

EC COMPLIANCE REPORT

for the period: Oct 2018 – Mar 2019

**INTERNATIONAL SHIP REPAIR FACILITY (ISRF) PROJECT
AT COCHIN PORT PREMISES
BY M/s COCHIN SHIPYARD LIMITED**



**A Govt. of India Enterprise
(A Mini Ratna Company Under The Ministry of Shipping)
Perumanoor PO, Kochi , Kerala, India-682015**

GOVERNMENT OF INDIA

Ministry of Environment and Forests & Climate Change
(Regional Office, Southern Zone). Bangalore

MONITORING REPORT – PROFORMA – PART I

File No:

Ref Letter No:

Date:

1	Name of the project	Augmentation of Existing Ship Repair Facility at Cochin Port of District Ernakulam, Kerala by M/s Cochin Shipyard Ltd.
2	Clearance letter No. & date	Environmental Clearance (EC) letter no. F.No.11-65/2013-IA-III dated 22 June 2017.
3	Location : District & State / UT	Ernakulam, Kerala
4	Address for correspondence:	Shri. A N Neelakandhan Occupier-Environment (Protection) Act 1986 Cochin Shipyard Limited, Perumanoor P O ,Kochi-682015 Ph: +91 484 2501360 Fax: +91 484 2370897 Email: gmmat@cochinshipyard.com
5	Contact No. of Office with name of responsible official	Shri. Eldho John General Manager (Infra Projects) Infra Projects Department, Cochin Shipyard Limited, Perumanoor P O ,Kochi-682015 Ph: +91 484 2501913 Fax: +91 484 2370897 Email: eldho.john@cochinshipyard.com
6	Mobile No. of concerned officials associated with monitoring	1. Shri. Siyad M A Senior Manager (Infra Projects) Infra Projects Department Cochin Shipyard Limited, Mob: +91 9995804298 Email: siyad.ma@cochinshipyard.com 2. Shri. Vulli Haranath Deputy General Manager (Infra Projects) Infra Projects Department Cochin Shipyard Limited, Mob: +91 8138001150 Email: vulli.haranath@cochinshipyard.com
7	a) Project cost as originally planned and subsequent revised estimates and the years of price reference	Cost Estimate as per DPR - Rs. 970 Crs, year 2015
	b) Allocations made for environmental management plans, with item wise and year wise breakup	<ul style="list-style-type: none"> • Compensatory mangrove afforestation: Rs. 12 lakhs (approx.). • ETP & STP: Rs. 137 lakhs • Environmental monitoring during the construction stage of ISRF project: Rs.13.92 Lakhs
8	a) Actual expenditure incurred on the project so far	Rs. 273.46 crores as on 31 Mar 2019



	b) Actual expenditure incurred on the environmental management plans so far	Actions are being taken to incur the expenditure earmarked for EMP, which will happen along with the construction works progressing at the site. CSL had remitted an amount of Rs.12 Lakhs to Kerala Forest Dept. for carrying out mangrove afforestation at Chettuva in Thrissur District. An expenditure of Rs.66,080/- has been incurred to carry out Environmental monitoring during the period Apr-Sep 2018.
9	Date of commencement (actual and/or planned)	Actual: 03 March 2018
10	Date of completion (actual and/or planned)	Planned: Jan 2023
11	Validity of CFO	Consent to Establish from Kerala State Pollution Control Board (KSPCB) (Consent No. : PCB/HO/AE2/EKM/ICE/12/2016 dated 06 April 2016) valid up to 31 May 2018. Further, the same was renewed by KSPCB (PCB/HO/EKM-1/ICE-R/13/2018 dated 05 Nov 2018) and its validity is up to 31 May 2023.
12	Reasons for the delay if the project is yet to start	NA
13	Present status of the project:	Environmental Clearance for the ISRF project was issued on 22 June 2017 subject to obtaining prior clearance from National Board for Wildlife (NBWL). Standing Committee of NBWL in its meeting held on 08 Dec 2017 had deliberated and recommended for the NBWL clearance of ISRF project. Subsequent to the release of minutes of meeting dated 09 Jan 2018, construction activities commenced at the project site on 03 March 2018. M/s Simplex Infrastructures Limited., Kolkata (SIL) is entrusted as the contractor for carrying out the construction works. Work is presently progressing at the site.
14	E-mail ID of the contact person to whom communications to be sent	gmmat@cochinshipyard.com with copy to: 1) eldho.john@cochinshipyard.com 2) siyad.ma@cochinshipyard.com
15	FAX Number	+91 484 2370897

