexure IV: CSR Activities by AVPPL during the compliance period (April 2018 – September 2018)

Annexure V: Report on compliance of conditions of KCZMA recommendation for Environmental / CRZ clearance

Annexure VI: Compliance status of the response/commitments made during Public Hearing

Annexure VII: Status of Environment Management Plan

Annexure VIII: DG Set Details

Annexure IX: EMP Budgetary Provision and Expenditure during the compliance period (April 2018 – September 2018)

Annexure X: Organizational Structure-EMP Implementation

Annexure XI: Details of Labour Camp

Annexure XII: Environment Monitoring Report (April 2018 – September 2018)

Annexure I

**Certificate of Consent to Establish – Renewal
(Consent No.: PCB/HO/TVM/ICE-R/O2/2018; Dated
19/07/2018)**



KERALA STATE POLLUTION CONTROL BOARD

FILE NO. :PCB/HO/TVM/IC/06 /2015

Date of issue :19/07/2018

INTEGRATED CONSENT TO ESTABLISH - RENEWAL

Consent No : PCB/HO/TVM/ICE-R/02/2018

Valid upto 31.07.2023

Ref : As per consent no.PCB/HO/TVM/ICE/08/2015 dated 15/09/2015 valid upto 31/07/2018.

The ' Integrated Consent to Establish' issued as per reference above to M/s ADANI VIZHINJAM PORT PRIVATE LIMITED AT VIZHINJAM, THIRUVANANTHAPURAM-695521, is hereby renewed up to 31/07/2023 and issued to M/s ADANI VIZHINJAM PORT PRIVATE LIMITED AT VIZHINJAM, THIRUVANANTHAPURAM-695521. The consent(s)/ variation order(s) cited under reference are integral part of this renewal order and this order is subject to the conditions stipulated therein and the following modifications/ additions.

I. GENERAL

S.No.	Items	Description
1	Date of application	11/06/2018
2	Fee remitted	Rs.44554800/-
3	Validity	31/07/2023
4	Annual fee	Rs.83,28,000/-

II. Stack Details

Stack No.	Source of Emission	Emission Rate(Nm3/Hr)	Stack Height above		Control Equipment
			Ground Level	Roof Level	
As per previous consent					

III. CONDITIONS

All other conditions of the Integrated Consent to Establish issued as per reference above remain unchanged.

K SAJEEVAN

Digitally signed by K SAJEEVAN
Date: 2018.07.25 14:50:23 +05'30'

DATE :19/07/2018

SIGNATURE & SEAL OF ISSUING AUTHORITY
CHAIRMAN



To

Mr.Rajesh Jha,
CEO, Adani Vizhinjam Port Private Limited,Adani House,
Near Mithakhali Six Roads,Navrangpura, Ahmedabad-380009

- 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.

Annexure II

**Report on Shoreline monitoring April 2018 –
September 2018 (in CD)**

Annexure III

Shoreline Mathematical Modelling Report (in CD)

March 2017 to February 2018

Annexure IV
CSR Activities by AVPPL
(During April 2018 – September 2018)


CSR –VIZHINJAM



April 2018 to September 2018


ADANI FOUNDATION
ADANI VIZHINJAM PORT PVT LTD

2nd Floor, Vipanchika Tower, Thycadu, Thiruvananthapuram – 695015

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport CSR Activities by Adani Vizhinjam Port Private Limited		

CONTENT

SL. NO.	TOPIC	PAGE NO
1.	EDUCATION	
1.1	SUMMER CAMP	
	a. VENAL THUMPIKAL	
	b. ARIVARANGU	
	c. CHANGATHIKOOTTAM	
	d. BALAJANA SANGHAM	
	e. SNEHAKOODARAM	
1.2	LITERATURE MEET	
1.3	OPEN HOUSE	
1.4	PRAVESANOLSAVAM	
1.5	ANGANWADI SUPPORT	
1.6	PARENTS MEET	
1.7	TEACHERS' DAY CELEBRATION	
1.8	ENGLISH LANGUAGE SKILL TRAINING	
2.	COMMUNITY HEALTH	
2.1	MOBILE HEALTH CARE UNIT	
2.2	SOLID WASTE MANAGEMENT	
2.3	SANITATION	
2.4	OCKHI SUPPORT	
2.5	DRINKING WATER	
2.5	MEDICAL CAMP	
2.6	SUPOSHAN	

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3. SUSTAINABLE LIVELIHOOD DEVELOPMENT

3.1 LIVELIHOOD DEVELOPMENT PROGRAMME

- a. HAND-HOLD SUPPORT
- b. CASE STUDIES

3.2 SKILL DEVELOPMENT PROGRAMME


- a. DIGITAL LITERACY PROGRAMME
- b. EMPLOYABILITY SKILL COURSES

4. COMMUNITY INFRASTRUCTURE DEVELOPMENT

- 4.1 TWO-STORIED BUILDING HALP SCHOOL
- 4.2 TWO-STORIED BUILDING, PNAVAILA UP SCHOOL
- 4.3 TOILET BLOCK – AYYANKALI UP SCHOOL
- 4.4 PLAY GROUND – KOTTAPPURAM
- 4.5 COMMUNITY TOILET – CHARUVILA
- 4.6 PUBLIC BATHING FACILITY – KARIMPALLIKKARA
- 4.7 WORKS UNDER PREPARATION

5 OTHERS

- 5.1 LOCAL EMPLOYMENT
- 5.2 EMPLOYEE VOLUNTEERING PROGRAMME
- 5.4 FILM ON CSR
- 5.4 FLOOD RELIEF WORK IN KERALA

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CSR INTERVENTION FROM 01.04.2018 TO 30.09.2018

The CSR intervention during the compliance period focused on community level 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


During the compliance period, eight major projects have been undertaken under the head of Education. This included

- i. Summer camp for the kids
 - a. Venal Thumpikal
 - b. Arivanrangu
 - c. Changathikoottam
 - d. Snehakoodaram
 - e. Balajana Sangham
- ii. Literature meet
- iii. Open house-Merit Scholarship
- iv. Pravesanolsavam
- v. Anganwadi support
- vi. Parents meeting
- vii. Teacher's day celebration
- viii. English Language Skill Development

1.1 SUMMER CAMP

a. VENAL THUMPIKAL

'Venal Thumpikal', a two day summer camp for the children of Vizhinjam was organized on 12th and 13th April 2018 for the students of age group 10

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to 14 years at CSR Training Hall, Vizhinjam. This is the second year of organizing Venal Thumpikal at Vizhinjam. It was participated by 46 students from the five wards of Vizhinjam. The camp was organized with a basic objective developing self-esteem, social commitment and to team up volunteers to become responsive citizen.

The first day training focused on sessions to improve self-confidence and self-esteem through classes, discussion, games and puzzles. The second day focused on teaming up of volunteers with more session, outdoor visits and deliberations. As Part of the programme, students visited Port site, made a transect walk through Kottappuram community to understand the issue of cleanliness and made a review prepared by students themselves. The training made the children to come-up with explorative skill to understand the local issues, observe it with deep sense of understanding, respond it in time to ensure social commitments with a spirit of volunteerism.



b. SUMMER CAMP - CHANGATHIKOOTTAM

A two day summer camp was organized for the merit scholarship students under the CSR of AVPPL-AF on 26th and 27th of April 2018. It was participated by 32 scholarship students. Imparting the much required organizing skills among the students was one of the important objectives of the programme. Towards that the students were divided in to five groups of Reception, Logistics, Programme arrangement, Documentation, News preparation and Cultural arrangements. The leaders for each group

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were selected by the students themselves and entrusted to organize the entire camp. Following input sessions were organized part of the programme.


- i. Career orientation,
- ii. Adolescent and Social Media &
- iii. Child rights.

Two exposure visits were also conducted as part of the camp

- i. Visit to Port construction site &
- ii. Visit to Old age home – Snehasanthwanam and a participatory lunch with inmates.

The camp has provided the much needed insight on proper use of social media, child rights and CHILDLINE, upcoming Port and its prospects and the importance to create humanitarian values. The visit to old-age home and a lunch with the inmates was a true eye-opener to the students to understand the love and care to be given to such abandoned and aged people. In the evaluation, students appreciated the effort under CSR for making such a wonderful camp and requested to have quarterly engagements of the groups to refresh their mind.



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c. **SNEHAKOODARAM**

Adani Foundation under its CSR facilitated the three day children camp organized by HALP School and Education Department on 10, 11 and 12th of April 2018. 120 students of HALP School participated, where Adani Foundation constructed a two-storied building. The sessions focused on making craft items using waste materials, awareness on cleanliness, health and education.




d. **BALAJANASANGHAM**

Adani Foundation supported the Balajana Sangam Cultural Fest organised as part of the Kalajatha organised by ward councilor of Vizhinjam on 25th April 2018. It was participated by 35 students and 50 youth from Vizhinjam area.



e. **ARIVARANGU – LITERATURE CAMP**

Arivarangu, a month long literary camp for the selected children of Vizhinjam was organized from 9th April to 30th April 2018 at Mukkola, Vizhinjam, under the CSR of AVPPL-AF in association with CV Smaraka

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Grandhasala, Thennoorkonam. It was first of its kind in Vizhinjam for the children's. The basic objective of the programme was to create interest among the students on reading books, making reviews of it and promoting literary works by the students. 40 students having interest in literary works participated. The students were divided into six groups and entrusted with 6 locally identified Resource Persons as mentor for each group. All students and mentors assembled on every Monday and Thursday to discuss debate and review the works. Following activities conducted as part of Arivarangu.

- Each student has provided three books from the Library.
- Bi-weekly meetings held to teach the students on how to make review of books.
- Six locally renowned people were selected as the Mentors/Resource Persons for the programme
- Every day, the meeting started with a presentation on any famous writer or orator by the mentors.
- Thereafter provided opportunities to the students to present the review made by the students based on the books they read. They evaluated the reviews and nurtured suggestions for improvement.
- A six member parents committee was also constituted and made part of the review meetings to create such a conducive atmosphere at homes to inculcate the habits of reading among the students and to make the parents supporting and promoting such qualities.

Output

- Among the 40 students who participated 12 have excelled in review writing as reviewed by the Resource Persons. The students reviewed 31 books during the time. It include famous books like "Mathilukal, Snehathinteyum maranahinteyum athiry, Vysali, Mukkuvannu

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Bhoothavum, Ariverum Kadhakal, Viswa /vikhyathamaya Mookku, Madyam Mattoru Visham, Life history of Darwin, Biriyan etc.

- Other than reading, students have come-up with their poems and stories which was also corrected and recommended by the Mentors.
- The students reviewed books, started writing English poems, Malayalam Poems which are evaluated by the Resource Persons


Sl.No.	Literature Camp Outcome	Total
1	Book Review	98
2	Pencil Drawing & Painting	36
3	English Poem	2
4	Malayalam Poem	1

- More importantly all the students have started reading books systematically first time in their life.
- Finally, the mentors and students decided to meet on a monthly basis and make debate on contemporary literature.



1.2 LITERATURE MEET – C.V. Smaraka Grandhasala

The monthly literature meet followed by the successful completion of summer literature camp was started at CV Smaraka library on 9th June 2018. Thereafter every second Saturday of the month from 2 p.m. to 5.p.m is scheduled for the literary camp. It is guided by 6 voluntary writers

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and selected forty students. Following table depicts the monthly sessions and participation of children for the literary meet.

Month & Date	Input	Output
June 09.06.18	<ul style="list-style-type: none"> • "Randidangazhi", a njanpeeth award novel written by Thakazhi Sivasankarapillai was presented by Shri.Rajamani, the former HM of Mulloor School. • "Vazhakkula" written by Changapuzha Krishna Pillai was presented by Shri. Ratnakaran, Principal of DIET (District Institute for Education and Training) • Students discussed with Resource Person on the writings of these two important poets. 	<ul style="list-style-type: none"> • 21 students and 6 writers participated. • The platform crated much of qualitative discussion on literature and contemporary subjects. • Created the students a positive habit of reading books and come up with reviews, stories and poems.
July 14.07.18	<ul style="list-style-type: none"> • Book review by students • The team discussed the theme on "evolution" based on the book of Charles Darvin. The theme was presented by Mr. P. Retnakaran, Retired teacher and poet. 	<ul style="list-style-type: none"> • 15 students and 6 voluntary writers participated. • Students debated on evolution" based on the book of Charles Darvin.
August 11.08.18	<ul style="list-style-type: none"> • Mr. P. Retnakaran, Retired teacher and poet presented in detail the Character and Sacrifices of Karnan in Mahabharata. • Mr. Vijayakumar, Retired Government officer and writer presented the literatures on William Wordsworth, and Shakespeare. • Open discussion on creative writing. • Presentation on the creativity of students 	<ul style="list-style-type: none"> • 16 students 4 writers and 3 parents participated. • Kumari. Anjana and Master Anandhu presented their poems "Nashta Vasantham" and "Onam" respectively. • Kumari Nandana presented a story MadhuramullaOnakkalam" • Kumari Karthika Chandran exhibited her creative work based on the theme Onam.
	• "values learned from	


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Month & Date	Input	Output
Sep 08.09.18	<p>Ramayana' presented by Mr. P. Retnakaran, Retired teacher</p> <ul style="list-style-type: none"> • Quiz competition on Ramayana • Mr. Vijayakumar, Retired Government officer Presented the life history of famous personalities in Astrology viz Galileo and Bruno, then on the literature of Kumaranasan - Chinthavishtayaya Seeta Duravastha, Chandala bhikshuki...etc, • Creative presentation made by students 	<ul style="list-style-type: none"> • 5 writers and 21 students • Kumari. Keerthana presented a poem on 'Mother'. • Master Abhilash presented a story on "Time".




1.3 MONTHLY OPEN HOUSES

Monthly open houses were conducted for the scholarship students to ensure better advancement in the academic performance and career selection. Every second Saturday of the month from 2 p.m. to 5.00 p.m. is the time set for monthly open houses.

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Following table gives the topics given for monthly open houses during last six months.

Month & Date	Topic for the day	Output
April 14.04.2018	<ul style="list-style-type: none"> • Social commitment of children. • Planning for Summer camp 	<ul style="list-style-type: none"> • 22 students participated • Five different camps for the children were planned.
May 12.05.2018	<ul style="list-style-type: none"> • Motivational class • Individual Career plan preparation 	<ul style="list-style-type: none"> • 32 students participated • preparing individual career plan and year-long mentoring support along with soft skill programme
June 09.06.2018	<ul style="list-style-type: none"> • WHO prescribed "10 core life skills" and its relevance in their life. 	<ul style="list-style-type: none"> • 27 students participated in the programme • Sessions learned the importance of Self-awareness, Self-esteem, Empathy, Effective communication, Interpersonal relationship, Critical thinking, Creative thinking, Problem solving, Decision making, Coping with Emotion and Coping with Stress in life.
July 14.07.2018	<ul style="list-style-type: none"> • Team Building and Concentration Exercise 	<ul style="list-style-type: none"> • 21 Students participated • Students learned on how to concentrate in studies and in other tasks.
August 11.08.2018	<ul style="list-style-type: none"> • LEADERSHIP- Basic Qualities to be practiced part of life skills L- Liveness; E- Efficiency; A-Aim; D-Dedication; E- Example; R- Relationship 	<ul style="list-style-type: none"> • 24 students participated • Planned Onam get-together • Selected 5 volunteers to organise the event.
September 08.09.2018	<ul style="list-style-type: none"> • Basics interpersonal and intra personal communication. 	<ul style="list-style-type: none"> • 22 students participated. • Practiced better communication skills.


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These programs cover specific themes such as goal setting, exam preparation, memory techniques, leadership & communication and life skills. Monthly open houses ensured quality changes in the overall performance of students in their academic and personal life. This also helped to make a joyful learning with focus on achieving the goals set by the students.

1.4 PRAVESANAOLSAVAM (School opening fest)

Adani Foundation joined with HALP Government School during the school opening day for the academic year celebration 2018-19, on 01.06.2018. The day witnessed different programme's starting from giving books to the students, planting trees as part of haritha-vidyalayam (Green-school) and rejuvenating teachers by lighting the lamp for joyful learning. The programme was inaugurated by the unit Head, CSR, Adani Foundation presided over by the PTA president Mr. Nizam and felicitated by School HM Mr. Johnson, SMC members, school teachers and PTA members. New saplings were planted in the school premises and sweets were distributed to all students and parents participated.

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1.5 ANGANWADI SUPPORT

- Distribution of Baby chairs to Anganvadies**

Anganvadies are the primary platform for kids, especially those from the weaker sections in the community to get basic education and health care facilities. There are 49 Anganvadies in five wards of Vizhinjam CSR intervention area. Unfortunately, the facilities in Angawadis are abysmal. Last year Adani Foundation provided Water purifies to all the 49 Anganvadies. This year it was decided to provide chairs for the kids in all the 49 Anganwadis falling in the five wards of CSR intervention area. The Objective of the programme is to provide better facilities for Anganvadies

Adani Foundation under CSR provided 600 baby friendly chairs to all 49 anganwadis during the compliance period. The programme was inaugurated by Mrs. Anitha, CDPO, Urban II, Trivandrum Municipal

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Corporation. The following activities were discussed as part of the initiatives proposed under CSR for Anganwadi support.

- It is planned to construct a model anganwadi at Vizhinjam this year under the CSR of Adani Foundation. A suitable government land owned by ICDS in any of the divisions of Mulloor / Kottappuram / Venganoor / Vizhinjam / Harbour will be used for construction.




- Electrification and Water connection to selected Anganwadis. It is planned to do necessary electrification and pipelines for getting electricity and water connection to the anganwadis having own building in the five divisions of Vizhinjam. For that, it has been requested to provide the list of Anganwadis having own building.
- Under CSR, it is planned to do BALA (Building as Learning Aid) painting in selected anganwadis. Towards that the department may share a copy of modules, policies and rules for BALA available at the department at Women and Child Development.

1.6. Parents meeting (Scholarship student)

A parents meeting of scholarship students was held at CSR training center, Mukkola on 23rd June 2018, attended by 22 parents. Discussions were held on monthly open house and the year-long training calendar planned for the financial year by Adani Foundation. The objective of the meeting was to ensure proper guidance to be ensured by the parents to their children and bringing their ownership for sending the children in Open Houses. The parents appreciated the effort undertook for the monthly open houses and suggested following topics to be included in the Open Houses.

- Career skills and choice

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- Personality traits
- Presentation skills
- Aptitude for higher studies
- Improvement in English
- Preparation for Competitive Examinations

All parents expressed their gratitude for the scholarship programme and the continued support and guidance promised to extend through open houses.




1.7. Teachers day celebration

The teacher's day was celebrated on 5th September 2018 at Vidhyadhiraja Public School, Venganoor by honouring the senior teachers. Two senior eminent educationists Mr. Venganoor Ramakrishnan Nair and Mr. Sreekantan Nair were the chief guests of the day. Both of them were felicitated by Adani Foundation for their contribution in the field of education. All teachers who participated the programme were also honoured.




1.8 English Language Skills

Adani Foundation under CSR has planned to continue the English Language skill course for the high school students from the fishing community during the year 2018-19. 200 students from Kottappuram

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school, 136 from Venganoor Girls school and 113 from Venganoor Boys school have been shortlisted for English courses. It is a 60 hour module titled **"Win with English"**. SB Global, one of the NSDC partners is the training provider for the programme. 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.

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2. COMMUNITY HEALTH

During the compliance period from April to September 2018, following important activities are carried out under Community Health

- i. Mobile Health Care Unit (MHCU)
- ii. Solid Waste Management,
- iii. Sanitation
- iv. Drinking Water Supply
- v. Medical Camps and
- vi. Suposhan


2.1 MOBILE HEALTH CARE UNIT (MHCU)

- From the month of April 2018 to September 2018, MHCU has visited 11 sites weekly and done eight regular camps. Total treatment provided was to 6614 persons including medical camps. Among that majority are from the needy and disadvantaged persons and the communities.
- Emergency Medical relief provided to 603 patients, at Pathanamthitta as part of flood relief work.
- The team has done 16 house visits for the bedridden patient, provided treatment and necessary medicines to them. 260 Gluco check-ups were done for the patients.
- Awareness on Seasonal diseases, hypertension, Diabetes, skin disease, and sanitation were conducted at each sites.

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

• Site wise patient break-up for April to September 2018

Sites	April	May	June	July	August	Sept	Total
NEWCHURCH	154	134	80	125	81	112	686

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Sites	April	May	June	July	August	Sept	Total
KADAYKULAM	94	58	60	85	20	34	351
KARAYADIVILLA	112	100	110	109	53	110	594
THULAVILLA	99	115	131	120	43	89	597
THERUVU	183	212	163	154	83	199	994
SNDP HALL	132	112	101	97	51	87	580
GATEWAY	104	116	91	79	59	72	521
NEAR AQUARIUM	164	80	159	177	121	37	701
MARIYAN NAGAR	111	131	96	112	92	51	593
TOWNSHIP	121	201	73	101	95	79	670
KIDARAKUZHI					21	4	25
TOTAL							6312

- Regular camp details during the compliance period

SN	Date	Camp site	Total treatments
1	13/4/2018	Vizhinjam	29
2	12/5/2018	Kidarakuzhi	36
3	19/5/2018	Idivizhunnavilla	43
4	7/7/2018	Samudra	58
5	14/7/2018	Keedarakuzhi	28
6	28/7/2018	Keedarakuzhi	24
7	7/8/2018	Aluninnavilla	53
8	22/9/2018	Harbour	31
Total			302


- Specific Disease pattern reported during the compliance period

Disease	Apr	May	Jun	Jul	Aug	Sep
Acid Peptic Disorder	276	299	174	291	265	238
Aplastic and other Anemia	30	99	54	84	78	71
Asthma	315	364	213	325	297	267
Bronchiectasis	3	3	2	3	5	2
Cancer / Neoplasms	6	5	3	4	6	3

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Disease	Apr	May	Jun	Jul	Aug	Sep
Candidiasis/ Fungal infections	70	69	37	76	67	60
Cataract	54	60	37	59	50	49
Chronic Obstructive Pulmonary	153	152	80	167	152	136
Conjunctivitis	25	26	16	29	23	17
Coronary Artery Diseases /Stroke/ Cardio vascular	231	243	152	242	229	214
Dental Caries/Gingivitis	90	109	55	90	81	84
Diabetes Mellitus	542	570	342	564	521	476
Diarrhea/Dysentery/Gastroenteritis/ any other intestinal disorder	49	48	26	51	44	42
Fever/Pyrexia	187	199	118	204	188	176
Glaucoma	0	0	0	0	0	1
Hypertension	604	627	389	647	580	542
Hypothyroid	225	247	145	220	203	190
Injury/Burn	42	47	28	44	39	39
Jaundice	1	1	0	1	1	1
Malnutrition/Obesity	52	54	34	67	53	53
Mental and Behavioral disorder	6	6	4	7	5	6
Osteo-Arthritis/Joint Pain/ Rheumatoid Arthritis	511	546	346	550	513	470
Skin Diseases	94	109	56	97	83	83
Upper Respiratory Tract Infection	81	91	51	80	74	72
Urinary Tract Infection	68	65	40	71	59	63
Weakness – Generalized	8	8	4	8	8	8
Worms Infestation	23	22	13	27	24	23
Other Diseases	959	1076	598	937	845	811

The MHCU 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 instant blood sugar testing.

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2.2 SOLID WASTE MANAGEMENT (SWM)

Foundation intervened in creating awareness among the community on SWM by installation of Thumboormozhi bins, Swachhagraha and Suchitha programmes.

a. Mangement of Thumboormozhi Bins (Alleppy Model)

Adani Foundation installed 21 Thumboormozhi Aero Bins for waste treatment in the three wards viz Vizhnjam, Harbour and Kottappuram in the year 2017-18. During the compliance period waste to the Aero bin is bought by the people from the nearby communities themselves. Thiruvananthapuram Corporation has engaged 9 staff for day to day operation and management of thumboormozhi.

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b. **Swachhagraha**

Adani Foundation initiated another important project viz “**Swachhagraha**” to create a behaviour change among the students with a culture of cleanliness. The project is aimed to inculcate 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 will be provided workbooks to prepare Self-Improvement Plan to become Swachhagrahi. Other activities included promoting personal hygiene, preventing littering behavior, identifying littering pockets in schools and premises, making a consumption checklist and finalize a plan and intervention to improve the culture of cleanliness. Permission has been accorded from Directorate of Public Instructions (DPI) to conduct the programme in selected 150 UP/HS of Thiruvananthapuram district. Till date programme has reached to 42 schools of the 5 wards.

c. **Environment Day – Awareness of waste related issues.**

Awareness cum cleaning programme was organized as part of world environment day on 5th June 2018, at Karimpallikkara, Kottappuram, Vizhinjam near the breakwater area where the community wastes has accumulated. Ward Councilor Kumari Shini W, Health Inspector Mr. Ashok Kumar and a team of 40 sanitation workers from Corporation, AF CSR team, Adani Environment team, HOWE staff, Contractors staff and the

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community people have participated in the programme. The theme for the year was **“Beat Plastic Pollution”**, where the message has been given through awareness programme, posters and leaflets to the community on the environmental pollution caused by plastic waste.



On the occasion of World Environment Day (WED) on 5 June 2018, following activities are conducted in association with the environment department of Adani Vizhinjam Port Private Ltd and Vizhinjam Zonal Health division of Trivandrum Municipal Corporation. The details of the activities carried are given below.

- **School awareness and quiz programme**

The school awareness programmes clubbed with quiz competition and video show were organized on 6th and 7th June 2018, as part of the world environment day celebration. Prizes like Geometry boxes and umbrellas were distributed to the successful student in quiz competitions.

Sr. No.	Date	Time		School
1	06.06.2018	10.30 am	11.30 am	HALPS, Harbour, Vizhinjam

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Sr. No.	Date	Time		School
2	06.06.2018	11.30 am	12.30 pm	St. Mary's HSS, Kottappuram
3	06.06.2018	2.00 pm	3.00 pm	Govt. UPS, Panavila, Mulloor
4	07.06.2018	10.30 am	11.30 am	Govt. LPS, Mudippuranada



- **Magic Show on SWM**

A unique awareness programme on Solid Waste Management was organized at Mukkola. It was distinctive of its kind by entertaining a **Mobile Magic show** titled "**Anathapuri Vismaya Yathra**", giving awareness on Solid Waste Management and a **street theatre** giving message on preventing the outburst of epidemics during rainy season. The magic show was performed by a team from Magic Academy of Magician Muthucadu who are UNICEF brand ambassador for Kerala.

Adani Foundation supported in organizing the event at Vizhinjam along with Residence Association, Kudumbashree groups, Municipal Workers and the community. Shri. PNR Chowdhury, Executive Director, Adani

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Foundation was the chief guest of the programme inaugurated by Smt. Omana, Mulloor Ward Councilor, as part of the programme, Adani Foundation honored all the 38 sanitation workers including Health Inspector of the Thiruvananthapuram Corporation for their service to the community and the wholehearted support extended for the CSR initiatives to make Vizhinjam clean.



2.3 PUBLIC SANITATION & CLEAN CAMPAIGN

Arogya Jagratha Programme (Clean Campaign Programme)

In view of rainy and summer season, a month long awareness campaign on cleanliness and precautions to be taken to prevent the communicable diseases in the entire communities of Vizhinjam was conducted jointly by Adani Foundation and Municipal Corporation of Thiruvananthapuram from 24th April 2018. The programme was planned to create door to door awareness, ensuring healthy sanitation habits, waste disposal and to look after any water agglomeration causing mosquito menace. The

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programme was formally inaugurated by the Health Standing Committee chairman Mr. Sreekumar presided over by Mr. Santhosh, ward councilor, Venganoor ward, Kumari Shiny Kottappuram Ward Councilor, Unit CSR Head - AVPPL, and Health Supervisor. 150 community leaders, Adani Health Volunteers, Kudumbshree members and the sanitation wing of Trivandrum Corporation participated.



Cleaning campaign

Adani Foundation together with the sanitation wing of Trivandrum Municipal Corporation conducted a cleaning campaign on 13th September 2018 at Chenavilakom, Vizhinjam. It was conducted to prevent the outbreak of leptospirosis, as there were two leptospirosis cases reported from the Harbour ward of Vizhinjam. A total of 65 persons including 32 sanitation workers of Trivandrum Municipal Corporation and 33 community volunteers participated in the cleaning campaign. The team cleaned up the vegetation, pathways, drains and narrow roads close to Vizhinjam Harbour.



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2.4 OCKHI SUPPORT

In continuation of the support extended to Ockhi victims, Adani group has provided an amount of 2.5 crores to Kerala Government for the 50 Ockhi death cases reported.

2.5 DRINKING WATER SUPPLY


The supply of drinking water to the communities at Kottappuram and nearby areas was continued during the compliance period also. Every day 50,000 liters of water was transported through tanker Lorries to the communities under CSR of AF (Adani Foundation). For the same, 16 water tanks are provided in the wards. The treated water from the water treatment plant of Vizhinjam International Seaport Limited operated by Kerala Water Authority is used for this purpose.



In an effort to streamline 25MLD water supply to the five wards near Port, efforts were made by AVPPL-AF team along with VISL by visiting NHAI (National Highway Authority of India) in getting permission for cutting the roads. Further, our team also visited KWA (Kerala Water Authority) in speeding up the process of laying pending pipelines of approximately one K.M in length. Continuous follow-up with KWA and NHAI for three months has resulted in laying of pipelines and connecting drinking water from the 25mld plant to Kottappuram ward.

2.6 MEDICAL CAMP

Although Kerala has made significant gains in health indices like Infant Mortality Rate, Birth Rate, Death Rate and expectancy of life at birth, the reach out to get health facilities in the coastal and fishing communities are still remains as an alarming concern. Vizhnjam being one of the backward areas in the coastal belt of Kerala has reported high incidence of communicable diseases like malaria, chikungunya, dengue fever,

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leptospirosis and swine-flu especially among the fishing communities. Hence AVPPL-AF conducted regular medical camps in the CSR intervention area. During the compliance period 13 medical camps were conducted in which 810 people were treated free of cost. The details are as follows.

Sl. No	Date	Camp	Place	Consulted (Nos.)
1	11.05.2018	Eye Camp	Santhiniketan Public School, Mukkola	72
2	12.05.2018	General Medical Camp	'Sisters Kudumbasree'- Kidarakuzhy	48
3	19.05.2018	General Medical Camp	Hindu Mathapadanakendram,	52
4	23.06.2018	Blood Donation Camp	HOWE, Site Office, Mukkola	50
5	30.06.2018	General Medical Camp	Kidarakuzhy Residence Association	54
6	07.07.2018	General Medical Camp	Udaya Samudra, Kovalam	60
7	14.07.2018	General Medical Camp	Kidarakuzhy Residence Association	28
8	14.07.2018	Eye Camp	Kidarakuzhy Residence Association	58
9	28.07.2018	General Medical camp	Kidarakuzhy Residence Association	24
10	28.07.2018	Eye Camp	Santhi Niketan Public school, Mukkola	56
11	11.08.2018	General Medical Camp	Aluninnavila	56
12	20.09.2018	Cancer Awareness Programme	St. Mary's HSS, Kottappuram	150
13	26.09.2018	Cancer Detection Camp	Parish Hall, Vizhinjam	102
	Total			810

a. Eye Camp

Three Eye camps were conducted during the compliance period. The first Eye camp was conducted at Santhiniketan Public school, Mukkola on 11.05.2018 for the selected people from Mulloor and Venganoor ward, which has benefitted 72 community people. The camp was organized


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under the CSR of AVPPL in association with Aradhana Eye Hospital. A team of 10 members including one doctor, 8 ophthalmologists and a coordinator from Aradhana Eye hospital participated in the camp. Among the patients checked, 15 were directed for specs and 6 were referred for cataract surgery. The follow-up support was also extended.

The second eye camp was organized in association with Kidarakuzhy Residence Association and **Aradhana Eye Hospital**, Trivandrum, where 58 people were screened. The medical team suggested dilation test for 9 people and cataract surgery for another 4 people. The support was extended further in taking the referral services.

The third eye camp was conducted in association with Mukkola Central Residence Association's Women Forum and Aradhana Eye hospital, Trivandrum where 56 people were screened. The medical team referred 12 people for cataract surgery and 19 for specs.



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b. Blood Donation Camp (23.06.2108)

A blood donation camp was organized by Adani Foundation and AVPPL in association with Noorul Islam Institute of Medical Science and Research Foundation (NIMS) and Aids Control Society of Govt. Hospital Thycaud on 23rd June 2018. The Mobile Blood Bank Vehicle of Government Women and Child Hospital, Thycaud, Trivandrum came to project site along with the staff of NIMS hospital. The staff of AVPPL, HOWE, AF and Dredging team participated in the camp.



c. Cancer Awareness Programme

As part of the Community Health initiatives, a cancer awareness programme for community volunteers was organized in association with Abhayam Charitable trust, palliative care wing of Vizhinjam parish and Ashraya Volunteer Association on 20th September 2018 at St. Mary's Higher Secondary School auditorium. Dr. Jayakrishnan, Associate Professor Community Oncology Department, Regional Cancer Centre took the session. 150 community volunteers participated in the session. The basic objective of the session was to train the volunteers on the symptoms of cancer and equipping them to do pre-screening of people having symptoms of cancer and encourage them to attend the Cancer Detection Camp scheduled on 26th September 2018.

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d. Cancer Detection Camp


A cancer detection camp was organized at the parish hall of Vizhinjam in association with Abhayam charitable trust on 26th September 2018. 102 people were screened on that day and 6 suspicious cases were referred to Regional Cancer Centre (RCC). The cancer screening was conducted in association with the Community Oncology Department of RCC. The detection camp was inaugurated by Fr. Prasant, Assistant Vicar, Vizhinjam Parish Hall.



e. General Medical Camps

In addition to the regular weekday's service to the community by Mobile Health Care Unit that is from Monday to Friday, 7 General Medical Camps were also conducted during the compliance period.


Sl. No	Date	Camp	Place	Treated (Nos.)
1	12.05.2018	General Medical Camp	'Sisters Kudumbasree'- Kidarakuzhy	48
2	19.05.2018	General Medical Camp	Hindu Mathapadanakendram, Idivizhunnava	52
3	30.06.2018	General Medical Camp	Kidarakuzhy Residence Association	54
4	07.07.2018	General Medical Camp	Udaya Samudra, Kovalam	60
5	14.07.2018	General Medical Camp	Kidarakuzhy Residence Association	28
6	28.07.2018	General Medical camp	Kidarakuzhy Residence Association	24
7	11.08.2018	General Medical Camp	Aluninnava	56
Total				322

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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 Infant Mortality Rate (IMR) and Maternal Mortality Rate (MMR). During the

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compliance period, SuPoshan programme has reached to the community at-large as detailed below.

a. Programme overview

Accomplishments & Achievements		
Year	2018 (April – September)	
No	Details	Total Coverage
1	Community Engagement	
1.1	House hold visits	7441
1.2	Family based counselling	1660
1.3	Aganwadi visits	526
1.4	Formations of women groups	49
1.5	Formations of Adolescent groups	49
2	Program Inputs	
2.1	Focus Group Discussions	244
2.2	Village Level Events	66
2.3	Anthropometric Measurements	2311
2.4	HB screenings	2390
3	Achievement - Positive movement	
	Conversion of children from SAM to MAM (Severe Malnourished)	
3.1	Accute Malnourished to Moderate Accute Malnourished)	12
3.2	Converison of children from MAM to Healthy children	64
3.3	Anaemia – Sever to Moderate	8
3.4	Anaemia – Moderate to Mild	10
3.5	Anaemia – Mid to No Anaemia	2

b. Monthly breakup of Community Engagement programme

Sl. No.	Programme	April	May	June	July	Aug	Sept	Total
1	House hold visits	1157	1510	1332	1951	795	696	7441
2	Family based	355	543	225	217	190	130	1660

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Sl. No.	Programme	April	May	June	July	Aug	Sept	Total
	counselling							
3	Anganwadi visits	105	112	84	88	64	73	526
4	Focus Group Discussions	43	50	41	42	29	34	239
5	Village Level Events	10	11	8	11	14	7	61
6	Anthropometric Measurements	200	269	458	662	288	434	2311
7	HB screenings	287	279	514	991	150	169	2390

c. Monthly breakup of Qualitative Change

Sl. No.	Programme	April	May	June	July	Aug	Sept	Total
1	Conversion from Severe Acute Malnourished (SAM) to Moderate Acute Malnourished (MAM)	4			1	7		12
2	Conversion from MAM to Healthy Child	10	4	20	17	13		64
3	Anemia cases changed from Severe to Moderate				7		1	8
4	Anemia – from Moderate to Mild				2	1	7	10
5	Anemia – from Mild to No Anemia					1	1	2
Total		14	4	20	27	22	9	96

d. Monthly breakup of community reach-out

Sl. No.	Awareness Programme	April	May	June	July	Aug	Sept	Total
1	FGD for Adolescent girls							
1.1	No. of Programme	20	21	21	17	11	15	105
1.2	No. of Participants	152	346	108	136	86	149	977
2	FGD for Mothers							
2.1	No. of programme	23	27	27	25	18	19	139
2.2	No. of Participants	241	414	297	348	207	196	1703
3	Village Level Meeting							

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Sl. No.	Awareness Programme	April	May	June	July	Aug	Sept	Total
3.1	No. of Programme	11	11	12	11	14	7	66
3.2	No. of Participants	1021	266	207	224	307	349	2374
Total No. of programme		54	59	60	53	43	41	310
Total No. of Participants		1414	1026	612	708	600	694	5054

e. Anemia Screening as on September 2018

Category	HB Screened	Severe Anemia	Moderate Anemia	Mild Anemia	No Anemia
Adolescent Girls	5379	228	1037	1220	2894
Pregnant Women	299	26	54	85	134
Lactating Mothers	305	25	48	96	136
Women in Reproductive Age	4682	140	556	1616	2370
Total	10665	419	1695	3017	5534

f. Children's Fest – Anganwadi Suposhan Kalolsavam

A Children's cultural fest was conducted at Vizhinjam on 6th April 2018. It was organized by the Suposham team along with CSR team and ICDS team it saw participation from 800 members including 375 kids, 54 Anganwadi workers, Helpers and parents. The programme started at 9.30 a.m. and concluded by 6.30 p.m. it provided opportunities for all the kids to perform in different cultural events like dance, songs, skit, action song, storytelling etc.

