

MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED (MIDPL)

REVISED MASTER PLAN OF KATTUPALLI PORT



Draft CEIA/EMP Report Volume I – (Part B) (Appendices & Attachments)

June, 2023

PREPARED BY



NABET ACCREDITED
Certificate No: NABET/EIA/2023/RA 0175

C1161303
RP003, Rev. B

**Draft CEIA/EMP Report
Volume I – (Part B)
(Appendices & Attachments)**

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APPENDIX A

APPENDIX A1
KATTUPALLI CRZ&EC MoEF&CC
APPROVAL DATED 03.07.2009

No. 10-130/2007-IA.III
Government of India
Ministry of Environment & Forests
(IA-III Division)

Paryavaran Bhawan,
C.G.O. Complex, Lodhi Road,
New Delhi - 110 003.

Dated : 3rd July, 2009.

To
M/s. L & T Ship Building Limited,
(Joint venture of L&T and TIDCO)
L & T Chennai House,
10, Club House Road,
Anna Salai, Chennai - 600 002.

Subject: CRZ and Environmental Clearance for the development of proposed Shipyard - cum - Minor Port Complex at Kattupalli, Ponneri Taluka, Tiruvallur District, Tamil Nadu by M/s. L & T Ship Building Limited (Joint venture of L&T and TIDCO) - Reg.

This has reference to your letter no. D/Shipyard/00/07 dated 29.10.2007, 06.06.2008, 20.03.2009 and 30.04.2009 from Director, Tamil Nadu Industrial Development Corporation Ltd. and letter. No. L&T /Shipyard/08/10 dated 13.06.2008, No. LTSB-08/MoEF/029 dated 28.08.2008 from Director, L&T Shipyard Ltd., No. LTSB-08/MoEF/033 dated 23.09.2008, on the subject mentioned above, seeking prior Clearance under EIA Notification, 2006 and Coastal Regulation Zone Clearance for the above project. The proposal has been appraised as per prescribed procedure in the light of provisions under the EIA Notification, 2006 and CRZ Notification, 1991 on the basis of the mandatory documents enclosed with the application viz., the Questionnaire, EIA, EMP and the additional clarifications furnished in response to the observations of the Expert Appraisal Committee constituted by the competent authority in its meetings held on 22nd - 23rd October, 2008.

2. It is interalia, noted that the project involves the development of shipyard - cum - minor port on an area of 1152 acres. It is proposed to construct two breakwaters to provide the requisite tranquillity in the harbour basin. The northern breakwater is about 1.5 km long and the southern breakwater is about 3 km long. It is proposed to provide a navigation channel of 300 m width, dredged to a depth of 15m CD. The length of the navigation channel is about 5 km. The facility proposed are Dry dock, Ship-lift, Outfitting jetties, Annual steel processing capacity of



about 450,000 T and Ship-building facilities for about 25 ships per year with product mix of high-end vessels like Crude Oil Tanker VLCC (300,000 DWT), Crude Oil Tanker Handysize (46,100 DWT), Bulker Panmax (80,000 DWT), Chemical Tanker (33,300 DWT), Container Ship (2,600 TEUs /35,000 DWT). Ship repair facilities for 60 ships per year up to VLCC size including offshore platforms/jack-up rigs. It is also proposed to build a minor port of 1400 m long berth phase for handling containers and break bulk cargo and 300 m long berth for handling shipyard cargo. The total cost of the project is Rs.3070 crores.

3. This activity comes under Category 7 (e) "Ports, Harbours" of EIA Notification, 2006. Out of total area of 1152 acres, 292.68 acres fall under CRZ-I and CRZ-III of the CRZ Notification 1991, the proposed facility is permissible in CRZ area. Tamil Nadu State Coastal Zone Management Authority in its meeting held on 17.10.2008 has recommended the proposal with certain conditions vide letter No. R.C. No.P1/2004/2008 dated 21.10.2008, which project proponent has to comply strictly. The recommendations were forwarded to the Ministry vide letter No.23037/EC3/08-1, dated 05.11.2008.

4. The Expert Appraisal Committee, after due consideration of the relevant documents submitted by the project proponent and additional clarifications furnished in response to its observations, have recommended for grant of clearance under EIA Notification, 2006 and CRZ Notification, 1991. Accordingly, the Ministry hereby accord necessary Clearance as per the provisions of EIA Notification, 2006 and CRZ Notification, 1991 and its subsequent amendments, subject to strict compliance of the terms and conditions as follows:

5. Specific Conditions:

- (i) The proponent shall comply all the conditions stipulated in the letter R.C.No.P1/2004/2008, dated 21.10.2008 of Department of Environment, Chennai.
- (ii) The proponent shall comply all the commitment made vide his letter No. D/Shipyard/00/07 dated 20.03.2009.
- (iii) Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.
- (iv) There shall be no withdrawal of groundwater in Coastal Regulation Zone area, for this project. In case any ground water 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.