Signature of authorized signatory with company seal



EC COMPLIANCE STATUS		
Sl No.	CONDITION	COMPLIANCE STATUS
A. SPECIFIC CONDITIONS:		
i	Construction activity shall be carried out strictly according to the provisions of CRZ Notification, 2011. No construction work other than those permitted in Coastal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.	Cochin Shipyard Limited (CSL) ensures that no construction work other than those mentioned in approved layout will be carried out.
ii	All the conditions stipulated by MoEF&CC, Regional Office (Southern Zone) vide letter No. 4-KLB1112/2017-BAN/197 dated 7 th June, 2017 shall be complied with.	Being complied with. Compliance Report submitted online in MoEFCC portal on 31 Oct 2017.
iii	The environmental clearance is subject to obtaining prior clearance for Wildlife from the Standing Committee of the National Board for Wildlife.	Complied. Standing Committee of the National Board of Wildlife in its 46 th meeting held on 08 Dec 2017 had recommended for the NBWL clearance of ISRF project. Minutes of the meeting is published in MoEFCC website on 09 Jan 2018.
iv	All the recommendations and conditions specified by Kerala Coastal Zone Management Authority shall be complied with.	Clause wise compliance of the recommendations and conditions specified by Kerala Coastal Zone Management Authority (KCZMA) is mentioned separately at page no. 9.
v	As proposed, PP shall carry out mangroves plantation in 2 ha. land and maintain.	CSL in association with Kerala Forest Dept had identified 'Chettuva' region in Thrissur Dist, Kerala to carry out compensatory mangrove afforestation. CSL is in receipt of detailed project report prepared by Kerala Forest Dept. Accordingly, CSL had remitted an amount of Rs.12 Lakhs for carrying out mangrove afforestation at Chettuva.
vi	The Project proponent shall ensure that no creeks or rivers are blocked due to any activities at the project site and free flow of water is maintained.	Complied. M/s DHI, Denmark was entrusted to carry out the hydrodynamic modeling study in connection with the ISRF project. The results of the study reveal that the proposed ISRF project does not indicate considerable influence on water levels and water availability outside of the shipyard area. No creeks or rivers are blocked due to this project.



vii	Shoreline should not be disturbed due to dumping. Periodical study on shore line changes shall be conducted and mitigation carried out, if necessary. The details shall be submitted along with the six monthly monitoring report.	International Ship Repair Facility (ISRF) project does not have any reclamation. In addition, shore is already protected with retaining walls. During the course of construction, retaining walls will not be disturbed. Hence shoreline change is not envisaged. Dredged material will be disposed off at the two offshore dumping sites maintained by Cochin Port Trust, which are North (10° 00"N, 76° 05"E) and South (9° 55"N, 76° 06"E) Dumping Grounds. The dumping sites are located at a distance of about 21 km away from the project site. Dredging activities in connection with the ISRF project had commenced and approximately 1,75,690 cum dredging is completed as on 31 Mar 2019.
viii	The ground water shall not be tapped within the CRZ areas by the PP to meet with the water requirement in any case.	Complied. Water requirement for the construction activities is being arranged from outside agencies in tankers. Hence ground water extraction is not carried out.
ix	All excavation related dewatering shall be as duly authorized by the CGWA. A NOC from the CGWA shall be obtained for all dewatering and ground water abstraction.	Complied. Secretary, Water Resource Department, Kerala has issued No Objection Certificate for the ISRF project vide letter No.GW1/296/2017-WRD dated 18 July 2017.
x	A detailed marine diversity conservation management plan based on possible environmental impacts shall be drawn up and implemented as suggested by the National Institute of Oceanography (NIO) or any other institute on marine ecology. The plan should include the management of marine and intertidal biotopes, corals and coral communities, sea grasses and sea weeds, subtidal habitats, fishes, other marine flora and fauna (Micro, macro and mega) including turtles, birds and marine mammals as also productivity.	Complied. CSIR-NIO was entrusted for the preparation of "Detailed marine diversity conservation management plan" in connection with the ISRF project on 16 Feb 2017. The recommendations of Marine Biodiversity management plan prepared by CSIR-NIO are strictly being followed during the construction phase.
xi	Shrouding shall be carried out in the work site enclosing the dock/proposed facility area. This will act as dust curtain as well achieving zero dust	Temporary shrouding by the way of moving sheds will be provided during the operation stage to contain the dust, if any generated from the work stations.