A valedictory function was organized part of the programme inaugurated by the Standing Committee Chairperson of Trivandrum Municipal Corporation Adv. Geetha Gopinath presided over by the ward councilor Mr. NA. Rasheed District Social Welfare Officer. Unit CSR head, CSR Project Officer, ICDS-CDPO and Supervisor were also present. Four Angawadi teachers who have completed more than 30 years of service as Angawadi teachers in Vizhinjam were recognized by Adani Foundation by giving

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them memento. All kids who participated were given awards and mementos. It was a good occasion where the effort of Adani Foundation was applauded by all leaders, officers, Angawadi functionaries and the parents of kids.



g. Skit and Role plays

During the month of May 2018, SuPoshan team has introduced innovative community awareness programme through skits and role plays making the programme live and interesting. A total of 90 children of age group of 12 - 18 have been selected by all sanginis and were trained for different skits and role plays. The selected children have been trained by the Sanginis and CSR team. A total of 160 T-shirts were provided from "Adani Foundation-Suposhan" for the same. Following are the main themes selected for the skits/role plays.

- i. Importance of Nutritious food
- ii. Anemia

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- iii. Leafy vegetables
- iv. Importance of Hand wash
- v. Adolescent's health and hygiene
- vi. Importance of vaccination
- vii. Importance of first 1000 days

The practice was done in a phased manner. In the first phase the sanginies gathered and prepared scripts for the role plays in local language and then finalized it in the review meetings. In the second phase they trained the children with the support of CSR team. This skit and role plays were performed in 40 locations covering 800 families.



Output

- Role plays and skits transferred the messages very effectively.
- Community participation is more in skits/role plays, especially the parents and the relatives of the children in organizing the events.
- This method seems quite effective for behavior modification.

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h. Quiz, Painting and Chart preparation competitions - SuPoshan

A quiz and drawing competition was conducted at Pulloorkonam on 19th May 2018 under the theme of healthy habits. 34 children and their parents participated in the programme.




i. Suposhan - Environment day celebrations (05.06.2018)

As part of world environment day Mrs. Jasmine Rose, one of our Sangini (Health Volunteer) from Harbour ward organized awareness cum saplings plantation programme at Mathippuram, Anpathuveedu colony area. 25 Anganwadi students and their parents participated.

Mrs. Sreekala, another Sangini from Venganoor ward organized a world environment day programme with Adolescent Health club members. She has cultivated 11 varieties of saplings and planted them in the nearby communities at Venganoor.

Motivated by the existing model kitchen garden at CSR office Mukkola, a adolescent health club from Venganoor ward started kitchen gardens in vacant places at Venganoor. This has been coordinated by Mrs. Sreekala one of the Sanginis. Venganoor adolescent health club members collected Rs.3000 from nearby areas and provided note books and pen to the economically weaker students in that area on 01st June 2018.

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All those efforts undertaken by the community volunteers trained by Adani Foundation brought visible changes in the community and are appreciated by the community.




j. Anganwadi opening celebration

Amidst the Suposhan programme, two of the sanginis have organized Anganwadi opening celebrations. One was at ICDS No. 137 Vizhinjam and the other at ICDS No. 141 Edvizhunnabila. The sanginies Smt. Anitha.S.K, and Smt. Kavitha organized it with Anganwadi workers and distributed sweets as part of welcoming the new comers.

k. Breast feeding week celebration

World Breastfeeding Week is celebrated every year from 1st to 7th August to encourage breastfeeding and improve the health of babies around the world. Understanding the importance of the week, Adani Foundation carried out week long programme on promoting exclusive breastfeeding among children up to 6 months old. As WHO recommends exclusive breastfeeding to be started within one hour after birth until a baby is 6

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months old and Nutritious complementary foods should then be added while continuing to breastfeed for up to 2 years or beyond.

The programme covered the theme “Breast feeding - Foundation of Life” and the sanginis have organized 6 community level programme to Inform, Anchor, Engage, Galvanize people especially the mothers on importance of breast feeding.

Sl. No.	Venue	Partici pants	Sangini charge in	Resource Person	Programme
1	Panavila, Mulloor	24	Mrs. Suja	Mrs. Thulasi Bai, Anganvady Teacher	Awareness, Skit, Rally and Door to Door Campaign
2	Vadayarapuray idom, Kottappuram	30	Mrs.Sumitha	Mrs. Maya Mohan, Community Mobiliser	Awareness, Skit, Rally and Door to Door Campaign
3	Harbour	30	Mrs. Chandri, & Mrs. Sudheera	Mrs. Maya Mohan, Community Mobiliser	Awareness, Skit, Rally and Door to Door Campaign
4	Thyvilakom, Venganoor	22	Mrs. Sreekala	Mrs. Padmakumar, Anganvady teacher	Awareness, Skit, Rally and Door to Door Campaign
5	Vizhinjam	30	Mrs. Sudheera	Mrs. Maya Mohan, Community Mobiliser	Awareness, Skit, Rally and Door to Door Campaign
6	Venganoor	32	Mrs. Anitha	Rt. Teachers Mrs. Subadra, & Mrs. Devakiamma	Awareness, Skit, Rally and Door to Door Campaign. Honored 2 Model Mothers promoted the campaign

I. National Nutrition week celebrations

National Nutrition Week was observed from 1st September to 7th September 2018 and it created awareness among community people about the importance of having nutritious food for a healthy human life.

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The theme for National Nutrition Week 2018 was '**Go Further with Food**'. The sessions focused on main sources of nutritious food items to be chosen wisely by human being. Awareness programme covered largely on how one has to explore the nutritious food to be included in their daily routine like whole grains, fruits, vegetables, fat-free milk etc.

The program included awareness rally, awareness classes, exhibition of nutritious food items, painting competitions, promotion of kitchen gardens and street plays during the compliance period. The programme helped bringing behavioral change among mothers and kids in consuming nutritious food items. Further in selected schools, the students have painted important nutritious food items, exhibited nutritious food items. Community people have also participated in the rallies and skits conveying the message on providing food rich with protein, fats, vitamins and minerals to live, grow and function properly. The programme concluded by promoting the importance of keeping good health and wellbeing as an unhealthy diet increases the risk of many diet-related diseases.


Following are the important programme celebrated from 1st to 7th September as part of the national nutrition week celebration at Vizhinjam

Sl. No	Date	Venue	Programme	No. of Participants
1	09.09.2018	Kovalam beach	<ul style="list-style-type: none"> Awareness Rally Awareness class Exhibition of 30 nutritious food item Street play 	84 General Public
2	13.09.2018	Manali, Venganoor	<ul style="list-style-type: none"> Quiz competition Awareness class 	32 Pregnant women Lactating mothers and adolescent girls
3	18.09.2018	Kurisadinada, Mulloor	<ul style="list-style-type: none"> Nutritious recipes preparation competition Awareness class 	10 Pregnant women and lactating mothers

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Sl. No	Date	Venue	Programme	No. of Participants
4	22.09.2018	Govt. LPS Panavila, Mulloor	<ul style="list-style-type: none"> Awareness class Video presentation Drawing competition Exhibition of 64 nutritious food items 	105 School students
5	22.09.2018	Govt. SVLPS, Vizhinjam	<ul style="list-style-type: none"> Drawing competition Setting up of Kitchen garden Awareness class 	73 School students
6	23.09.2018	Thaivilakom	<ul style="list-style-type: none"> Awareness class Chart Preparation competition 	17 Pregnant women and lactating mothers



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Kitchen Garden promoted by Suposhan team.



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3 SUSTAINABLE LIVELIHOOD DEVELOPMENT

The important program's undertaken under Sustainable Livelihood Development during the compliance period are

- i. Livelihood Development Programme and
- ii. Skill Development Programme.

3.1 LIVELIHOOD DEVELOPMENT PROGRAMME

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

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

One of the focuses of livelihood programme during the compliance period is to extend hand-hold support to the units that started functioning.

Present Status:

- 576 women from the five wards were trained on these management modules and they formed 17 livelihood groups.

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- Another group of 416 youth were trained on ASDC-NSDC skill courses of which 126 members have conveyed their interest to start their own enterprises.

a. Extending Handhold support to promote market linkages

An assessment on the performance of existing livelihood groups was done by Adani Foundation to understand the present status of the groups and areas where hand-hold support needed to be provided to sustain the groups. Following table gives the present status of the groups and follow-up plans to sustain it.

Sl. No	Name of Group	Type of Business	Present Status	Follow-up support as per the need assessment
1	Clean 4 U	Hi Tech Cleaning Group	<ul style="list-style-type: none"> • Group got SSI registration and started cleaning of Houses, Flats, Hospitals, Offices, Water tanks, Vehicle...etc. • The average monthly turnover is Rs.30,000/- 	<ul style="list-style-type: none"> • Facilitate the group in setting separate office space. • Help the group in buying a vehicle for transportation. • Market tie-ups & customer base • Adding more equipment like automatic water tank cleaner, pest control and allergy proofing machine like hand held steam cleaner. • Hand-hold Training on advanced cleaning techniques, general management and cost cutting measures
2	Anaswara Poultry Unit	Hitech poultry cages of two with a capacity of 45 chickens for each cage.	<ul style="list-style-type: none"> • Group consists of 7 members and having two cages and 90 birds. • Each member gets revenue of Rs.4,000/- month which will be doubled in coming month as the new birds will start giving eggs. 	<ul style="list-style-type: none"> • Sales Tax Registration of the unit to sell eggs to city counters. • Modification in cage, by dividing it into four cabins. • Service of a Veterinary doctor for training & consultancy to the unit • Linking sales to other units such as Harbour Cafe, Vegetable Selling Unit etc.

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Sl. No	Name of Group	Type of Business	Present Status	Follow-up support as per the need assessment
3	Thriпти Poultry Unit	Hitech poultry cages of two with a capacity of 45 chicken for each cage with waste collection system	<ul style="list-style-type: none"> • Getting 25 eggs per day for each group member with consolidated number of 175 eggs for the group per day. • Each member gets revenue of Rs.4,500 per month. It may be doubled as the new cages added to the unit. 	<ul style="list-style-type: none"> • Replenishing birds in cages where it was killed. • Modification in the cages, by dividing it into four cabins. • Service of a Veterinary doctor for training & consultancy to the unit • Linking the sales to other units such as Harbour Cafe, Vegetable Selling Unit etc.
4	Harbour Canteen Unit	Canteen unit specially for traditional seafood's	<ul style="list-style-type: none"> • Daily turnover of Rs.9,000 to Rs.10,000 and gets a profit of Rs.1,000 • Beautification process progressing. 	<ul style="list-style-type: none"> • Attractive and noticeable Name Board • Change of old furniture • Improving the Front Area & inside walls • Branding & Painting • Kitchen Garden • Live Fish Counter • Mobile Counter for Sales • Training • Promoting through Social Media
5	Sreebhadra Big Shopper Unit	Big shopper Unit	<ul style="list-style-type: none"> • Unit got registration & PAN. • Monthly an average of 4,500 cloth bags are distributed to local shops. 	<ul style="list-style-type: none"> • Cloth bags promotion. • Raw material procurement. • Market tie-ups. • Design support.
6	Vizhinjam Karshika Karmasena	Running of Eco shop, preparation of growbags & Agri. works	<ul style="list-style-type: none"> • Eco Shop Unit opened with organic vegetables from the farmers • The group is planning to sell cut vegetables to households. 	<ul style="list-style-type: none"> • Designing vegetable kits & selling in various public places. (Shanthigiri Model). • Improving vegetable cultivation in a community model. • Arrangement of selling vegetables to other institutions promoted by the group, canteens, Harbour Cafe etc. • Improvement of the shop. • Sending vegetables to city centre. • Providing training & professional consultancy support.

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Sl. No	Name of Group	Type of Business	Present Status	Follow-up support as per the need assessment
7	Prime Events	Event Management & Marketing Team	<ul style="list-style-type: none"> • CSR subsidy amount has been provided. 	<ul style="list-style-type: none"> • This group is having sales flair, therefore should be utilized for coordinating other groups. • They can work for arranging sales points for many groups, organize small fairs, help the groups in sales & marketing. • Identifying public or private places for setting up street vending kiosks. • Helping the Harbour Cafe to improve sales by promoting the unit to nearby offices & business establishments using good collaterals. • Helping the vegetable group to procure vegetables & setting it to city counters. • Selling poultry & other products to city counters. • Helps taking data on a daily basis and reporting to AF.

b. CASE STUDIES OF LIVELIHOOD GROUP


i. Eco Shop – poison free organic vegetable shop

Eco Shop unit, one more livelihood group started their business under CSR at Vizhinjam on 26th June 2018 during the compliance period.

Brief of Eco Shop unit – Vizhinjam

A group of seven women farmers trained by Adani Foundation under the CSR project started an Eco-shop Unit at Mullumukku junction near Vizhinjam in association with Vizhinjam Agri Bhavan on 26th June 2018. The shop started with a clear objective of providing poison free vegetables to local residents. This is a maiden attempt of the agri-produce-marketing society formed by women. The livelihood training of Adani Foundation fostered the women groups to start collecting bio-products directly from farmers and selling to the public



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through this unit. The group is now planning to promote agriculture related services like door-to-door delivery of cut-vegetables and kitchen garden too.

The group was started as **Karshika Karma Sena** and has undergone intensive five day livelihood training provided by Adani Foundation. To understand more about agriculture and agriculture Products, the group attended the ASDC Skill development course on organic farming conducted jointly by Adani Foundation and IL&FS. Smt. Prasannakumari and Smt. Nisha Shaji are the president and secretary of the group wherein Smt. Udhayarani, Smt. Nisha, Smt. Sunithakumari, Smt. Shylaja and Smt. Priya are members of the group. All these seven member of the group are from Below Poverty Line looking for a livelihood opportunity, which added their ownership and commitment to start the unit.



The groups had regular meetings at Adani Livelihood Hatching Centre, where the members have come regularly and brainstormed on starting a livelihood unit. Finally the group decided to start an Eco shop unit selling organic vegetables and food items prepared by the people in and around the community. Under the guidance of CSR team, the group conducted several meetings with the Agri. Department. The continuous intervention and meetings with the Agriculture officials ensured the necessary hand-hold support to the group. The Agri-department provided a Agri-Sale

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Counter at a subsidized rate of Rs.2000/- per month to the group. Agri. Dept. further agreed to provide agricultural equipment free of cost and support in developing eco-friendly grow bags, tie-up with the local farmers and horticulture for the availability of organic vegetables. At present the group makes a sale of Rs.4000/- per day, which can be multiplied shortly, as the demand for locally made fresh vegetable is very high compared to the supply. Adani Foundation has agreed to provide a subsidy of 25% of the project cost and also facilitate in getting another 25% from VISL and 40% as the bank loan in addition to the 10% beneficiary contribution. The unit is targeting to accomplish the envisaged twin objectives of starting a direct marketing of locally produced vegetables and thereby getting reasonable price to the farmers and secondly to set-up indigenous group with modern equipment's for promoting local agri-farming.


ii. Stitching cum bakery unit.

A livelihood group on stitching cum bakery unit was started at Kottappuram, Vizhinjam on 1st June 2018 by Ms. Mini Jose, from Kottappuram ward. She was one of the participants of AF livelihood training and ASDC skill course. The unit consists of a stitching centre and a bakery unit. The shop manages to get a daily turnover of Rs.3,000, further proposal is under process for expanding the group to increase their sales.



iii. Data Plus Services

The inauguration of Data Plus – a new livelihood group for digital services is planned during October 2018. The group consists of 3 women from Kottappuram ward, who have high aspirations towards their life, all of them had undergone Tally – Skill courses under ASDC and are also trained

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under the management modules under the CSR Livelihood programme. They have developed a calendar and strategical plan for their shop by getting business from various stakeholders. The group had a future plan to expand their business.


a. Other Livelihood Groups under formation

Sl. No	Name of Livelihood Group	Type of Business/Activity	Status
1	Prime Events	Event Management & Marketing Team	<ul style="list-style-type: none"> • Proposal finalized, Shop Identified • Vendor registered • Subsidy of VISL under process
2	Happy Days Napkin distribution Unit	Sanitary Napkins distribution in tie up with HLL	<ul style="list-style-type: none"> • Pan Card received • Proposal under progress
3	Health Pro	Home based medical test and providing low cost specs	<ul style="list-style-type: none"> • Proposal ready • Group formed
4	Ooruvilakam Karshaka sangham	Vegetable cultivation	<ul style="list-style-type: none"> • Proposal under process • Group formed
5.	Thattukkada Unit	Shop for preparation & Selling of steam based snacks	<ul style="list-style-type: none"> • The Shop runs from morning 4:30 AM to 9:30 AM • Providing fast food for the localities • The shop earns a turnover of Rs.2500/day • Proposal ready for further expansion

3.3 SKILL DEVELOPMENT PROGRAMME

Skilling youth and making them employable is one of the priorities under the CSR initiatives of Vizhinjam. During the compliance period following programme were conducted under Skill Development.

- Digital Literacy Programme
- Employability Skill Courses

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a. Digital Literacy Programme

Digital literacy is a new initiative under skill development programme of ASDC. It is planned to target 1200 public this year under digital literacy at Vizhinjam under the CSR of AF. It would be 30 – 50 hour module covering the topics on computer and computer parts, typing, practice on typing, software, desktop settings, paint, MS word, MS excel, MS power point, internet and e-commerce, payment banking and its importance etc.

A team of 25 community resource persons selected from the 35 candidates have been trained on Digital literacy. Training of Trainers (ToT) for Community resource Persons held from 19.06.2018 & 20.06.2018.


The programme envisages producing clear information through writing and other forms of communication on various digital platforms to the public. Digital Literacy also equips people to use e-platforms with focus on payment banking, e-commerce and e-marketing including social media. The Digital literacy Programme has got a wide reach and has started 9 batches in different venues, it is decided to execute the programme in association with TSSS, Local NGO's and residence association.

SI No	Location	Supporting Organization	Number of Participants
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	15
6	Punchakkari	Localities	16
7	Mulloor	NSS	22
8	Thulavila	TSS	13
9	Osavila	TSS	24

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Digital Literacy Programme at various centers



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b. Commencement of Skill Courses


• General Duty Assistant

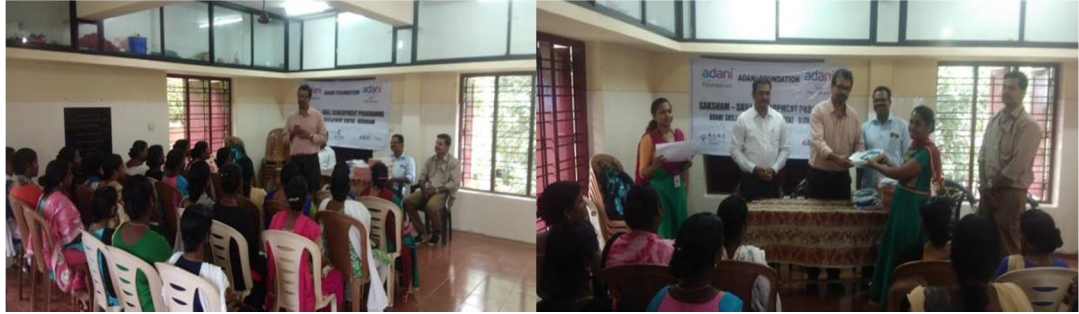
The skill development course on General Duty Assistant for the youth will formally start in October 2018 at CV Smaraka Grandasala Hal, Thennoorkonam, Vizhinjam. The course will be conducted at two centers, theory classes at CV Smaraka Granshashala and practical at IL&FS center Kowdiyar. The batch will start with 30 students, these 30 students were selected after attending entry gate assessment and personal counselling in which a total of 78 students participated. The course is intended for a period of 60 days under level-4 of NSQF (National Skill Qualification Framework) Under NSDC. The successful students would get a NSDC/SSC certification.

• Consignment Booking Assistant

The skill development course on Consignment Booking Assistant for the youth will also start in October 2018 at Jawahar Smaraka Grandhashala, Kidarakuzhy, Mullor. The batch will start with 25 students who got selected out of 47 students. The course is intended for a period of 60 days under level – 3 of NSQF (National Skill Qualification Framework) Under NSDC. The successful students would be getting NSDC/SSC certification.



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c. Certificate Distribution

Certificates were distributed to the students of GDA, Trainee Associate Retail and Assistant Beauty Therapist.

The certificate distribution for those who passed the General Duty Assistant, Trainee Associate Retail, Assistant Beauty therapist was done on 1st June 2018. AF CSR team and IL&FS team were there for the distribution ceremony. For GDA courses a total of 12 students are currently working where 10 in Asha Home care and 2 in KIMS Hospital, in Asst. Beauty Therapist a total of 29 students are working, in that 4 working in nearby beauty parlors and 25 are doing self-employment and in Fitness Trainer 3 students working in Spartans Gymnasium and 1 started working in Thunderbolt (Private Security agency for Cine Artists) and further placement is going on for all the courses.




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Certificate Distribution of Data Entry Operator and Tally

ASDC-NSDC certificates were distributed on 27th September 2018 to the students on successful completion of Data Entry Operator and Tally courses. A total of 80 students attended the programme and 77 completed the course and passed the exam. Among that 23 students got offers



from companies like Idea Communication, Street bell technologies, Hilltree supermarket, Lentebuzz education, RJ Ratheesh associates etc. A three member group from the batch started a Self-Employment Unit "Data Plus Services" and another 3 member students from Data entry course started an Abacus training center.

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4 COMMUNITY INFRASTRUCTURE DEVELOPMENT

Urban Infrastructure Development is another important visible activity undertaken under the CSR of Adani Foundation. 7 infrastructure projects are at various stages of completion during the compliance period under the CSR of Adani Foundation at Vizhinjam.

4.1 COMPLETION OF TWO STORIED BUILDING AT HALP SCHOOL

The construction of a two storied building for HALP School under the CSR of Adani Foundation was completed in 8 months' time by end of June, 2018. The formal inauguration of the building was held on 18th July 2018 by **Smt. J Mercy Kutty Amma**, Hon'ble Minister for Fisheries and Harbour, **Sri. Ramachandran Kadannappally**, Hon'ble Minister for Port, Museums and Archaeology, also Hon'ble **Mayor Adv. V K Prasanth** inaugurated the newly setup computer lab at HALP School. The MLA of Kovalam Adv. M Vincent handed over the key to school H.M and also distributed the merit scholarship to meritorious students.


Harbor Area Lower Primary School (HALPS) is one of the oldest LP schools at Vizhinjam having more than 400 students studying from the fishing community. The school was having two main buildings, of which one is a double storied building and other is a single storied. The double storied building has been closed as it is found with cracks, certified in danger situation.

Old dilapidated building



Foundation stone



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New CSR building-HALP School



School kids welcoming dignitaries



Minister unveiling the plaque



Inauguration by cutting the ribbon



Felicitating HOWE for work in 8 months' time.



Token of appreciation from School to CSR



Introductory Speech



Inaugural Address



Presidential Address



Special Address



Handing over key to HM by MLA




Cultural performance by school kids



4.2 TWO STORIED BUILDING AT MULLOOR UP SCHOOL

The construction of two storied building at Mulloor UP School is under progress as per the schedule. Presently the shade work is completed and

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block masonry work is ongoing. The project cost for the building is 1.25 crores. The entire work may be completed by end of January 2019.


Mullor school is one of the oldest schools established in the year 1888. It is the only Upper Primary School within five wards of CSR intervention. The work for renovation of building has been undertaken based on the request from Harbor Engineering Department of GoK, SMC of Mullor school, Ward councilor, school authorities and education department.



4.3 AYYANKALI SCHOOL TOILETS

AVPPL-AF under CSR constructed urinals and toilets at Ayyankali School, Venganoor. The work was done based on the request from local MLA, Ward Councillor and the SMC of Ayyankali Smaraka Upper Primary (UP)-School for providing separate toilet block for boys and girls under CSR. The school is having classes from Pre-KG to 7th standard. It is managed by Kerala Pulayar Maha Sabha (KPMS), one of the marginalized sections of society under the category of Scheduled Caste. Presently, the school is having strength of 173 children. It includes 88 girl students, 85 boy's students and eight lady teachers. The school has only two toilets for girl students, one urinal for Pre-KG girl students and a toilet for teachers. Even, the present conditions of existing toilets were pathetic. Hence, the request for supporting toilet facilities for Ayyankali school has been considered under the CSR.



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4.4 KOTTAPPURAM PLAY GROUND

The construction of playground at Kottappuram St. Mary's School is almost completed. The ground has been developed to play foot-ball, basketball, volleyball and athletic events. This ground has been developed based on the request from the Kottappuram School and from the local youth understanding the affinity of coastal community for sports, especially Football, Cricket and Volley ball.



4.5 COMMUNITY TOILET AT KOTTAPPURAM

The construction of public toilet at Kottappuram has been completed. Setting up of separate septic tank is under progress. This has been constructed at Ozavila colony at Kottappuram ward. An old community toilet which is totally dilapidated was present earlier. There was a request from Ward Councilor and the local community to construct a new toilet block. This colony is having 200 families, where about 75 families are not having toilet facilities due to lack of space in their premises. Open defecation is prevalent in this area, where the women from the families are the worst sufferers. Hence the request has been considered under the CSR of AVPPL - AF. The construction of public toilet at Thulavila, started on 14th March 2018.

Old dilapidated community toilet	New one under progress
	

adani™	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
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4.6 PUBLIC BATHING FACILITY AT KARIMPALLIKKARA

The work for construction of bathing facilities and renovation of pond at Karimpallikkara is completed. Karimpallikkara is a fishermen colony in the ward of Kottappuram close to Adani Vizhinjam Port. There are close to 345 houses near to this pond, wherein almost 150 families depend on this pond. Adani Foundation started renovation of this pond based on the request from the community. The work included five bathing facility for women, one bathing facility for gents, repair work, compound wall, metal sheet separator for man and women, nalas for free flow of water to drains.




4.7 NEW CONSTRUCTION PROJECTS UNDER Consideration

Sl. No.	Project	
1	Drainage facilities at Kottappuram, Vizhinjam and Mulloor. (This is the work requested by the District Collector) <ul style="list-style-type: none"> • 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.) <ol style="list-style-type: none"> 1. Harbour Road, Valiyaparambu, Vizhinjam 2. Venganoor 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	Following are works to be done inside the school <ol style="list-style-type: none"> i. Stage Platform ii. Washing Facility
4	HALP School, Harbour Road, Vizhinjam.	Following are works to be done inside & outside <ol style="list-style-type: none"> 1. Side roofing to protect 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 building. (tapping point around 50 meter) 4. New pump is to be considered for water supply.

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Sl. No.	Project	
5	LPS School, Kidarakuzhi	<p>Following are works to be done outside the school:-</p> <ul style="list-style-type: none"> • Toilet block for boys & staff is to be made out from existing unused kitchen block. • 8 urinals for boys, Soak pit & septic tank at right side of the existing block.
6	Model Anaganwadi, Vizhinjam (Nr. Police Station)	<ul style="list-style-type: none"> • 1500 Sq. ft. Montessori model Aganwadi at Govt. Vizhinjam LP School compound.
7	Palliative Care Centre	<ul style="list-style-type: none"> • Approx. 7500 Sq. ft. building for Palliative Care Centre
8	Electrification and Water Connection to all anganwadi's.	<p>Water and Electricity Connection to 30 Anganwadis:</p> <ol style="list-style-type: none"> 1. Provide lighting facility & fan 2. Water connection with drinking tap, sanitation tap and wash-tap
9	Old age Home (Ambranchi villa, Andoorkonam, Vizhinjam)	<ul style="list-style-type: none"> • Kitchen platforms, Toilet /wash rooms (2 nos,) refurbishment of existing building, Cloth Washing facility & bathrooms separately (3 nos.), • Beautification works of existing well (Plaster, cleaning colour 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:-

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5 OTHERS


5.1 Local Employment

A total of 190 Keralite including 107 localities are engaged in different construction activities. This has been ensured by conducting regular meeting of contractors every 15 days for tracking the employment status of local people. Localities are engaged in different sections like construction, helpers, security, office assistant and even in supervisory cadres.

5.2 Employee Volunteering Programme (EVP)

AVPPL-AF felicitated the Employee Volunteers and Community Volunteers for their valuable contribution during the flood relief work in Kerala. Shri. Rajesh Jha, CEO AVPPL inaugurated the programme on 29th September 2018 at Animation Hall, Kovalam. The other dignitaries of the programme were Shri. Vinay Singhal, Project Director HOWE and Shri. Sushil Nair Head Corporate Affairs. Certificate of appreciation, medals and T-shirts were given to the Employee Volunteers and Community Volunteers who have participated in the Flood Relief works during the period 21st August 2018 to 1st September 2018. The Employee Volunteers included the members from HOWE - dredging team, safety and HR; AVPPL- Corporate Affairs, Environment, Security and Finance, AF- CSR, Suposhan, MHCUC, Livelihood group members, Smash Cleaning Company and the Community Volunteers. The team consist of a total of 86 volunteers with 33 Employee Volunteers and 53 Community Volunteers. The volunteers supported following activities during flood relief.

- Packed 1500 relief kits on 20th August 2018 containing rice, clothes, sanitary items and food items to distribute in flood affected areas.
- Distributed relief kits in remote areas and tribal belts of Konni Taluk in Pathanamthitta district on 21st and 22nd August 2018.

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- Involved intensively in cleaning the schools and hospitals at Ramangiri Panchayat in Alappuzha district on 31st August 2018 and 1st September 2018.



Felicitation of EVs & CVs	CEO Addressing
	
Group presentation	Group discussion on flood relief
	

**Vizhinjam International Deepwater Multipurpose Seaport
CSR Activities by Adani Vizhinjam Port Private Limited****Distribution of medals and certificates****Felicitation of Volunteers****Felicitating AF- Livelihood Group****Felicitating Employee Volunteers**

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

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5.3 Film on CSR

To portray CSR initiatives a film on CSR-Vizhinjam has been shot. It included major CSR activities conducted in the areas of Education, Community Health, Sustainable Livelihood Development and Infrastructure development under the guidance and support of AF-HO. The film is shown during different community meetings, community engagement programmes and in social media.

5.3 Distribution of Life Saving Jackets to Fishing Community


The cyclone Ockhi that hit the coastal belt of Kerala on 29th November 2017 has taken many lives. The impact was more in Kottappuram and Vizhinjam which are the two adjacent wards of Adani Vizhinjam Port. The official report released by end of January 2018 says that Ockhi has taken the life of 50 people in Kerala; among those 14 cases were from Vizhinjam and Kottappuram wards alone. Adani Foundation provided immediate relief and response measures including 50000 purified bottled drinking water and 40,000 food packets during the ten days of rescue operations. A team of 30 CSR Volunteers and Adani Mobile Health Care Unit were also joined with the relief and rescue operations. Adani group has provided Rs.2.5 crores to Government of Kerala to distribute among families whose near and dear ones are lost during the cyclone. Continuous counselling and psycho-social support that the CSR team provided has made the victims and affected families to understand the reality and built confidence to come out of stress.

However, the rescued fishermen shared that lifesaving jacket is much needed for ensuring their safety. If they were having life jackets at the time of Ockhi, then many of the deceased could have been saved. Considering the genuine request as a measure to ensure the safety of Fishermen, AVPPL-AF under CSR decided to provide 1000 lifesaving jackets to the Fishing Community. The formal distribution function was held on 26th July 2018, inaugurated by Shri. Ramachandran Kadannappally,

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Hon'ble Minister for Ports, presided over by Adv. V.K. Prasanth, Hon'ble Mayor, Thiruvananthapuram Corporation. Having "life jackets" is one of the important requirements of our fishing community to ensure their safety said the Minister. The Minister applauded the efforts of Adani Foundation on its CSR activities to support the graving community and he specially mentioned the need to have a common platform of Government, Local authorities, Corporates like Adani and the community at large to respond such emergency situations. Adv. V K Prasanth, Hon. Mayor, Trivandrum Municipal Corporation wholeheartedly welcomed the efforts of Adani Foundation on its CSR activities and the initiatives taken with Trivandrum Corporation on cleanliness.

Keynote Address by CEO-AVPPL	Introductory speech by CSR unit Head	Switch on function of newly produced CSR film
		
Mayor on Presidential Address	Inauguration by lighting the lamp	Minister of Inaugural Address
		
Keynote address by MD VISL	Distribution of Life-Jackets	Blessing note by the Vicar of Kottappuram Church
		

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Address by commanding officer - ICGS	Demo by ICGS on jacket wearing	Participated fishing community
		

5.4 Flood Relief Activities – Sep 2018

Adani Foundation has committed INR 50 crore to the Kerala Chief Minister's Distress Relief Fund, to aid the state in its herculean task of reconstruction and rehabilitation followed by the devastating flood. The first instalment of




Rs.25 crores was handed over to the Chief Minister on 23rd August 2018. Also the Group employees have pledged a day's salary to express solidarity with the state's distressed people.

Distributed Relief kits to 1500 flood affected people in Ranni Taluk of Pathanamthitta. The villages intervened in specific are Kokkathode, Mundanplavu, Nellikkampara and Kottampara Kurisadi Junction in Aruvapulam Panchayath; Thekkemala, Vanchipramala, Catholic church



and St.George Orthodox church in Mallappuzhasseri Panchayat, Mangaram and Maroor villages in Konni. Each relief kit contained rice, rice flakes, biscuits, bath soap, wash soap, toothpaste, toothbrush,

candles, matchbox, lungi, nightclothes and cloth bags.

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The Foundation has also pressed into service its Mobile Healthcare Van in Kozhancherry from 22nd August 2018 to 29th August 2018 with doctor, pharmacist and social worker stationed at relief camps.



The major diseases arising as aftermath of flood are fungal infections, skin diseases, asthma and arthritis.

Flood Relief Cleaning Works carried out in schools, hospitals and pathways with a team of 52 members including CSR team, Adani staff and community volunteers on 31st August 2018 and 1st Sep 2018.

Employee Volunteers in Relief kit packing



Cleaning Work

Start of cleaning camp at Ramankiri School	Safety introduction by HOWE Safety Head
Cleaning work	Disposal of waste

Vizhinjam International Deepwater Multipurpose Seaport
CSR Activities by Adani Vizhinjam Port Private Limited



Cleaning of bench & desk

Cleaning of walla



Waste cleaning

Roof cleaning




School well cleaning

Class room cleaning


Annexure V

**Report on compliance of conditions of KCZMA
recommendation for Environmental / CRZ clearance**


	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Report on compliance of conditions of KCZMA recommendation for Environmental / CRZ clearance.		

Annexure V


Half yearly compliance report of conditions stipulated in KCZMA recommendation for Environment and CRZ Clearance		
Sr. No.	Conditions	Compliance Status as on 30-09-2018
(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 Necessary approvals from concerned Statutory Departments / Agencies have been obtained <ul style="list-style-type: none"> Renewed Consent to Establish from State Pollution Control Board vide Consent No. PCB/HO/TVM/ICE-R/O2/2018, dated 19.07.2018 valid till 31/07.2023 is attached as Annexure I. Airport Authority of India NOC vide NOC no AAI/SR/NOC/RHQ dated 7.12.2015 As per the exemption granted by Government of Kerala (GoK) vide G.O No. 310/2015/LSGD dated 01/10/2015, we are not required to obtain any further permission to construct port related building within the port premises.
(ii)	Since the project envisages development of roads, infrastructural facilities, dredging of the lake and kayals proper environmental safety measures must be ensured.	Complied All safety measures are being adopted. Full time Environment & Safety professionals are employed by AVPPL, contractors & subcontractors to oversee the implementation of environmental safety measures. 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	Complied "Consent for Establishment" has been

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Vizhinjam International Deepwater Multipurpose Seaport Report on compliance of conditions of KCZMA recommendation for Environmental / CRZ clearance.		


Half yearly compliance report of conditions stipulated in KCZMA recommendation for Environment and CRZ Clearance		
Sr. No.	Conditions	Compliance Status as on 30-09-2018
	the Kerala State Pollution Control Board, Health Department and other appropriate Authorities when such implementation programmes are undertaken.	obtained from Kerala State Pollution Control Board vide Consent No. PCB/HO/TVM/ICE/O8/2015, dated 15.09.2015 valid up to 31.07.2018. Subsequently the consent renewal application was submitted to KSPCB vide application number 7298974 dated 25 th April 2018, and it was renewed vide Consent No. PCB/HO/TVM/ICE-R/O2/2018 dated 19.07.2018 valid up to 31.07.2023. Copy of the same is attached as Annexure I.
(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 Contractor has 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. A dedicated solid waste management facility is planned which will be constructed along with project <ul style="list-style-type: none"> No solid waste is being disposed of in the Coastal Regulation Zone area. Currently no effluent is generated; domestic wastewater generated is treated in STP at labour camp and treated water is used for water

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Vizhinjam International Deepwater Multipurpose Seaport Report on compliance of conditions of KCZMA recommendation for Environmental / CRZ clearance.		

Half yearly compliance report of conditions stipulated in KCZMA recommendation for Environment and CRZ Clearance		
Sr. No.	Conditions	Compliance Status as on 30-09-2018
		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 During the compliance period Member Secretary and official of KCZMA reviewed the EC & CRZ compliance as part of NGT direction on 03.08.2018 at Thiruvananthapuram. All the necessary facilities/support to officials of KCZMA during the review meeting was provided. Additionally we are also meeting Member Secretary & officials of KCZMA from time to time for suggestion and to appraise them of various project related work/component. Copy of Six monthly EC&CRZ clearance compliance report is 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 <ul style="list-style-type: none"> Member Secretary KCZMA is also the member secretary of NGT appointed expert appraisal committee; the expert committee meets every six months to review the compliance of Environmental 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: <ul style="list-style-type: none"> No dredging was carried out during the compliance period from April to September 2018. The dredged material till 30th September 2018 amounting to 2.26Milm³ has been

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Vizhinjam International Deepwater Multipurpose Seaport Report on compliance of conditions of KCZMA recommendation for Environmental / CRZ clearance.		