- (v) The paints based on 'primer non-toxic water organic co-polymer latish solvent free' shall be used to prevent VOC. No Tri butyl Tin (TBT) based paints shall be used
- (vi) No dumping of dredging materials in the sea shall be undertaken. In case of sea dumping is required, an integrated modelling study to be carried out to locate the dump site so that it does not cause any problem to Ennore port.
- (vii) Shoreline changes due the project shall be monitored continuously. Nourishment of northern shoreline shall be carried out using the sediments from beach acceleration on the southern shoreline.
- (viii) Suitable screens shall be installed between the construction area and the intakes so that operation of the intakes are not affected by the construction activity.
- (ix) At least a distance of 100 meters shall be provided between intake of Chennai Water Desalination Ltd. (CWDL) and north edge of the northern breakwater as agreed in the meeting between the proponent and CWDL.
- (x) An independent port connectivity shall be developed.
- (xi) Rehabilitation if any shall be carried out as per law/ State Government.
- (xii) Fire station shall be located within the project area
- (xiii) The Hazardous waste generated shall be properly collected and handled as per the provisions of Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008.
- (xiv) The waste water generated from the activity shall be collected, treated and reused properly.
- (xv) Sewage Treatment facility should be provided in accordance with the CRZ Notification.
- (xvi) 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.
- (xvii) Installation and operation of DG set if any shall comply with the guidelines of CPCB.



- (xviii) There shall be no reclamation / dredging of areas.
- (xix) Air quality including the VOC shall be monitored regularly as per the guidelines of CPCB and reported.
- (xx) The project proponent shall undertake green belt development all along the periphery of the project area and also along side the road.
- (xxi) All necessary clearances from the concerned agencies shall be obtained before initiating the project.
- (xxii) Project proponent shall install necessary oil spill mitigation measures in the shipyard. The details of the facilities provided shall be informed to this Ministry within 3 months from the date of receipt of this letter.
- (xxiii) No hazardous chemicals shall be stored in the Coastal Regulation Zone area.
- (xxiv) The project shall not be commissioned till the requisite water supply and electricity to the project are provided by the PWD/ Electricity Department.
- (xxv) Specific arrangements for rainwater harvesting shall be made in the project design and the rain water so harvested shall be optimally utilised.
- (xxvi) The facilities to be constructed in the CRZ area as part of this project shall be strictly in conformity with the provisions of the CRZ Notification, 1991 and its amendment. The facilities such as office building and residential buildings which do not require water front and foreshore facilities shall not be constructed within the Coastal Regulation Zone area.

6. 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 1991 & its amendments. All the construction designs / drawings relating to the proposed construction activities must have approvals of the concerned State Government Departments / Agencies.
- (ii) Adequate provisions for infrastructure facilities such as water supply, fuel, sanitation etc. shall be ensured for construction workers during the construction phase of the project so as to avoid felling of trees/mangroves and pollution of water and the surroundings.



- (iii) 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.
- (iv) 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 Tamil Nadu State Pollution Control Board before commissioning of the project and a copy of each of these shall be sent to this Ministry.
- (v) In order to carry out the environmental monitoring during the operational phase of the project, the project authorities shall establish an environmental laboratory well equipped with standard equipment and facilities and qualified manpower to carry out the testing of various environmental parameters.
- (vi) The proponents shall provide for a regular monitoring mechanism so as to ensure that the treated effluents conform to the prescribed standards. The records of analysis reports must be properly maintained and made available for inspection to the concerned State/Central officials during their visits.
- (vii) The sand dunes and mangroves, if any, on the site shall not be disturbed in any way.
- (viii) A copy of the clearance letter will be marked to the concerned Panchayat / local NGO, if any, from whom any suggestion / representation has been received while processing the proposal.
- (ix) The Tamil Nadu Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Centre and Collector's Office/Tehsildar's Office for 30 days.
- (x) The funds earmarked for environment protection measures shall be maintained, in a separate account and there shall be no diversion of these funds for any other purpose. A year-wise expenditure on environmental safeguards shall be reported to this Ministry.