	discharge from the site. These curtain or shroud will be immensely effective in restricting disturbance from wind in affecting the dry dock operations, preventing waste dispersion, improving working conditions through provision of shade for the workers.	
xii	Dust collectors shall be deployed in all areas where blasting (surface cleaning) and painting operations are to be carried out, supplemented by stacks for effective dispersion.	Will be complied during operation phase of the ISRF project.
xiii	The work space shall be maintained as per international standards for occupational health and safety with provision of fresh air respirators, blowers, and fans to prevent any accumulation and inhalation of undesirable levels of pollutants including VOCs.	Will be complied during operation phase of the ISRF project.
xiv	The diesel generators shall be used as back-up power supply and shall be run only during power cuts. Low sulphur content fuel will be used for the generators and will be subjected to periodical maintenance and servicing. This will cut down on emission volume to a considerable extent. Also, the DG sets will be provided with mufflers for pollutant emission control.	Complied. ISRF project facility is equipped with 2 nos. of 500 KVA DG sets, which are used as a backup source of power supply. Low sulphur content fuel is being used in these DG sets. Regular maintenance and servicing are also carried out at regular intervals. DG sets are provided with mufflers and also comply with latest emission norms.
xv	Necessary arrangements for the treatment of the effluents and solid wastes must be made and it must be ensured that they conform to the standards laid down by the competent authorities including the Central or State Pollution Control Board and under the Environment (Protection) Act, 1986.	The oily wastewater generated from workstations due to ship washing will be collected through covered drains and treated in ETP before discharge. The treated water will be used for gardening / horticulture. In rainy season, the treated water will be let out to channel along with storm water. The wastewater from toilets, bathrooms and areas in the operational building will be treated in STP.
xvi	All measures shall be taken during the excavation activity as deemed necessary from the geotechnical investigation of the soil and ground water profile.	Complied. Geotechnical investigation was carried out at the land side and marine side before the commencement of construction activities. Excavation activity at the project site is mainly the



		boring operation carried out in connection with the casting of piles. Results of the Geotechnical investigation are duly taken care while carrying out the boring operation.
xvii	Construction activity related wastes (C & D waste) shall be disposed off as per Solid Waste Management Rule, 2016.	Complied. C& D waste generated from the project site is being disposed as per the Solid Waste Management Rule, 2016.
xviii	All such solid and hazardous wastes including onboard wastes (while ships dock at the site) will be handled as per the Hazardous and other Waste (Management & Trans-boundary Movement) Rule, 2016.	Will be complied during operation phase.
xix	Silt curtains shall be used to contain the spreading of suspended sediment during dredging within the dredging area.	Complied. Dredging activities at ISRF project marine area was commenced in the month of July 2018 and the same is under progress. Silt curtains are being used to contain the spreading suspended sediments during dredging.
xx	The dredging schedule shall be so planned that the turbidity developed is dispersed soon enough to prevent any stress on the fish population.	Complied. Dredging activities at ISRF project marine area commenced in the month of July 2018 and the same is under progress. Dredging is done in line with "Detailed marine diversity conservation management plan" prepared by CSIR-NIO for the project.
xxi	Earth protection work shall be carried out to avoid erosion of soil from the shoreline/boundary line from the land area into the marine water body.	Shore is already protected with retaining walls. During the course of construction, retaining walls will not be disturbed. New construction will be resting on piles.
xxii	No ships docking at the proposed project site will discharge its on-board waste water untreated in to the estuary/channel. All such wastewater load will be diverted to the proposed Effluent Treatment Plant of the project site.	On-board waste water, if any from the docked ships will not be discharged directly on land or to water body without appropriate treatment. The same will be treated in ETP before discharge.
xxiii	All effluent generated in the existing and proposed ship repairing centre shall be drained in to the ETP having capacity 300 KLD and equipped to treat the effluent into dischargeable standards. The oil-water operator of the ETP shall remove any unwanted oil	Will be ensured by the installation of the proposed ETP.