Half yearly compliance report of conditions stipulated in KCZMA recommendation for Environment and CRZ Clearance		
Sr. No.	Conditions	Compliance Status as on 30-09-2018
		<p>utilized for reclamation of 30 Ha area. The dredged material has been used for reclamation only.</p> <ul style="list-style-type: none"> As per the directions of NGT, various quarterly and half yearly reports are being furnished to KCZMA including the details of the development works. No Breakwater construction took place during the compliance period. Work on Port Operation Building (POB), substation, RMU control center, workshop building, GIS building has started in the back up yard. Jetty construction work is in progress, 414 piles out of 615 piles have been completed till 30th September 2018.
(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 rd January, 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 is attached as Annexure IX.
(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,	Not Applicable The condition is not applicable since the application for CRZ/Environmental clearance was submitted by Vizhinjam International Seaport Ltd.(VISL), a

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Report on compliance of conditions of KCZMA recommendation for Environmental / CRZ clearance.		

Half yearly compliance report of conditions stipulated in KCZMA recommendation for Environment and CRZ Clearance		
Sr. No.	Conditions	Compliance Status as on 30-09-2018
	in the district/Sub Treasury concerned, if private parties are involved in the project and the chalan receipt in original be forwarded to the Science & Technology Department quoting this letter.	Government of Kerala undertaking

Annexure VI

**Compliance of the response/commitments made
during Public Hearing**

**Vizhinjam International Deepwater Multipurpose Seaport
Compliance of the Responses/Commitments made during Public Hearing**

Annexure VI

Compliance of the Response/Commitments made during Public Hearing		
Sl. No.	Responses/Commitments	Status as on 30.09.2018
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.97.43 Cr was sanctioned by GoK, instead of Rs.7.1 crores suggested earlier in the EIA stage. Out of this amount, Rs.70.52 crores have been disbursed till 30 th September 2018 for a total number of 2593 (This includes boat owners as well to whom kerosene is supplied free of cost during the port construction period) Livelihood Affected Persons (LAPs) whose verification was complete in all respects. 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
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.
5	Existing harbour will be improved under the CSR provisions of the project	Being Complied 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

**Vizhinjam International Deepwater Multipurpose Seaport
Compliance of the Responses/Commitments made during Public Hearing**

Compliance of the Response/Commitments made during Public Hearing		
Sl. No.	Responses/Commitments	Status as on 30.09.2018
		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.	<p>Being Complied</p> <p>Year round status of the shoreline is being mapped from Feb 2014 for a stretch of 40km. Monitoring is being continued for the construction phase. The 1st Mathematical Report prepared by L&T Infrastructure Engineering Pvt. Ltd. (LnTIEL) based on Shoreline Monitoring data for the period Feb'15-Feb'17 has been submitted with compliance report (Apr'17-Sep'17) in Nov'17. The mathematical modelling report has affirmed that the shoreline change is in line to the prediction done as part of the EIA report.</p> <p>In continuation, the shoreline data from March 2017 to February 2018 was submitted to LnTIEL for mathematical modelling to assess the impact on shoreline. Mathematical modelling report so prepared and vetted by NIOT is attached as Annexure III. The mathematical modelling report has affirmed that the shoreline change is in line to the prediction done as part of the EIA report.</p>
8	Water supply provision to the Vizhinjam fishing village	<p>Complied</p> <p>Scheme has been commissioned in April, 2013 by VISL by expending an amount of Rs. 7.3 crores. For O&M of the same an amount of Rs. 4.4 crores has been spent till 30th September 2018 by VISL. AVPPL have installed 20 water tanks in the water scarce areas in the project neighbourhood and water is being supplied on a daily basis on mobile water tankers.</p>
9	Construction of the new fishing harbour will be simultaneously completed with the port project	<p>Being Complied</p> <p>Refer Point No. 4</p>
10	Railway work will be initiated after	Complied

**Vizhinjam International Deepwater Multipurpose Seaport
Compliance of the Responses/Commitments made during Public Hearing**

Compliance of the Response/Commitments made during Public Hearing		
Sl. No.	Responses/Commitments	Status as on 30.09.2018
	Environment Clearance (EC)	To minimize the impacts, tunnelling methods are being explored for the rail route through Konkan Railway Corporation Limited. Draft Detailed Project Report (DPR) has been completed and submitted to VISL for review by Konkan Railway Corporation Limited.
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, 182 are from Kerala and 96 out of them are from nearby area within 10 km from project site.
12	Rehabilitation measures ensures employment opportunities for fishermen	Being Complied Refer point No. 1
13	Take all possible measures for judicious use of lighting system as part of the Green Port concept to reduce the carbon footprint	Will be Complied Will be considered with appropriate planning.
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

**Vizhinjam International Deepwater Multipurpose Seaport
Compliance of the Responses/Commitments made during Public Hearing**

Compliance of the Response/Commitments made during Public Hearing		
Sl. No.	Responses/Commitments	Status as on 30.09.2018
		<p>the waste management practices in line to waste management rules 2016 as amended. A dedicated solid waste management facility is planned which will be constructed along with project.</p> <p>For SWM of local community 21 Thumboormozhi Aero Bins were installed under CSR and municipal corporation has engaged 9 workers for managing them, during the compliance period all the Thumboormozhi were running.</p> <p>In addition to this through awareness classes people were educated on importance of segregation of solid waste.</p>
17	Upgradation of PHC at Vizhinjam will be carried out	<p>Being Complied</p> <p>The total project cost for Community Health Centre (CHC) –Vizhinjam 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. The multi-storey building will have facility for 37 inpatients, operation theatre, outpatient treatment hall, pharmacy, wash rooms, waiting area and parking. AVPPL-AF will soon release the first instalment of Rs. 1.18 crore for construction of CHC.</p>
18	New fishing harbour with all the infrastructural facilities will be constructed with reserved rights to mooring/berthing the boats	<p>Being Complied</p> <p>Refer point No. 9</p>
19	Appropriate compensation will be given to the resort owners as per the regulatory advice of KCZMA and MoEF since the resorts are seen to be located in No Development Zone (NDZ) as per CRZ Notification 2011	<p>Being Complied</p> <p>G.O.(Rt) No.2021/2017/RD dated 27-04-2017, was modified with G.O.(MS) No.17/2018/F&PD dated 09-06/2018 and 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.</p>
20	Rail, Road, Coastal and Inland Waterways connectivity will be	<p>Being Complied</p> <p>This is one of the objectives of the</p>

**Vizhinjam International Deepwater Multipurpose Seaport
Compliance of the Responses/Commitments made during Public Hearing**

Compliance of the Response/Commitments made during Public Hearing		
Sl. No.	Responses/Commitments	Status as on 30.09.2018
	ensured to the rest of Kerala and other Indian Peninsula Ports	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 suggested in EIA report will be carried out	Being Complied Refer point No. 7
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 No dredging and reclamation work was carried out during the compliance period. 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. Please refer Annexure XI .
25	VISL will ensure that livelihood	Being Complied

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	issues of Mussel collectors are addressed as per the EIA report	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 siting the 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 Road construction is stopped due to local protest, rail corridor work is yet to start. Status of construction stage EMP in matrix format is enclosed as Annexure VII . CSR activities are detailed in Annexure IV .
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. Six monthly compliance reports are submitted to all concerned regulatory authorities.
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, forest department has identified an area of 12 Ha. of land for AVPPL in Sainik School, Trivandrum. The afforestation activities are completed by the forest department for AVPPL.
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	Being complied No dredging is carried out during the compliance period; the dredged material

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Compliance of the Response/Commitments made during Public Hearing		
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	required	till 30 th September 2018 amounting to 2.26Milm ³ has been utilized for reclamation of 30 Ha area. The dredged material has been used for 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 st May 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 Year round status of the shoreline is being mapped for a stretch of 40km a (Last Six month Monitoring Report is attached as Annexure II). The Shoreline Modelling Report based on shoreline data from February 2015 to February 2017 was submitted with compliance report (April 17 to September 17). 2 nd Shoreline modelling report based on monitoring data collected for the period March 2017 – February 18 prepared by LnTIEL and vetted by NIOT is attached as Annexure III . The mathematical modelling report has affirmed that the shoreline change is in line to the prediction done as part of the EIA report
33	An Area Development Plan (ADP) is being prepared by CEPT University (Ahmedabad) for planned	Being complied VISL in coordination with town planning department, Tourism department and

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	development of the region to avoid haphazard development.	related stakeholder is in process of finalizing an integrated Area Development Plan. An integrated Area Development Plan is being prepared through the CEPT university, Draft plan was submitted and discussed before the working group and modifications suggested by the working group are being included in the plan.
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 location like Pozhiyur–Poovar estuary	Being complied Refer point No. 1
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 IV . 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 27.18 crores have been sanctioned by the GoK as inconvenience allowance in the form of kerosene in November 2017. 6.56 Cr has been given till 30 th September 2018 to the disbursal

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Compliance of the Response/Commitments made during Public Hearing		
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		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 VII 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.
42	Rail connectivity is proposed along the outer side of the stream running parallel to the harbour road and that too on elevated structures without affecting the entry to the fishing harbour	Will be complied 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 disturbance. Draft Detailed Project Report (DPR) has been completed and submitted to VISL for review.
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

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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 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	Being complied 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.
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	Will be complied During operation phase

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	safety norms and operational requirements.	
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.	Will be complied Inconvenience, if any, to fishing will be monitored during the construction phase.
54	The maximum rate of accretion at southern side of the harbour will be 21.6 m/year in the 1 st year and by 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.	Being complied Refer Point 32
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	Being complied Refer point No. 19

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	considering that all these resorts are in NDZ as per CRZ Notification, 2011	
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 VII
Status of Environment Management Plan

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Status of Environmental Management Plan.

Annexure VII

Status of Environment Management Plan- Port site- Construction Stage Potential Impacts and Mitigation Measures of Various Project Activities				
Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
1	Capital dredging	Marine water quality Marine ecology	<ul style="list-style-type: none"> Check turbidity levels with baseline levels as reference during entire monitoring programme Preparation of Dredge/reclamation Management plan Discharge of waste into sea will be prohibited Oil Spill control measures will be adopted Ensure that slop tanks will be provided to barges/ workboats for collection of liquid/ solid waste Marine environmental monitoring as per environmental monitoring programme 	Being Compiled <ul style="list-style-type: none"> Dredging has stopped since November 2017 as the dredgers were damaged during Okhi cyclone. The dredged materials till 30th September 2018 amounting to 2.26 Milm³ has been utilized for reclamation of 30 Ha area. 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 KITCO has been identified for preparing Facility Level Oil Spill Contingency Plan the work on the same has started, after finalization of the same it will be submitted to MoEF&CC in due course. Marine Environmental Monitoring at 5 locations as per the Environment Monitoring Plan prescribed in EIA has commenced since August 2016, one additional marine water monitoring location has been added from October 17 after suggestion from NGT committee and the parameters are within permissible limits. Six monthly monitoring reports are regularly

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Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
				submitted to regulatory authorities.
2	Material transport and construction activities	Air Quality	<ul style="list-style-type: none"> Most of the Breakwater stones will be transported from the quarries to the nearest harbour. From there through Barges it will be transported to project site. This is will avoid substantiate flow of Heavy Vehicles during construction Phase thereby minimizing impact on Air and Noise Quality in the project region. To reduce impacts from exhausts, emission control norms will be enforced / adhered. 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 	Being Complied <ul style="list-style-type: none"> At present due to unavailability of stones break water construction has stopped and no stones are transported for breakwater construction. It is ensured that all vehicles entering the Port have a valid PUC certification Adequate sized construction yard has been provided for storage of construction materials, equipment tools, earthmoving equipment etc. The dumpers have speed governors ensuring adherence to speed limit Also signage for speed control are displayed inside port area Water sprinkling is carried out for suppressing dust It is ensured that all trucks transporting material are covered by tarpaulin at top Regular awareness programme on various Environment aspects is being imparted to workers and employees.

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Status of Environment Management Plan- Port site- Construction Stage
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Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			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	
		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 possible, will be oriented so that the noise is directed away from sensitive receptors o Noise attenuation will be practiced for noisy equipment by employing suitable techniques such as acoustic controls, insulation and vibration dampers o High noise generating activities such as piling and drilling will be scheduled at daytime (6.00 am to 10pm) to minimise noise impacts o Personnel exposed to noise levels beyond	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 limit. o Protective gear like earplugs, muffs are provided to workers exposed to noise level beyond threshold limits

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Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			threshold limits will be provided with protective gear like earplugs, muffs, etc. o Ambient noise levels will be monitored at regular intervals	
		Disturbance to Natural Drainage pattern	o Port development is mostly on reclaimed land o Rainwater/surface water harvesting pond included in design o Existing drainage near port boundary (backup area) will be integrated with port storm water drainage & management plan o 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 o 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 mix of water harvesting pond with appropriate drains are planned for the operational phase o No work has started in warehouse area and drains/streams passing through the area are not closed / diverted.
		Vegetation and Strain on existing infrastructure	o Port development is planned mostly on reclaimed land; o Land use at backup area, PAF Zone and warehouse area will be mostly coconut plantation and low mixed plantation o Adequate green belt will be developed in port and its associated (backup area, PAF, warehouse and road & rail connectivity). o Temporary workers camp with self-sufficient infrastructure facilities.	Being Complied o 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 o Temporary Worker camp with all necessary infrastructure facilities (Water, Electricity, Sanitation, Fuel, etc.) has been provided details are given in Annexure XI .
		Existing Traffic	o 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	Being Complied o Traffic monitoring & regularization is being carried out for maximum efficiency o During the compliance period no breakwater construction took place

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Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			<p>dedicated road of 45 M RoW is proposed to connect site with NH Bypass</p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Rock transportation through sea route via barges from nearby quarry site is being explored. The Konkan Railway Corporation has been engaged as a consultants for turnkey execution of the project, the option of tunnel is being looked into to minimize the disturbance. Draft Detailed Project Report (DPR) has been completed and submitted to VISL for review.
3.	Land Reclamation	Existing Water Resources like Groundwater and surface water	<ul style="list-style-type: none"> Land to be reclaimed will be separated from adjoining land by creating containment bund. Return sea water will be sent back to sea through appropriate channels. 	<p>Being Complied</p> <ul style="list-style-type: none"> No dredging is carried out during the compliance period During dredging return sea water is sent back to sea through appropriate channels. The existing drains are maintained for unhindered disposal of surface drainage water.
4.	Solid Waste Management	Soil quality	<ul style="list-style-type: none"> Construction waste will be used within port site for filling of low lying areas. Composted bio-degradable waste will be used as manure in greenbelt. Other recyclable wastes will be sold. Excavated soil at backup, PAF Zone and ware house area will be stockpiled in a corner of the site in bunded area to avoid run off with storm water. General refuse generated on-site will be collected in waste skips and separated from 	<p>Being Complied</p> <ul style="list-style-type: none"> Construction waste is used within port site for filling of low lying areas in line to C&D Waste Management Rules 2016. Burning of refuse at construction sites is prohibited. Contractors working at the site have been made responsible for management of Solid Waste during construction stage. They have obtained Consent of Kerala State Pollution Control Board and complying with the provisions pertaining to management of

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Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			<p>construction waste.</p> <ul style="list-style-type: none"> Burning of refuse at construction sites will be prohibited. All control measure will be taken to avoid the contamination of groundwater during construction phase 	<p>Solid Waste in line to Solid Waste Management Rules 2016.</p> <ul style="list-style-type: none"> There is no disposal of waste in the project area which may lead to groundwater contamination
5.	Handling of hazardous wastes	Human safety and property loss	<ul style="list-style-type: none"> Adequate safety measures as per OSHA standards will be adopted Construction site will be secured by fencing with controlled/limited entry points. Hazardous materials such as lubricants, paints, compressed gases, and varnishes etc., will be stored as per the prescribed/approved safety norms. Construction site will be secured by fencing with controlled/ limited entry points Medical facilities including first aid will be available for attending to injured workers. Handling and storage as per statutory guidelines. Positive isolation procedures will be adhered Hazardous wastes will be disposed through approved KSPCB/CPCB vendors. 	<p>Being Complied</p> <ul style="list-style-type: none"> Adequate safety measures as per OSHA standards are adopted as and when necessary as per the HSE Plan Construction site is being secured by fencing with controlled/limited entry points Medical facilities including first aid are available for attending to injured workers, ambulance is also available at site for shifting the injured to the nearby hospitals. Handling and storage as per statutory guidelines. Hazardous waste is disposed through approved KSPCB/CPCB vendors.
6.	Water Resources	Water scarcity / Pollution	<ul style="list-style-type: none"> Water requirement during the construction is expected to be around 0.10 MLD 	<p>Being Complied</p> <ul style="list-style-type: none"> The water supply scheme had already been

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Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			<ul style="list-style-type: none"> 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 	commissioned with the source as Vellayani Lake. 3.00 MLD of raw water will be available for treatment with a net availability of 2.49 MLD of potable water. Out of this 1.49 MLD of water shall be distributed to the locality as part of social welfare measures of VISL. The balance 1.0 MLD is for the port use. Water requirement during construction is being met from the above source.
7.	Fishing	Fishermen and fishing villages	<ul style="list-style-type: none"> 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 community before commencement of construction works 	Being Complied <ul style="list-style-type: none"> Signboards have been placed for demarcation of construction area. A dedicated whatsapp group has been formed by CSR team for Continuous interaction with fisherman/fishing community members to facilitate the flow of various project related information/updates as necessary/useful
8.	Tourism	Effect on tourism	<ul style="list-style-type: none"> Tourism activity is observed at Kovalam located about 2.0 km towards the North of Proposed Port. Mathematical Modelling studies on shoreline changes show the insignificant impact due to the port development on the existing coastline. However, the Shoreline monitoring during construction as well as operation Phases were proposed. 	Being Complied <ul style="list-style-type: none"> The tourism activity in the nearby Kovalam area is not impacted by the construction of the port. Shoreline monitoring for a stretch of 40 Km (20 Km on both sides of the project site) is being done and reports are regularly submitted to regulatory authorities.

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Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			<ul style="list-style-type: none"> o A cruise terminal and related facilities is part and parcel of the project. This is to largely compensate the losses made o For all acquired properties and land adequate compensation will be provided based on legally valid documents 	<ul style="list-style-type: none"> o 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 o G.O.(Rt) No.2021/2017/RD dated 27-04-2017, was modified with G.O.(MS) No.17/2018/F&PD dated 09-06/2018 and 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.
9	Breakwater	Change in shoreline	<ul style="list-style-type: none"> o Shoreline monitoring shall be carried out o Suitable Shoreline protection measures will be implemented based on the observations 	<p>Being Complied</p> <p>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</p> <p>The existing Shoreline Monitoring arrangement consists of:</p> <ul style="list-style-type: none"> o Engaging of M/s Ocean Science & Surveying for Cross Shore Beach Profiling



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To : September 2018

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Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
				<p>perpendicular to the shoreline 20 KM on either side of the port at 500 meter intervals which includes bathymetry survey upto CD -10 and landside survey upto HTL + 100 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 4 locations for 3 seasons, tide measurement, continuous wave measurement by wave rider buoy, water sampling and analysis, continuous turbidity monitoring at 3 locations, bathymetry and cross section survey of 6 rivers debouching into the sea in 40 Km stretch study area, continuous weather monitoring by Automatic Weather Station.</p> <ul style="list-style-type: none">○ The 1st Mathematical Report prepared by L&T Infrastructure Engineering Pvt. Ltd. (LnTIEL) based on Shoreline Monitoring data for the period Feb'15-Feb'17 was submitted with the compliance (April 17 – September 17).

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Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
				<ul style="list-style-type: none"> o In continuation with the same practise AVPPL has submitted the shoreline data from March 2017 to February 2018 to LnTIEL for mathematical modelling to assess the impact on shoreline under the guidance of National Institute of Ocean Technology (NIOT). Mathematical modelling report prepared is vetted by NIOT and attached as Annexure III. The mathematical modelling report has affirmed that the shoreline change is in line to the prediction done as part of the EIA report. o Additionally comparison of analyzed data with satellite image and drawing of conclusions for accretion and erosion by NIOT has also started and 4 quarterly reports are already submitted to shoreline monitoring cell as instructed by NGT expert committee.
10	Effect on existing fishing harbour	Movement of fishing boats	<ul style="list-style-type: none"> o 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 	Being Complied <ul style="list-style-type: none"> o 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. o The 1st Mathematical Report prepared by L&T Infrastructure Engineering Pvt. Ltd.

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Potential Impacts and Mitigation Measures of Various Project Activities

Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			<ul style="list-style-type: none"> Traffic of Marine vessel/ fishing boats will 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 	<p>(LnTIEL) based on Shoreline Monitoring data for the period Feb'15-Feb'17.</p> <ul style="list-style-type: none"> In continuation with the same practise AVPPL has submitted the shoreline data from March 2017 to February 2018 to LnTIEL for mathematical modelling to assess the impact on shoreline. Mathematical modelling report prepared is vetted by NIOT and attached as Annexure III. The mathematical modelling report has affirmed that the shoreline change is in line to the prediction done as part of the EIA report. During operation phase traffic of Marine vessel/ fishing boats will be planned without affecting each other The work for construction of the fish landing center (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. 565 meter length of breakwater has been completed which forms part of the new fishing harbor, but during cyclone Ohki approx. 200 meter of breakwater was partially washed off. At present fishing boats are docked in the

Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.

Status of Environment Management Plan- Port site- Construction Stage
Potential Impacts and Mitigation Measures of Various Project Activities

Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
				<p>proposed area affecting the progress of fishery berth. The GoK has initiated discussions with fishermen representatives for removal of the boats to facilitate construction work.</p> <ul style="list-style-type: none"> o In consultation with the fishermen, enhanced livelihood compensation of Rs.97.43 Cr was sanctioned by GoK, instead of Rs.7.1 crores suggested earlier in the EIA stage. Out of this amount, Rs.70.52 crores have been disbursed till 30th September 2018 for a total number of 2593 (This includes boat owners as well to whom kerosene is supplied free of cost during the port construction period) Livelihood Affected Persons (LAPs) whose verification was complete in all respects. 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. The draft shoreline impact management plan is given in Appendix 6.6.	<p>Being Complied</p> <ul style="list-style-type: none"> o NIOT has been engaged to give technical advice on aspects related to shoreline monitoring & shoreline evolution. o Comprehensive Shoreline Monitoring is being carried out under the technical Guidance of NIOT and six monthly monitoring reports are being submitted



Adani Vizhinjam Port Private Ltd

From : April 2018

To : September 2018

**Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.****Status of Environment Management Plan- Port site- Construction Stage
Potential Impacts and Mitigation Measures of Various Project Activities**


Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
				<p>regularly as part of EC & CRZ Compliance.</p> <ul style="list-style-type: none">Wave, current and tide data are being monitored a 40 km stretch. Based on the above, the modelling long with the shoreline monitoring of studies done at the EIA stage has been further evaluated.The 1st Mathematical Report prepared by L&T Infrastructure Engineering Pvt. Ltd. (LnTIEL) based on Shoreline Monitoring data for the period Feb'15-Feb'17 has affirmed that the shoreline change is in line to the prediction done as part of the EIA report.In continuation with the same practise AVPPL has submitted the shoreline data from March 2017 to February 2018 to LnTIEL for mathematical modelling to assess the impact on shoreline under the guidance of National Institute of Ocean Technology (NIOT). Mathematical modelling report prepared is vetted by NIOT and attached as Annexure III. The mathematical modelling report has affirmed that the shoreline change is in line to the prediction done as part of the EIA report.

Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.

Environmental Management Plan - Road/Rail Corridors*

*No Construction work was carried out during the compliance period for Road/ Rail Corridors

Sl. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 30.09.2018
1	Environmental Management and Monitoring Facility Equipment for EMP (Meters, Vehicles and Buildings)	This will include institutional requirements, training, environmental management and monitoring. Provision for purchasing required equipment.	Noted for Compliance <ul style="list-style-type: none"> An Environment Management Cell has been established to look after day to day affairs like Monitoring, Training 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 <ul style="list-style-type: none"> No work happened for road construction, retaining walls and gabions will be provided as and when required.
3	Dust	<ul style="list-style-type: none"> Water should be sprayed during the construction phase, at mixing sites, and temporary roads. In laying sub-base, water spraying is needed to aid compaction of the material. After the compaction, water spraying should be carried out at regular intervals to prevent dust. Vehicles delivering materials should be covered to 	Being Compiled <ul style="list-style-type: none"> No work is carried out during the compliance period.

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Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan.		

Environmental Management Plan - Road/Rail Corridors*			
*No Construction work was carried out during the compliance period for Road/ Rail Corridors			
Sl. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 30.09.2018
		reduce spills and dust blowing off the load.	
4	Air Pollution	<ul style="list-style-type: none"> o Vehicles and machinery are to be maintained so that emissions conform to National and State standards. o All vehicles and machineries should obtain Pollution Under Control Certificates (PUC). 	Being Complied <ul style="list-style-type: none"> o 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) o It is ensured that all vehicles have Pollution Under Control Certificate (PUC)
5	Noise	<ul style="list-style-type: none"> o Machinery and vehicles will be maintained to keep their noise to a minimum. o Construction of noise barriers of an average length of 100m and eight feet height where ever necessary. o Proper maintenance of the rail track and rail wagon, by frequent lubrication to avoid frictional noise. o Regular monitoring shall be carried out as per the Environmental Monitoring Plan. 	Being Complied <ul style="list-style-type: none"> o All the machinery and vehicles are maintained to keep the noise at minimum o Noise monitoring is being done since August 2016, and the readings are within the limits at port site o During compliance period no work is carried out for road construction o Regular monitoring of ambient Noise is carried out since August 2016 as per the Environmental Monitoring Plan prescribed in EIA and results are within the prescribed limit at port site.
6	Loss of low lying land and ponds	<ul style="list-style-type: none"> o Impacted ponds can be enhanced by constructing bridged structures like Gabions to avoid plugging of springs. o Mitigation/Compensation shall be affected for the completely impacted ponds. o At Chainage km 6.500 the Railway alignment goes 	Will be complied <ul style="list-style-type: none"> o During compliance period no construction work was carried out for road construction. o For impacted ponds in road alignment suitable mitigation measure will be adopted during construction.

Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.

Environmental Management Plan - Road/Rail Corridors*

*No Construction work was carried out during the compliance period for Road/ Rail Corridors

Sl. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 30.09.2018
		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.	
7	Flood Impacts and Cross Drainage Structures	Formation level should be raised according to the design and the cross drainage structures suitably planned for the flood events.	Will be complied
8	Alteration of drainage	<ul style="list-style-type: none"> o 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. 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 to the Contractors visual integration and management plan and EMP. 	Will be complied
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	<ul style="list-style-type: none"> o Quarrying will be carried out at approved and licensed quarries only. o Details of Quarrying material sources are given in Chapter 4. 	Will be complied
12	Soil Erosion and Soil	<ul style="list-style-type: none"> o On slopes and other suitable places along the two 	Will be complied

Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.


Environmental Management Plan - Road/Rail Corridors*

*No Construction work was carried out during the compliance period for Road/ Rail Corridors

Sl. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 30.09.2018
	Conservation	<p>proposed corridors, trees and grass should be planted.</p> <ul style="list-style-type: none"> 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. 	
13	Loss of agricultural topsoil	<ul style="list-style-type: none"> Arable land should not be used for topsoil borrowing. Topsoil will be kept and reused after excavation is over. Any surplus to be used on productive agricultural land. 	Will be Complied
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	<ul style="list-style-type: none"> Areas of trees cleared will be replaced according to Compensatory Afforestation Policy under the Forest Conservation Act - 1980. Landscaping shall be done at major junctions. 	Being Complied <ul style="list-style-type: none"> 12 Ha of land was identified by social forest department to carry out compensatory afforestation activities (at an aerial distance of 24 km from project site).The afforestation activities have been completed by forest department.
16	Vegetation clearance	<p>Tree clearing within the ROW should be avoided beyond that which is directly required for construction activities and/ or to reduce accidents.</p> <p>Especially in plantation and house garden areas both along road and rail alignment.</p>	Will be complied <ul style="list-style-type: none"> Special care is taken to minimize the tree felling to the extent possible, but in line with the technical requirements of the project. Due prior permission is taken for tree felling from Forest Department.
17	Fauna	Construction workers should protect natural resources	Being Complied

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Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan.		

Environmental Management Plan - Road/Rail Corridors*			
*No Construction work was carried out during the compliance period for Road/ Rail Corridors			
Sl. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 30.09.2018
		and animals. Hunting of birds and other local animals is prohibited.	<ul style="list-style-type: none"> Construction workers are housed in labour camp near the project site and are provided with all the basic amenities such as drinking water, proper sanitation, canteen etc. Regular awareness session is being given to the construction workers regarding importance of natural resources and animals. Hunting of birds & other local animals is strictly prohibited
18	Traffic Jams and congestion	If there is traffic congestion during construction, measures should be taken to relieve it as far as possible 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/a 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 <ul style="list-style-type: none"> All the workers are provided with Personal Protective Equipment's (PPE) and it is ensured that they wear it all the time Also all the contractors working at site have a dedicated health and safety person to oversee the work carried out.
20	Pollution of Streams parallel or along the alignments	Construction material /waste should be disposed of properly so as not to block or pollute streams or ponds with special attention to confining concrete work.	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.	Will be complied

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Environmental Management Plan - Road/Rail Corridors*			
*No Construction work was carried out during the compliance period for Road/ Rail Corridors			
Sl. No.	Environmental Impacts and Issues	Mitigation Measures	Status as on 30.09.2018
		Archaeologists will supervise the excavation to avoid any damage in the relics.	

Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.

Environment Management Plan – Warehouse Area* (Construction Phase)

*No work was carried out in Warehouse area during compliance period

Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
WAREHOUSE AREA (Construction Phase)				
1	Material transport and construction activities	Air Quality/Dust	<ul style="list-style-type: none"> To reduce impacts from exhausts, emission control norms will be enforced / adhered. All the vehicles and construction machinery will be periodically checked to ensure compliance to the emission standards. Construction equipment and transport vehicles will be periodically washed to remove accumulated dirt. Providing adequately sized construction yard for storage of construction materials, equipment, tools, earthmoving equipment, etc. Provide enclosures on all sides of construction site Movement of material will be mostly during non-peak hours. On-site vehicle speeds will be controlled to reduce excessive dust suspension in air and dispersion by traffic Water should be sprayed during the construction phase, at mixing sites, and temporary roads. In laying sub-base, water spraying is needed to aid compaction of the material. After the compaction, water spraying should be carried out at regular intervals to prevent dust. Vehicles delivering materials should be covered to 	Complied <ul style="list-style-type: none"> Monthly Environment Monitoring is being carried out and all the parameters are within the stipulated limit It is ensured that all vehicles entering the area have a valid PUC certification Vehicles entering the site have are following speed limit Tarpaulin cover is used in vehicles



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Status of Environmental Management Plan.

Environment Management Plan – Warehouse Area* (Construction Phase)

*No work was carried out in Warehouse area during compliance period

Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			<ul style="list-style-type: none">reduce spills and dust blowing off the load.Environmental awareness program will be provided to the personnel involved in developmental works.Use of tarpaulin covers and speed regulations for vehicles engaged in transportation.	
		Noise	<ul style="list-style-type: none">Noise levels will be maintained below threshold levels stipulated by Central/Kerala State Pollution Control Board (CPCB)/KSPCB.Procurement of machinery / construction equipment will be done in accordance with specifications conforming to source noise levels less than 75 dB (A).Well-maintained construction equipment, which meets the regulatory standards for source noise levels, will be usedAny equipment emitting high noise, wherever possible, will be oriented so that the noise is directed away from sensitive receptors.Noise attenuation will be practiced for noisy equipment by employing suitable techniques such as acoustic controls, insulation and vibration dampers.High noise generating activities such as piling and drilling will be scheduled at daytime (6.00 am to 10 pm) to minimize noise impacts.	Complied <ul style="list-style-type: none">Ambient Noise is being monitored fortnightly for Day & Night time and results are within the prescribed limit. Construction equipment machinery procurement is done in accordance with specifications conforming prescribed standard. Personnel engaged in construction activity are provided with appropriate PPE's (Earplugs/muffs)

Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.

Environment Management Plan – Warehouse Area* (Construction Phase)

*No work was carried out in Warehouse area during compliance period

Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			<ul style="list-style-type: none"> Personnel exposed to noise levels beyond threshold limits will be provided with protective gear like earplugs, muffs, etc. Ambient noise levels will be monitored at regular intervals 	
2	Construction of Buildings, Roads, Sheds, etc.	Vegetation and Strain on existing infrastructure	<ul style="list-style-type: none"> Most of the land is covered with coconut trees and few other trees. Trees that are cut down will be accounted for and the same no. of trees of the same or some other species will be replanted at another location to compensate for the loss of greenery. 	Will be Complied At present no trees are cut in the warehouse area
		Water Environment	<ul style="list-style-type: none"> The streams 1 and 2 will be made to avoid entering the warehouse area by diverging them into the Karichal River. A tunnel like arrangement with RCC structures will be used so as to not affect the streams (3 and 4) that will go through the warehouse area. The streams will be made to go under the warehouse areas through the tunnel. Another option is to divert the stream through the boundary An application has been filed with the irrigation department for permission. 	Will be complied Will be appropriately planned in consultation with the concerned departments
			<ul style="list-style-type: none"> The low lying area in the region is already made use by the local people, and has been degraded. There are no active ecological systems in the area. As far as possible, during operation phase 	Will be complied Will be appropriately planned in consultation with the concerned departments

Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.

Environment Management Plan – Warehouse Area* (Construction Phase)

*No work was carried out in Warehouse area during compliance period

Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			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. o Filling of low lying areas (if required) shall be done	
			o 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	o 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. o 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. 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	Will be complied

Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.

Environment Management Plan – Warehouse Area* (Construction Phase)

*No work was carried out in Warehouse area during compliance period


Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			conformity EMP.	
		Existing Traffic	<ul style="list-style-type: none"> Transportation of construction materials will be carried out during non- peak hours. Regularization of truck movement. Existing roads shall be strengthened and shall be used for the construction material transportation. 	Will be complied
3	Solid Waste Management	Soil quality	<ul style="list-style-type: none"> Construction waste will be used within warehouse site for filling of low lying areas. Composted bio-degradable waste will be used as manure in greenbelt. Other recyclable wastes will be sold. Excavated soil will be stockpiled in a corner of the site in bunded area to avoid run off with storm water. General refuse generated on-site will be collected in waste skips and separated from construction waste. Burning of refuse at construction sites will be prohibited. 	Will be complied

Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.

Project Auxiliary Facility (PAF)* ZONE - Construction Phase

*No construction work is carried out during the compliance period in PAF zone

Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
1	Material transport and construction activities	Air Quality/Dust	<ul style="list-style-type: none"> To reduce impacts from exhausts, emission control norms will be enforced / adhered. All the vehicles and construction machinery will be periodically checked to ensure compliance to the emission standards. Construction equipment and transport vehicles will be periodically washed to remove accumulated dirt. Providing adequately sized construction yard for storage of construction materials, equipment tools, earthmoving equipment, etc. Provide enclosures on all sides of construction site Movement of material will be mostly during non-peak hours. On-site vehicle speeds will be controlled to reduce excessive dust suspension in air and dispersion by traffic Water should be sprayed during the construction phase, at mixing sites, and temporary roads In laying sub-base, water spraying is needed to aid compaction of the material. After the compaction, water spraying should be carried out at regular intervals to prevent dust. 	Complied <ul style="list-style-type: none"> Monthly Environment Monitoring is being carried out and all the parameters are within the stipulated limit It is ensured that all vehicles entering the area have a valid PUC certification Vehicles entering the site have are following speed limit Tarpaulin cover is used for vehicles transporting the construction material Water sprinkling is carried out on the temporary roads by contractors Environment awareness programme is provided to the personnel engaged in development work

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Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan.		


Project Auxiliary Facility (PAF)* ZONE - Construction Phase *No construction work is carried out during the compliance period in PAF zone				
Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			<ul style="list-style-type: none"> o Vehicles delivering materials should be covered to reduce spills and dust blowing off the load. 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. 	
		Noise	<ul style="list-style-type: none"> 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 possible, will be oriented so that the noise is directed away from sensitive receptors. o 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)

Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.

Project Auxiliary Facility (PAF)* ZONE - Construction Phase

*No construction work is carried out during the compliance period in PAF zone

Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			<p>dampers.</p> <ul style="list-style-type: none"> High noise generating activities such as piling and drilling will be scheduled at daytime (6.00 am to 10 pm) to minimise noise impacts. Personnel exposed to noise levels beyond threshold limits will be provided with protective gear like earplugs, muffs, etc. Ambient noise levels will be monitored at regular intervals 	
2	Construction of Buildings, Roads, Parking features, etc.	Vegetation and Strain on existing infrastructure	<ul style="list-style-type: none"> Most of the land is covered with coconut trees and few other trees. Trees that are cut down will be accounted for and the same no. of trees of the same or some other species will be replanted at another location to compensate for the loss of greenery. There are very few existing buildings and infrastructure on the PAF zone area land which will be acquired and people in that area will be rehabilitated. 	Will be complied Will be complied alongside the road and port boundaries
		Existing Traffic	<ul style="list-style-type: none"> Transportation of construction materials will be carried out during non- peak hours. Regularization of truck movement. The existing roads shall be strengthened and shall 	Will be complied

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Vizhinjam International Deepwater Multipurpose Seaport Status of Environmental Management Plan.		

Project Auxiliary Facility (PAF)* ZONE - Construction Phase *No construction work is carried out during the compliance period in PAF zone				
Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			be used for the construction material transportation.	
		Solid Waste	<ul style="list-style-type: none"> Construction waste will be used within port site for filling of low lying areas. Composted bio-degradable waste will be used as manure in greenbelt. Other recyclable wastes will be sold. Excavated soil 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

Vizhinjam International Deepwater Multipurpose Seaport
Status of Environmental Management Plan.

BACK UP AREA* – Construction Phase

*Construction of buildings has commenced in only in reclaimed area during the compliance period

Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
1	Material transport and construction activities	Air Quality	<ul style="list-style-type: none"> To reduce impacts from exhausts, emission control norms will be enforced / adhered. All the vehicles and construction machinery will be periodically checked to ensure compliance to the emission standards Construction equipment and transport vehicles will be periodically washed to remove accumulated dirt Providing adequately sized construction yard for storage of construction materials, equipment tools, earthmoving equipment, etc. Provide enclosures on all sides of construction site Movement of material will be mostly during non-peak hours. On-site vehicle speeds will be controlled to reduce excessive dust suspension in air and dispersion by traffic Water sprinkling will be carried out to suppress fugitive dust Environmental awareness program will be provided to the personnel involved in developmental works Use of tarpaulin covers and speed regulations for vehicles engaged in transportation 	Being Complied <ul style="list-style-type: none"> Ambient air quality monitoring is carried out at 5 locations as per the Environment Monitoring Plan prescribed in EIA and has commenced since August 2016, the results obtained are within the limits prescribed by National Ambient Air Quality Standards (NAAQS) It is ensured that all vehicles have Pollution Under Control Certificate (PUC) Water sprinkling was carried out at regular interval over the temporary road during transportation of cut material. All the trucks transporting material are covered by tarpaulin cover. Signage's for speed control are placed within the port area Adequate storage for construction material is provided within the port area on reclaimed land Environmental awareness program was carried out for contractors working at site.