- (xi) Full support shall be extended to the officers of this Ministry's Regional Office at Bangalore and the officers of the Central and State Pollution Control Boards by the project proponents during their inspection for monitoring purposes, by furnishing full details and action plans including the action taken reports in respect of mitigative measures and other environmental protection activities.
- (xii) In case of deviation or alteration in the project including the implementing agency, a fresh reference shall be made to this Ministry for modification in the clearance conditions or imposition of new ones for ensuring environmental protection.
- (xiii) This Ministry reserve the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry.
- (xiv) This Ministry or any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environmental protection, which shall be complied with.
- (xv) The Project proponents shall inform the Regional Office at Bangalore as well as the Ministry the date of financial closure and final approval of the project by the concerned authorities and the date of start of Land Development Work.

11 Draft in reply ✓
E-115 ✓

7. These stipulations would be enforced among others under the provisions of water (Prevention and Control of Pollution) Act, 1974 the Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991, the Hazardous Chemicals (Manufacture, Storage and Import) Rules, 1989, Municipal Solid Wastes (Management and Handling) Rules, 2000 and the Coastal Regulation Zone Notification, 1991 and its subsequent amendments made thereunder from time to time.

8. All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.

✓ 9. The project proponent should advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental Clearance and copies of clearance letters are available with the Tamil Nadu Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at <http://www.envfor.nic.in>. The advertisement should be made within 10

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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.

10. Any appeal against this Environmental Clearance shall lie with the National Environment Appellate Authority, if preferred, within a period of 30 days as prescribed under Section 11 of the National Environment Appellate Act, 1997.

11. Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.



(Bharat Bhushan)

Director (IA-III)

03.07.2009

Copy to:

1. The Secretary, Department of Environment, Govt. of Tamil Nadu, Chief Secretariate, Chennai.
2. The Chairman, CPCB, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi - 32.
3. The Chairman, Tamil Nadu Coastal Zone Management Authority, Guindy Anna Salai, Chennai.
4. The C.C.F., Regional Office (SZ), Ministry of Environment & Forests, Kendriya Sadan, IV Floor, Environment & Forests Wings, Office (SZ), 7th Main Road, II Block, Koramangala, Bangalore - 560 034.
5. Guard File.
6. Monitoring Cell.

(Bharat Bhushan)

Director (IA-III)

APPENDIX A2
KATTUPALLI CRZ&EC AMENDMENT
DATED 12.05.2010

No. 10-130/2007- A.III
Government of India
Ministry of Environment & Forests



Paryavaran Bhawan,
CGO Complex, Lodhi Road,
New Delhi - 110 003.

Dated: 12th May, 2010.

To
M/s. L & T Ship Building Limited,
(Joint venture of L&T and TIDCO)
L & T Chennai House,
10, Club House Road,
Anna Salai, Chennai - 600 002.

Subject: Amendment to the CRZ and Environmental Clearance issued for the development of proposed Shipyard - cum - Minor Port Complex at Kattupalli, Ponneri Taluka, Tiruvallur District, Tamil Nadu by M/s. L & T Ship Building Limited (Joint venture of L&T and TIDCO) - Reg.

This has reference to your letter No. LTSB - 10 /port/MoEF/202 dated 8th January 2010 and subsequent letter dated 12.02.2010 requesting for amendment to the CRZ and Environmental Clearance issued on 3rd July, 2009 for the development of Shipyard - cum - Minor Port Complex at Kattupalli, Tamil Nadu. The proposal has been appraised as per prescribed procedure in the light of provisions under the EIA Notification - 2006 and Coastal Regulation Zone Notification, 1991 on the basis of the details submitted and presentation made during the meeting of the Expert Appraisal Committee constituted by the competent authority held on 25th - 26th February, 2010.

2. It is interalia noted that the CRZ and Environmental Clearance issued on 03.07.2009 stipulated some Specific and General conditions Under Specific conditions, following two conditions require amendment:

(vi) No dumping of dredging material in the sea shall be undertaken. In case sea dumping is required, integrated model study to be carried out to locate the dump site so that it does not cause any problem to Ennore Port.

It was clarified that about 8.5 million cum of material would be dredged, out of which about 7.0 million cum shall be used for reclamation. The balance quantity of 1-1.5 million cum, which is mainly silt and clay material that cannot be used for reclamation shall be disposed off-shore. As per the study undertaken by L&T Ramboll, the site for off-shore dumping is identified at about 3 km north of the

A handwritten signature in black ink, appearing to be "Shomul", written in a cursive style.

proposed harbour basin. The identified dumping site is a rectangular area within the co-ordinates of A-13°19'22"N, 80°24'33"E, B-13°19'27"N, 80°24'00"E, C- 13°20'11"N, 80°24'41"E, and D- 13°20'16"N, 80°24'08"E. This study report also confirmed that the sediments from this site do not enter any of the navigational channels or the operational area of the Ennore Port as well as the proposed Kattupalli Port.