	<p>& grease content from the effluent. The ETP shall be equipped to treat such effluent including the bilge water and other ship discharges to meet the general standards for discharge of effluent in marine coastal areas before disposal in to the channel. Ballast water from ships shall be stored at the facility and will be used in refilling of same before release of ships back into water.</p>	
xxiv	<p>Workers shall be strictly enforced to wear personal protective equipments like dust mask, ear muffs or ear plugs, whenever necessary/required. Special visco-elastic gloves will be used by labour exposed to hazards from vibration.</p>	<p>PPE's like safety helmets, safety harness, safety shoes, goggles, dust mask, ear muffs or ear plugs, as applicable are strictly enforced for the workers during construction. Special visco-elastic gloves are also being used by labourers exposed to hazards from vibration.</p>
xxv	<p>In case of repair of any old vessels, excessive care shall be taken while handling Asbestos & Freon gas. Besides, fully enclosed covering should be provided for the temporary storage of asbestos material at site before disposal to CTSDF.</p>	<p>Will be complied during operation phase. In addition, CSL has an MOU in force with M/s Kerala Enviro Infrastructure Ltd. (KEIL), the only designated hazardous waste disposal center in Kerala for the disposal of C&D and asbestos sheet waste, which will be generated at the project site during demolition of existing buildings.</p>
xxvi	<p>Safety training shall be given to all workers specific to their work area and every worker and employee will be engaged in fire hazard awareness training and mock drills which will be conducted regularly. All standard safety and occupational hazard measures shall be implemented and monitored by the concerned officials to prevent the occurrence of untoward incidents/accidents.</p>	<p>Safety induction training covering fire hazard awareness is imparted to all workforce of the contractor. In addition, job specific safety training is also given. All standard safety and occupational hazard measures are implemented at the project site. In addition, audits / site inspections are regularly carried out to ensure compliance of the safety standards to prevent the occurrence of untoward incidents/accidents.</p>
xxvii	<p>The commitments made during the Public Hearing and recorded in the Minutes shall be complied with letter and spirit. A hard copy of the action taken shall be submitted to the Ministry.</p>	<p>Public Hearing meeting was held on 24 March 2015. All participants, who had spoken during the meeting, had appreciated the project. No issues were raised from any of the members present during the public hearing and hence no specific commitments were given from the side of CSL.</p>



B. GENERAL CONDITIONS:		
i	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	Noted and being complied with.
(i)	Full support shall be extended to the officers of this Ministry / Regional Office at Bhubaneswar 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. CSL confirms full support to the officers of MoEFCC in connection with the ISRF project.
(ii)	A six-Monthly monitoring report shall need to be submitted by the project proponents to the Regional Office of this Ministry at Bhubaneswar Bangalore regarding the implementation of the stipulated conditions.	Noted and being complied with.
(iii)	Ministry of Environment, Forest and Climate Change 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.
(iv)	The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry.	Noted.
(v)	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, Forest and Climate Change.	Noted.
(vi)	The project proponents shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of land development work.	➤ Subsequent to the deliberation in Public Investment Board meeting held on 09 March 2016, approval for the ISRF project was accorded on 19 May 2016. ➤ Construction work commenced on 03 March 2018.
(vii)	A copy of the clearance letter shall be marked to concerned Panchayat / local NGO, if any, from whom any suggestion / representation has been made	Complied. Copy of the EC letter handed over to Secretary, Kochi Corporation on 27 June 2017.



	received while processing the proposal.	
(viii)	A copy of this clearance letter shall also be displayed on the website of the concerned State Pollution control Board. The Clearance letter shall also be displayed at the Regional Office, District Industries centre and Collector's Office/ Tehsildar's office for 30 days.	Complied. <ul style="list-style-type: none"> ➤ Copy of EC letter send by speed post to Chairman, Kerala State Pollution Control Board (KSPCB) on 27 June 2017. ➤ Copies of EC letter also handed over to District Industries Centre, District Collector's Office and Regional office of KSPCB on 27 June 2017.

C. OTHER CONDITIONS IN ENVIRONMENTAL CLEARANCE COMPLIANCE LETTER:

1.	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.	Noted for applicable compliances.
2.	The project proponent shall advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental and CRZ Clearance and copies of clearance letters are available with the State Pollution Control Board and may also be seen on the website of the Ministry of Environment, Forest and Climate Change at http://www.envfor.nic.in . The advertisement should be made within seven days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bangalore.	Complied. <ul style="list-style-type: none"> ➤ CSL had advertised in two leading dailies in vernacular language viz. Malayala Manorama and Mathrubhumi on 02 July 2017. ➤ Copy of the advertisement was forwarded to MoEFCC, Regional Office, Bangalore vide our letter dated INFRA/ISRF/64/2017 dated 05 July 2017.
3.	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.