Vizhinjam International Deepwater Multipurpose Seaport
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BACK UP AREA* – Construction Phase

*Construction of buildings has commenced in only in reclaimed area during the compliance period


Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
		Noise	<ul style="list-style-type: none"> Noise levels will be maintained below threshold levels stipulated by Central/Kerala State Pollution Control Board (CPCB)/KSPCB Procurement of machinery / construction equipment will be done in accordance with specifications conforming to source noise levels less than 75 dB (A) Well-maintained construction equipment, which meets the regulatory standards for source noise levels, will be used Any equipment emitting high noise, wherever possible, will be oriented so that the noise is directed away from sensitive receptors Noise attenuation will be practiced for noisy equipment by employing suitable techniques such as acoustic controls, insulation and vibration dampers High noise generating activities such as piling and drilling will be scheduled at daytime (6.00 am to 10 pm) to minimise noise impacts Personnel exposed to noise levels beyond threshold limits will be provided with protective gear like earplugs, muffs, etc. Ambient noise levels will be monitored at regular 	Being Compiled <ul style="list-style-type: none"> All the machinery and vehicles are maintained to keep the noise at minimum Regular Noise monitoring is being carried since August 2016, and the readings are within the limits at port site At present only building work has commenced in limited way and barriers will be installed where ever necessary in future Regular monitoring of ambient Noise is carried out since August 2016 as per the Environmental Monitoring Plan prescribed in EIA

Vizhinjam International Deepwater Multipurpose Seaport
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BACK UP AREA* – Construction Phase

*Construction of buildings has commenced in only in reclaimed area during the compliance period

Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			intervals	
2	Construction Activities	Water Environment	<ul style="list-style-type: none"> Formation level should be raised according to the design and the cross drainage structures suitably planned for the flood events. All justifiable measures will be taken to prevent the wastewater produced during construction from entering directly into the water bodies. 	Being Compiled <ul style="list-style-type: none"> The contractors working at site have obtained separate consent from KSPCB for their batching plant and they have constructed settling pond for wash water generated. No wash water is disposed into the water bodies.
		Land Environment	<ul style="list-style-type: none"> On slopes and other suitable places along the two proposed corridors, trees and grass should be planted. On sections with filling and deep cutting their slopes should be covered by sod, or planted with grass, etc. If existing irrigation and drainage system, ponds are damaged, they will be suitably repaired. Retaining walls and gabions shall be suitably provided. 	Will be complied
			<ul style="list-style-type: none"> Arable land should not be used for topsoil borrowing. Topsoil will be kept and reused after excavation is over. Any surplus to be used on productive agricultural land. 	Will be complied

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BACK UP AREA* – Construction Phase				
*Construction of buildings has commenced in only in reclaimed area during the compliance period				
Sl. No.	Activity	Relevant Environmental Components likely to be impacted	Proposed Mitigation Measures	Status as on 30.09.2018
			<ul style="list-style-type: none"> Construction vehicles should operate within the Backup Areas avoiding damage to soil and vegetation. 	Will be complied alongside the road and port boundaries
			<ul style="list-style-type: none"> Areas of trees cleared will be replaced according to Compensatory Afforestation Policy under the Forest Conservation Act - 1980. Landscaping shall be done at major junctions. 	Refer point No.15 of Environment Management Plan – Road/Rail Corridors
			<ul style="list-style-type: none"> Tree clearing within the backup areas should be avoided beyond that which is directly required for construction activities and / or to reduce accidents. 	Will be complied to the extent possible considering the technical requirements


Annexure VIII

DG Set Details

adani	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport D.G Set Details.		


Annexure VIII

D.G Set Details					
Sl. No.	P & M Number	Working Status	Capacity KVA	Location	Pollution Control Measure
In Use					
1	G005082/14253	In use	82.5	Load jetty 01	Adequate Stack Height
2	15890	In use	250	DG shed (Fabrication Yard)	Manufacturer certificate with up-flow type exhaust
3	22655	In use	160	DG shed (Fabrication Yard)	Adequate Stack Height
4	4535	In use	125	Load jetty 02	Adequate Stack Height
5	22208	In use	20	Labour Camp	Adequate Stack Height
6	G005082/9125	In use	82.5	Load Jetty 01	Adequate Stack Height
7	G00 5040/15492	In use	40	Labour camp	Adequate Stack Height
8	22208	In use	62.5	Labour Camp	Adequate Stack Height
9	MC1251819204	In use	125	CBM Batching Plant	Adequate Stack Height
10	N7F250734	In use	62.5	Near B & R site office	Adequate Stack Height
11	G00125/10622	In use	125	Near B & R site office	Adequate Stack Height
12	CP40D5P/F40	in use	40	Substation	Adequate Stack Height
13	1720916	In use	125	Near to batching plant	Adequate Stack Height
14	1720624	In use	25	Site office	Adequate Stack Height
15	G17I30803	In use	62.5	POB	Adequate Stack Height
16	DG18E101129	In use	160	Paver block yard	Adequate Stack Height
17	DG18E051092	In use	82.5	Paver block yard	Adequate Stack Height
18	0527	In use	125	Beaching Plant	Adequate Stack Height
19	0528	In use	25	Site Office	Adequate Stack Height
20	14336	In use	15	Howe office	Adequate Stack Height
21	D3.9616/1600141	In use	5	At zero point	Adequate Stack

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport D.G Set Details.		


D.G Set Details					
Sl. No.	P & M Number	Working Status	Capacity KVA	Location	Pollution Control Measure
					Height
22	D3.5301/1600135	In use	5	Near approach jetty 2	Adequate Stack Height
Not In Use					
23	22206	Not In use	20	CPE Workshop	Not in Use
24	16292	Not In use	82.5	CPE Workshop	Not in Use
25	20034	Not In use	20	CPE workshop	Not in Use

Annexure IX
Environmental Management Plan Budgetary
Provision

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environmental Management Plan Budgetary Provision		

Annexure IX

Environmental Management Plan		Commitment in EIA (in Crores)
1	Cost of Contractors EMP for all planned EMP implementation measures (Action plan report)	1.00
4	Cost of Capacity building- Training and Institutional strengthening (Training workshop)	0.20
5	Compensatory afforestation for the green cover lost for the port and its associated facilities (2500 plants per Ha for 25 Ha area)	1.25
6	Air quality monitoring at sensitive locations	0.252
7	Water quality monitoring at major water bodies	0.054
8	Noise monitoring at sensitive locations	0.009
9	Soil quality monitoring at sensitive locations	0.002
10	Marine water quality and sediment and marine biology	1.08
11	Shoreline changes	0.30
14	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
15	Solid waste management (sector wise)-Collection disposal system	2.50
16	Storm water Management	5.00
17	Marine Life Protection out of Oil Spill(Provision for scavenger boat)One tugboat with booms and skimmer and dust exhausting equipment	20.00
18	Cost of scavenger boat including manpower(Cost of boat)	0.20
19	Dust Sweeper (2 nos)	0.60
20	Air Pollution Control (Four water tankers for wetting of road surface and springing system)	1.00
21	Water and waste water treatment plants	4.00
22	Battery of toilets with bimonthly maintenance provision	1.00
23	Desilting and strengthen of Streams	0.50
24	Enhancement of water bodies (ponds along road & rail)	0.10
25	Enhancement of religious structures (Temple)	0.05
26	Cultural property rehabilitation cost for sacred grove	0.01
	TOTAL	39.937 (Rounded off to 40 Crores)


	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environmental Management Plan Budgetary Provision		

Actual Expenditure:

Activity	Expenditure in Crores (INR)
Shoreline Monitoring	0.95
Turbidity Monitoring	0.18
Air, Noise, Surface Water, Ground Water & Marine Water Monitoring	0.21
Modelling Studies	0.25
Study on shoreline using Satellite Images	0.02
Site Specific Environment and Social Management Plan	0.47
CRZ study fee	0.1
Environment Awareness among employees and local community	0.003
Consultancy fee for expert on shoreline	0.12
Comprehensive Shoreline Monitoring Programme.	0.06
Water Sprinkling for dust suppression	0.03
Compensatory Afforestation	0.80
Total	3.19

Annexure X

Organizational Structure-EMP Implementation

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Health, Safety & CSR Organizational Structure.		

Annexure – X

Environment Health, Safety & CSR Organizational Structure

Name	Designation	Experience	Qualification	Organization
Narayanan M	Chief Project Coordinator & Engineer (Infra) Coordinator Environment and Welfare Measure	30 Years' experience	B Tech (Civil Engg.);	VISL
Anil Balakrishnan	Head – CSR	19 Years	MSW, Phd.	AVPPL
Y D Manmohan	Environment Specialist	28 Years	PG in Env. Engg.	STUP
Sebastian Britto	Project Officer	20 Years	MA , Economics	AVPPL
Stephen Vinod	Community Mobilizer	12 Years	BA, Economics	AVPPL
George Zen	Community Mobilizer	31 Years	BA, Sociology	AVPPL
Maya Mohan	Community Mobilizer	5 Years	MSW	AVPPL
Hebin C	Head – Environment	11 Years	MS, Oceanography & Coastal area studies.	AVPPL
Harsh Yadav	Deputy Manager –Environment	7 Years	B Tech (Chem. Engg.); M Tech. in Environment process design, NEBOSH	AVPPL
Kanwar P Malik	Head-Horticulture	13 Years	BSc - Agriculture	AVPPL
Amrendra Sinha	Head – Safety	17 Years	Diploma in Industrial Safety and Fire Safety	HOWE
Shaji Joseph	Safety Executive	8 Years	Diploma in mechanical & Diploma in fire and safety	HOWE

Annexure XI
Details of Labour Camp

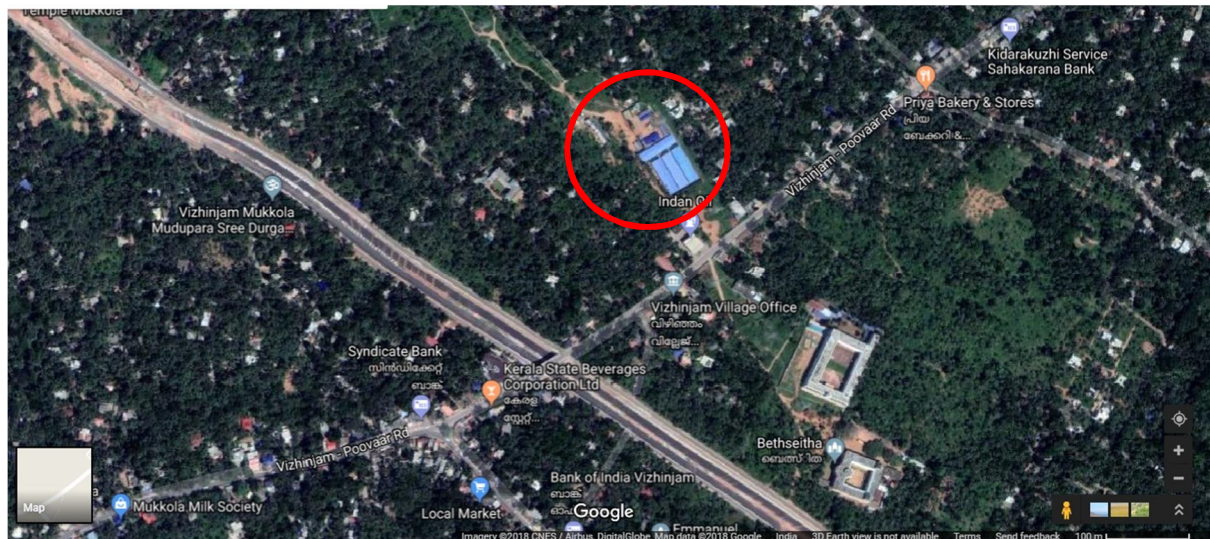
adani	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Details of Labour Camp.		

Annexure XI

Details of Labour Camp

Location of the Labour Camp

Currently at port two main contractors are working, both the labour contractors Ms/ AFCONS and M/s B&R have constructed labour camp for accommodation of workers at Mukkola-Vizhinjam, Kerala. The location of the camp is such that, Mukkola, the nearby small town is situated at walkable distance from the camp. Also, the surrounding greenery presents a comfortable environment to the inhabitants during all weather conditions.




Location of the labour camp of both contractors







Facilities inside the Camp


Welfare for the workmen

Workmen are provided with concrete floor, beds and cots. Adequate lighting and ventilation is ensured in each room. Workmen in the colony are provided with potable RO drinking water. The drinking water tanks are cleaned at frequent intervals and water is tested once in a quarter through authorized laboratory. Individual kitchen is provided by both the contractors. Cooking gas is provided by both the contractors for their workers in kitchen and a separate dining room is also made available near to the kitchen. Adequate number of toilets, bathing and cloth washing facility is also ensured at the camp of both AFCONS and B&R. Also STP of adequate capacity has

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Details of Labour Camp.		

been installed by both the contractors at their labour camps and the treated water is being used for sprinkling at the port site.

	
Living Blocks of Workmen at labour camp of M/s AFCONS	RO plant for drinking water at M/s AFCONS
	
Living Block of Workmen at labour camp of M/s B&R	Drinking water at labour camp of M/s B&R
	
Cooking gas provided in the kitchen of M/s B&R	Apron provided in the kitchen of M/s AFCONS

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Details of Labour Camp.		



STP Plant of M/s AFCONS



STP plant enclosed within Shed at M/s AFCONS



STP plant of M/s B&R




Toilet and washing facility at labour camp of M/s AFCONS





Toilet and washing facility at labour camp of M/s B&R




	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Details of Labour Camp.		

Housekeeping arrangement

Dedicated cleaning staff is deployed for daily housekeeping in both the camps. Brooming around the camp premises, collection of waste in colour coded dust bins, daily disposal of collected food waste etc. are ensured during housekeeping. Bleaching powder is sprinkled around the camp premises as and when required. The waste water from kitchen, bathroom and washing facilities are transferred through closed conduits to the STP for treatment, treated water is being used for sprinkling within the port premises.

	
Dust bins provided at labour camp of M/s B&R	COLOUR CODED DUST BINS INSIDE THE CAMP of M/s AFCONS
	
Labour Camp of M/s B&R post cleaning	Daily cleaning by cleaning staff at labour camp of M/s AFCONS

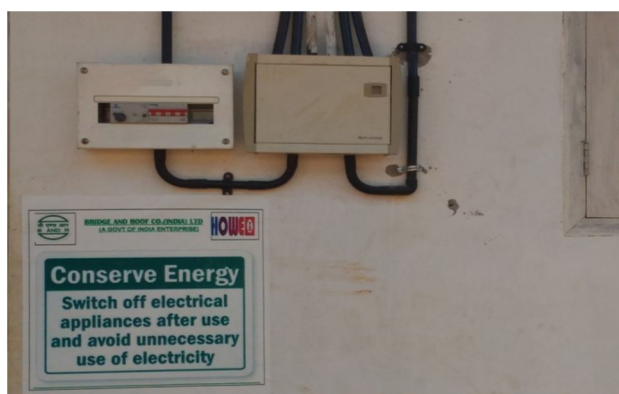
	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Details of Labour Camp.		

Health, Safety and Environment Management

Adequate numbers of dust bins are kept inside the camp premises of both the contractors for collection and segregation of waste. Information posters / signage's are displayed throughout the camp regarding health, hygiene, first aid, safety, environment etc. by both the contractors. Weekly inspection of labour camps by EHS team of both the contractors is conducted. The posters are displayed in different languages for understanding of workmen from diverse locations. For mosquito control, chemical spraying and fogging is done. Adequate fire extinguishers are provided around the camps, giving due consideration while placing them near to the kitchen and diesel generator. First aid box is readily available inside the camps. The camps in charge are trained for first aid as well as to ensure security and welfare of workmen. In addition, the camps of both the contractors are surrounded by fencing with single entry gate controlled by security guard at all times to prevent entry of intruders and stray animals. Health camp is also organized for the workers periodically.



Health poster inside the labour camp of AFCONS




Poster inside the labour camp of M/s B&R



Medical Check up camp conducted at labour camp of M/s B&R



Medical Check up camp conducted at labour camp of M/s AFCONS

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Details of Labour Camp.		



Emergency Mockdrill at Labour Camps of M/s Afcons and M/s B&R



Fire extinguisher inside the camp of
M/s AFCONS



Fire extinguisher inside the camp of M/s
B&R



Weekly Inspection of Labour camp by
EHS team of M/s AFCONS

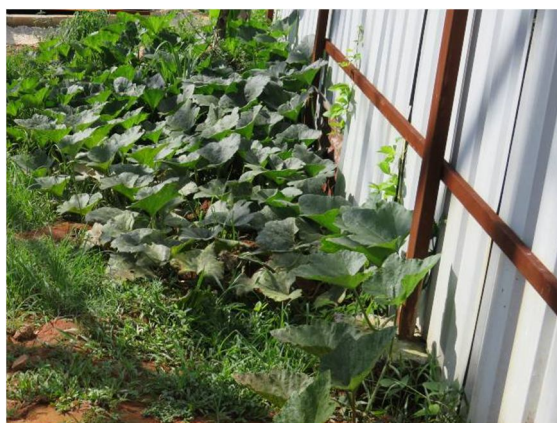


Fogging carried out within Labour camp of
M/s B&R

adani	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Details of Labour Camp.		

Gardening inside the Camp

The soil inside both the camp premises is naturally rich in nutrients. Gardening and farming is done inside the camps with the help of workmen as part of green initiative. Banana tree, tapioca, chilly, pumpkin etc. are so far planted and growing healthy. The flowering plants are also grown in the premise which adds to aesthetic and beauty of camp.




Gardening inside the camp of M/s AFCONS



Gardening inside the camp of M/s B&R

Annexure XII
Environment Monitoring Report
(April 2018 – September 2018)

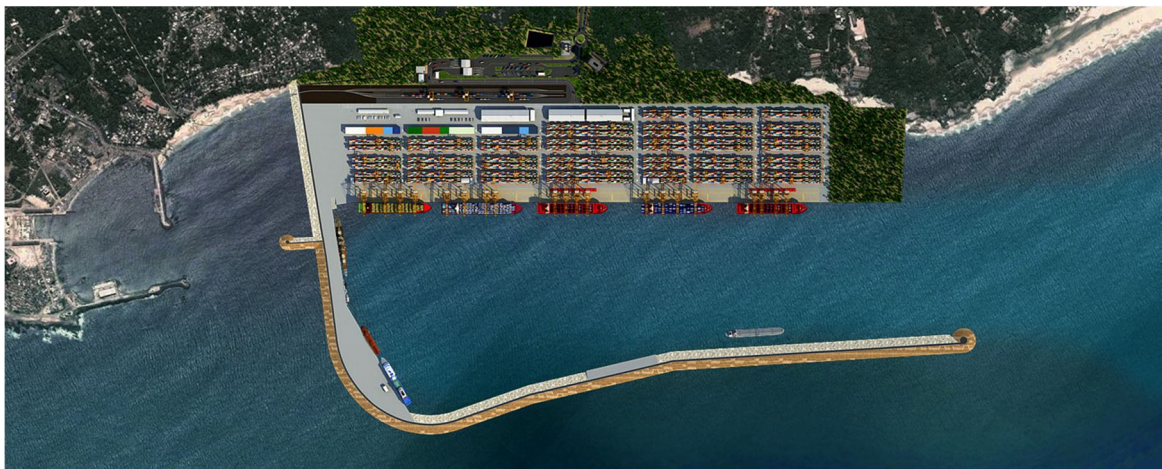
	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

Annexure XII

HALF YEARLY ENVIRONMENT MONITORING REPORT


For the period

April 2018 to September 2018




Adani Vizhinjam Port Pvt. Ltd.

Vizhinjam, Kerala

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

CONTENET

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

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

CHAPTER 1


Introduction

Ashwamedh Engineers and Consultants was established in May 1986. The company is engaged in providing Environmental pollution testing, Food and agriculture testing and Consultancy Services. Our affiliates are established all over India and overseas. Ashwamedh has steadily achieved growth up to such an extent that, it has become India's foremost analytical laboratory with several branch offices. The well-equipped laboratory and office set up of about 28000 sq. ft. is at Nashik, Maharashtra. The strength of our 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.


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

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

Ashwamedh Engineers and Consultants (AEC) was engaged by Adani Vizhinjam Port Pvt. Ltd. (AVPPL) for the Post EIA Environmental Monitoring as per Environmental Monitoring Plan mentioned in EIA and EC. AVPPL issued service order no. 5700182233 dated: 31.05.2016. SO mentions the matrix, parameters and frequency of environmental monitoring. AEC carried out said environmental monitoring strictly as per above mention service order.

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

AEC is also 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.

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

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.

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

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.

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		


7. Acceptance criteria in case of replicate/duplicate testing is $\leq 20\%$ 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 $\leq 20\%$ relative standard deviation.
11. Correlation of results for different characteristics like TDS/EC ratio. Anion/cation balance, COD/BOD correlation is carried out.
12. The quality control data is analysed and where they are found to be outside predefined criteria, planned action is taken to correct the problem and to prevent incorrect results from being reported.

Table 2.1 Check list format for sampling

Item	Yes or No	If No, reason and Justification for acceptance
Was the sampling point correctly located?	Yes	
Permanent facility available?	Yes	
Was the correct sample used?	Yes	
Were the proper types of sample containers used?	Yes	
Were the replicates or multiple samples taken as required?	Yes	
Were adequate quantities of samples taken?	Yes	
Were the sample containers properly labelled?	Yes	
Were the preservatives added and sample containers sealed as required?	Yes	
Were the sealed sample containers maintained at required storage condition?	Yes	
Checked by: Team In-charge	Yes	

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

Table 2.2 Check list for sample Integrity

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

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

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


Table 2.3 Check list format for analysis

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

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

Table 2.4 Check list format for quality check in the field

Parameters	Comments (Yes/No)	Remarks
Sample bottle labelled?	Yes	
Sample container rinsed with D.D. water?	Yes	
Field equipment blanks are identified	Yes	

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

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

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

Table 2.5 Check list format for quality check in the lab

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

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

adani	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

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 April 2018 to September 2018.

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

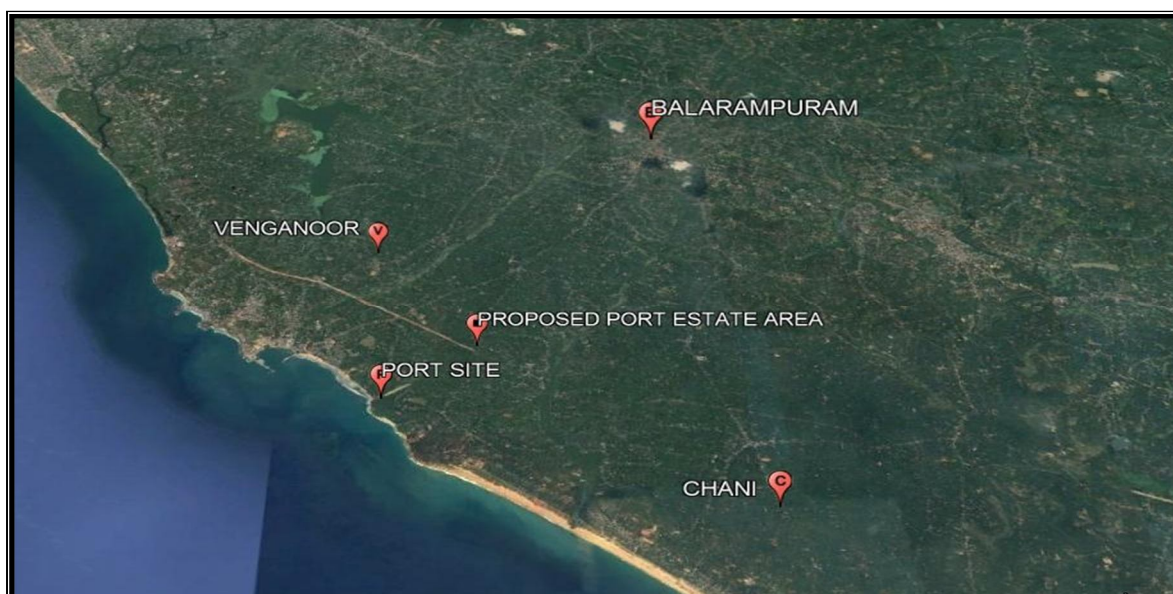



Figure 3.1 Google earth view of AAQM stations

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

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	CPCB Guidelines, Volume I,36/2012-13, Page no.11 WI/SAP-AA/5/1, Issue no.: 03 Issue date: 01.04.2014 (Gravimetric Method)
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 and Instrument Manufacturer Operating Manual WI/SAP-AA/5/1, Issue no.: 03 Issue date: 01.04.2014 (Gravimetric Method)
3.	Sulphur Dioxide (SO ₂)	µg/m ³	4.0	CPCB Guidelines, Volume I, 36/2012-13, Page no.1, WI/SAP-AA/5/2, Issue no.: 03 Issue date: 01.04.2014 (Improved West & Gaeke Method)
4.	Nitrogen Dioxide (NO ₂)	µg/m ³	3.0	CPCB Guidelines, Volume I, 36/2012-13, Page no.7, WI/SAP-AA/5/3, Issue no.: 03 Issue date: 01.04.2014 (Modified Jacob & Hochheiser Sodium Arsenite Method)
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 April 2018 to September 2018:

Table 3.4 - Location: Venganoor

Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
02.04.2018	56	16	5.72	5.47	BDL	BDL
05.04.2018	52	14	5.16	5.79	BDL	BDL
09.04.2018	42	12	4.73	4.90	BDL	BDL

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		


Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
12.04.2018	60	18	4.23	3.82	BDL	BDL
16.04.2018	68	21	5.22	4.62	BDL	BDL
19.04.2018	57	17	4.61	4.86	BDL	BDL
23.04.2018	70	24	5.13	5.72	BDL	BDL
26.04.2018	81	26	5.78	5.46	BDL	BDL
30.04.2018	64	20	4.37	6.28	BDL	BDL
04.05.2018	61	19	BDL	5.10	BDL	BDL
07.05.2018	58	18	5.21	5.26	BDL	BDL
11.05.2018	49	10	BDL	BDL	BDL	BDL
14.05.2018	55	17	5.24	3.12	BDL	BDL
18.05.2018	67	20	5.81	4.10	BDL	BDL
21.05.2018	50	15	4.27	BDL	BDL	BDL
25.05.2018	72	23	BDL	5.11	BDL	BDL
28.05.2018	78	25	5.34	5.26	BDL	BDL
04.06.2018	79	24	5.10	9.23	BDL	BDL
07.06.2018	71	20	4.67	6.23	BDL	BDL
11.06.2018	66	19	5.43	4.95	BDL	BDL
14.06.2018	70	23	4.66	5.58	BDL	BDL
18.06.2018	56	14	5.01	5.50	BDL	BDL
21.06.2018	63	18	4.87	5.79	BDL	BDL
25.06.2018	58	16	4.53	5.42	BDL	BDL
28.06.2018	44	11	4.87	5.79	BDL	BDL
02.07.2018	41	10	4.33	6.16	BDL	BDL
05.07.2018	43	11	5.42	6.67	BDL	BDL
09.07.2018	49	12	5.00	7.80	BDL	BDL
12.07.2018	56	13	5.00	8.10	BDL	BDL
16.07.2018	58	14	5.60	7.97	BDL	BDL
19.07.2018	68	18	4.12	5.80	BDL	BDL
23.07.2018	78	22	5.20	4.60	BDL	BDL
26.07.2018	71	20	4.60	6.40	BDL	BDL
30.07.2018	62	16	4.30	4.20	BDL	BDL
02.08.2018	52	12	5.80	6.53	BDL	BDL
06.08.2018	60	15	5.79	6.99	BDL	BDL
09.08.2018	70	17	5.79	6.28	BDL	BDL
13.08.2018	32	8	BDL	11.7	BDL	BDL
16.08.2018	58	14	BDL	4.63	BDL	BDL
20.08.2018	77	20	4.82	8.79	BDL	BDL
23.08.2018	84	21	BDL	BDL	BDL	BDL
27.08.2018	26	7	BDL	BDL	BDL	BDL
30.08.2018	66	16	BDL	BDL	BDL	BDL
03.09.2018	80	23	6.27	5.83	BDL	BDL

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
06.09.2018	84	25	5.19	6.16	BDL	BDL
10.09.2018	61	16	5.62	6.16	BDL	BDL
13.09.2018	72	20	5.42	5.17	BDL	BDL
17.09.2018	54	14	4.51	4.51	BDL	BDL
20.09.2018	67	18	4.26	5.84	BDL	BDL
24.09.2018	58	15	4.71	5.76	BDL	BDL
27.09.2018	49	12	5.11	4.88	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
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
02.04.2018	84	28	6.71	8.01	BDL	BDL
05.04.2018	59	18	5.06	5.99	BDL	BDL
09.04.2018	49	14	5.59	6.23	BDL	BDL
12.04.2018	55	16	4.58	4.74	BDL	BDL
16.04.2018	62	22	6.22	3.85	BDL	BDL
19.04.2018	74	24	5.17	5.82	BDL	BDL
23.04.2018	58	19	4.62	6.43	BDL	BDL
26.04.2018	60	20	4.87	5.12	BDL	BDL
30.04.2018	76	26	5.74	5.64	BDL	BDL
04.05.2018	86	27	5.88	7.81	BDL	BDL
07.05.2018	64	20	5.46	6.12	BDL	BDL
11.05.2018	52	16	6.12	8.10	BDL	BDL
14.05.2018	48	14	4.51	5.23	BDL	BDL
18.05.2018	55	18	5.76	4.92	BDL	BDL
21.05.2018	71	23	5.71	5.46	BDL	BDL
25.05.2018	68	22	4.62	5.11	BDL	BDL
28.05.2018	72	25	4.82	4.26	BDL	BDL
04.06.2018	66	16	5.09	8.83	BDL	BDL
07.06.2018	70	20	5.07	6.68	BDL	BDL
11.06.2018	53	13	4.87	5.34	BDL	BDL
14.06.2018	84	30	4.60	5.50	BDL	BDL
18.06.2018	46	12	4.80	6.22	BDL	BDL
21.06.2018	69	18	4.94	5.42	BDL	BDL
25.06.2018	61	15	4.88	5.79	BDL	BDL
28.06.2018	50	12	4.81	5.50	BDL	BDL
02.07.2018	52	15	5.49	6.10	BDL	BDL
05.07.2018	61	18	4.52	5.95	BDL	BDL
09.07.2018	49	13	5.00	7.39	BDL	BDL

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
12.07.2018	38	11	6.69	7.87	BDL	BDL
16.07.2018	42	12	5.00	7.80	BDL	BDL
19.07.2018	68	20	5.30	6.20	BDL	BDL
23.07.2018	56	16	5.80	4.60	BDL	BDL
26.07.2018	78	24	6.20	5.70	BDL	BDL
30.07.2018	80	26	5.40	5.20	BDL	BDL
02.08.2018	48	12	5.60	7.76	BDL	BDL
06.08.2018	50	12	5.13	6.12	BDL	BDL
09.08.2018	34	8	5.12	5.97	BDL	BDL
13.08.2018	16	4	BDL	7.85	BDL	BDL
16.08.2018	72	19	BDL	6.90	BDL	BDL
20.08.2018	44	11	4.82	7.03	BDL	BDL
23.08.2018	65	17	BDL	BDL	BDL	BDL
27.08.2018	51	13	BDL	BDL	BDL	BDL
30.08.2018	45	11	BDL	BDL	BDL	BDL
03.09.2018	71	20	4.89	3.69	BDL	BDL
06.09.2018	80	26	4.89	5.77	BDL	BDL
10.09.2018	78	24	5.97	6.16	BDL	BDL
13.09.2018	59	14	5.22	5.46	BDL	BDL
17.09.2018	62	16	5.42	5.81	BDL	BDL
20.09.2018	50	15	5.89	6.12	BDL	BDL
24.09.2018	72	18	4.67	5.27	BDL	BDL
27.09.2018	64	17	4.81	5.44	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
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
02.04.2018	80	24	5.16	4.90	BDL	BDL
05.04.2018	89	28	5.23	7.06	BDL	BDL
09.04.2018	79	20	5.80	6.68	BDL	BDL
12.04.2018	92	30	6.42	7.46	BDL	BDL
16.04.2018	86	26	5.38	8.34	BDL	BDL
19.04.2018	98	36	4.22	7.46	BDL	BDL
23.04.2018	94	34	6.43	7.34	BDL	BDL
26.04.2018	88	27	5.86	6.24	BDL	BDL
30.04.2018	90	29	5.41	5.83	BDL	BDL
04.05.2018	94	32	5.16	BDL	BDL	BDL
07.05.2018	90	30	5.23	4.58	BDL	BDL
11.05.2018	82	26	BDL	6.10	BDL	BDL

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
14.05.2018	96	34	6.42	7.84	BDL	BDL
18.05.2018	88	26	5.38	7.92	BDL	BDL
21.05.2018	90	31	BDL	6.10	BDL	BDL
25.05.2018	98	38	6.43	6.26	BDL	BDL
28.05.2018	86	28	BDL	6.24	BDL	BDL
04.06.2018	86	28	6.12	9.91	BDL	BDL
07.06.2018	79	22	5.36	5.88	BDL	BDL
11.06.2018	90	31	5.48	6.01	BDL	BDL
14.06.2018	92	35.5	5.09	6.31	BDL	BDL
18.06.2018	82	25	4.66	5.11	BDL	BDL
21.06.2018	56	14	4.87	5.58	BDL	BDL
25.06.2018	62	15	4.74	6.32	BDL	BDL
28.06.2018	78	19	4.87	5.33	BDL	BDL
02.07.2018	82	28	5.74	7.94	BDL	BDL
05.07.2018	80	26	4.61	5.75	BDL	BDL
09.07.2018	51	16	5.00	8.62	BDL	BDL
12.07.2018	68	22	5.60	7.16	BDL	BDL
16.07.2018	60	20	5.00	7.39	BDL	BDL
19.07.2018	56	18	4.56	6.40	BDL	BDL
23.07.2018	78	25	5.60	5.80	BDL	BDL
26.07.2018	90	31	6.10	8.20	BDL	BDL
30.07.2018	76	24	4.80	6.70	BDL	BDL
02.08.2018	56	14	5.79	6.86	BDL	BDL
06.08.2018	85	21	5.27	6.67	BDL	BDL
09.08.2018	96	39	5.64	6.31	BDL	BDL
13.08.2018	79	20	BDL	4.89	BDL	BDL
16.08.2018	54	13	5.61	13.4	BDL	BDL
20.08.2018	55	15	BDL	14.6	BDL	BDL
23.08.2018	72	18	4.62	8.59	BDL	BDL
27.08.2018	80	26	BDL	7.64	BDL	BDL
30.08.2018	63	16	BDL	7.10	BDL	BDL
03.09.2018	56	13	4.28	3.77	BDL	BDL
06.09.2018	76	20	5.79	6.19	BDL	BDL
10.09.2018	64	14	5.27	6.16	BDL	BDL
13.09.2018	80	24	4.32	4.86	BDL	BDL
17.09.2018	94	30	5.22	5.42	BDL	BDL
20.09.2018	82	24	6.11	6.45	BDL	BDL
24.09.2018	78	20	4.83	4.8	BDL	BDL
27.09.2018	81	22	5.61	5.1	BDL	BDL
NAAQS 2009	100	60	80	80	4	-



	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

Table 3.7 - Location: Chani


Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
02.04.2018	76	24	5.32	5.5	BDL	BDL
05.04.2018	82	28	5.37	5.79	BDL	BDL
09.04.2018	59	17	5.38	6.04	BDL	BDL
12.04.2018	76	26	6.12	6.43	BDL	BDL
16.04.2018	64	20	4.53	5.82	BDL	BDL
19.04.2018	68	21	5.72	6.47	BDL	BDL
23.04.2018	70	22	4.86	5.89	BDL	BDL
26.04.2018	80	26	5.74	5.74	BDL	BDL
30.04.2018	78	24	5.44	5.12	BDL	BDL
04.05.2018	68	24	5.86	5.14	BDL	BDL
07.05.2018	78	25	6.12	5.80	BDL	BDL
11.05.2018	86	28	6.28	6.22	BDL	BDL
14.05.2018	80	26	5.48	5.64	BDL	BDL
18.05.2018	62	20	4.67	4.89	BDL	BDL
21.05.2018	59	19	4.55	5.46	BDL	BDL
25.05.2018	75	22	4.10	5.90	BDL	BDL
28.05.2018	82	27	5.12	6.12	BDL	BDL
04.06.2018	47	11	5.94	9.52	BDL	BDL
07.06.2018	68	21	4.67	6.23	BDL	BDL
11.06.2018	74	26	4.60	5.04	BDL	BDL
14.06.2018	53	14	4.67	5.79	BDL	BDL
18.06.2018	60	19	5.25	6.51	BDL	BDL
21.06.2018	80	28	5.28	5.79	BDL	BDL
25.06.2018	44	11	5.43	6.41	BDL	BDL
28.06.2018	52	13	5.51	5.60	BDL	BDL
02.07.2018	77	24	4.35	6.16	BDL	BDL
05.07.2018	44	14	5.39	6.66	BDL	BDL
09.07.2018	57	16	5.00	7.80	BDL	BDL
12.07.2018	37	10	5.00	7.39	BDL	BDL
16.07.2018	42	12	6.09	8.10	BDL	BDL
19.07.2018	68	22	5.30	6.80	BDL	BDL
23.07.2018	80	28	4.80	5.70	BDL	BDL
26.07.2018	76	25	5.70	6.20	BDL	BDL
30.07.2018	81	26	4.20	5.40	BDL	BDL
02.08.2018	48	12	6.20	6.96	BDL	BDL
06.08.2018	44	11	6.08	5.31	BDL	BDL
09.08.2018	36	9	6.11	7.28	BDL	BDL
13.08.2018	20	5	BDL	7.64	BDL	BDL
16.08.2018	19	5	BDL	BDL	BDL	BDL
20.08.2018	36	10	BDL	BDL	BDL	BDL