(xviii) There shall be no reclamation /dredging of areas.

It has been indicated that the project area would be reclaimed by using the dredged material, as dredging would be carried out to a depth of 15 meters.

Hence requested for amendment to the conditions stipulated in the Environmental Clearance.

3. The Expert Appraisal Committee, after due consideration of the relevant documents submitted by the project proponent and additional clarifications furnished in response to its observations, have recommended for the amendment of CRZ and Environmental Clearance for the project. Accordingly, the Ministry hereby accord necessary amendment to CRZ and Environmental Clearance for the above project as per the provisions of Environmental Impact Assessment Notification - 2006 and Coastal Regulation Zone Notification, 1991 and its subsequent amendments, subject to strict compliance of the following specific conditions in addition to the conditions stipulated in the clearance letter dated 03.07.2009.

4. Specific Conditions:

- (i) The details of combined effect on both the Ports (i.e. Ennore Port and Kattupalli Port) shall be carried out to monitor the impact of the post-dumping. This model study shall be carried out for a period of one year.
- (ii) A comparison between model study and actual dumping shall be carried out to examine the impacts both on North-East and South-West of the Ports and shall be submitted to the Ministry.
- (iii) No reclamation of the areas outside the Port limit and Buckingham Canal shall be carried out.

5. All the conditions will remain same for strict compliance.



(Bharat Bhushan)
Director (IA-III)

12.05.2010

Copy to:

1. The Secretary, Department of Environment, Govt. of Tamil Nadu, Chief Secretariate, Chennai.
2. The Chairman, CPCB, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi - 32.
3. The Chairman, Tamil Nadu Coastal Zone Management Authority, Guindy Anna Salai, Chennai.
4. The C.C.F., Regional Office (SZ), Ministry of Environment & Forests, Kendriya Sadan, IV Floor, Environment & Forests Wings, Office (SZ), 7th Main Road, II Block, Koramangala, Bangalore - 560 034.
5. Guard File.
6. Monitoring Cell.

/

(Bharat Bhushan)
Director (IA-III)

APPENDIX A3
NEW CARGO AMENDMENT
MOEF&CC APPROVAL
17.12.2014

F.No.10-130/2007-IA.III
 Government of India
 Ministry of Environment, Forests & Climate Change
 (IA-III Section)

Indira Paryavaran Bhawan,
 Jor Bagh Road,
 New Delhi - 110 003

Dated: 17th Decemocr, 2014

To

M/s L&T Ship Building Limited,
 Ports Division, TC-1, InfoTech Gate,
 No.22, Mount Poonamallce Road,
 Chennai - 600 089, Tamil Nadu

Fax No. 044-2270 6579

E-mail:ggr@ntidpl.com

Subject: Extension of validity and amendment in CRZ and Environmental Clearance dated 03.07.2009 granted for the development of Shipyard cum Minor port complex at Kattupalli, Ponneri Taluka, Tiruvallur District, Tamil Nadu by M/s L&T Ship Building Limited (LTSB) - Reg.

Sir,

This has reference to your letter No. LTSB/PORTS/111 dated 05.05.2014 seeking amendment to the CRZ and Environmental Clearance dated 03.07.2009 under EIA Notification, 2006 and CRZ Notification, 2011 and letter dated 26.05.2014 seeking extension of validity of clearance dated 03.07.2009.

2. The L&T Shipbuilding Limited (LTSB), a joint venture between Tamil Nadu Industrial Development Corporation Limited (TIDCO) and L&T, was accorded CRZ and Environmental Clearance for the project by the Ministry of Environment & Forests (MoEF) vide letter No.10-130/2007-IA.III dated 03.07.2009. The Environmental and CRZ Clearance was issued for the development of Shipyard cum Minor port complex at Kattupalli, Ponneri Taluka, Tiruvallur District, Tamil Nadu.

3. The issue was discussed by the EAC in its meetings held on 30th June, 2014 - 2nd July, 2014 and 25th - 27th August, 2014 and committee recommended for the extension of validity of the clearance dated 03.07.2009 for a period of five years. Accordingly, the validity of the clearance dated 03.07.2009 is extended up to 02.07.2019. All other conditions remain unchanged.