4.	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.
5.	Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.	Noted.
6.	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad/Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.	Complied. ➤ Copy of EC letter forwarded to Secretary, Kochi Corporation on 23 June 2017. ➤ EC letter is also published in CSL website.
7.	The proponent shall upload the status of compliance of the stipulated clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF&CC, the respective Zonal Office of CPCB and the SPCB.	Noted. Environmental monitoring is being carried out by M/s SV Enviro Labs & consultants, Visakhapatnam at ISRF project site. Report showing data of monitoring results has been prepared and submitted by monitoring agency M/s SV Enviro Labs & Consultants and the same is attached herewith as Annexure:1 of encl:2 . Monitoring results are also published in CSL website.
8.	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&CC, the respective Zonal Office of CPCB and the SPCB.	Noted.
9.	The environmental statement for each financial year ending 31 st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the	Will be complied during the operation stage of the ISRF project



	Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of clearance conditions and shall also be sent to the respective Regional Office of MoEF&CC by e-mail.	
10	The above stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act 1974, the Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification 1994, including the amendments and rules made thereafter.	Noted.

D. KCZMA Recommendations

S. No.	KCZMA Recommendation	Compliance Status
1.	The debris and waste generated from dredging and during the phase of demolition and construction should not be dumped into the CRZ area and wetlands.	<ul style="list-style-type: none"> • The dredged material from the project site is being disposed off at the two identified dumping ground locations of Cochin Port Trust (CoPT) in the outer sea about 21km away from the project site. • Dumping of construction and demolition (C&D) waste into CRZ area and wetlands is strictly prohibited and is being disposed in line with the C&D waste management rules 2016.
2.	Species wise mangrove identification may be done and bio-diversity register shall be maintained. The compensatory species wise mangrove afforestation in patch areas used for developmental works should be given top priority and the progress report shall be submitted to KCZMA before initiating developmental works.	<ul style="list-style-type: none"> • There is no mangrove forest except two small isolated mangrove patches in the project area having spread area 92.8 sq. M & 93.8 sq. M. These mangroves (15 nos. plants in total) may have grown due to the sediment deposit near to the slipway area where quay wall is not present. These mangroves belonging to Acanthus ilicifolius and Rhizophora Species, are to be felled for the project. • As a compensatory measure insisted by MoEFCC, CSL is in the process of carrying out 2 ha mangrove afforestation at Chettuva, Thrissur in association with Kerala Forest Dept., Govt. of Kerala. CSL has remitted Rs.12 Lakhs in connection with this and mangrove



		afforestation activities at Chettuva will commence soon. The matter was already informed to Kerala Coastal Zone Management Authority (KCZMA).
3.	Storing of hazardous materials during the construction and operation phase, if any, need to be done as per relevant rules and regulations.	Being complied with. Hazardous materials are not allowed to be disposed to marine water, wetland or CRZ area. In addition, CSL is having tie-up with CTSDf viz. M/s Kerala Enviro Infrastructure Ltd. (KEIL), Cochin for the disposal of Hazardous waste.
4.	All the provisions of CRZ notifications of 1991/2011, local town and country plan regulations for construction should be strictly followed during the implementation of the project.	Being complied with.
5.	Necessary environmental regulations and port/shipping regulations also shall be followed.	The project is being implemented as per the necessary environmental regulations and port/shipping regulations. CSL is working in compliance with International Ship and Port Facility Security (ISPS) code.
6.	Proper monitoring plan may be put in place to safeguard the environment.	Monitoring plan during the construction phase has been formulated and M/s SV Envirolabs & Consultants, Visakhapatnam is entrusted with the job of carrying out environmental monitoring on 07 May 2018.



REPORT OF ENVIRONMENTAL MONITORING DURING THE
CONSTRUCTION STAGE OF ISRF PROJECT
(OCT 2018- MAR 2019)

1 INTRODUCTION

International Ship Repair Facility (ISRF) is a prestigious project of Cochin Shipyard Limited (CSL) which is being developed at the leased out land of Cochin Port Trust at Willingdon Island, Cochin. The proposed facility consists of a ship lift, work stations and afloat jetties for carrying out repair works of vessels having size 130 m LOA x 25 m beam.