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		


Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
23.08.2018	80	21	BDL	BDL	BDL	BDL
27.08.2018	51	12	5.11	4.35	BDL	BDL
30.08.2018	39	10	4.22	3.32	BDL	BDL
03.09.2018	58	18	5.19	4.25	BDL	BDL
06.09.2018	46	12	4.99	5.87	BDL	BDL
10.09.2018	41	9	5.18	5.82	BDL	BDL
13.09.2018	69	24	5.28	6.1	BDL	BDL
17.09.2018	74	25	4.35	5.62	BDL	BDL
20.09.2018	56	20	4.83	5.83	BDL	BDL
24.09.2018	80	28	5.72	5.41	BDL	BDL
27.09.2018	70	26	5.48	5.02	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
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
02.04.2018	89	29	5.86	7.08	BDL	BDL
05.04.2018	92	31	5.73	6.42	BDL	BDL
09.04.2018	62	18	6.57	8.28	BDL	BDL
12.04.2018	78	25	5.22	5.12	BDL	BDL
16.04.2018	70	22	6.31	6.41	BDL	BDL
19.04.2018	65	19	5.83	6.80	BDL	BDL
23.04.2018	76	24	5.46	5.76	BDL	BDL
26.04.2018	82	27	5.82	7.12	BDL	BDL
30.04.2018	68	20	4.63	7.63	BDL	BDL
04.05.2018	80	26	4.15	6.45	BDL	BDL
07.05.2018	76	24	5.10	5.82	BDL	BDL
11.05.2018	88	28	4.78	7.15	BDL	BDL
14.05.2018	65	21	4.90	5.82	BDL	BDL
18.05.2018	56	18	5.16	5.79	BDL	BDL
21.05.2018	60	20	5.28	6.10	BDL	BDL
25.05.2018	79	25	4.65	6.12	BDL	BDL
28.05.2018	85	27	6.12	8.10	BDL	BDL
04.06.2018	42	10	5.90	3.80	BDL	BDL
07.06.2018	68	21	5.40	4.00	BDL	BDL
11.06.2018	83	28	5.28	6.23	BDL	BDL
14.06.2018	57	14	4.58	5.26	BDL	BDL
18.06.2018	72	22	5.43	5.96	BDL	BDL
21.06.2018	54	13	5.08	5.79	BDL	BDL

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

Date	Parameters					
	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	HC
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	ppm
25.06.2018	64	18	5.24	6.70	BDL	BDL
28.06.2018	61	15	5.08	6.23	BDL	BDL
02.07.2018	52	15	4.93	5.75	BDL	BDL
05.07.2018	43	13	5.42	6.67	BDL	BDL
09.07.2018	37	11	5.00	7.39	BDL	BDL
12.07.2018	80	26	5.00	8.62	BDL	BDL
16.07.2018	70	23	5.12	8.09	BDL	BDL
19.07.2018	58	16	4.52	3.56	BDL	BDL
23.07.2018	62	20	4.62	4.51	BDL	BDL
26.07.2018	75	24	5.33	5.86	BDL	BDL
30.07.2018	68	22	5.84	6.12	BDL	BDL
02.08.2018	84	21	5.74	6.77	BDL	BDL
06.08.2018	80	20	5.13	7.79	BDL	BDL
09.08.2018	58	14	5.79	7.10	BDL	BDL
13.08.2018	42	10	BDL	11.5	BDL	BDL
16.08.2018	85	30	BDL	3.57	BDL	BDL
20.08.2018	63	16	4.12	8.13	BDL	BDL
23.08.2018	78	18	BDL	5.41	BDL	BDL
27.08.2018	45	11	BDL	5.18	BDL	BDL
30.08.2018	67	17	BDL	BDL	BDL	BDL
03.09.2018	97	28	5.08	4.19	BDL	BDL
06.09.2018	83	22	5.59	6.16	BDL	BDL
10.09.2018	90	26	5.23	5.87	BDL	BDL
13.09.2018	78	18	5.20	4.51	BDL	BDL
17.09.2018	59	15	4.68	3.82	BDL	BDL
20.09.2018	68	16	4.98	4.12	BDL	BDL
24.09.2018	80	21	5.67	6.12	BDL	BDL
27.09.2018	72	19	5.80	5.92	BDL	BDL
NAAQS 2009	100	60	80	80	4	-

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
Vizhinjam International Deepwater Multipurpose Seaport Environment Monitoring Report from April 2018 to September 2018		

5. Monthly Average Results of Ambient Air Quality Monitoring

Table 3.9: Monthly Average Results

Parameter	NAAQS 2009	Month	Venganoor	Proposed Port Estate Area	Port Site	Chani	Balaramapuram
Particulate matter (size less than 10µm) or PM ₁₀ , µg/ m ³	100	Apr-18	61.1	64.1	88.4	72.6	75.8
		May-18	61.3	64.5	90.5	73.8	73.6
		Jun-18	63.4	62.4	78.1	59.8	62.6
		Jul-18	58.4	58.2	71.2	62.4	60.6
		Aug-18	58.3	47.2	71.1	41.4	66.9
		Sep-18	65.6	67.0	76.4	61.8	78.4
Particulate matter (size less than 2.5µm) or PM _{2.5} , µg/ m ³	60	Apr-18	18.7	20.8	28.2	23.1	23.9
		May-18	18.4	20.6	30.6	23.9	23.6
		Jun-18	18.1	17.0	23.7	17.9	17.6
		Jul-18	15.1	17.2	23.3	19.7	18.9
		Aug-18	14.4	11.9	20.2	10.6	17.4
		Sep-18	17.9	18.8	20.9	20.3	20.6
Sulphur dioxide (SO ₂), µg/m ³	80	Apr-18	4.99	5.40	5.55	5.39	5.71
		May-18	5.17	5.36	5.72	5.27	5.02
		Jun-18	4.89	4.88	5.15	5.17	5.25
		Jul-18	4.84	5.49	5.22	5.09	5.09
		Aug-18	5.55	5.17	5.39	5.54	5.20
		Sep-18	5.14	5.22	5.18	5.13	5.28
Nitrogen Dioxide (NO ₂), µg/ m ³	80	Apr-18	5.21	5.76	6.81	5.87	6.74
		May-18	4.66	5.88	6.43	5.65	6.42
		Jun-18	6.06	6.16	6.31	6.36	5.50
		Jul-18	6.41	6.31	7.11	6.69	6.29
		Aug-18	7.49	6.94	8.45	5.81	6.93
		Sep-18	5.54	5.47	5.34	5.49	5.09
Carbon Monoxide (CO), µg/m ³	4	Apr-18	BDL	BDL	BDL	BDL	BDL
		May-18	BDL	BDL	BDL	BDL	BDL
		Jun-18	BDL	BDL	BDL	BDL	BDL
		Jul-18	BDL	BDL	BDL	BDL	BDL
		Aug-18	BDL	BDL	BDL	BDL	BDL
		Sep-18	BDL	BDL	BDL	BDL	BDL
Hydrocarbon (HC), ppm	-	Apr-18	BDL	BDL	BDL	BDL	BDL
		May-18	BDL	BDL	BDL	BDL	BDL
		Jun-18	BDL	BDL	BDL	BDL	BDL
		Jul-18	BDL	BDL	BDL	BDL	BDL
		Aug-18	BDL	BDL	BDL	BDL	BDL
		Sep-18	BDL	BDL	BDL	BDL	BDL

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

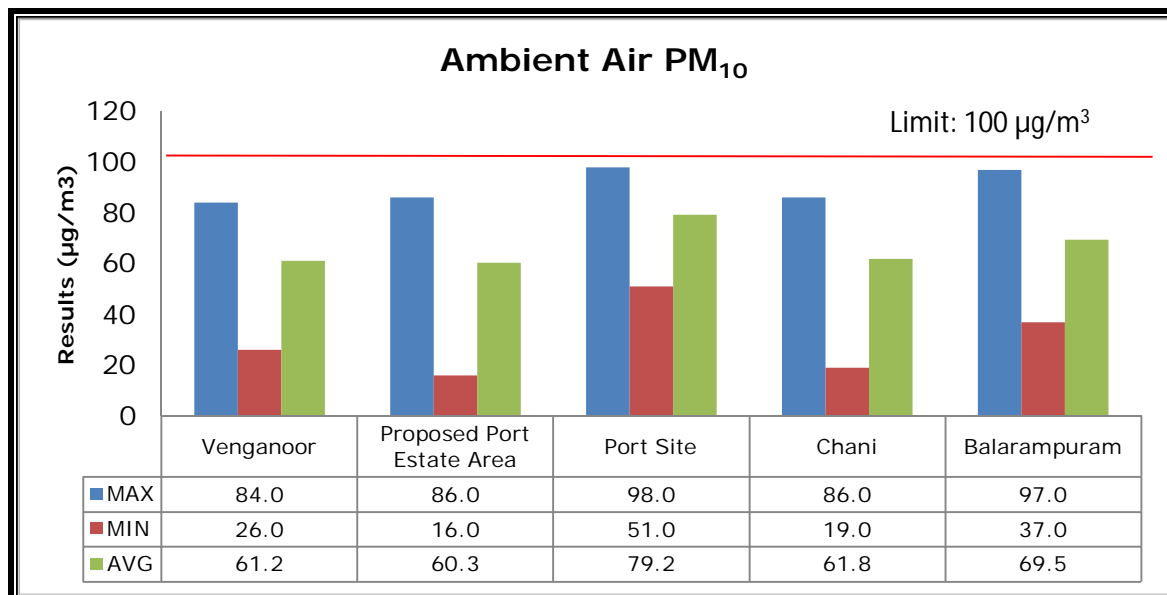


Figure 3.2 Particulate matter (size less than 10µm) (PM₁₀)

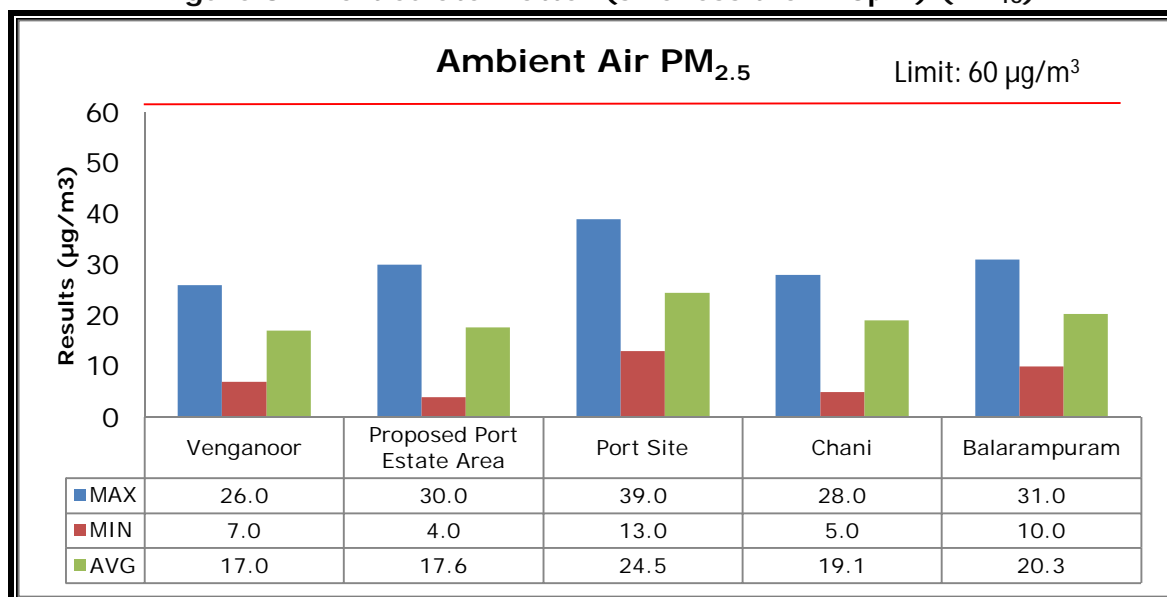


Figure 3.3 Particulate matter (size less than 2.5µm) (PM_{2.5})

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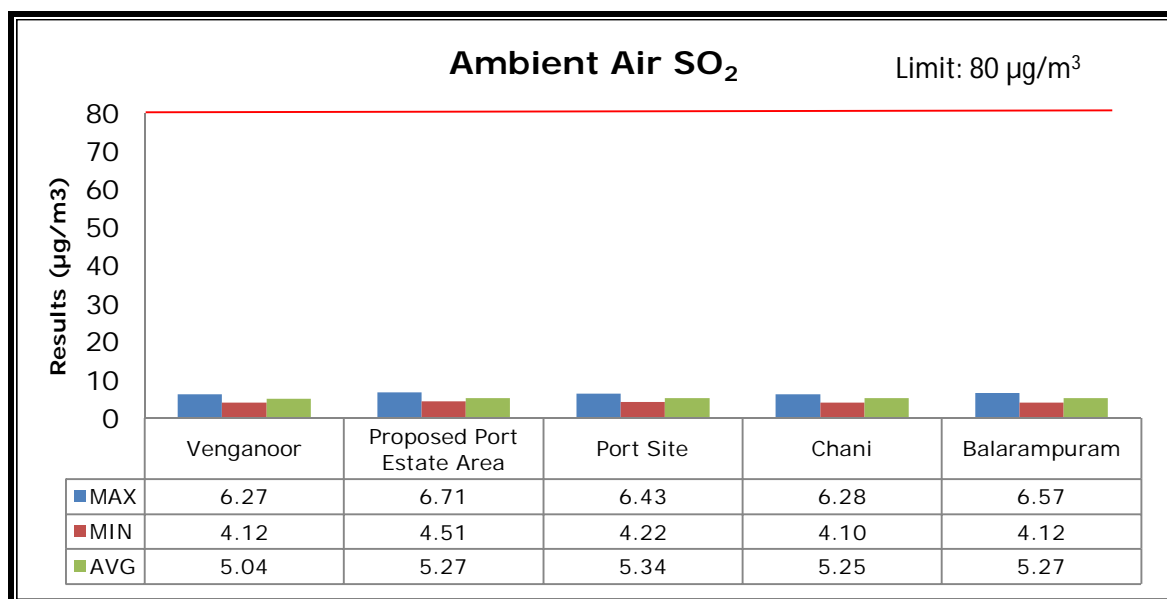


Figure 3.4: Sulphur dioxide (SO₂)

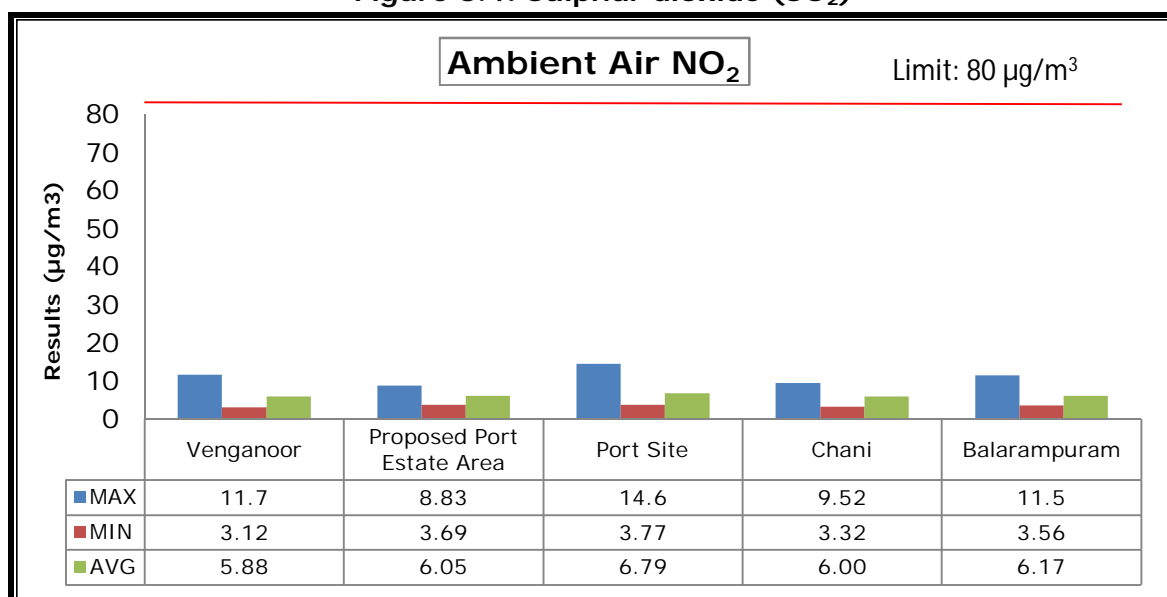



Figure 3.5 Nitrogen Dioxide (NO₂)

7. Summary - Ambient Air Quality

During the period April 2018 to September 2018, at the location **Venganoor**, the concentration of PM₁₀ was observed in the range between 26 - 84 µg/m³ with an average of 61.2 µg/m³, PM_{2.5} was observed in the range between 7 - 26 µg/m³ with an average of 17.0 µg/m³, SO₂ was observed in the range between 4.12 – 6.27 µg/m³ with an average of 5.04 µg/m³, NO₂ was observed in the range between 3.12 – 11.7 µg/m³ with an average of 5.88 µg/m³, CO and HC were observed below the detection limit for all six months.

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At the location **Proposed Port Colony**, concentration of PM₁₀ was observed in the range between 16 - 86 µg/m³ with an average of 60.3 µg/m³, PM_{2.5} was observed in the range between 4 - 30 µg/m³ with an average of 17.6 µg/m³, SO₂ was observed in the range between 4.51 - 6.71 µg/m³ with an average of 5.27 µg/m³, NO₂ was observed in the range between 3.69 – 8.83 µg/m³ with an average of 6.05 µg/m³, 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 51 - 98 µg/m³ with an average of 79.2 µg/m³, PM_{2.5} was observed in the range between 13 - 39 µg/m³ with an average of 24.5 µg/m³, SO₂ was observed in the range between 4.22 – 6.43 µg/m³ with an average of 5.34 µg/m³, NO₂ was observed in the range between 3.77 – 14.6 µg/m³ with an average of 6.79 µg/m³, 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 19 - 86 µg/m³ with an average of 61.8 µg/m³, PM_{2.5} was observed in the range between 5 - 28 µg/m³ with an average of 19.1 µg/m³, SO₂ was observed in the range between 4.10 – 6.28 µg/m³ with an average of 5.25 µg/m³, NO₂ was observed in the range between 3.32 – 9.52 µg/m³ with an average of 6.00 µg/m³, 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 37 - 97 µg/m³ with an average of 69.5 µg/m³, PM_{2.5} was observed in the range between 10 - 31 µg/m³ with an average of 20.3 µg/m³, SO₂ was observed in the range between 4.12 - 6.57 µg/m³ with an average of 5.27 µg/m³, NO₂ was observed in the range between 3.56 – 11.5 µg/m³ with an average of 6.17 µg/m³, 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.

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CHAPTER 4

Ambient Noise Monitoring

1. Ambient Noise Monitoring location details

This chapter describes the sampling location, methodology adopted for monitoring ambient noise and analysis of monitored results. Ambient Noise Monitoring during April 2018 to September 2018 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

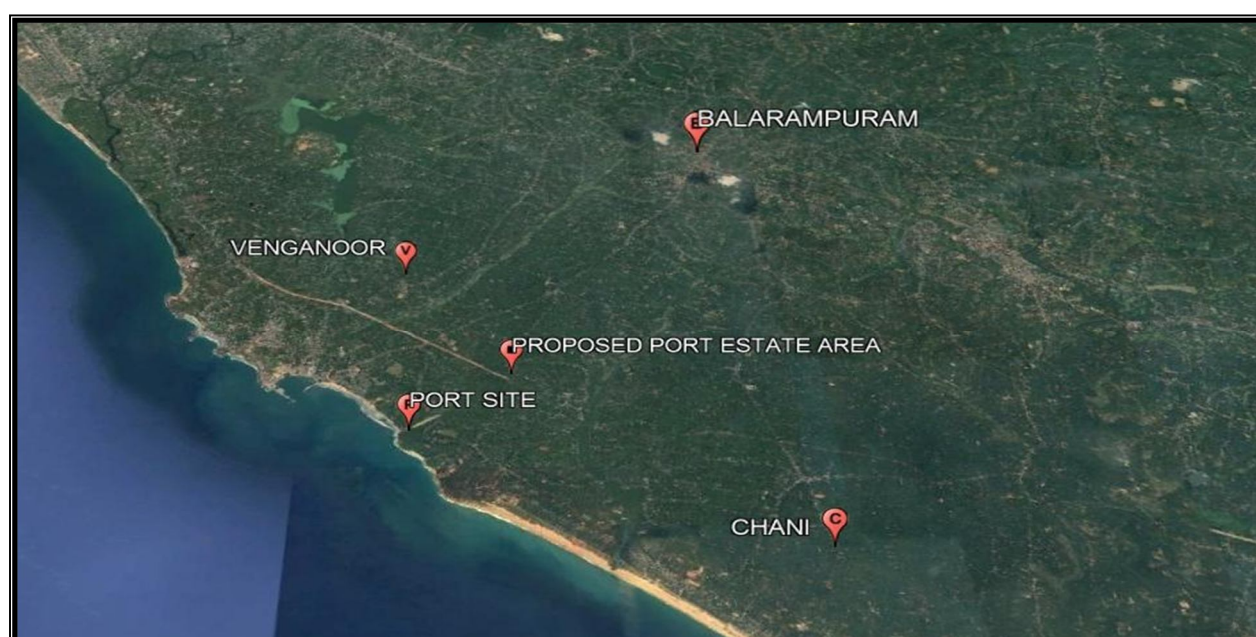



Figure 4.1 Google earth view of Ambient Noise Monitoring Stations

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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 April 2018 to September 2018

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)					
Apr-18	05.04.2018	89.9	82.9	41.0	41.0	71.5	59.0
	26.04.2018	91.3	82.0	51.7	63.2	74.3	65.8
May-18	03.05.2018	89.1	76.1	44.6	41.9	63.3	55.4
	24.05.2018	90.7	83.0	38.9	40.9	71.2	60.5
Jun-18	07.06.2018	90.2	87.9	40.4	40.6	67.7	59.4
	21.06.2018	91.3	85.1	52.8	46.3	73.7	62.0
Jul-18	05.07.2018	95.3	80.7	46.4	41.1	70.7	58.8
	26.07.2018	94.4	90.4	51.3	40.9	70.6	63.7
Aug-18	09.08.2018	92.9	82.8	44.5	41.1	66.1	53.7
	23.08.2018	89.3	79.8	44.7	41.3	65.6	55.3
Sep-18	06.09.2018	89.8	70.8	41.6	41.1	59.2	51.8
	20.09.2018	91.8	79.8	44.1	41.4	60.8	52.2
As per the Noise Pollution (Regulation & Control) Rules, 2000 [Rules 3 (1) and 4(1)]						75	70


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Table 4.4 - Location: Balaramapuram (Commercial)

Month	Date	L _{max} Day time	L _{max} Night time	L _{min} Day time	L _{min} Night time	L _{eq} Day time	L _{eq} Night time
		dB (A)					
Apr-18	09.04.2018	84.0	76.4	37.4	36.1	58.5	50.1
	30.04.2018	89.6	82.5	41.9	41.2	62.5	53.6
May-18	07.05.2018	87.9	81.9	38.0	36.8	60.1	54.1
	28.05.2018	85.8	82.5	41.9	40.9	62.5	53.6
Jun-18	11.06.2018	88.6	82.9	40.5	39.9	65.0	59.0
	25.06.2018	88.9	79.8	48.5	43.1	64.2	55.9
Jul-18	09.07.2018	86.8	76.0	40.6	37.6	60.3	47.1
	30.07.2018	87.0	81.4	37.5	37.2	60.5	52.5
Aug-18	13.08.2018	86.4	67.1	44.9	38.9	58.9	45.4
	27.08.2018	85.2	74.3	39.0	37.3	61.6	48.4
Sep-18	10.09.2018	81.3	72.9	35.4	35.3	51.9	42.5
	24.09.2018	77.8	73.7	44.0	39.8	52.4	48.2
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)					
Apr-18	06.04.2018	82.1	72.1	36.8	38.6	54.5	45.0
	27.04.2018	87.8	76.7	39.2	31.9	57.6	44.3
May-18	04.05.2018	85.6	72.8	37.5	35.9	54.1	44.2
	25.05.2018	85.6	65.2	38.5	35.3	54.3	43.7
Jun-18	08.06.2018	84.0	72.8	37.4	35.9	58.0	46.3
	22.06.2018	87.2	74.1	39.5	35.6	56.3	47.4
Jul-18	06.07.2018	79.9	69.6	43.1	38.1	54.2	45.0
	27.07.2018	84.7	78.8	37.0	34.8	55.0	44.2
Aug-18	10.08.2018	76.2	67.8	36.0	35.1	51.1	42.6
	24.08.2018	80.5	60.7	36.2	35.9	55.0	39.9
Sep-18	07.09.2018	84.6	71.9	36.3	35.6	53.0	42.8
	21.09.2018	81.1	67.8	37.5	31.0	54.2	44.6
As per the Noise Pollution (Regulation & Control) Rules, 2000 [Rules 3 (1) and 4(1)]						55	45



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Table 4.6 - Location: Chani (Residential)

Month	Date	L _{max} Day time	L _{max} Night time	L _{min} Day time	L _{min} Night time	L _{eq} Day time	L _{eq} Night time
		dB (A)					
Apr-18	07.04.2018	80.7	82.1	37.5	36.2	54.1	48.8
	28.04.2018	89.7	74.1	34.2	34.9	58.5	48.9
May-18	05.05.2018	79.4	68.5	35.0	34.6	52.3	43.5
	26.05.2018	89.2	65.5	35.3	35.9	58.5	43.5
Jun-18	09.06.2018	87.1	72.8	37.2	37.8	57.5	46.1
	23.06.2018	59.9	59.9	35.0	35.0	53.9	42.2
Jul-18	07.07.2018	86.2	67.3	40.3	40.1	54.5	45.0
	28.07.2018	87.6	72.8	38.1	37.8	59.8	45.0
Aug-18	11.08.2018	83.9	77.0	40.9	35.3	54.8	42.3
	25.08.2018	80.0	70.4	39.3	36.5	53.8	44.0
Sep-18	08.09.2018	79.6	64.3	36.0	34.6	46.7	40.9
	22.09.2018	84.7	68.4	37.0	36.9	47.7	43.5
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)					
Apr-18	08.04.2018	77.2	74.4	36.3	35.9	51.4	44.4
	29.04.2018	87.8	69.1	34.2	33.1	57.7	40.3
May-18	06.05.2018	76.1	67.4	36.3	35.1	48.0	41.5
	27.05.2018	75.6	63.7	35.1	35.0	54.0	39.7
Jun-18	10.06.2018	82.7	74.4	37.6	36.3	54.2	44.4
	24.06.2018	81.7	70.1	39.0	38.1	52.4	42.9
Jul-18	08.07.2018	88.9	67.9	38.5	34.9	54.5	44.1
	29.07.2018	82.7	70.5	38.5	36.3	55.0	42.0
Aug-18	12.08.2018	74.5	61.3	35.0	34.2	45.6	37.2
	26.08.2018	74.3	64.0	35.4	34.1	47.7	38.7
Sep-18	09.09.2018	75.0	59.0	35.8	33.7	44.4	40.5
	23.09.2018	71.6	66.9	37.7	36.4	44.4	40.3
As per the Noise Pollution (Regulation & Control) Rules, 2000 [Rules 3 (1) and 4(1)]						55	45

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5. Half Yearly Average Results of Ambient Noise Monitoring

Table 4.8: Half Yearly Average Results

Parameter		Proposed Port Estate Area	Chani	Venganoor	Port Site	Balaramapuram
		Residential	Residential	Residential	Industrial	Commercial
		Day Time (55) Night Time (45)	Day Time (55) Night Time (45)	Day Time (55) Night Time (45)	Day Time (75) Night Time- (70)	Day Time (65) Night Time (55)
L_{max} Day time dB (A)	Max	87.8	89.7	88.9	95.3	89.6
	Min	76.2	59.9	71.6	89.1	77.8
	Avg	83.3	82.3	79.0	91.3	85.8
L_{max} Night time dB (A)	Max	78.8	82.1	74.4	90.4	82.9
	Min	60.7	59.9	59.0	70.8	67.1
	Avg	70.9	70.3	67.4	81.8	77.6
L_{min} Day time dB (A)	Max	43.1	40.9	39.0	52.8	48.5
	Min	36.0	34.2	34.2	38.9	35.4
	Avg	37.9	37.2	36.6	45.2	40.8
L_{min} Night time dB (A)	Max	38.6	40.1	38.1	63.2	43.1
	Min	31.0	34.6	33.1	40.6	35.3
	Avg	35.3	36.3	35.3	43.4	38.7
Leq Day time dB (A)	Max	58.0	59.8	57.7	74.3	65.0
	Min	51.1	46.7	44.4	59.2	51.9
	Avg	54.8	54.3	50.8	67.9	59.9
Leq Night time dB (A)	Max	47.4	48.9	44.4	65.8	59.0
	Min	39.9	40.9	37.2	51.8	42.5
	Avg	44.2	44.5	41.3	58.1	50.9

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

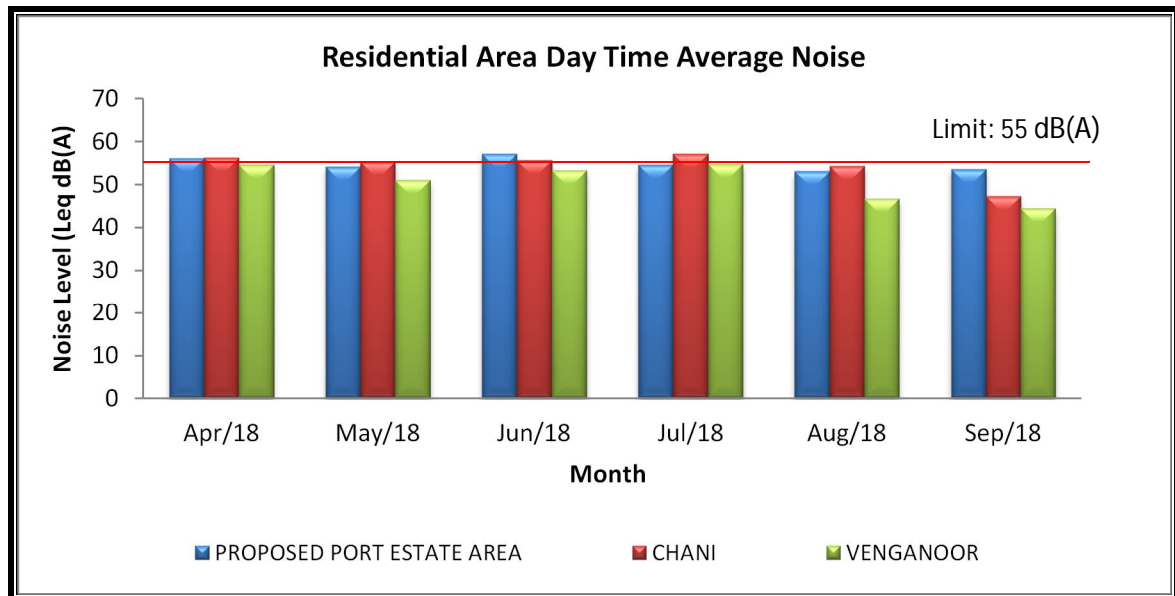


Figure 4.2 Residential Area Noise Level at day time

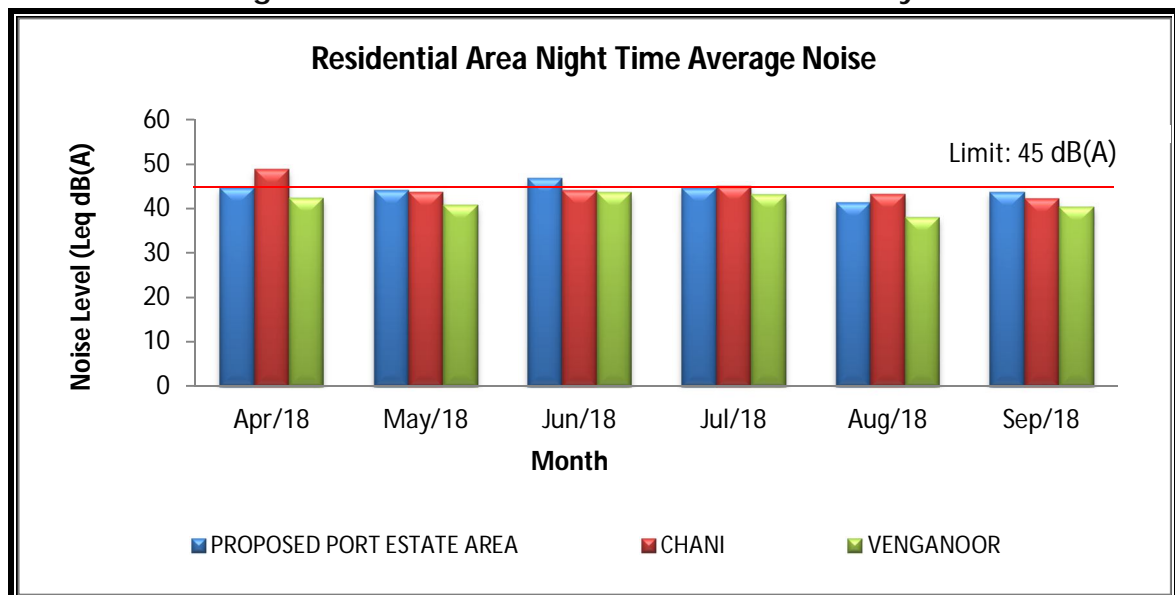


Figure 4.3 Residential Area Noise Level at night time

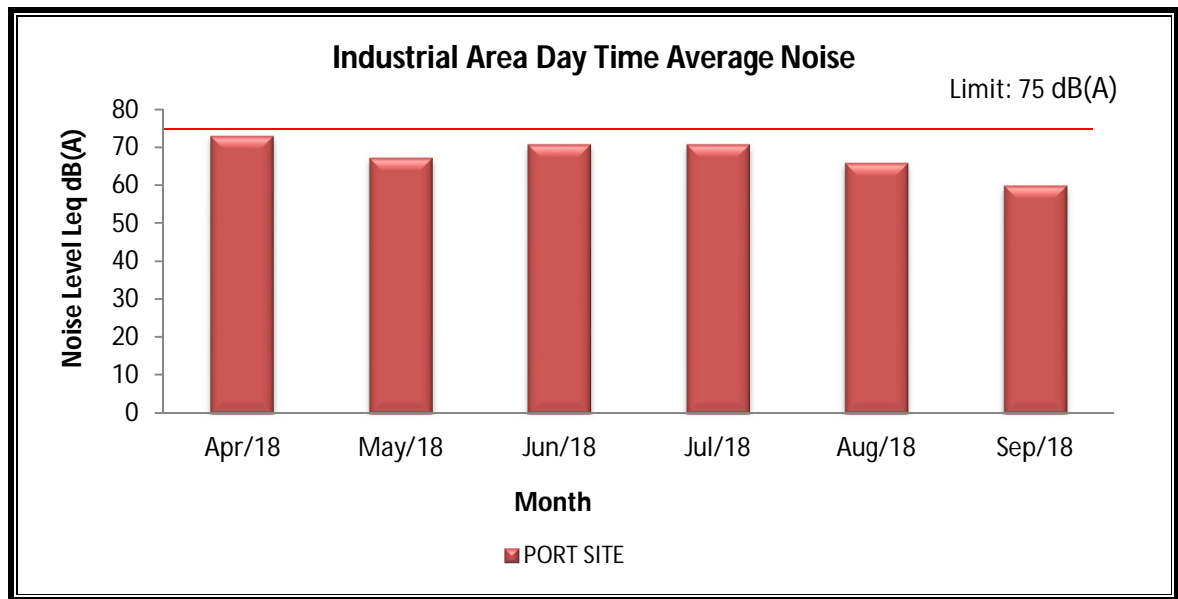


Figure 4.4 Industrial Area Noise Level at day time

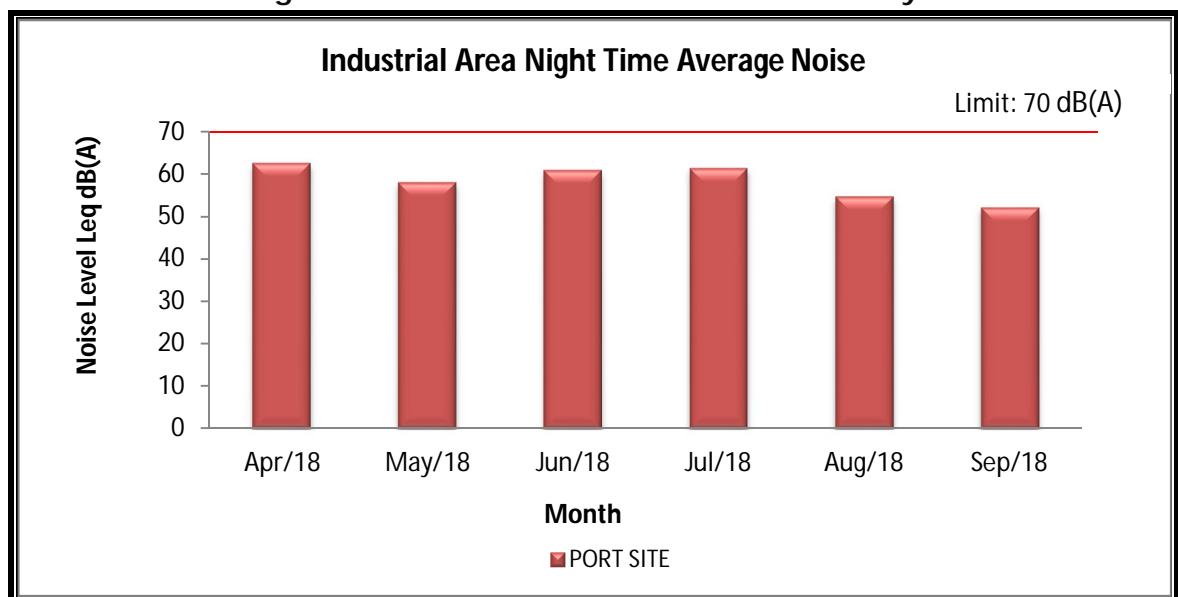


Figure 4.5 Industrial Area Noise Level at night time

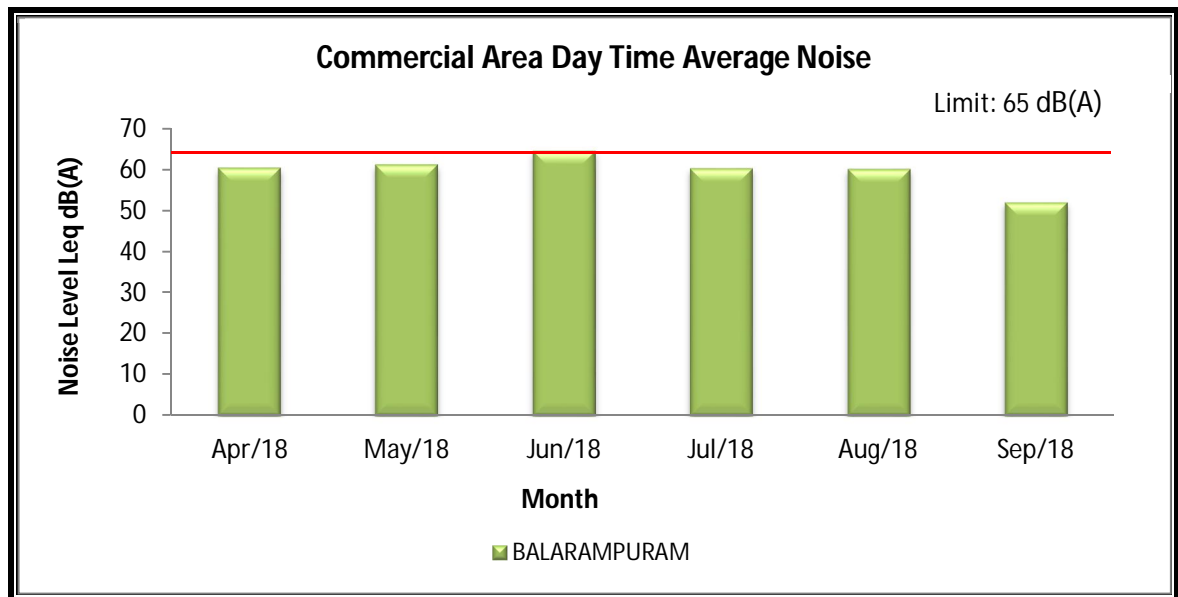


Figure 4.6 Commercial Area Noise Level at day time

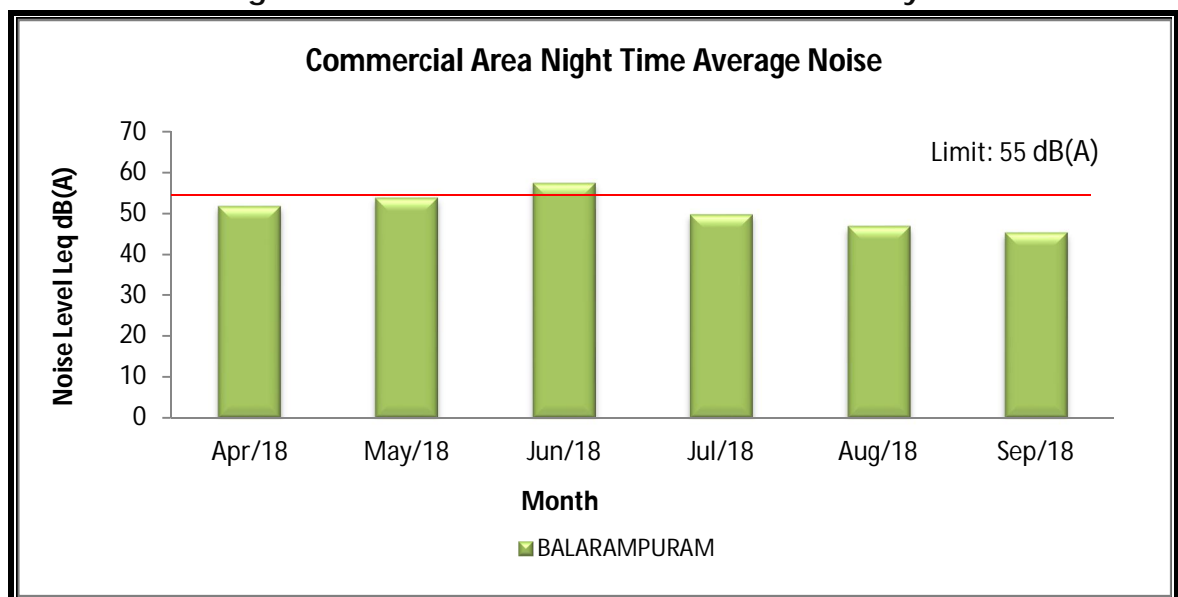



Figure 4.7 Commercial Area Noise Level at night time

7. Summary - Ambient Noise Monitoring

During the period April 2018 to September 2018, average noise level observed at residential areas i.e. at Proposed Port Estate Area, Chani and Venganoor during day time were 54.8 dBA, 54.3 dBA and 50.8 dBA respectively and during night time 44.2 dBA, 44.5 dBA and 41.3 dBA respectively.