4. Project Proponent informed that the LTSB proposes to strengthen their traffic by handling Automobile (Ro-Ro) and Liquid Non-hazardous cargo and revised traffic of Project/Break Bulk Cargo in addition to Containers, General Cargo and Break bulk etc., which are currently being handled at the developed facilities. The prior Clearance was obtained for about 25.0 MTPA which includes 2.0 Million TEUs per Annum of Container (around 24.0 MTPA) and 0.5 MTPA of Steel Cargo and 0.5 MTPA of Project Cargo/Break bulk/General Cargo. Based on the present traffic projections the total traffic volume is about 24.65 MTPA. The proposed handling capacity will be well within the capacity for which prior Clearance is obtained. As such, no revision in the port layout is envisaged due to handling of the proposed cargo, except for re-allocating storage areas for the mentioned cargo. The total cost of project is Rs. 40 crores.




(i) Container 21.60 MTPA, (ii) Ro-Ro - 0.22 MTPA, (iii) Project cargo-0.44 MTPA, (iv) Break bulk/General Cargo (Barytes/Gypsum/Limestone/Granite/Steel cargo)-1.82 MTPA and (v) Edible oil, CBFS, Base Oil and Lube oil and non-hazardous liquid cargo - 0.57 MTPA.

5. The Tamil Nadu Coastal Zone Management Authority (TNCZMA) recommended the proposal for amendment vide letter no. 6064/EC.3/2014-1 dated 26.06.2014.

6. The EAC, after due consideration of the relevant documents submitted by the project proponent and additional clarifications furnished in response to its observations viz. quantity of cargo to be handled along with details on storage and pollution control measures, details of safety measures for liquid cargo and details of transportation of cargoes, have recommended the proposal for amendment in CRZ and Environmental Clearance to handle revised cargo traffic within the approved capacity. Accordingly, Ministry hereby accords amendment to the Clearance dated 03.07.2009 and stipulates the following conditions:

- (i) The cargo should only include (i) Container 21.60 MTPA, (ii) Ro-Ro - 0.22 MTPA, (iii) Project cargo-0.44 MTPA, (iv) Break bulk/General Cargo (Barytes/Gypsum/Limestone/Granite/Steel cargo)-1.82 MTPA and (v) Edible oil, CBFS, Base Oil and Lube oil and non-hazardous liquid cargo - 0.57 MTPA.
- (ii) All the conditions stipulated by the Tamil Nadu Coastal Zone Management Authority (TNCZMA) vide letter no. 6064/EC.3/2014-1 dated 26.06.2014, shall be strictly complied with.
- (iii) No additional land should be utilized for the proposed development.
- (iv) As committed, the local traffic should not be disturbed.

7. All other conditions shall remain unchanged in accordance with the Environmental and CRZ Clearance provided vide letter No. 10 130/2007-IA-III dated 03.07.2009.


(Dr. Manoranjan Hota)
Director

Copy to.

- (1) The Principal Secretary, Department of Environment and Forests, First Floor, Panagal Building, Saidapet, Chennai - 600 015, Tamil Nadu.
- (2) The Chairman, CPCB, Parivesh Bhawan, CBD-cum Office Complex, East Arjun Nagar, Delhi - 110032.
- (3) The Director, Department of Environment, Government of Tamilnadu, Panagal Building, Ground Floor, Saidapet, Chennai-15, Tamil Nadu.
- (4) The Chairman, Tamil Nadu Pollution Control Board, No. 76, Mount Salai, Gundy, Chennai, Tamil Nadu.
- (5) The CCF, Regional Office, MoEF&CC (SZ), Kendriya Sadan, IVth floor, E&F wings, 17th Main Road, Koramangala II Block, Bangalore - 560 034.
- (6) Guard File.
- (7) Monitoring Cell.


(Dr. Manoranjan Hota)
Director

APPENDIX A4
EC LETTER FOR MIDPL 09.02
2018

F. No.10-130/2007-IA.III
Government of India
Ministry of Environment & Forests
(IA-III Division)

Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi – 3

Date: 9th February, 2018

To,

Shri S. Sridhar, Director
M/s Marine Infrastructure Developer Private Limited,
TC-1 Building, L&T Construction Complex,
Mount Poonamallee Road,
Manapakkam, Chennai - 600 089 (Tamil Nadu)

Subject: CRZ and Environmental Clearance for the development of proposed Shipyard-cum-Minor Port Complex at Kattupalli, Ponneri Taluka, Tiruvallur District. Tamil Nadu by M/s Marine Infrastructure Developer private Limited (MIDPL) - bifurcation of Environmental and CRZ Clearance reg.

Kindly refer to online application of M/s L&T Shipbuilding Limited (LTSB) vide proposal No. IA/TN/MIS/20243/1910 dated 27th May, 2017, submitted to this Ministry for bifurcation of Environmental and CRZ Clearance issued vide Letter No. 10-130/2007-IA.III dated July 03, 2009 in favor of M/s L & T Ship Building Limited (Joint venture of L&T and TIDCO) in terms of the provisions of the Environment Impact Assessment (EIA) Notification, 2006 and CRZ Notification, 2011 under the Environment (Protection) Act, 1986.