CSL has engaged **M/s. SV Enviro Labs & Consultants**, an accredited consultant by NABL and NABET, GoI, MoEFCC to carry out the Environmental monitoring studies during the construction stage of ISRF project as per the norms.

This report covers the monitored environmental data for the period of October 2018 to March 2019.

2 LOCATION OF THE PROJECT

The Project site is located in the eastern side of Mattancherry channel, Willingdon Island in Thoppumpady Village, Kochi Tehsil of Ernakulum District in the state of Kerala.

The geographic location of the ISRF is (Google earth, 2014):

Geographic longitude (east)	9°56'37.64" E
Geographic latitude (north)	76°16'3.22" N

3 ENVIRONMENTAL MONITORING REPORT DURING OCT 2018- MAR 2019

Environmental monitoring data for the six months has been compiled and is furnished below.



01. AMBIENT AIR QUALITY MONITORING**Summary of Analysis of Ambient Air Quality for the period of Oct'18 – Mar'19**

Monitoring Station	PM10 ($\mu\text{g}/\text{m}^3$)				PM2.5 ($\mu\text{g}/\text{m}^3$)				SO2 ($\mu\text{g}/\text{m}^3$)				NOX ($\mu\text{g}/\text{m}^3$)				CO (mg/m^3)			
	No. of samples	Maximum	Minimum	Mean	No. of samples	Maximum	Minimum	Mean	No. of samples	Maximum	Minimum	Mean	No. of samples	Maximum	Minimum	Mean	No. of samples	Maximum	Minimum	Mean
1	52	88.1	59.7	75.6	52	39.9	27.0	34.2	52	16.2	11.0	13.9	52	19.4	13.2	16.7	52	0.33	0.22	0.28
2	52	63.5	51.3	58.4	52	28.7	23.2	26.4	52	10.5	8.5	9.7	52	12.6	10.2	11.6	52	<0.05	<0.05	<0.05
3	52	60.2	47.6	55.3	52	27.2	21.5	25.0	52	9.5	7.5	8.7	52	11.1	8.8	10.2	52	<0.05	<0.05	<0.05
NAAQS standards	100				60				80				80				4			
Method followed	IS:5182 (P-23) Gravimetric				40 CFR USEPA Gravimetric				IS:5182 (P-2)- West and Gaeke Method				IS:5182(P-6) - Jacob & Hochheiser Method				IS:5182 (P-10) NDIR Spectroscopy			



02. AMBIENT NOISE QUALITY**NOISE LEVELS AT SECURITY GATE**

S.No	Date of collection	Leq(day) dB(A)	Leq(Night) dB(A)	L ₁₀	L ₅₀	L ₉₀
1.	13.10.2018	69.2	59.3	66.1	63.2	60.1
2.	31.10.2018	67.8	59.6	63.9	61.4	58.8
3.	15.11.2018	65.0	58.6	62.7	59.9	56.8
4.	29.11.2018	71.5	60.8	67.2	64.2	61.5
5.	13.12.2018	68.1	59.6	61.2	60.1	58.3
6.	28.12.2018	65.3	58.2	63.1	60.0	59.2
7.	16.01.2019	67.9	58.3	64.9	61.5	58.9
8.	31.01.2019	65.2	57.9	61.3	60.1	56.8
9.	15.02.2019	69.5	61.6	63.2	60.2	57.3
10.	28.02.2019	68.9	60.2	64.6	61.2	58.8
11.	15.03.2019	70.0	62.2	67.2	64.4	61.6
12.	29.03.2019	65.9	59.9	62.7	60.1	56.8
Standards		75	70	-	-	-

NOISE LEVELS AT NORTH WEST BOUNDARY OF PROJECT SITE

S.No	Date of collection	Leq(day) dB(A)	Leq(Night) dB(A)	L ₁₀	L ₅₀	L ₉₀
1.	13.10.2018	70.2	60.3	64.9	61.6	59.1
2.	31.10.2018	70.1	61.6	68.2	67.3	61.5
3.	15.11.2018	71.0	62.8	70.3	67.2	62.5
4.	29.11.2018	69.6	61.5	68.2	65.3	61.2
5.	13.12.2018	69.4	60.9	66.5	64.1	60.2
6.	28.12.2018	68.6	59.6	64.2	61.6	57.3
7.	16.01.2019	67.3	60.4	63.2	61.0	58.2
8.	31.01.2019	68.5	59.8	64.2	60.1	58.3
9.	15.02.2019	71.7	62.8	68.7	65.1	60.1
10.	28.02.2019	71.8	62.9	70.1	67.2	63.5
11.	15.03.2019	70.1	62.9	68.2	65.5	62.1
12.	29.03.2019	69.8	59.5	66.3	62.3	59.2
Standards		75	70	-	-	-