At industrial area i.e. at Port Site area average noise level observed at day time 67.9 dBA and at night time 58.1 dBA.

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At commercial area i.e. Balaramapuram area average noise level observed at day time 59.9 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 April 2018 to September 2018 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. During the month of July and August due to rough sea condition monitoring was not carried out. Classification of locations as per the Noise Pollution (Regulation & Control) Rules, 2000 (Rules 3 (1) and 4(1)) is as below:

Table 5.1 Marine Water and Sediment sampling locations details

Sr. No.	Location	Latitude	Longitude
1.	Near Kovalam Beach	8 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 ⁰ ,58',37.62" E

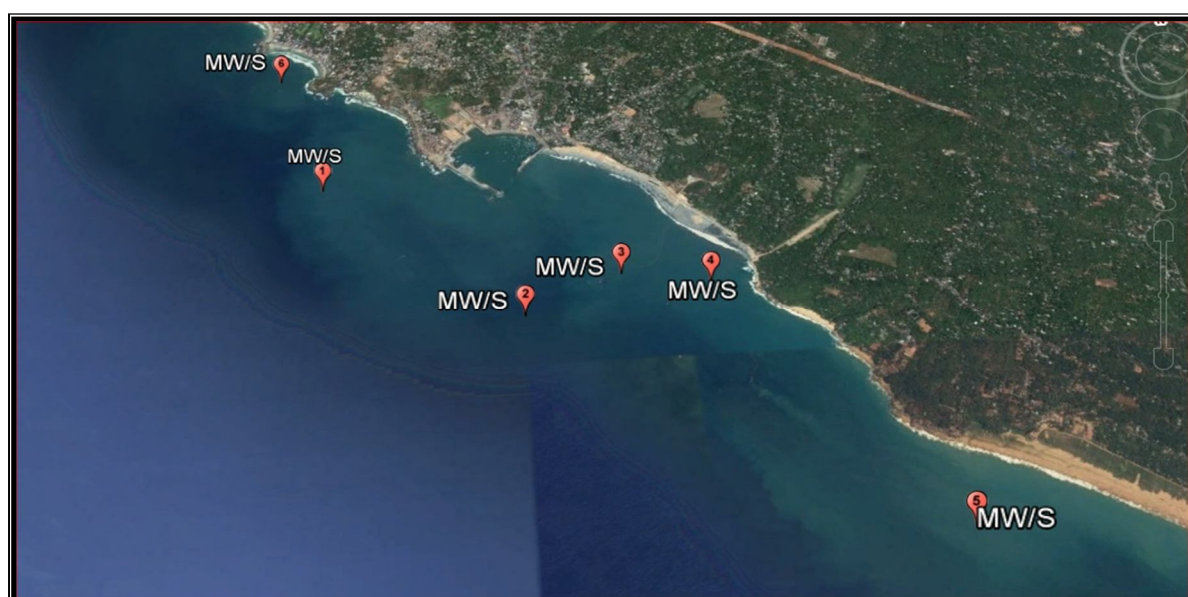



Figure 5.1 Google earth view of Marine Water and Sediment Sampling Locations


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2. Methodology of Sampling and Analysis

Table 5.2 Sampling and Analysis Methodology

Sr. No.	Parameter	Unit	Detection Limit	Method Reference
Marine Water Analysis				
1.	pH Value	-	1	IS 3025(Part 11):1983, Reaffirmed 2006
2.	Dissolved Oxygen	mg/L	0.05	IS 3025 (Part 38): 1989, Reaffirmed 2009
3.	Colour and Odour	-	Qualitative	-
4.	Floating Materials – Oil, Grease and Scum (Including Petroleum Products)	mg/L	0.005	APHA, 22 nd Ed. 2012, 5520-B, 5-40 Clause 6 of IS: 3025 (Part 39): 1991, Amds.2, Sept 2013
5.	Faecal Coliforms	MPN Index /100ml	1.8	APHA, 22 nd Ed., 2012, 9221-E, 9-74
6.	Biochemical Oxygen Demand (3 days, 27°C)	mg/L	1	IS 3025(Part 44): 1993, Reaffirmed 2009, Amds.1
7.	Phytoplanktons	No./100ml	ND	APHA, 22 nd Ed., 2012
8.	Zooplanktons	No./100ml	ND	Microscopy APHA, 22 nd Ed.,
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, 22 nd Ed., 2012
Note: ND: Not Detected				


3. Marine Water Standards

	Adani Vizhinjam Port Private Ltd	From : April 2018 To : September 2018
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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).		

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4. Marine Water Analysis Result for the period April 2018 to September 2018

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	pH	6.5-9.0	Apr-18	High tide	7.70	7.69	7.80	7.84	7.80	7.81
				Low tide	7.66	7.67	7.70	7.82	7.84	7.84
			May-18	High tide	7.89	7.80	7.93	7.86	7.90	7.90
				Low tide	7.84	7.82	7.95	7.90	7.87	7.89
			Jun-18	High tide	7.70	7.66	7.67	7.61	7.34	7.61
				Low tide	7.73	7.70	7.72	7.71	7.64	7.64
			Jul-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Aug-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
2	Dissolved Oxygen (mg/L)	3.0 mg/L or 40 % saturation value, whichever is higher	Apr-18	High tide	5.40	5.20	5.40	5.40	5.30	5.50
				Low tide	4.90	5.00	5.20	5.00	5.10	5.40
			May-18	High tide	5.20	5.30	5.50	5.30	5.40	5.30
				Low tide	5.00	5.10	5.30	5.20	5.20	5.20
			Jun-18	High tide	5.30	5.50	5.80	5.50	5.60	5.40
				Low tide	5.20	5.40	5.60	5.30	5.40	5.30

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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
3	Colour and Odour	No visible colour or offensive odour	Jul-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Aug-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Sep-18	High tide	5.10	5.20	5.50	5.10	5.50	5.20
				Low tide	4.90	5.10	5.40	5.50	5.30	5.10
			Apr-18	High tide	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour
				Low tide	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour
			May-18	High tide	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour
				Low tide	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour
			Jun-18	High tide	No visible colour or offensive	No visible colour or offensive	No visible colour or offensive	No visible colour or offensive	No visible colour or offensive	No visible colour or offensive

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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
					odour	odour	odour	odour	odour	odour
				Low tide	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour
			Jul-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Aug-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Sep-18	High tide	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour
				Low tide	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour	No visible colour or offensive odour
			Apr-18	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
4	Floating Materials (Oil, Grease and Scum)	Max. 10	May-18	High tide	BDL	BDL	BDL	BDL	BDL	<1
				Low tide	BDL	BDL	BDL	BDL	BDL	<1
			Jun-18	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL

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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
	(Including Petroleum Products) (mg/L)		Jul-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Aug-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Sep-18	High tide	BDL	BDL	BDL	BDL	BDL	BDL
				Low tide	BDL	BDL	BDL	BDL	BDL	BDL
5	Faecal Coliforms (/100 ml)	Max. 500	Apr-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
			May-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
			Jun-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
			Jul-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Aug-18	High tide	-	-	-	-	-	-
				Low tide	-	-	-	-	-	-
			Sep-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
6	Biochemical	Max. 5	Apr-18	High tide	5.20	5.30	6.20	6.30	6.40	4.90
				Low tide	5.70	6.30	6.60	6.60	6.70	5.10
			May-18	High tide	5.30	5.50	5.80	6.50	6.10	5.00

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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
	Oxygen Demand (3 days, 27°C) (mg/L)		Jun-18	Low tide	5.40	5.90	6.20	6.70	6.40	5.10
				High tide	4.90	5.30	5.60	6.10	5.90	4.80
			Jul-18	Low tide	5.10	5.50	5.90	6.50	6.20	5.00
				High tide	-	-	-	-	-	-
			Aug-18	Low tide	-	-	-	-	-	-
				High tide	-	-	-	-	-	-
			Sep-18	Low tide	-	-	-	-	-	-
				High tide	5.20	5.40	5.90	6.40	6.00	4.90
				Low tide	5.30	5.60	6.30	6.00	6.10	5.20

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

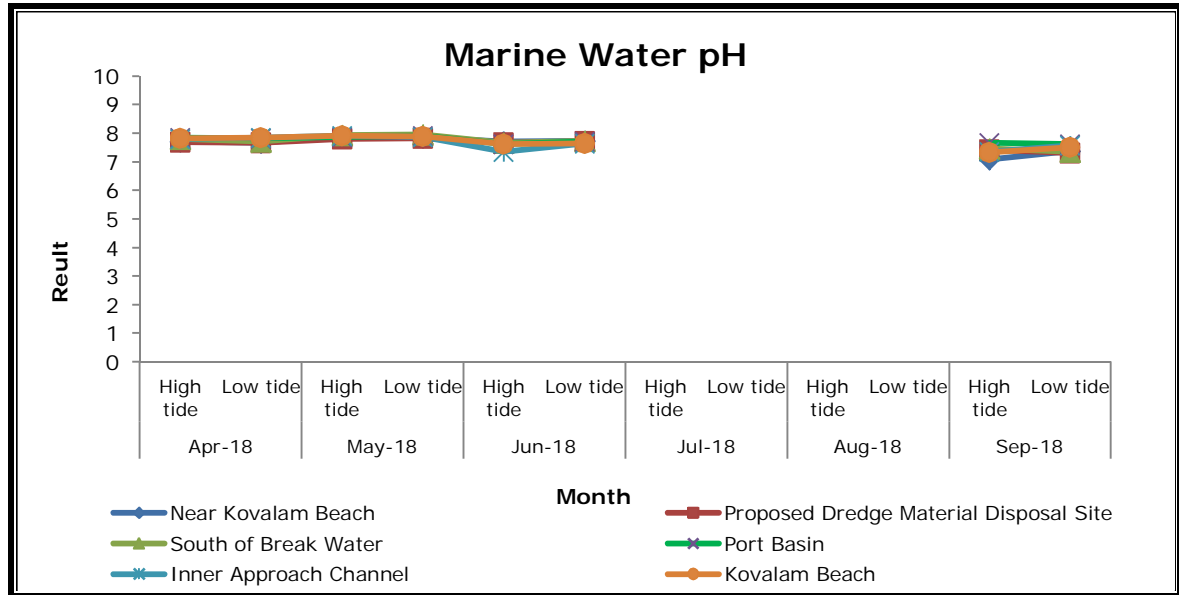


Figure 5.2 Marine Water Analysis for pH

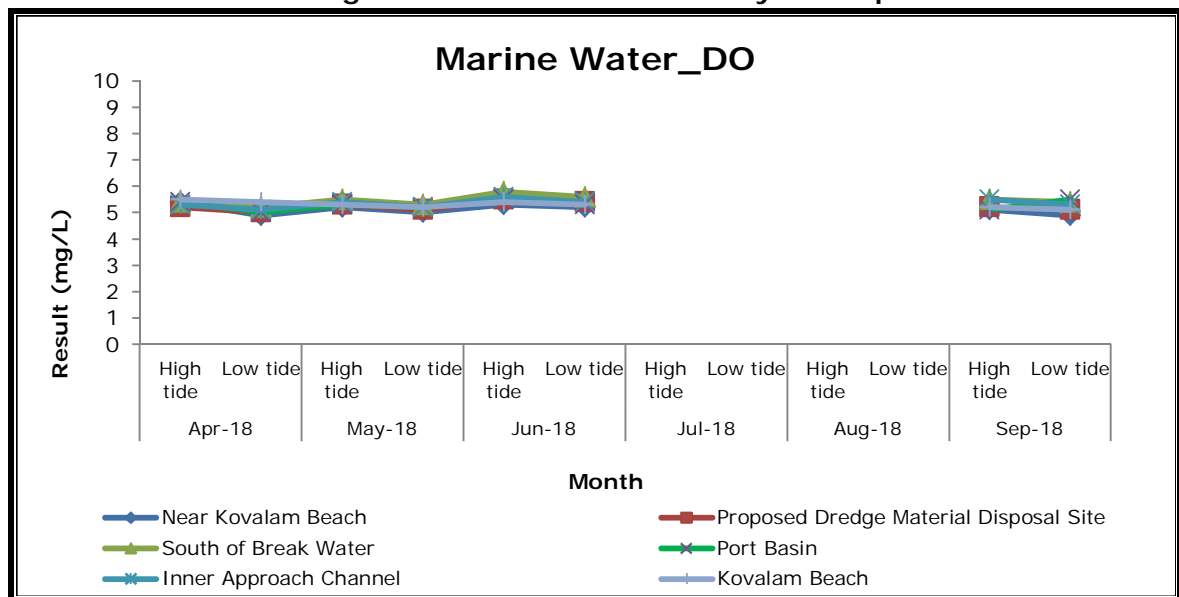


Figure 5.3 Marine Water Analysis for Dissolved Oxygen

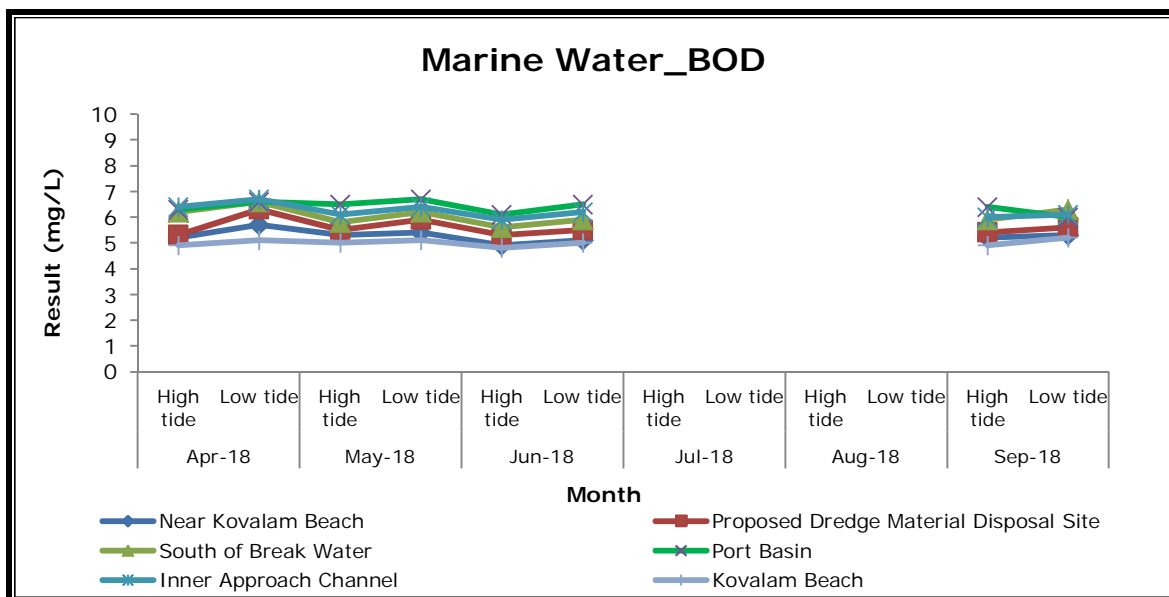
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Figure 5.4 Marine Water Analysis for Biochemical Oxygen Demand

6. Summary - Marine water analysis:

During the period April 2018 to September 2018, at the location **Near Kovalam Beach**, the low tide and high tide concentration of pH were observed in the range between 7.08 – 7.89, Dissolved oxygen was observed in the range between 4.90 - 5.40 mg/L, No visible colour or offensive odour observed, Floating materials were observed below the detection limit to <1. Faecal Coliforms were observed <1.8 /100 ml and Biochemical Oxygen Demand was observed in the range between 4.90 – 5.70 mg/L.

At the location **Proposed Dredge Material Disposal Site**, the low tide and high tide concentration of pH were observed in the range between 7.31 - 7.82, Dissolved oxygen was observed in the range between 5.00 - 5.50 mg/L, No visible colour or offensive odour observed, Floating materials were observed below detection limit to <1. Faecal Coliforms were observed <1.8 /100 ml and Biochemical Oxygen Demand was observed in the range between 5.30 – 6.30 mg/L.


At the location **South of Break Water**, the low tide and high tide concentration of pH were observed in the range between 7.35 - 7.95, Dissolved oxygen was observed in the range between 5.20 - 5.80 mg/L, No visible colour or offensive odour observed, Floating materials were observed below detection limit to <1. Faecal Coliforms were observed <1.8 /100ml and Biochemical Oxygen Demand was observed in the range between 5.60 – 6.60 mg/L.

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At the location **Port Basin**, the low tide and high tide concentration of pH were observed in the range between 7.61 – 7.90, Dissolved oxygen was observed in the range between 5.00 – 5.50 mg/L, No visible colour or offensive odour observed, Floating materials were observed below detection limit to <1. Faecal Coliforms were observed <1.8 /100ml and Biochemical Oxygen Demand was observed in the range between 6.00 – 6.70 mg/L.

At the location **Inner Approach Channel**, the low tide and high tide concentration of pH were observed in the range between 7.34 – 7.90, Dissolved oxygen was observed in the range between 5.10 – 5.60 mg/L, No visible colour or offensive odour observed, Floating materials were observed below detection limit to <1. Faecal Coliforms was observed <1.8 /100ml and Biochemical Oxygen Demand was observed in the range between 5.90 – 6.70 mg/L.

At the location **Kovalam Beach**, the low tide and high tide concentration of pH were observed in the range between 7.32 – 7.90, Dissolved oxygen was observed in the range between 5.10 – 5.50 mg/L, No visible colour or offensive odour observed, Floating materials were observed below detection limit to <1. Faecal Coliforms was observed <1.8 /100ml and Biochemical Oxygen Demand was observed in the range between 4.80 – 5.20 mg/L.

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7. Sediment Analysis Result

Table 5.5: Near Kovalam Beach

Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Texture	-	Sandy	Sandy	Sandy	-	-	Sandy
Organic Matter	%	6.46	6.20	7.80	-	-	4.99
Total Phosphorus (as P)	mg/kg	21.0	36.0	30.1	-	-	25.2
Aluminium (as Al)	mg/kg	633	688	780	-	-	860
Chromium (as Cr)	mg/kg	23.9	25.3	21.5	-	-	9.40
Copper (as Cu)	mg/kg	0.130	0.260	0.240	-	-	BDL
Iron (as Fe)	mg/kg	2644	2820	3140	-	-	3763
Lead (as Pb)	mg/kg	2.01	2.10	3.10	-	-	8.86
Manganese (as Mn)	mg/kg	5.60	5.95	7.41	-	-	3.96
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	-	-	BDL
Zinc (as Zn)	mg/kg	1.00	1.21	2.41	-	-	4.86
Nickel (as Ni)	mg/kg	0.683	0.610	1.24	-	-	4.46
Benthic Organism							
Micro Benthic Organism	/m ²	94800	96400	91600	-	-	90400
Macro Benthic Organism	/m ²	96400	89100	85400	-	-	83100
Total	/m²	191200	185500	177000	-	-	173500

Table 5.6: Proposed Dredge Material Disposal Site

Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Texture	-	Sandy	Sandy	Sandy	-	-	Clay
Organic Matter	%	16.2	8.4	10.2	-	-	5.24
Total Phosphorus (as P)	mg/kg	15.4	52.6	32.1	-	-	18.3
Aluminium (as Al)	mg/kg	552	599	410	-	-	618
Chromium (as Cr)	mg/kg	13.9	14.7	18.2	-	-	6.5
Copper (as Cu)	mg/kg	0.430	0.800	0.400	-	-	2.12
Iron (as Fe)	mg/kg	1623	1735	1920	-	-	1018
Lead (as Pb)	mg/kg	0.865	0.892	1.22	-	-	13.1

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Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Manganese (as Mn)	mg/kg	6.84	7.21	14.2	-	-	3.06
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	-	-	BDL
Zinc (as Zn)	mg/kg	BDL	BDL	BDL	-	-	5.18
Nickel (as Ni)	mg/kg	0.708	BDL	BDL	-	-	3.86
Benthic Organism							
Micro Benthic Organism	/m ²	/m ²	144000	139000	-	-	11800
Macro Benthic Organism	/m ²	/m ²	97800	98100	-	-	91700
Total	/m²	/m²	241800	237100	-	-	103500

Table 5.7: South of Breakwater

Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Texture	-	Sandy	Sandy	Sandy	-	-	Sandy
Organic Matter	%	8.20	7.17	10.1	-	-	1.37
Total Phosphorus (as P)	mg/kg	13.5	31.4	18.4	-	-	18
Aluminium (as Al)	mg/kg	176	181	211	-	-	448
Chromium (as Cr)	mg/kg	18.1	18.5	20.3	-	-	10.4
Copper (as Cu)	mg/kg	0.058	0.041	0.210	-	-	BDL
Iron (as Fe)	mg/kg	876	903	870	-	-	1631
Lead (as Pb)	mg/kg	2.22	2.12	1.83	-	-	12.8
Manganese (as Mn)	mg/kg	6.36	6.57	5.40	-	-	6.46
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	-	-	BDL
Zinc (as Zn)	mg/kg	BDL	BDL	BDL	-	-	1.91
Nickel (as Ni)	mg/kg	0.378	0.378	0.410	-	-	0.690
Benthic Organism							
Micro Benthic Organism	/m ²	36300	38200	31400	-	-	30200
Macro Benthic Organism	/m ²	19800	20100	18500	-	-	17400
Total	/m²	56100	58300	49900	-	-	47600


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Table 5.8: Port Basin

Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Texture	-	Sandy	Sandy	Sandy	-	-	Clay
Organic Matter	%	18.0	8.20	6.10	-	-	6.10
Total Phosphorus (as P)	mg/kg	13.4	46.1	21.2	-	-	26.6
Aluminium (as Al)	mg/kg	134	138	182	-	-	1667
Chromium (as Cr)	mg/kg	11.1	11.3	13.4	-	-	7.55
Copper (as Cu)	mg/kg	0.510	0.670	0.51	-	-	0.750
Iron (as Fe)	mg/kg	675	697	760	-	-	4059
Lead (as Pb)	mg/kg	0.192	1.09	2.1	-	-	8.00
Manganese (as Mn)	mg/kg	2.29	2.39	3.9	-	-	14.6
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	-	-	BDL
Zinc (as Zn)	mg/kg	BDL	BDL	BDL	-	-	3.20
Nickel (as Ni)	mg/kg	BDL	BDL	BDL	-	-	3.08
Benthic Organism							
Micro Benthic Organism	/m ²	78100	79800	77800	-	-	78900
Macro Benthic Organism	/m ²	60800	61200	60100	-	-	59100
Total	/m²	138900	141000	137900	-	-	138000

Table 5.9: Inner Approach Channel

Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Texture	-	Sandy	Sandy	Sandy	-	-	Sandy
Organic Matter	%	5.05	5.60	3.90	-	-	0.580
Total Phosphorus (as P)	mg/kg	23.0	38.0	31.2	-	-	21.0
Aluminium (as Al)	mg/kg	557	607	512	-	-	766
Chromium (as Cr)	mg/kg	23.4	24.7	21.5	-	-	5.14
Copper (as Cu)	mg/kg	0.121	0.230	0.410	-	-	BDL
Iron (as Fe)	mg/kg	2113	2262	2450	-	-	1926
Lead (as Pb)	mg/kg	1.23	1.26	1.85	-	-	10.0
Manganese (as Mn)	mg/kg	9.28	9.93	6.41	-	-	3.75

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Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	-	-	BDL
Zinc (as Zn)	mg/kg	0.247	0.220	0.820	-	-	3.14
Nickel (as Ni)	mg/kg	1.23	1.10	1.21	-	-	2.03
Benthic Organism							
Micro Benthic Organism	/m ²	30100	32800	29800	-	-	28100
Macro Benthic Organism	/m ²	8800	9000	8700	-	-	8500
Total	/m²	38900	41800	38500	-	-	36600

Table 5.10: Kovalam Beach

Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Texture	-	Sandy	Sandy	Sandy	-	-	Sandy
Organic Matter	%	5.03	5.60	6.9	-	-	4.37
Total Phosphorus (as P)	mg/kg	20.5	33	22.6	-	-	23.2
Aluminium (as Al)	mg/kg	564	503	640	-	-	743
Chromium (as Cr)	mg/kg	26	27.5	21.4	-	-	9.61
Copper (as Cu)	mg/kg	0.093	0.850	0.610	-	-	BDL
Iron (as Fe)	mg/kg	2481	2639	2890	-	-	2923
Lead (as Pb)	mg/kg	2.99	3.09	4.05	-	-	11.1
Manganese (as Mn)	mg/kg	5.02	5.30	7.10	-	-	1.39
Mercury (as Hg)	mg/kg	BDL	BDL	BDL	-	-	BDL
Zinc (as Zn)	mg/kg	0.620	0.730	1.12	-	-	4.96
Nickel (as Ni)	mg/kg	0.436	0.310	0.540	-	-	5.41
Benthic Organism							
Micro Benthic Organism	/m ²	90800	96700	94300	-	-	92500
Macro Benthic Organism	/m ²	91300	93100	91200	-	-	90100
Total	/m²	182100	189800	185500	-	-	182600

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

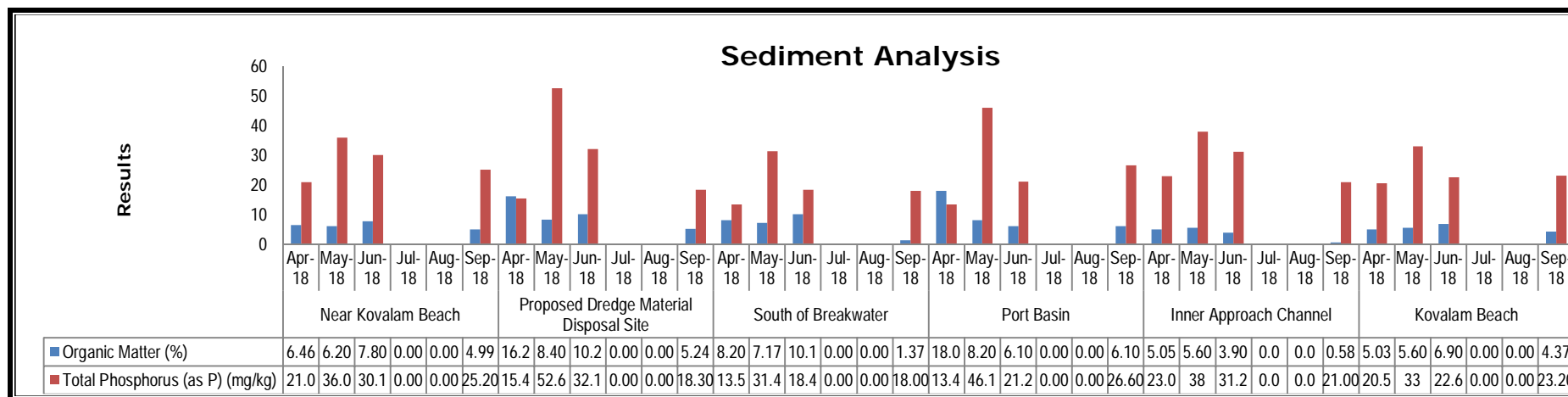


Figure 5.5: Sediment analysis for Organic Matter and Total Phosphorus

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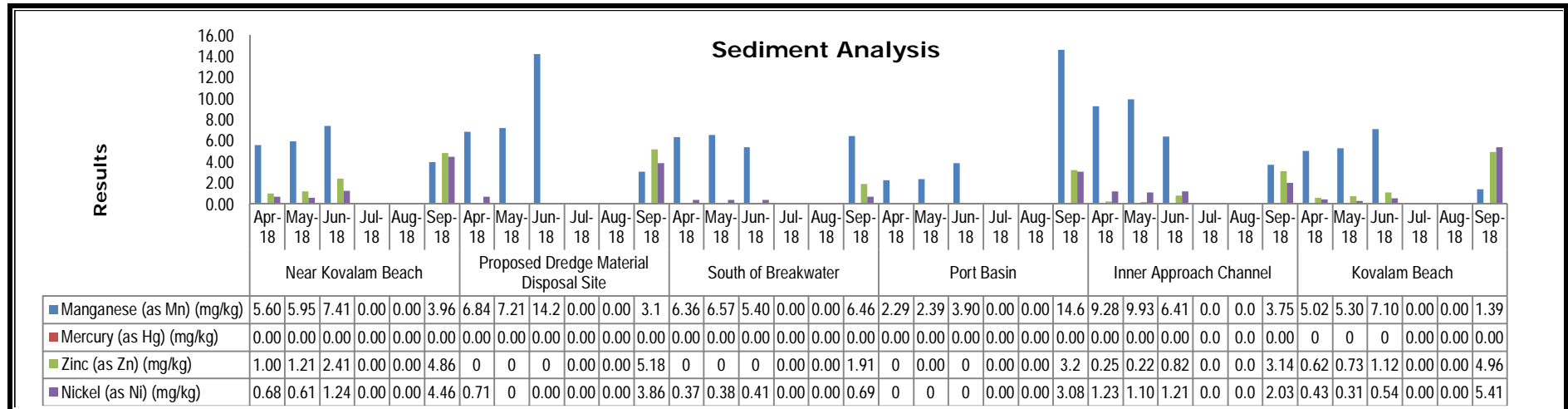


Figure 5.6: Sediment analysis for Manganese, Mercury, Zinc and Nickel

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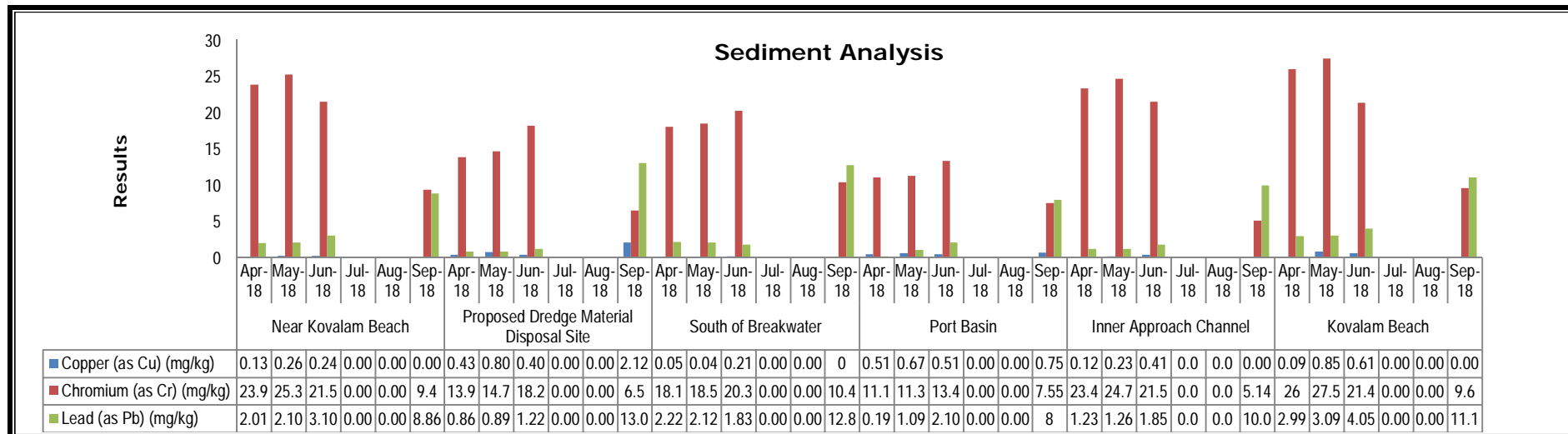


Figure 5.7: Sediment analysis for Copper, Chromium and Lead

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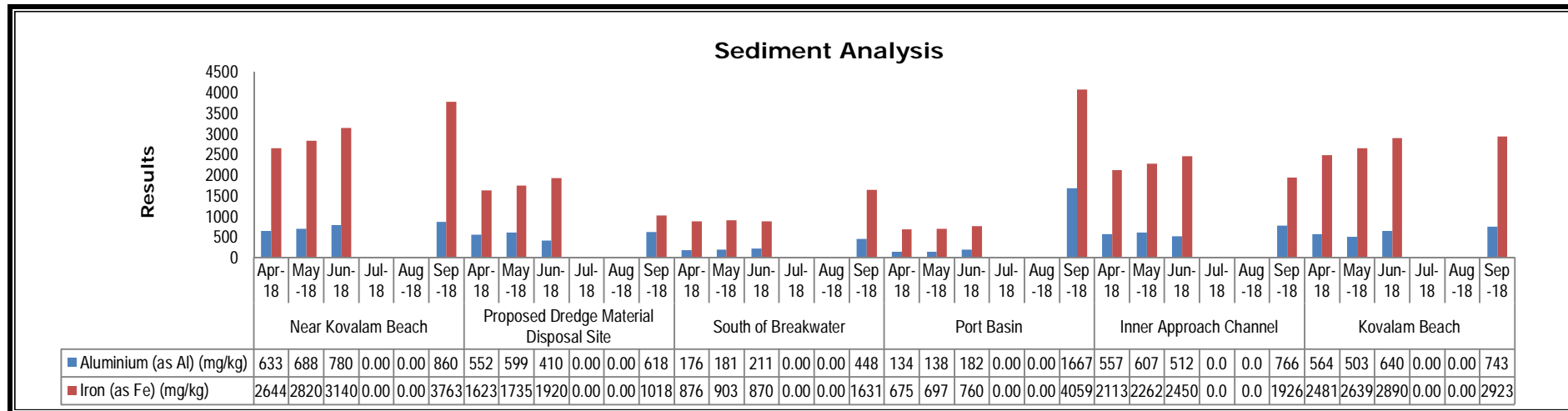


Figure 5.8: Sediment analysis for Aluminium and Iron

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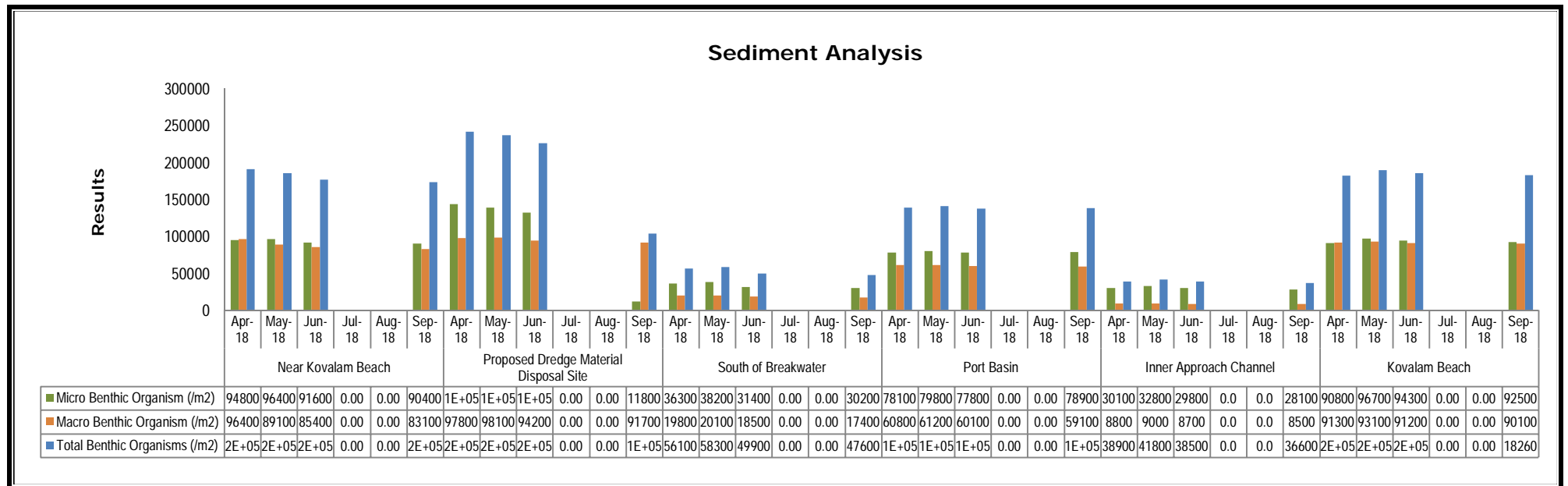



Figure 5.9: Sediment analysis for Benthic organisms


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9. Summary- Sediment Analysis:

During the period April 2018 to September 2018, At the location **Near Kovalam Beach**, the observed texture was clay and sandy, Organic matter was observed in the range between 4.99 – 7.80 %, Total Phosphorus (as P) was observed in the range between 21.0 – 36.0 mg/kg. Aluminium (as Al) was observed in the range between 630 - 860 mg/kg. Chromium (as Cr) was observed in the range between 9.40 – 25.3 mg/kg. Copper (as Cu) was observed in the range between 0.130 – 0.260 mg/kg. Iron (as Fe) was observed in the range between 2644 - 3763 mg/kg. Lead (as Pb) was observed in the range between 2.01 – 8.86 mg/kg. Manganese (as Mn) was observed in the range between 3.96 – 7.41 mg/kg. Mercury (as Hg) was observed below the detection limit. Zinc (as Zn) was observed in the range between 1.00 – 4.86 mg/kg. Nickel (as Ni) was observed in the range between below the detection limit to 4.46 mg/kg. Micro benthic organisms were observed in the range between 90400 – 96400 /m² and macro benthic organisms were observed in the range between 83100 – 96400 /m².