2. The proposal was considered by the EAC (Infra-2) in its 21st meeting held during 21-24 August, 2017 and 23rd meeting held on 13th October, 2017. It is inter-alia, noted that the Environmental and CRZ clearance for the development of Shipyard-cum-Minor Port Complex at Kattupalli village, Thiruvallur district, Tamil Nadu was granted to L&T Shipbuilding Limited (LTSB) vide Letter No. 10-130/2007-IA.III dated July 03, 2009. The project consists of shipbuilding, ship repair, modular fabrication facilities, port and associated infrastructure. The Kattupalli Shipyard cum Port Complex has become operational since January, 2013.

3. In considering the divergent nature of business of LTSB and to harness the potential for growth with clear focus on port business, LTSB had approached the Hon'ble National Company Law Tribunal (NCLT), Chennai with a Scheme of Arrangement for Demerger of Port business of LTSB into a separate company Viz., M/s Marine Infrastructure Developer private Limited (MIDPL). The Hon'ble NCLT after careful examination of the scheme, had accorded its approval on 20.03.2017. In pursuant to the said NCLT Order, the Port business in Kattupalli Shipyard cum Port Complex on a going concern basis together with the identified port assets, powers,


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sanctions, approvals, registrations etc., stands transferred and vested with MIDPL. The facilities to be operated by MIDPL are given below:

Port and Common Facilities

- (i) North breakwater, facilities required for Port such as Navigational Channel [Outer (-)16.7 m CD and Inner (-)17.5 m CD depth], Other Navigational Facilities,
- (ii) Five Berths and 2 Port Craft Berths, Container Freight Station,
- (iii) Container Stackyard, Cargo Storage areas and Tank farms, other various necessary supporting infrastructures, utilities and services etc., Dredging of Port area and Navigation channel and Offshore dumping
- (iv) Area: 336.75 Acres (321.75 Acres of Revenue Land and 15.0 Acres of Coastal land)
- (v) The Permitted activities to be carried out by MIDPL are as given below:

Cargo Handling	
Containers (Mn TEU's)	1.80
Ro-Ro –Automobiles (nos)	1,49,899
Project Cargo (MTPA)	0.44
Break Bulk/general cargo (Barytes/Gypsum/Limestone/Granite/Steel Cargo) (MTPA)	1.82
Edible oil, CBFS, Base Oil, Lube Oil and Non-Hazardous Liquid Cargo (MTPA)	0.57
Total Handling Capacity at Port	24.65 MTPA

4. Based on the information furnished by the Project proponent and the EAC recommendations, the Ministry hereby bifurcates the Environmental & CRZ Clearance in to L&T Shipbuilding Limited (LTSB) and Marine Infrastructure Developer private Limited (MIDPL) for the development of proposed Shipyard-cum-Minor Port Complex at Kattupalli, Ponneri Taluka, Tiruvallur District Tamil Nadu subject to strict compliance of following specific and general conditions:

Specific Conditions:

- (i) The proponent shall comply all the conditions stipulated in the letter R.C No.P1/2004/2008, dated 21.10.2008 of Department of Environment, Chennai.
- (ii) The proponent shall comply all the commitment made vide his letter No. D/Shipyard/00/07 dated 20.03.2009.
- (iii) Provision shall be made for the housing of Construction labour within the site with all necessary infrastructure and facilities such as fuel or cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing

may be in the form of temporary structures to be removed after the completion of the project

- (iv) There shall be no withdrawal of groundwater in Coastal Regulation Zone area, for this project. In any case any ground water 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.
- (v) No dumping of dredging materials in the sea shall be undertaken. In case of sea dumping required, an integrated Modelling study to be carried out to locate the dump site so that it does not cause any problem to Ennore port.
- (vi) Shoreline changes due the project shall be monitored continuously nourishment of northern shoreline shall be carried out using the sediments from beach acceleration on the southern shoreline.
- (vii) Suitable Screens shall be installed between the construction area and the intakes so that operations of the intakes are not affected by the construction activity.
- (viii) At least a distance of 100 meter shall be provided between intake of Chennai Water Desalination Ltd. (CWDL) and north edge of the northern breakwater as agreed in the meeting between the proponent and CWDL
- (ix) An independent port connectivity shall be developed.
- (x) Rehabilitation if any shall be carried out as per law / State Government.
- (xi) Fire station shall be located within the project area
- (xii) The Hazardous waste generated shall be properly collected and handled as per the provisions of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- (xiii) The waste water generated from the activity shall be collected, treated and reused properly.
- (xiv) Sewage Treatment Facility should be provided in accordance with the CRZ Notification.
- (xv) No Solid Waste will be disposed of in the Coastal Regulatory Zone area. The Solid Waste shall be properly collected segregated and disposed as per the provision of Solid Waste Management Rules, 2016.
- (xvi) Installation and operation of DG set if any shall comply with the guidelines of CPCB.
- (xvii) There shall be no reclamation / dredging of areas.
- (xviii) Air quality including the VOC shall be monitored regularly as per the guidelines of CPCB and reported.
- (xix) The project proponent shall undertake green belt development all along the periphery of the project area and also alongside the road.
- (xx) All necessary clearances from the concerned agencies shall be obtained before initiating the project.