NOISE LEVELS AT CENTRE OF PROJECT SITE

S.No	Date of collection	Leq(day) dB(A)	Leq(Night) dB(A)	L ₁₀	L ₅₀	L ₉₀
1.	13.10.2018	66.5	56.2	57.2	54.2	51.9
2.	31.10.2018	69.4	59.3	65.4	62.1	58.2
3.	15.11.2018	70.8	62.4	68.6	64.2	60.5
4.	29.11.2018	69.3	59.3	67.2	65.4	60.3
5.	13.12.2018	66.4	58.7	60.1	56.2	52.6
6.	28.12.2018	67.2	58.6	64.1	59.3	58.3
7.	16.01.2019	68.4	58.1	65.4	60.4	57.3
8.	31.01.2019	63.7	58.2	59.6	54.2	51.6
9.	15.02.2019	70.8	61.3	65.2	62.8	58.4
10.	28.02.2019	71.5	60.4	68.3	64.1	60.5
11.	15.03.2019	69.8	59.8	64.5	62.6	61.5
12.	29.03.2019	67.6	58.2	60.4	56.4	51.8
Standards		75	70	-	-	-

NOISE LEVELS AT SOUTH WEST BOUNDARY OF PROJECT SITE

S.No	Date of collection	Leq(day) dB(A)	Leq(Night) dB(A)	L ₁₀	L ₅₀	L ₉₀
1.	13.10.2018	65.2	57.8	63.2	60.4	55.3
2.	31.10.2018	68.2	59.3	66.2	62.7	59.2
3.	15.11.2018	63.2	55.1	60.8	57.2	54.2
4.	29.11.2018	66.3	58.5	59.4	55.2	51.6
5.	13.12.2018	66.8	57.2	60.3	56.2	52.2
6.	28.12.2018	69.4	59.6	65.2	60.2	58.3
7.	16.01.2019	68.9	57.5	62.2	59.2	55.2
8.	31.01.2019	68.9	58.2	63.2	60.1	57.2
9.	15.02.2019	67.3	60.2	65.6	61.5	59.2
10.	28.02.2019	66.8	55.2	61.8	57.2	54.1
11.	15.03.2019	68.2	58.1	61.5	56.2	52.8
12.	29.03.2019	64.2	57.1	60.8	56.5	53.2
Standards		75	70	-	-	-



03. MARINE WATER QUALITY**Date of Sampling: 29.10.2018**

S.No	Parameter	Units	Class SW-IV (For Harbour Waters)	Upstream	Project site-1	Project site-2	Downstream
1.	pH	-		7.09	6.90	6.95	7.06
2.	Temperature	°C	-	27.0	28.0	28.0	27.5
3.	Salinity	ppt	-	9.263	9.693	10.64	10.0
4.	TDS	mg/l	-	10058	10106	10886	10659
5.	TSS	mg/l	-	32	39	41	36
6.	DO	mg/l	3.0 min	5.8	5.4	5.5	5.6
7.	BOD	mg/l	5.0 max	4.5	5.0	4.9	4.4
8.	Total Hardness	mg/l	-	1595	1624	1810	1695
9.	Total Alkalinity	mg/l	-	75.6	68.4	70.4	73.0
10.	Chlorides as Cl	mg/l	-	5128	5366	5895	5536
11.	Turbidity	NTU	-	12.5	18.1	16.6	15.9
12.	Conductivity	µmhos/cm	-	17129	17281	18515	18116
13.	Oil and Grease	mg/l	10 mg/l	2.6	5.8	5.5	3.0
14.	Heavy Metals						
	Arsenic	mg/l	-	<0.01	<0.01	<0.01	<0.01
	Lead	mg/l	-	0.022	0.022	0.026	0.024
	Cadmium	mg/l	-	0.0010	0.0015	0.0016	0.0012
	Chromium	mg/l	-	<0.01	<0.01	<0.01	<0.01
	Mercury	mg/l	-	<0.001	<0.001	<0.001	<0.001
	Zinc	mg/l	-	0.0055	0.0079	0.0081	0.0062
	Selenium	mg/l	-	<0.01	<0.01	<0.01	<0.01