At the location **Proposed Dredge Material Disposal site**, the observed texture was clay and sandy, Organic matter was observed in the range between 5.24 – 16.2 %, Total Phosphorus (as P) was observed in the range between 15.4 – 52.6 mg/kg. Aluminium (as Al) was observed in the range between 410 - 618 mg/kg. Chromium (as Cr) was observed in the range between 6.50 – 18.2 mg/kg. Copper (as Cu) was observed in the range between 0.400 – 2.12 mg/kg. Iron (as Fe) was observed in the range between 1018 - 1290 mg/kg. Lead (as Pb) was observed in the range between 0.865 – 13.1 mg/kg. Manganese (as Mn) was observed in the range between 3.06 – 14.2 mg/kg. Mercury (as Hg) was observed below the detection limit. Zinc (as Zn) was observed in the range between below the detection limit to 5.18 mg/kg. Nickel (as Ni) was observed in the range between below the detection limit to 3.86 mg/kg. Micro benthic organisms were observed in the range between 11800 – 144000 /m² and macro benthic organisms were observed in the range between 91700 – 98100 /m².

At the location **South of break water**, the observed texture was clay and sandy, Organic matter was observed in the range between 1.37 – 10.1 %, Total Phosphorus (as P) was observed in the range between 13.5 – 31.4 mg/kg. Aluminium (as Al) was observed in the range between 176 - 448 mg/kg. Chromium (as Cr) was observed in the range between 10.4 – 20.3 mg/kg. Copper (as Cu) was observed in the range

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between 0.041 – 0.210 mg/kg. Iron (as Fe) was observed in the range between 870 - 1631 mg/kg. Lead (as Pb) was observed in the range between 1.83 – 12.8 mg/kg. Manganese (as Mn) was observed in the range between 5.40 – 6.57 mg/kg. Mercury (as Hg) was observed below detection limit. Zinc (as Zn) was observed in the range between below detection limit to 1.91 mg/kg. Nickel (as Ni) was observed in the range between below detection limit to 0.690 mg/kg. Micro benthic organisms were observed in the range between 30200 – 38200 /m² and macro benthic organisms were observed in the range 17400 – 20100 /m².

At the location **Port Basin**, the observed texture was clay and sandy, Organic matter was observed in the range between 6.10 – 18.0 %, Total Phosphorus (as P) was observed in the range between 13.4 – 46.1 mg/kg. Aluminium (as Al) was observed in the range between 134 - 1667 mg/kg. Chromium (as Cr) was observed in the range between 7.55 – 13.4 mg/kg. Copper (as Cu) was observed in the range between 0.510 – 0.750 mg/kg. Iron (as Fe) was observed in the range between 675 - 4059 mg/kg. Lead (as Pb) was observed in the range between 0.192 – 8.00 mg/kg. Manganese (as Mn) was observed in the range between 2.29 – 14.6 mg/kg. Mercury (as Hg) was observed below detection limit. Zinc (as Zn) was observed in the range between below detection limit to 3.20 mg/kg. Nickel (as Ni) was observed in the range between below detection limit to 3.08 mg/kg. Micro benthic organisms were observed in the range between 77800 – 79800 /m² and macro benthic organisms were observed in the range between 59100 - 61200 /m².

At the location **Inner Approach Channel**, the observed texture was clay and sandy, Organic matter was observed in the range between 0.580 – 5.6 %, Total Phosphorus (as P) was observed in the range between 21 – 38 mg/kg. Aluminium (as Al) was observed in the range between 512 - 766 mg/kg. Chromium (as Cr) was observed in the range 5.14 – 24.7 mg/kg. Copper (as Cu) was observed in the range between 0.121 – 0.410 mg/kg. Iron (as Fe) was observed in the range between 1926 - 2450 mg/kg. Lead (as Pb) was observed in the range between 1.23 – 10.0 mg/kg. Manganese (as Mn) was observed in the range between 3.75 – 9.93 mg/kg. Mercury (as Hg) was observed below detection limit. Zinc (as Zn) was observed in the range between below detection limit to 3.14 mg/kg. Nickel (as Ni) was observed in the range between below detection limit to 2.03 mg/kg. Micro benthic organisms were observed in the range between 28100 – 32800 /m² and macro benthic organisms were observed in the range between 8500 – 9000 /m².

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At the location **Kovalam Beach**, the observed texture was clay and sandy, Organic matter was observed in the range between 4.37 – 6.90 %, Total Phosphorus (as P) was observed in the range between 20.5 – 33.0 mg/kg. Aluminium (as Al) was observed in the range between 503 - 743 mg/kg. Chromium (as Cr) was observed in the range 9.61 – 27.5 mg/kg. Copper (as Cu) was observed in the range between 0.093 – 0.850 mg/kg. Iron (as Fe) was observed in the range between 2481 - 2923 mg/kg. Lead (as Pb) was observed in the range between 2.99 – 11.1 mg/kg. Manganese (as Mn) was observed in the range between 1.39 – 7.10 mg/kg. Mercury (as Hg) was observed below detection limit. Zinc (as Zn) was observed in the range between 0.620 to 4.96 mg/kg. Nickel (as Ni) was observed in the range between below detection limit to 5.41 mg/kg. Micro benthic organisms were observed in the range between 90800 – 96700 /m² and macro benthic organisms were observed in the range between 90100 - 93100 /m².

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	Apr-18	4671100	419800	1699000	138900	1099300	4613800
	May-18	4638200	405900	1541700	136600	1051400	4523900
	Jun-18	4438800	392500	1469500	128300	1027300	4436900
	Jul-18	-	-	-	-	-	-
	Aug-18	-	-	-	-	-	-
	Sep-18	636000	374700	1420700	121800	985000	4313900
Total Zooplankton No/ 100 mL	Apr-18	9904	11807	10432	9706	12083	10810
	May-18	9571	11333	9778	9360	11585	10076
	Jun-18	9578	10955	9504	9359	11681	10736
	Jul-18	-	-	-	-	-	-
	Aug-18	-	-	-	-	-	-
	Sep-18	9607	11263	9355	9066	11519	10377

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

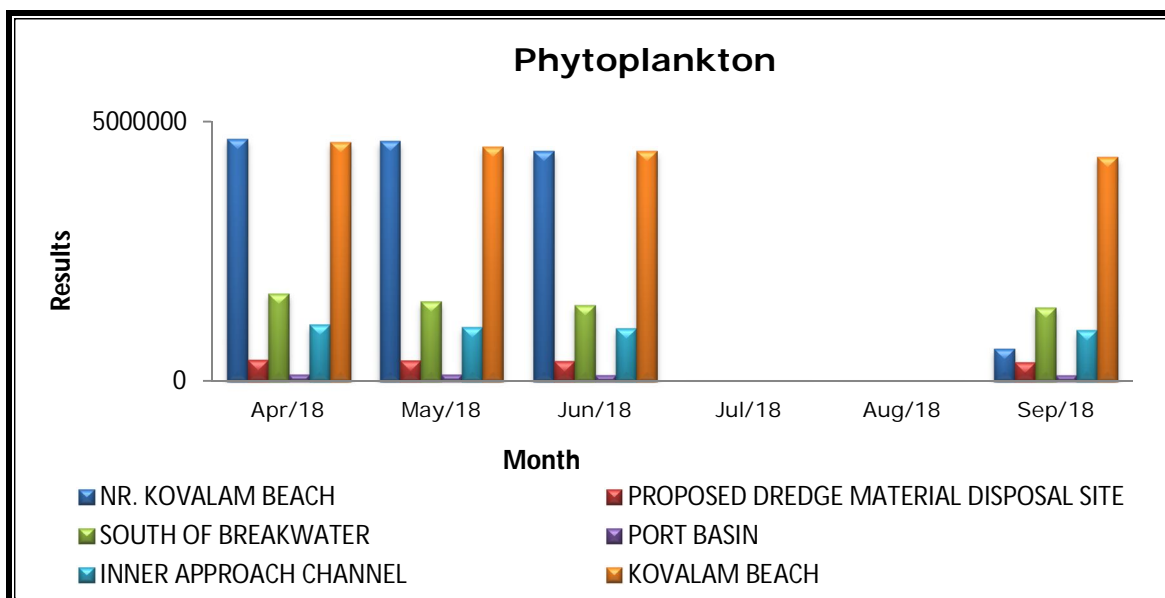


Figure 5.10: Marine Water Analysis for Total Phytoplankton

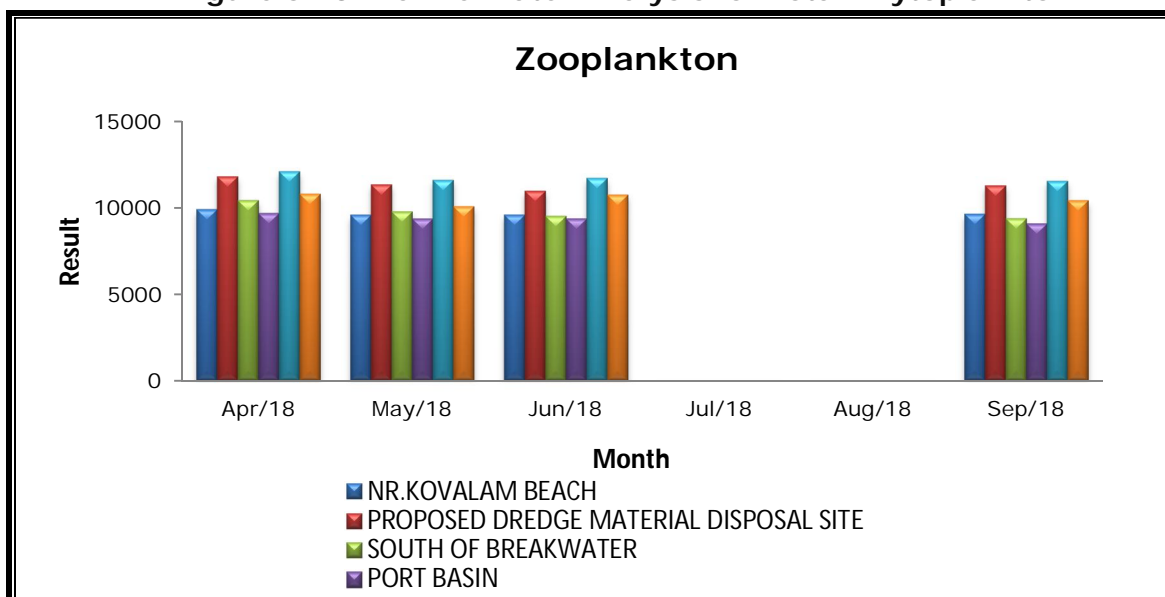



Figure 5.11: Marine Water Analysis for Total Zooplankton

12. Summary- Marine Water Analysis for Phytoplankton and Zooplanktons

During the period April 2018 to September 2018, at the location **Near Kovalam Beach**, Phytoplanktons were observed in the range between 4438800 - 6336000 No/100 mL and Zooplanktons were observed in the range between 9571 - 9904 No/100 mL.

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At the location **Proposed Dredge Material Disposal site**, Phytoplanktons were observed in the range between 374700 - 419800 No/100 mL and Zooplanktons were observed in the range between 10955 – 11807 No/100 mL.

At the location **South of Break water**, Phytoplanktons were observed in the range between 1420700 - 1699000 No/100 mL and Zooplanktons were observed in the range between 9355 – 10432 No/100 mL.

At the location **Port Basin**, Phytoplanktons were observed in the range between 121800 - 138900 No/100 mL and Zooplanktons were observed in the range between 9066 – 9706 No/100 mL.

At the location **Inner Approach Channel**, Phytoplanktons were observed in the range between 985000 - 1099300 No/100 mL and Zooplanktons was observed in the range between 11519 – 12083 No/100 mL.

At the location **Kovalam Beach**, Phytoplanktons were observed in the range between 4313900 - 4613800 No/100 mL and Zooplanktons was observed in the range between 10076 – 10810 No/100 mL.

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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 April 2018 to September 2018. 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

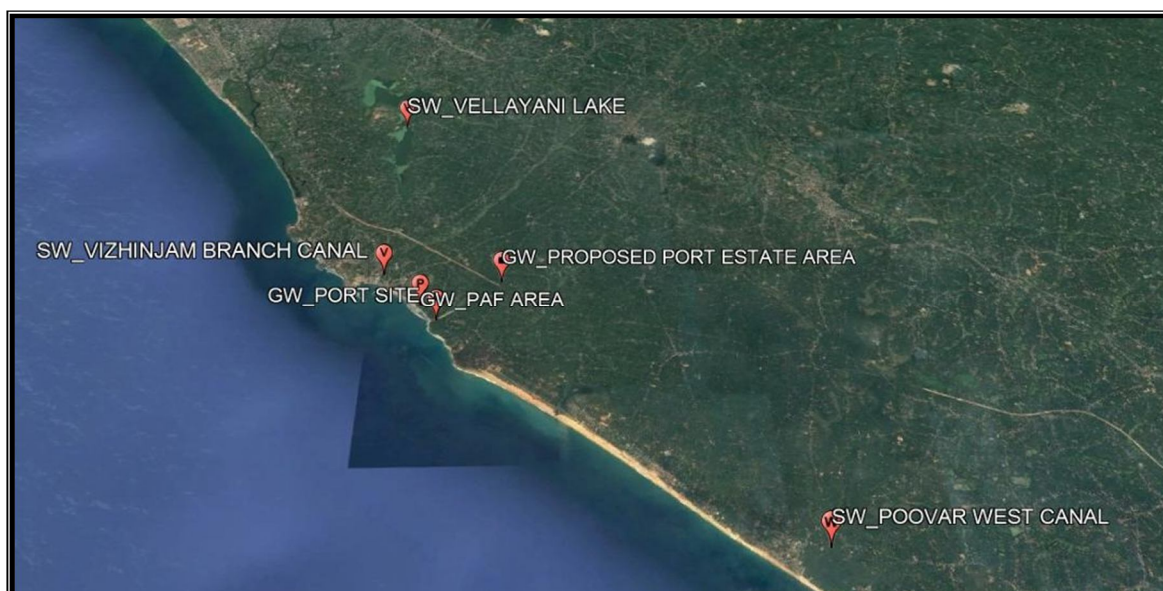


Figure 6.1: Google earth views of Ground water and Surface water sources

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2. Methodology of Sampling and Analysis:

Table 6.2: Ground Water and Surface Water methodology

Sr. No.	Parameter	Unit	Detection Limit	Method Reference
1.	Colour	Hazen Units	1	IS 3025(Part 4): 1983, Reaffirmed 2006
2.	Odour	-	Qualitative	IS 3025 (Part 5): 1983, Reaffirmed 2006
3.	pH Value	-	1-14	IS 3025(Part 11):1983, Reaffirmed 2006
4.	Turbidity	N.T.U.	0.1	IS 3025(Part 10):1984, Reaffirmed 2006
5.	Electrical Conductivity (at 25°C)	µmho/cm	0.1	IS 3025(Part 14): 1984, Reaffirmed 2006
6.	Total Dissolved Solids	mg/L	5	IS 3025 (Part 16):1984, Reaffirmed 2006, Ed.2.1 (1999-12)
7.	Dissolved Oxygen	mg/L	0.05	IS 3025 (Part 38): 1989, Reaffirmed 2009
8.	Biochemical Oxygen Demand (3 days, 27°C)	mg/L	1	IS 3025 (Part 44): 1993, Reaffirmed 2009, Amds.1
9.	Oil & Grease	mg/L	1	APHA, 22 nd Ed., 2012, 5520-B, 5-40
10.	Aluminium (as Al)	mg/L	0.025	APHA, 22 nd Ed., 2012, 3500-Al-B, 3-61
11.	Ammonia (as NH ₃ - N)	mg/L	0.1	APHA, 22 nd Ed., 2012, 4500 NH ₃ , B & C, 4 - 110, 4-112,
12.	Anionic Detergents (as MBAS) Calculated as LAS mol.wt. 288.38	mg/L	0.1	APHA, 22 nd Ed., 2012, 5540-B&C, 5-51& 5-53,
13.	Barium (as Ba)	mg/L	0.1	IS 3025(Part 2): 2004
14.	Boron (as B)	mg/L	0.1	APHA, 22 nd Ed., 2012, 4500-B -B, 4-25
15.	Calcium (as Ca)	mg/L	0.4	IS 3025(Part 40): 1991, Reaffirmed 2009, Ed.2.1 (2004-02)
16.	Chloramines (as Cl ₂)	mg/L	0.05	APHA, 22 nd Ed., 2012, 4500-Cl-G, 4-69
17.	Chloride (as Cl)	mg/L	0.25	IS 3025 (Part 32):1988, Reaffirmed 2009
18.	Copper (as Cu)	mg/L	0.02	IS 3025(Part 2): 2004
19.	Fluoride (as F)	mg/L	0.05	APHA, 22 nd Ed., 2012, 4500-F-, D, 4-87
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, Reaffirmed 2009, Amds.2
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, 22 nd Ed., 2012, 4500-NO ₃ , B-4-122
25.	Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	0.001	APHA, 22 nd Ed., 2012, 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, Reaffirmed 2009
29.	Sulphide (as H ₂ S)	mg/L	0.025	IS 3025 (Part 29) 1986, Reaffirmed 2009
30.	Total Phosphate (as PO ₄)	mg/L	0.1	APHA, 22 nd Ed. 2012 , 4500 P.E, 4-155
31.	Total Alkalinity (as CaCO ₃)	mg/L	0.5	IS 3025(Part 23): 1986, Reaffirmed 2009, Amds. 1
32.	Total Hardness (as CaCO ₃)	mg/L	0.5	IS 3025(Part 21): 1983, Reaffirmed 2006
33.	Calcium Hardness (as CaCO ₃)	mg/L	-	IS 3025(Part 21): 1983, Reaffirmed 2006
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, Reaffirmed 2009, Amds.1
36.	Potassium (as K)	mg/L	0.06	IS 3025(Part 45): 1993, Reaffirmed 2009, Amds.1

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Sr. No.	Parameter	Unit	Detection Limit	Method Reference
37.	Sodium Absorption Ratio	-	-	IS 11624:1986, Reaffirmed 2006
38.	Cadmium (as Cd)	mg/L	0.002	IS 3025(Part 2): 2004
39.	Cyanide (as CN)	mg/L	0.001	APHA, 22 nd Ed., 2012, 4500-CN, C & E, 4-41 & 4-44
40.	Lead (as Pb)	mg/L	0.008	IS 3025(Part 2): 2004
41.	Mercury (as Hg)	mg/L	0.0008	IS 3025(Part 2): 2004
42.	Molybdenum (as Mo)	mg/L	0.002	IS 3025(Part 2): 2004
43.	Nickel (as Ni)	mg/L	0.01	IS 3025(Part 2): 2004
44.	Pesticide Residues			
i.	Alachlor	µg/L	0.01	US EPA 525.2,1995
ii.	Atrazine	µg/L	0.01	US EPA 525.2,1995
iii.	Aldrin/Dieldrin	µg/L	0.01	US EPA 525.2,1995
iv.	Alpha HCH	µg/L	0.01	US EPA 525.2,1995
v.	Beta HCH	µg/L	0.01	US EPA 525.2,1995
vi.	Butachlor	µg/L	0.01	US EPA 525.2,1995
vii.	Chlorpyrifos	µg/L	0.05	US EPA 525.2,1995
viii.	Delta HCH	µg/L	0.01	US EPA 525.2,1995
ix.	2,4D chlorophenoxyacetic acid	µg/L	0.07	US EPA 515.1,1995
x.	DDT (o,p & p,p- Isomers of DDT, DDE, DDD)	µg/L	0.01	US EPA 525.2,1995
xi.	Endosulfan (α,β & 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 814IB, 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, 22 nd Ed., 2012, 6440, 6-94
47.	Total Arsenic (as As)	mg/L	0.005	IS 3025(Part 2): 2004
48.	Total Chromium (as Cr)	mg/L	0.02	IS 3025(Part 2): 2004
49.	Trihalomethanes			
a)	Bromoform	mg/L	0.01	USEPA 551.1, Rev1,1995 WI/SAP-GC/5/16,
b)	Dibromochloromethane	mg/L	0.01	USEPA 551.1, Rev1,1995 WI/SAP-GC/5/16,
c)	Bromodichloroethane	mg/L	0.01	USEPA 551.1, Rev1,1995 WI/SAP-GC/5/16
d)	Chloroform	mg/L	0.01	USEPA 551.1, Rev1,1995 WI/SAP-GC/5/16
50.	<i>E. coli</i>	MPN Index /100 ml	1.8	APHA, 22 nd Ed., 2012, 9221-E, G, 9-76


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Sr. No.	Parameter	Unit	Detection Limit	Method Reference
51.	Total Coliforms	MPN Index /100 ml	1.8	APHA, 22 nd Ed., 2012, 9221-B, 9-66
52.	Faecal Coliforms	MPN Index /100ml	1.8	APHA, 22 nd Ed., 2012, 9221-E, 9-74


3. Ground Water Analysis Results for the period April 2018 to September 2018:

Table 6.3 - Location: Port Site

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
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	6.58	6.99	6.61	6.63	6.93	6.63
Turbidity	N.T.U	Max. 1	3.70	1.60	BDL	BDL	BDL	0.800
Total Dissolved Solids	mg/L	Max. 500	338	456	362	302	312	310
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
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 ₆ H ₅ OH)	mg/L	Max. 0.001	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Silver (as Ag)	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate (as SO ₄)	mg/L	Max. 200	43.9	56.6	66.0	60.9	45.2	29.5
Sulphide (as H ₂ S)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL

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Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
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 acid	µg/L	30	BDL	BDL	BDL	BDL	BDL	BDL
DDT (o, p & p,p- Isomers of DDT, DDE, DDD)	µg/L	1	BDL	BDL	BDL	BDL	BDL	BDL
Endosulfan (a,b& Sulphate)	µg/L	0.4	BDL	BDL	BDL	BDL	BDL	BDL
Ethion	µg/L	3	BDL	BDL	BDL	BDL	BDL	BDL
γ HCH (Lindane)	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Isoproturon	µg/L	9	BDL	BDL	BDL	BDL	BDL	BDL
Malathion	µg/L	190	BDL	BDL	BDL	BDL	BDL	BDL
Methyl Parathion	µg/L	0.3	BDL	BDL	BDL	BDL	BDL	BDL
Monocrotophos	µg/L	1	BDL	BDL	BDL	BDL	BDL	BDL
Phorate	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Polychlorinated Biphenyls (PCB)	mg/L	Max.0.0005	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear Aromatic Hydrocarbons (PAH)	mg/L	Max.0.0001	BDL	BDL	BDL	BDL	BDL	BDL
Total Arsenic (as As)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium (as Cr)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Trihalomethanes								
Bromoform	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Dibromochloro Methane	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL

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Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Bromodichloroethane	mg/L	Max. 0.06	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	mg/L	Max. 0.2	BDL	BDL	BDL	BDL	BDL	BDL
Bacteriological Analysis								
<i>E. coli</i>	MPN Index /100 mL	Not Detectable	4.5	11	6.8	<1.8	Absent	<1.8
Total Coliforms	MPN Index /100 mL	-	33	26	39	<1.8	70	<1.8

Table 6.4 - Location: Proposed Port Estate Area

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
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	6.51	6.58	6.12	6.82	7.00	8.12
Turbidity	N.T.U	Max. 1	BDL	BDL	BDL	BDL	BDL	0.200
Total Dissolved Solids	mg/L	Max. 500	48	232	198	156	242	232
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	2.40	12.0	17.6	13.6	26.4	22.4
Chloramines (as Cl ₂)	mg/L	Max. 4.0	BDL	BDL	BDL	BDL	BDL	BDL
Chloride (as Cl)	mg/L	Max.250	16	112	61	51.5	52	62.5
Copper (as Cu)	mg/L	Max.0.05	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	Max. 1	BDL	0.050	0.300	0.300	0.400	0.1
Iron (as Fe)	mg/L	Max.0.3	0.22	0.28	0.063	BDL	0.15	0.068
Magnesium (as Mg)	mg/L	Max. 30	1.46	9.23	9.20	9.80	8.74	9.72
Manganese (as Mn)	mg/L	Max.0.1	BDL	0.021	BDL	BDL	BDL	BDL
Mineral Oil	mg/L	Max.0.5	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO ₃)	mg/L	Max.45	1.92	3.99	4.60	2.60	9.80	4.20
Phenolic Compounds	mg/L	Max. 0.001	BDL	BDL	BDL	BDL	BDL	BDL

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Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
(as C ₆ H ₅ OH)								
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	11.1	29.5	39	37.7	40.5	26.5
Sulphide (as H ₂ S)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as CaCO ₃)	mg/L	Max.200	10	25	17.5	25	70	65
Total Hardness (as CaCO ₃)	mg/L	Max. 200	12	68	82	62	102	96
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 & 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

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Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Total Arsenic (as As)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium (as Cr)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Trihalomethanes								
Bromoform	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Dibromochloro Methane	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloroethane	mg/L	Max. 0.06	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	mg/L	Max. 0.2	BDL	BDL	BDL	BDL	BDL	BDL
Bacteriological Analysis								
<i>E. coli</i>	MPN Index /100 mL	Not Detectable	<1.8	<1.8	<1.8	<1.8	Absent	<1.8
Total Coliforms	MPN Index /100 mL	-	14	<1.8	<1.8	63	22	23

Table 6.5 - Location: PAF Area

Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
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	6.54	6.60	6.16	6.80	6.61	6.86
Turbidity	N.T.U	Max. 1	0.400	BDL	BDL	BDL	BDL	0.900
Total Dissolved Solids	mg/L	Max. 500	208	272	316	298	321	428
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	11.2	9.12	32.9	24.9	34.1	44
Chloramines (as Cl ₂)	mg/L	Max. 4.0	BDL	BDL	BDL	BDL	BDL	BDL
Chloride (as Cl)	mg/L	Max.250	100	82	125	98	102	170
Copper (as Cu)	mg/L	Max.0.05	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	Max. 1	0.300	BDL	0.300	0.300	0.100	0.200

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Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Iron (as Fe)	mg/L	Max.0.3	0.270	0.280	0.105	BDL	0.140	BDL
Magnesium (as Mg)	mg/L	Max. 30	6.80	4.20	18.9	10.2	15.2	19.9
Manganese (as Mn)	mg/L	Max.0.1	0.100	0.100	BDL	0.065	BDL	BDL
Mineral Oil	mg/L	Max.0.5	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO ₃)	mg/L	Max.45	3.82	1.91	5.61	4.00	4.44	4.52
Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	Max. 0.001	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Silver (as Ag)	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate (as SO ₄)	mg/L	Max. 200	28.8	26.6	82.4	30.8	41.4	62.4
Sulphide (as H ₂ S)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as CaCO ₃)	mg/L	Max.200	25	10	40	21	52	50
Total Hardness (as CaCO ₃)	mg/L	Max. 200	156	92	160	110	140	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 & 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

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Parameter	Unit	Acceptable Limit as per IS 10500: 2012	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Methyl Parathion	µg/L	0.3	BDL	BDL	BDL	BDL	BDL	BDL
Monocrotophos	µg/L	1	BDL	BDL	BDL	BDL	BDL	BDL
Phorate	µg/L	2	BDL	BDL	BDL	BDL	BDL	BDL
Polychlorinated Biphenyls (PCB)	mg/L	Max.0.0005	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear Aromatic Hydrocarbons (PAH)	mg/L	Max. 0.0001	BDL	BDL	BDL	BDL	BDL	BDL
Total Arsenic (as As)	mg/L	Max. 0.01	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium (as Cr)	mg/L	Max. 0.05	BDL	BDL	BDL	BDL	BDL	BDL
Trihalomethanes								
Bromoform	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Dibromochloro Methane	mg/L	Max. 0.1	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloroethane	mg/L	Max. 0.06	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	mg/L	Max. 0.2	BDL	BDL	BDL	BDL	BDL	BDL
Bacteriological Analysis								
<i>E. coli</i>	MPN Index/ 100mL	Not Detectable	4.5	<1.8	<1.8	<1.8	Absent	<1.8
Total Coliforms	MPN Index/ 100mL	-	39	<1.8	<1.8	<1.8	14	14

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

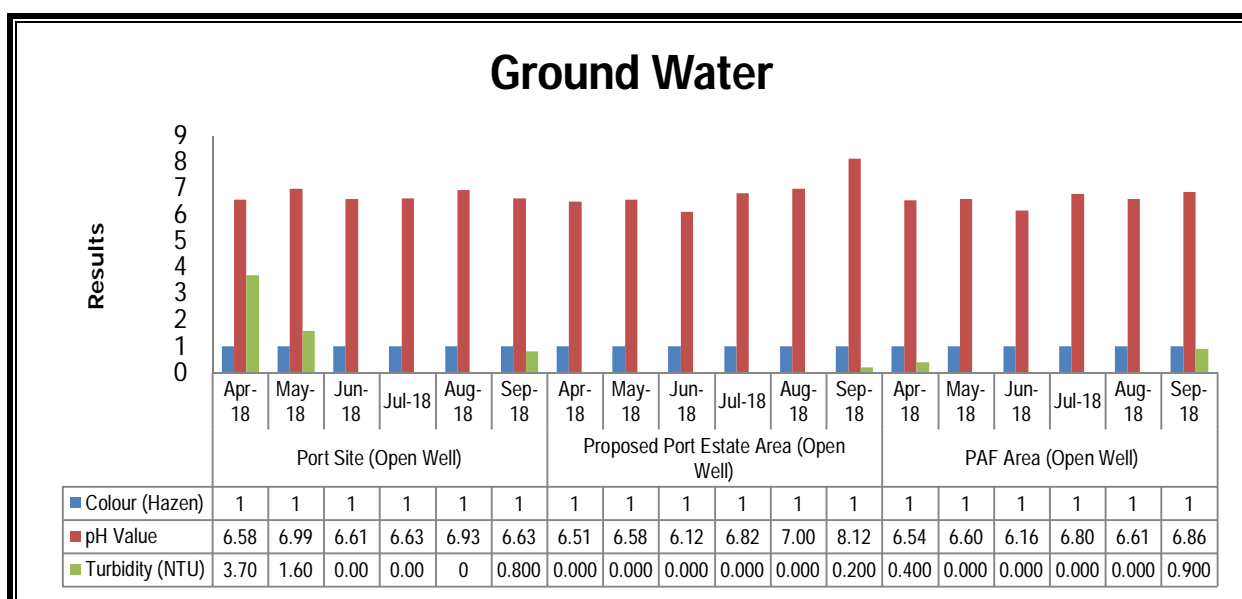


Figure 6.2: Ground Water Analysis for Colour, pH value and Turbidity

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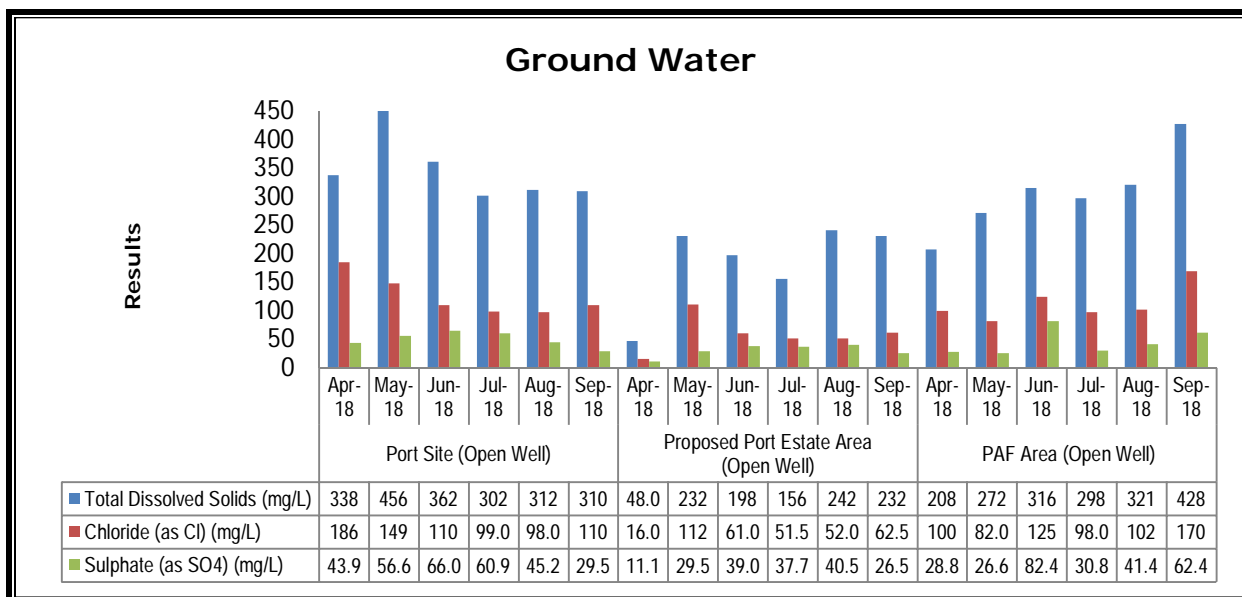


Figure 6.3: Ground Water Analysis for Total Dissolved Solids, Chloride and Sulphate