- (xxi) Project proponent shall install necessary oil spill mitigation measures in the shipyard. The details of the facilities provided shall be informed to this Ministry within 3 months from the date of receipt of this letter.
- (xxii) No hazardous chemicals shall be stored in the Coastal Regulation Zone area.
- (xxiii) The project shall not be commissioned till the requisite water supply and electricity to the project are provided by the PWD/ Electricity Department.
- (xxiv) Specific arrangements for rainwater harvesting shall be made in the project design and the rain water so harvested shall be optimally utilized.
- (xxv) The facilities to be constructed in the CRZ area as part of this project shall be strictly in conformity with the provisions of the CRZ Notification, 2011 and its amendment. The facilities such as office building and residential buildings which do not require water front and foreshore facilities shall not be constructed within the Coastal Regulation Zone area.

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 1991 & its amendments. All the construction designs /drawings relating to the proposed construction activities must have approvals of the concerned State Government Departments /Agencies.
- (ii) Adequate provisions for infrastructure facilities such as water supply, fuel, sanitation etc. shall be ensured for construction workers during the construction phase of the project so as to avoid felling of trees/mangroves and pollution of water and the surroundings.
- (iii) 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.
- (iv) 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 Tamil Nadu State Pollution Control Board before commissioning of the project and a copy of each of these shall be sent to this Ministry.
- (v) In order to carry out the environmental monitoring during the operational phase of the project, the project authorities shall establish an environmental laboratory well equipped with standard equipment and facilities and qualified manpower to carry out the testing of various environmental parameters.
- (vi) The proponents shall provide for a regular monitoring mechanism so as to ensure that the treated effluents conform to the prescribed standards. The

records of analysis reports must be properly maintained and made available for inspection to the concerned State/Central officials during their visits.

- (vii) The sand dunes and mangroves, if any, on the site shall not be disturbed in any way.
- (viii) A copy of the clearance letter will be marked to the concerned Panchayat / local NGO, if any, from whom any suggestion / representation has been received while processing the proposal.
- (ix) The Tamil Nadu Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Centre and Collector's Office/Tehsildars Office for 30 days.
- (x) The funds earmarked for environment protection measures shall be maintained, in a separate account and there shall be no diversion of these funds for any other purpose. A year-wise expenditure on Environmental safeguards shall be reported to this ministry
- (xi) Full support shall be extended to the officers (this Ministry's Regional Office at Chennai and the officers of the Central and State Pollution Control Boards by the project proponents during their inspection for monitoring purposes, by furnishing full details and action plans including the action taken reports in respect of mitigative measures and other environmental protection activities.
- (xii) In case of deviation or alteration in the project including the implementing agency, a fresh reference shall be made to this ministry for modification in the clearance conditions or imposition of new ones for ensuring environmental protection.
- (xiii) This Ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry.
- (xiv) This Ministry or any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environmental protection, which shall be complied with.
- (xv) The Project proponents shall inform the Regional Office at Chennai 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.

EC & CRZ Amendment letter No. 10-130/2007- A.III dated 12.05.2010

(2. Specific Conditions:)

- (i) The details of combined effect on both the Ports (i.e. Ennore Port and Kattupalli Port) shall be carried out to monitor the impact of the post-dumping. This model study shall be carried out for a period of one year.
- (ii) A comparison between model study and actual dumping shall be carried out to examine the impacts both on North-East and South-West of the Ports and shall be submitted to the Ministry,
- (iii) No reclamation of the areas outside the Port limit and Buckingham Canal shall

be carried out.