Date of Sampling: 30.01.2019

S.No	Parameter	Units	Class SW-IV (For Harbour Waters)	Upstream	Project site-1	Project site-2	Downstream
1.	pH	-	6.0 – 9.0	7.66	7.53	7.65	7.57
2.	Temperature	°C	-	28.0	29.0	29.5	28.5
3.	Salinity	ppt	-	9.094	9.997	11.5	10.3
4.	TDS	mg/l	-	31030	33040	32370	32528
5.	TSS	mg/l	-	34	48	60	47
6.	DO	mg/l	3.0 min	6.2	5.8	5.7	6.0
7.	BOD	mg/l	5.0 max	4.8	4.6	4.9	5.0
8.	Total Hardness	mg/l	-	5700	6600	6100	5900
9.	Total Alkalinity	mg/l	-	101	96	98	94
10.	Chlorides as Cl	mg/l	-	16370	18150	16519	16690
11.	Turbidity	NTU	-	28.4	40.6	58.1	35.4
12.	Conductivity	µmhos/cm	-	47745	50842	49812	50024
13.	Oil and Grease	mg/l	10 mg/l	2.2	4.1	3.3	3.1
14.	Heavy Metals						
	Arsenic	mg/l	-	<0.01	<0.01	<0.01	<0.01
	Lead	mg/l	-	0.018	0.019	0.021	0.019
	Cadmium	mg/l	-	< 0.001	< 0.001	< 0.001	< 0.001
	Chromium	mg/l	-	<0.01	<0.01	<0.01	<0.01
	Mercury	mg/l	-	<0.001	<0.001	<0.001	<0.001
	Zinc	mg/l	-	0.0038	0.0059	0.0065	0.0044
	Selenium	mg/l	-	<0.01	<0.01	<0.01	<0.01

04. MARINE SEDIMENT**Date of Sampling: 30.01.2019**

S.No	Parameter	Units	Upstream	Project site-1	Project site-2	Downstream
1.	Organic Carbon	%	2.16	2.42	2.44	2.21
2.	Organic Nitrogen	%	0.022	0.041	0.049	0.030
3.	Heavy Metals					
	Iron	µg/gm	1382	1601	1715	1435
	Zinc	µg/gm	0.0003	0.0005	0.0005	0.0004
	Lead	µg/gm	0.003	0.005	0.005	0.003
	Mercury	µg/gm	<0.001	<0.001	<0.001	<0.001
	Arsenic	µg/gm	2.91	2.99	2.94	2.95

05. MARINE BIOLOGY**Date of Sampling: 30.01.2019**

S.No	Parameter	Units	Upstream	Downstream
1.	Phytoplankton			
	Biomass	ml/m ³	2.05	2.6
	Diversity	-	0.398	0.462
	Major Species	-	Coscinodiscus Sp.	Coscinodiscus Sp.
2.	Zooplankton			
	Biomass	ml/m ³	0.015	0.028
	Diversity	-	0.942	1.070
	Major Species	-	Calanoid Sp.	Calanoid Sp.
3.	Benthic Communities			
	Meiofauna			
	Total Count	No./10cm	5	5
	Major Species		<i>Terschellingia longicaudata</i>	<i>Pseudochromadora casca</i>
	Macrofauna			
	Total Count	No./10cm	4	3
	Major Species		<i>Heteromastus bifidus</i>	<i>Paraheteromastus tenuis</i>

06. SOIL QUALITY**Date of Sampling: 29.10.2018**

S.No	Parameter	Units	Location-1	Location-2	Method
1	Texture				
a	Sand	%	40	41	Reference manual of M.I.Jackson, C.A.Black
b	Silt	%	34	36	
c	Clay	%	26	23	
2	pH	-	7.76	7.58	IS:2720 P 26
3	Electrical Conductivity	us/cm	112	98	IS:2720 P 21
4	Organic matter	%	0.44	0.53	IS:2720 P 22
5	Organic Carbon	%	0.26	0.31	IS:2720 P 22
6	Phosphorus as PO ₄ ⁻³	mg/kg	2.88	3.42	Reference manual of M.I.Jackson, C.A.Black
7	Total Nitrogen as N	mg/kg	22.8	20.5	
8	Potassium as K	mg/kg	32.8	40.6	
9	Sodium as Na	mg/kg	54.8	63.0	
10	Lead as Pb	mg/kg	< 0.02	< 0.02	USEPA