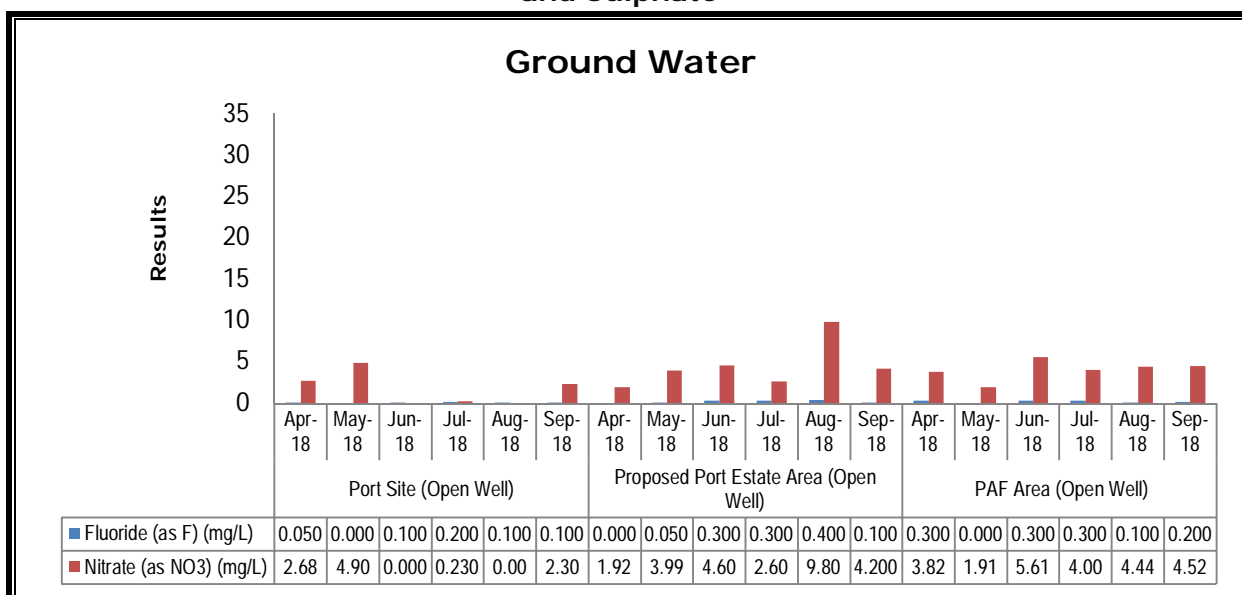


Figure 6.4: Ground Water Analysis for Fluoride and Nitrate

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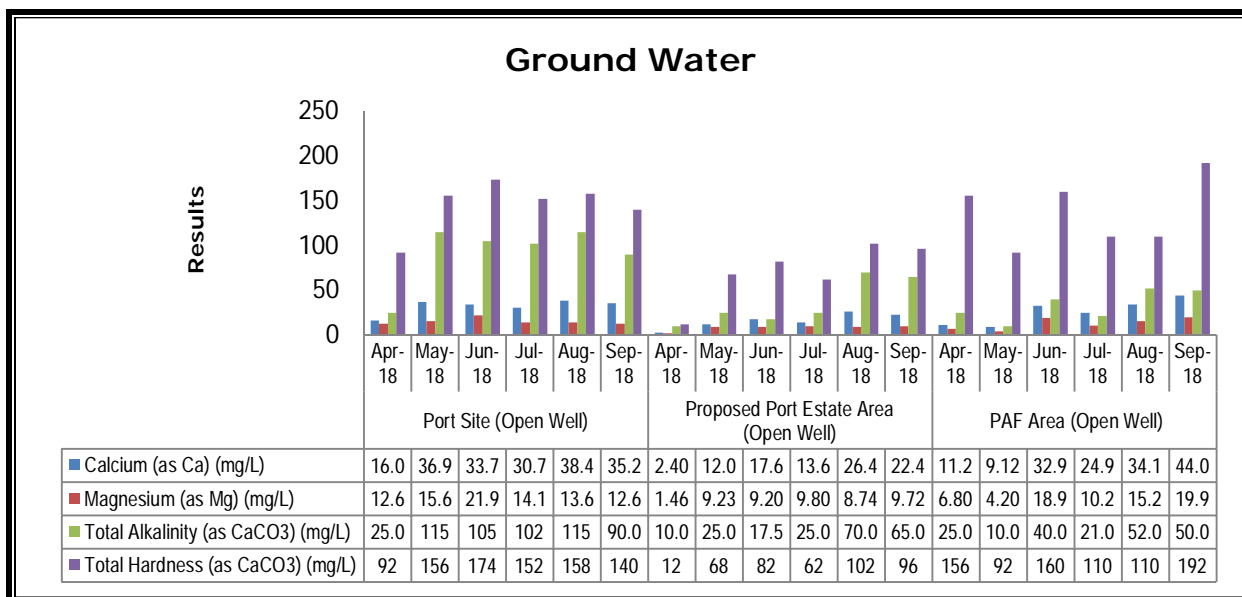


Figure 6.5: Ground Water Analysis for Calcium, Magnesium, Total Alkalinity and Total Hardness

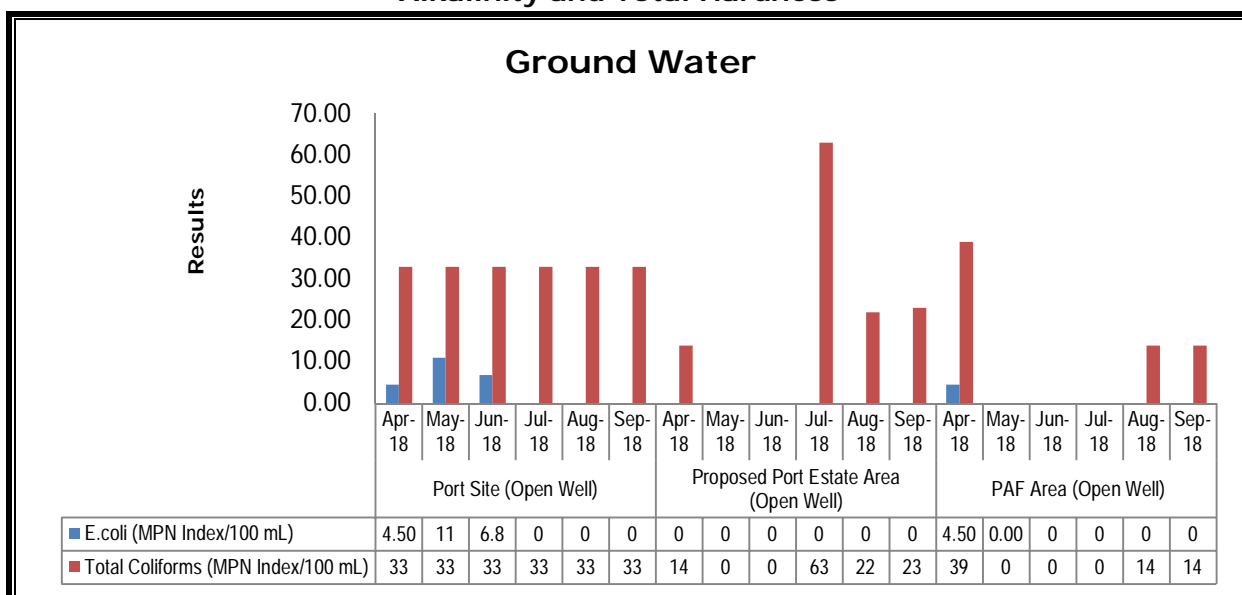



Figure 6.6: Ground Water Analysis for E.Coli. and Total Coliforms


5. Summary- Ground Water Analysis

During the period April 2018 to September 2018, 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 6.58 – 6.99. Turbidity was observed in the range between below detection limit to 3.70 NTU. Total Dissolved Solids was observed in the range between 302 - 456 mg/L. limit. Calcium (as Ca) was observed in the range between 16.0 – 38.4 mg/L. Chloride (as Cl) was observed in the range between 98.0 – 186 mg/L. Fluoride (as F) was observed in the range between below detection limit

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to 0.200 mg/L. Iron (as Fe) was observed in the range between below detection limit to 0.290 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 0.033 mg/L. Nitrate (as NO₃) was observed in the range between below detection limit to 4.90 mg/L. Sulphate (as SO₄) was observed in the range between 29.5 – 66.0 mg/L. Total Alkalinity (as CaCO₃) was observed in the range between 25.0 - 115 mg/L. Total Hardness (as CaCO₃) was observed in the range between 92 - 174 mg/L. Aluminium (as Al), Ammonia (as NH₃- N), Anionic Detergents, Barium (as Ba), Boron, Chloramines (as Cl₂), Copper (as Cu), Mineral Oil, Phenolic Compounds (as C₆H₅OH), Selenium (as Se), Silver (as Ag), Sulphide (as H₂S), Zinc (as Zn), Cadmium (as Cd), Cyanide (as CN), Lead (as Pb), Mercury (as Hg), Molybdenum (as Mo), Nickel (as Ni), Total Arsenic (as As), Total Chromium (as Cr), Pesticide Residues, Trihalomethanes, Polychlorinated Biphenyls (PCB) and Polynuclear Aromatic Hydrocarbons (PAH) were observed below detection limit. Bacteriological parameters such as *E.coli* was observed in the range between <1.8 - 11 MPN Index/100 mL and Total Coliforms were observed in the range between <1.8 - 70 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 6.12 – 8.12. Turbidity was observed in the range between below detection limit to 0.200 NTU. Total Dissolved Solids was observed in the range between 48.0 - 242 mg/L. Calcium (as Ca) was observed in the range between 2.40 – 26.4 mg/L. Chloride (as Cl) was observed in the range between 16.0 – 112 mg/L. Fluoride (as F) was observed in the range between below detection limit to 0.400 mg/L. Iron (as Fe) was observed in the range between below detection limit to 0.280 mg/L. Magnesium (as Mg) was observed in the range between 1.46 – 9.80 mg/L. Manganese (as Mn) was observed in the range between below detection limit to 0.021 mg/L. Nitrate (as NO₃) was observed in the range between 1.92 – 9.80 mg/L. Sulphate (as SO₄) was observed in the range between 11.1 – 40.5 mg/L. Total Alkalinity (as CaCO₃) was observed in the range between 10.0 – 70.0 mg/L. Total Hardness (as CaCO₃) was observed in the range between 12.0 - 102 mg/L. Aluminium (as Al), Ammonia (as NH₃- N), Anionic Detergents, Barium (as Ba), Boron, Chloramines (as Cl₂), Copper (as Cu), Iron (as Fe), Mineral Oil, Phenolic Compounds (as C₆H₅OH), Selenium (as Se) and Silver (as Ag), Sulphide (as H₂S) Zinc (as Zn), Cadmium (as Cd), Cyanide (as CN), Lead (as Pb), Mercury (as Hg), Molybdenum (as Mo), Nickel (as Ni), Total Arsenic (as As), Total Chromium (as Cr), Pesticide Residues, Trihalomethanes, Polychlorinated

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Biphenyls (PCB) and Polynuclear Aromatic Hydrocarbons (PAH) were observed below detection limit. Bacteriological parameters such as *E.coli* was observed in the range between 0 to <1.8 MPN Index/100 mL and Total Coliforms were observed in the range between <1.8 to 63 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 6.16 – 6.86. Turbidity was observed in the range between below detection limit to 0.900. Total Dissolved Solids was observed in the range between 208 - 428 mg/L. Calcium (as Ca) was observed in the range between 9.12 – 44.0 mg/L. Chloride (as Cl) was observed in the range between 82 - 170 mg/L. Fluoride (as F) was observed in the range between below detection limit to 0.300 mg/L. Iron (as Fe) was observed in the range between below detection limit to 0.280 mg/L. Magnesium (as Mg) was observed in the range between 4.20 – 19.9 mg/L. Manganese (as Mn) was observed in the range between below detection limit to 0.100 mg/L. Nitrate (as NO₃) was observed in the range between 1.91 – 5.61 mg/L. Sulphate (as SO₄) was observed in the range between 26.6 – 82.4 mg/L. Total Alkalinity (as CaCO₃) was observed in the range between 10.0 – 52.0 mg/L. Total Hardness (as CaCO₃) was observed in the range between 92 – 192 mg/L. Aluminium, Ammonia (as NH₃- N), Anionic Detergents and Barium (as Ba), Boron (as B), Chloramines (as Cl₂), Copper (as Cu), Manganese (as Mn), Mineral Oil, Phenolic Compounds (as C₆H₅OH), Selenium (as Se) and Silver (as Ag), Sulphide (as H₂S), Cadmium (as Cd), Cyanide (as CN), Lead (as Pb), Mercury (as Hg), Molybdenum (as Mo), Nickel (as Ni), Total Arsenic (as As), Total Chromium (as Cr), Pesticide Residues, Trihalomethanes, Polychlorinated Biphenyls (PCB), Polynuclear Aromatic Hydrocarbons (PAH) and Zinc (as Zn) were observed below detection limit. Bacteriological parameters such as *E.coli* was observed in the range between 0 to 4.50 MPN Index/100 mL and Total Coliforms were observed in the range between <1.8 to 39 MPN Index/100 mL.


6. Surface Water Analysis Results for the period April 2018 to September 2018:

Table 6.6 - Location: Poovar West Canal

Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Physical Parameters							
Colour	Hazen Units	1	1	1	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable

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Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
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	6.40	6.30	6.00	6.80	6.10	6.5
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	2.30	2.50	2.00	2.00	1.80	1.1
Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Free Ammonia	mg/L	0.200	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	5.61	18.4	16.0	13.6	4.80	6.41
Chloride (as Cl)	mg/L	102	570	130	519	13	70.5
Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	0.300	0.050	0.100	0.400	BDL	0.1
Iron (as Fe)	mg/L	0.090	0.091	BDL	BDL	0.260	BDL
Magnesium (as Mg)	mg/L	6.32	35.0	9.20	40.9	3.40	5.83
Manganese (as Mn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Mineral Oil	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO ₃)	mg/L	1.47	3.07	6.61	1.10	1.70	2.69
Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Silver (as Ag)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate (as SO ₄)	mg/L	19.7	70.9	25.7	71.0	11.6	8.51
Total Phosphate (as PO ₄)	mg/L	BDL	0.100	BDL	BDL	BDL	BDL
Total Alkalinity (as CaCO ₃)	mg/L	20.0	22.5	22.5	17.5	15.0	20
Total Hardness (as CaCO ₃)	mg/L	40	190	78	182	26	40
Calcium Hardness (as CaCO ₃)	mg/L	14	46	40	34	12	16
Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	BDL	0.055
Sodium (as Na)	mg/L	2.70	3.20	7.20	9.40	6.60	15.9
Potassium (as K)	mg/L	2.30	BDL	6.50	8.70	1.70	4.2
Sodium Absorption Ratio	-	BDL	BDL	BDL	BDL	BDL	1.55
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							

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Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Alachlor	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Atrazine	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Aldrin/Dieldrin	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Alpha HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Beta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Butachlor	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Chlorpyrifos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Delta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
2,4D chlorophenoxyacetic acid	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
DDT (o,p & p,p- Isomers of DDT, DDE, DDD)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Endosulfan (a,b & Sulphate)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Ethion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
γ HCH (Lindane)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Isoproturon	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Malathion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Methyl Parathion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Monocrotophos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Phorate	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear Aromatic Hydrocarbons (PAH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Arsenic (as As)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium (as Cr)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Biological Analysis							
Total Coliforms	MPN Index/ 100 mL	23	22	79	47	49	13
Faecal Coliforms	MPN Index/ 100 mL	<1.8	<1.8	22	14	Absent	<1.8

Table 6.7 - Location: Vizhinjam Branch Canal

Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Physical Parameters							
Colour	Hazen Units	1	1	1	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH Value	-	6.66	6.59	7.23	7.40	7.25	7.33
Turbidity	N.T.U.	1.90	0.900	BDL	BDL	BDL	1.2
Electrical Conductivity (at 25°C)	µmho/cm	261	220	310	255	247	232
Total Dissolved Solids	mg/L	146	122	174	142	140	130

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Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Chemical Parameters							
Dissolved Oxygen	mg/L	6.50	6.10	6.70	6.90	7.00	6.3
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	1.90	3.10	3.00	2.00	1.00	1.3
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	12.0	10.4	14.4	14.4	13.6	11.2
Chloride (as Cl)	mg/L	43.5	49.0	48.0	46.0	31.0	44
Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	0.200	0.050	0.100	0.300	0.200	0.2
Iron (as Fe)	mg/L	0.240	0.240	0.456	BDL	0.210	0.0807
Magnesium (as Mg)	mg/L	3.88	5.35	6.80	4.40	5.34	3.88
Manganese (as Mn)	mg/L	0.040	0.036	BDL	BDL	BDL	BDL
Mineral Oil	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO ₃)	mg/L	3.15	2.05	8.17	4.64	3.40	5.08
Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Silver (as Ag)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate (as SO ₄)	mg/L	8.11	2.12	17.3	28.5	17.9	4.4
Total Phosphate (as PO ₄)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as CaCO ₃)	mg/L	45	55	80	37.5	40	30
Total Hardness (as CaCO ₃)	mg/L	46	48	64	54	56	44
Calcium Hardness (as CaCO ₃)	mg/L	30	26	28	36	34	28
Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sodium (as Na)	mg/L	1.60	1.50	5.50	4.90	16.0	14.7
Potassium (as K)	mg/L	1.70	1.90	6.80	4.80	1.90	3.9
Sodium Absorption Ratio	-	BDL	BDL	BDL	BDL	0.930	1.35
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

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Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Butachlor	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Chlorpyrifos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Delta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
2,4D chlorophenoxyacetic acid	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
DDT (o,p & p,p- Isomers of DDT, DDE, DDD)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Endosulfan (a,b & Sulphate)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Ethion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
γ HCH (Lindane)	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Isoproturon	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Malathion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Methyl Parathion	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Monocrotophos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Phorate	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear Aromatic Hydrocarbons (PAH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Arsenic (as As)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium (as Cr)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Biological Analysis							
Total Coliforms	MPN Index/ 100 mL	14	27	47	20	26	46
Faecal Coliforms	MPN Index/ 100 mL	<1.8	14	14	9.30	Absent	<1.8

Table 6.8 - Location: Vellayani Lake

Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Physical Parameters							
Colour	Hazen Units	1	1	1	1	1	1
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH Value	-	6.50	6.57	6.49	7.00	7.05	6.70
Turbidity	N.T.U.	BDL	BDL	BDL	BDL	BDL	6.20
Electrical Conductivity (at 25°C)	µmho/cm	164	162	123	130	162	168
Total Dissolved Solids	mg/L	92	90	68	70	92	94
Chemical Parameters							
Dissolved Oxygen	mg/L	6.20	5.90	5.70	5.80	5.90	5.60
Biochemical Oxygen Demand (3 days, 27°C)	mg/L	3.20	3.40	2.10	1.80	1.70	2.20
Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL

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Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Free Ammonia	mg/L	0.420	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	7.21	6.40	6.50	8.81	9.61
Chloride (as Cl)	mg/L	30.0	34.0	23.0	21.7	25.0	30.5
Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (as F)	mg/L	0.100	0.050	0.050	0.050	0.200	0.100
Iron (as Fe)	mg/L	0.113	0.114	BDL	0.230	0.200	0.813
Magnesium (as Mg)	mg/L	2.43	4.37	3.40	3.10	3.89	2.91
Manganese (as Mn)	mg/L	BDL	0.020	BDL	0.049	BDL	BDL
Mineral Oil	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate (as NO ₃)	mg/L	1.47	1.59	2.60	1.33	1.80	2.59
Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Silver (as Ag)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate (as SO ₄)	mg/L	5.65	4.95	BDL	4.10	3.97	2.85
Total Phosphate (as PO ₄)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity (as CaCO ₃)	mg/L	30	30	20	25	30	30
Total Hardness (as CaCO ₃)	mg/L	28	36	30	34	38	36
Calcium Hardness (as CaCO ₃)	mg/L	18	18	16	14	22	24
Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Sodium (as Na)	mg/L	1.10	0.690	4.90	1.10	11.9	9.20
Potassium (as K)	mg/L	1.90	1.80	3.20	1.70	2.20	3.90
Sodium Absorption Ratio	-	BDL	BDL	BDL	BDL	0.840	0.950
Cadmium (as Cd)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Cyanide (as CN)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Lead (as Pb)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Mercury (as Hg)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL
Pesticide Residues							
Alachlor	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Atrazine	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Aldrin/Dieldrin	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Alpha HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Beta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Butachlor	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Chlorpyrifos	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
Delta HCH	µg/L	BDL	BDL	BDL	BDL	BDL	BDL
2,4D chlorophenoxyacetic acid	µg/L	BDL	BDL	BDL	BDL	BDL	BDL

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Parameter	Unit	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
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	11	14	27	5.80	49	23
Faecal Coliforms	MPN Index/100 mL	<1.8	6.80	14	27	Absent	<1.8

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

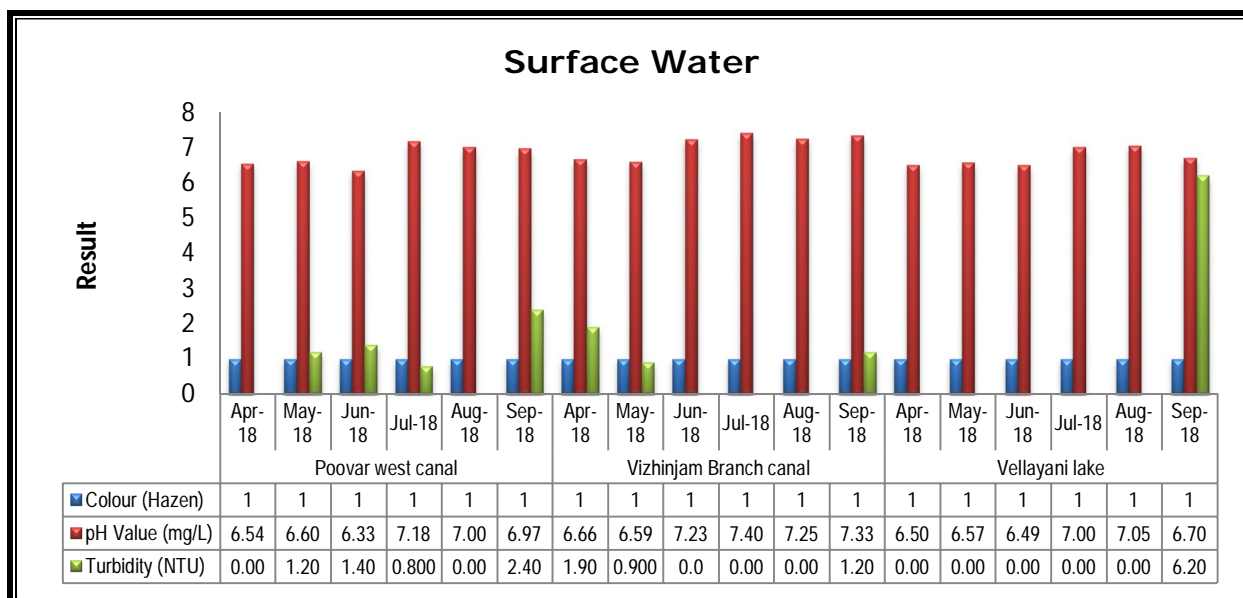


Figure 6.7: Surface Water Analysis for Colour, pH value and Turbidity

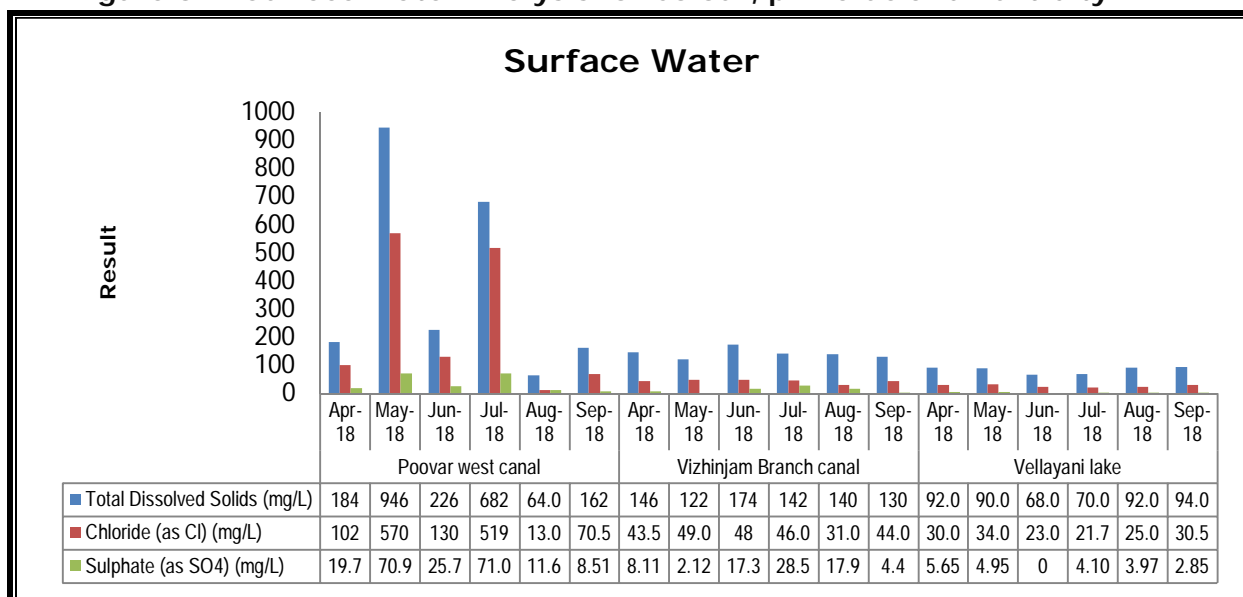


Figure 6.8: Surface Water Analysis for Total Dissolved Solids, Chloride and Sulphate

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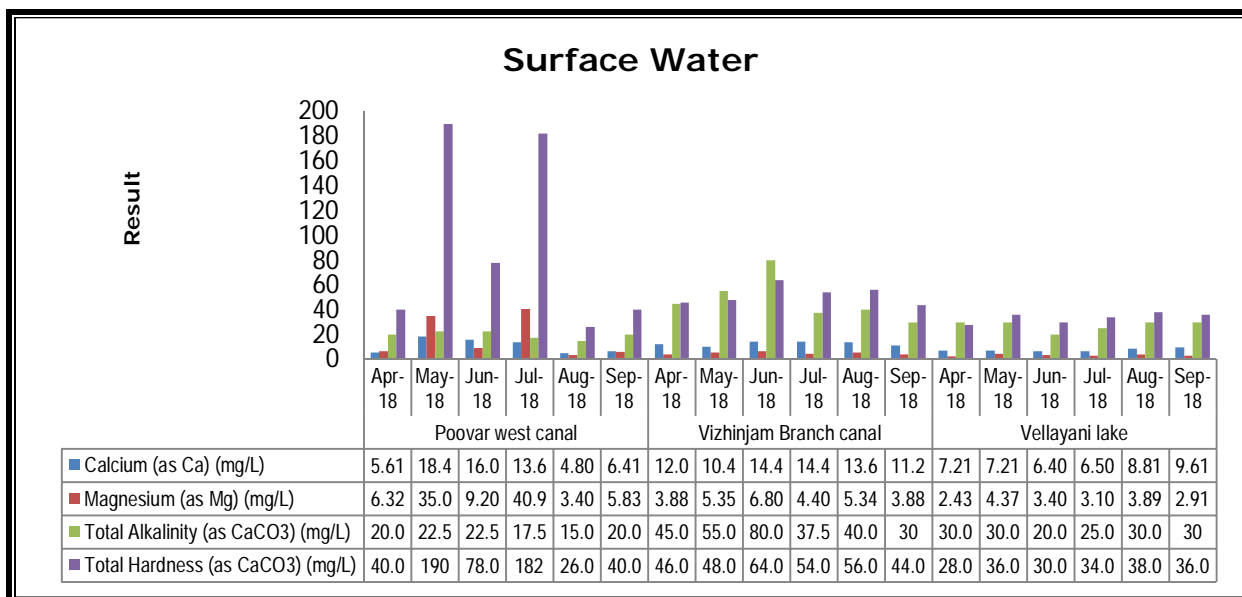


Figure 6.9: Surface Water Analysis for Calcium, Magnesium, Total Alkalinity and Total Hardness

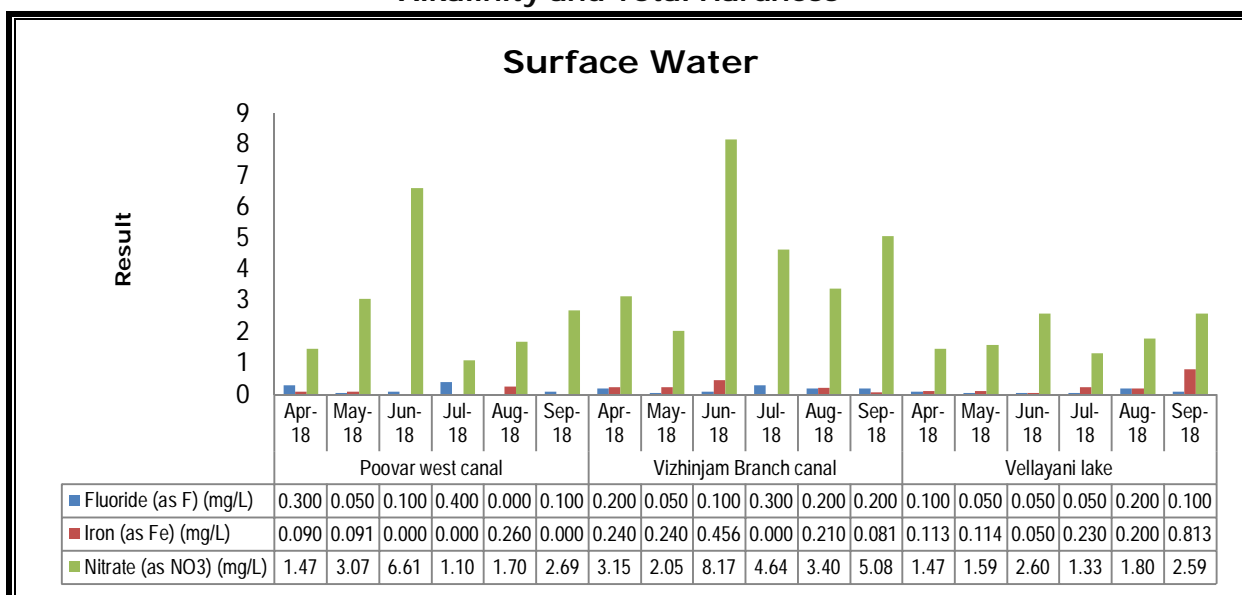


Figure 6.10: Surface Water Analysis for Fluoride, Iron and Nitrate

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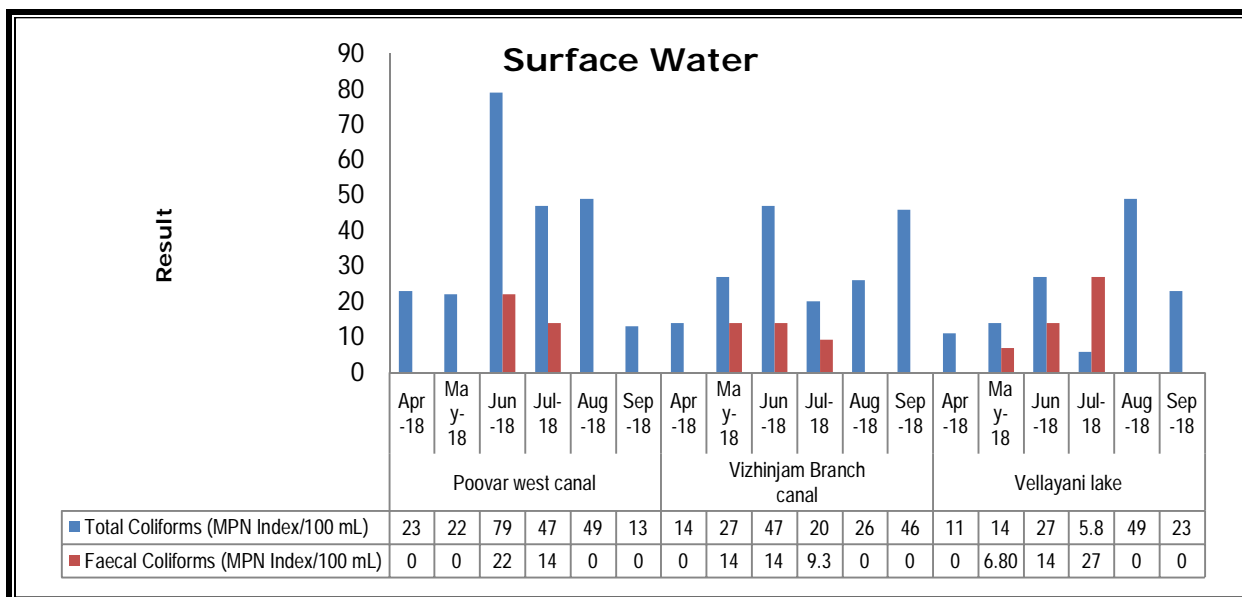



Figure 6.11: Surface Water Analysis for *E.coli*. and Total Coliforms


8. Summary of Surface water

During the period April 2018 to September 2018, at the location **Poovar West Canal**, Colour was observed 1 Hazen unit and odour was agreeable. pH was observed in the range between 6.33 – 7.18. Turbidity was observed in the range between below the detection limit to 2.40 NTU. Total Dissolved Solids was observed in the range between 64 - 946 mg/L. Electrical Conductivity was observed in the range between 108 - 1690 μ mho/cm. Dissolved Oxygen was observed in the range between 6.00 – 6.80 mg/L. Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 1.10 – 2.50 mg/L. Free Ammonia was observed in the range between below the detection limit to 0.200 mg/L. Calcium (as Ca) was observed in the range between 4.80 – 18.4 mg/L. Chloride (as Cl) was observed in the range between 13.0 - 570 mg/L. Fluoride (as F) was observed in the range between below the detection limit to 0.400 mg/L. Iron (as Fe) was observed in the range between below the detection limit to 0.260 mg/L. Magnesium (as Mg) was observed in the range between 3.40 – 40.9 mg/L. Manganese (as Mn) was observed below the detection limit. Nitrate (as NO₃) was observed in the range between 1.10 – 6.61 mg/L. Sulphate (as SO₄) was observed in the range between 8.51 – 71.0 mg/L. Total Phosphate (as PO₄) was observed in the range between below the detection limit to 0.100 mg/L. Total Alkalinity (as CaCO₃) was observed in the range between 15.0 – 22.5 mg/L. Total Hardness (as CaCO₃) was observed in the range between 26.0 – 190 mg/L. Calcium Hardness (as CaCO₃) was observed in the range between 12.0 – 46.0

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mg/L. Sodium (as Na) was observed in the range between 2.70 – 15.9 mg/L. Potassium (as K) was observed in the range between 1.70 – 8.70 mg/L. Sodium Absorption Ratio was observed in the range between below the detection limit to 1.55. Oil & Grease, Anionic Detergents and Barium (as Ba), Boron (as B), Copper (as Cu), Mineral Oil, Phenolic Compounds (as C₆H₅OH), 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 13 to 79 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 6.59 – 7.40. Turbidity was observed in the range between below detection limit to 1.90 NTU. Total Dissolved Solids was observed in the range between 122 - 174 mg/L. Electrical Conductivity was observed in the range between 220 - 310 µmho/cm. Dissolved Oxygen was observed in the range between 6.10 – 7.00 mg/L. Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 1.00 – 3.10 mg/L. Calcium (as Ca) was observed in the range between 10.4 – 14.4 mg/L. Chloride (as Cl) was observed in the range between 31.0 – 49.0 mg/L. Fluoride (as F) was observed in the range between below detection level to 0.300 mg/L. Iron (as Fe) was observed in the range between below detection level to 0.456 mg/L. Magnesium (as Mg) was observed in the range between 3.88 – 6.80 mg/L. Manganese (as Mn) was observed in the range between below detection level to 0.040 mg/L. Nitrate (as NO₃) was observed in the range between below detection level to 8.17 mg/L. Sulphate (as SO₄) was observed in the range between 2.12 – 28.5 mg/L. Total Alkalinity (as CaCO₃) was observed in the range between 30.0 – 80.0 mg/L. Total Hardness (as CaCO₃) was observed in the range between 44.0 – 64.0 mg/L. Calcium Hardness (as CaCO₃) was observed in the range between 26.0 – 36.0 mg/L. Sodium (as Na) was observed in the range between 1.50 – 16.0 mg/L. Potassium (as K) was observed in the range between 1.70 – 6.80 mg/L. Sodium Absorption Ratio was observed in the range between 0.930 – 1.35. Oil & Grease, Free Ammonia, Anionic Detergents and Barium (as Ba), Boron (as B), Copper (as Cu), Mineral Oil, Phenolic Compounds (as C₆H₅OH), Selenium (as Se), Silver (as Ag), Total Phosphate (as PO₄), Zinc (as

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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 14 to 47 MPN Index/100 mL and Faecal Coliforms were observed in the range between 0 to 14 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 6.49 – 7.05. Turbidity was observed in the range between below detection limit to 6.20 NTU. Total Dissolved Solids was observed in the range between 68 - 94 mg/L. Electrical Conductivity was observed in the range between 123 - 168 $\mu\text{mho/cm}$. Dissolved Oxygen was observed in the range between 5.60 – 6.20 mg/L. Biochemical Oxygen Demand (3 days, 27°C) was observed in the range between 1.70 – 3.40 mg/L. Free Ammonia was observed in the range between below detection level to 0.420 mg/L. Calcium (as Ca) was observed in the range between 6.40 – 9.61 mg/L. Chloride (as Cl) was observed in the range between 21.7 – 34.0 mg/L. Fluoride (as F) was observed in the range between 0.050 – 0.200 mg/L. Iron (as Fe) was observed in the range between below detection level to 0.813 mg/L. Magnesium (as Mg) was observed in the range between 2.43 – 4.37 mg/L. Manganese (as Mn) was observed in the range between below detection level to 0.049 mg/L. Nitrate (as NO_3) was observed in the range between 1.33 – 2.60 mg/L. Sulphate (as SO_4) was observed in the range between below detection level to 5.65 mg/L. Total Alkalinity (as CaCO_3) was observed in the range between 20.0 – 30.0 mg/L. Total Hardness (as CaCO_3) was observed in the range between 28.0 – 38.0 mg/L. Calcium Hardness (as CaCO_3) was observed in the range between 14.0 – 24.0 mg/L. Sodium (as Na) was observed in the range between 0.690 – 11.9 mg/L. Potassium (as K) was observed in the range between 1.70 – 3.90 mg/L. Sodium Absorption Ratio was observed in the range between below the detection limit to 0.950. Oil & Grease, Anionic Detergents and Barium (as Ba), Boron (as B), Copper (as Cu), Mineral Oil, Phenolic Compounds (as $\text{C}_6\text{H}_5\text{OH}$), Selenium (as Se) 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

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were observed in the range between 5.8 to 49 MPN Index/100 mL and Faecal Coliforms were observed in the range between 0 to 27 MPN Index/100 mL.