EC & CRZ Extension of validity letter No. 10-130/2007- A.III dated 17.12.2014

6. Conditions

- (i) The cargo should only include Container (i) 21.60 MTPA, (ii) Ro-Ro - 0.22 MTPA, (iii) Project Cargo 0.44 MTPA, (iv) Break bulk/General Cargo (Barites/Gypsum/Limestone/Granite/Steel cargo)-1.82 MTPA and (v) Edible oil, CFBS Base Oil and Lube oil and non-hazardous liquid cargo - 0.57 MTPA.
 - (ii) All the conditions stipulated by the Tamil Nadu Coastal Zone Management Authority (TNCZMA) vide letter no. 6064/EC.3/2014-1 dated 26.06.2014, shall be strictly complied with.
 - (iii) No additional land should be utilized for the proposed development.
 - (iv) As committed, the local traffic should not be disturbed.
5. These stipulations would be enforced among other 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, the Hazardous Chemical (Manufacture, Storage and Import) Rules, 1989, Solid Waste Management Rules, 2016 and the Coastal Regulation Zone Notification, 2011 and its subsequent amendments made there under from time to time.
 6. 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.
 7. The project proponent should advertise in at least two local newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental Clearance and copies of clearance letters are available with the Tamil Nadu Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at <http://envfor.nic.in>. The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Chennai.
 8. Any appeal against this Environmental Clearance shall lie with the National Environment Appellate Authority, if preferred, within a period of 30 day as prescribed under section 11 of the National Environment Appellate Act, 1997.
 9. Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.
 10. This Environmental and CRZ Clearance is valid till 2nd July, 2019.

11. This issues with the approval of the Competent Authority.


(Kushal Vashist)
Director

Copy to:

- 1) The Secretary, Department of Environment, No.1, Jeenis Road, Panagal Building, Ground Floor, Saidapet, Chennai-600 015.
- 2) Addl. Principal Chief Conservator of Forests (Central), Ministry of Environment, Forests and Climate Change, 1st and 11nd Floor, Handloom Export Promotion Council, 34, Cathedral Garden Road, Nungambakkam, Chennai-34.
- 3) The Chairman, Central Pollution Control Board Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, New Delhi - 110 032.
- 4) The Member Secretary, Tamil Nadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai - 600 032.
- 5) Monitoring Cell, MoEF&CC, Indira Paryavaran Bhavan, New Delhi.
- 6) Guard File/ Record File/ Notice Board.
- 7) MoEF&CC Website.


(Kushal Vashist)
Director

F. No.10-130/2007-IA.III
Government of India
Ministry of Environment & Forests
(IA-III Division)

Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi - 3

Date: 9th February, 2018

To,

Shri K. Venkatesh, Director
M/s L & T Ship Building Limited,
Ground Floor, TC-1 Building,
L&T Construction Complex,
Mount Poonamallee Road,
Manapakkam, Chennai - 600 089 (Tamil Nadu)

Subject: CRZ and Environmental Clearance for the development of proposed Shipyard-cum-Minor Port Complex at Kattupalli, Ponneri Taluka, Tiruvallur District, Tamil Nadu by M/s L&T Shipbuilding Limited - bifurcation of Environmental and CRZ Clearance reg.

Kindly refer to your online application vide proposal No. IA/TN/MIS/20243/1910 dated 27th May, 2017, submitted to this Ministry for bifurcation of Environmental and CRZ Clearance issued vide Letter No. 10-130/2007-IA.III dated July 03, 2009 in favor of M/s L & T Ship Building Limited (Joint venture of L&T and TIDCO) in terms of the provisions of the Environment Impact Assessment (EIA) Notification, 2006 and CRZ Notification, 2011 under the Environment (Protection) Act, 1986.

2. The proposal was considered by the EAC (Infra-2) in its 21st meeting held during 21-24 August, 2017 and 23rd meeting held on 13th October, 2017. It is inter-alia, noted that the Environmental and CRZ clearance for the development of Shipyard-cum-Minor Port Complex at Kattupalli village, Thiruvallur district, Tamil Nadu was granted to L&T Shipbuilding Limited (LTSB) vide Letter No. 10-130/2007-IA.III dated July 03, 2009. The project consists of shipbuilding, ship repair, modular fabrication facilities, port and associated infrastructure. The Kattupalli Shipyard cum Port Complex has become operational since January, 2013.

3. In considering the divergent nature of business of LTSB and to harness the potential for growth with clear focus on port business, LTSB had approached the Hon'ble National Company Law Tribunal (NCLT), Chennai with a Scheme of Arrangement for Demerger of Port business of LTSB into a separate company Viz., M/s Marine Infrastructure Developer private Limited (MIDPL). The Hon'ble NCLT after careful examination of the scheme, had accorded its approval on 20.03.2017. In pursuant to the said NCLT Order, the Port business in Kattupalli Shipyard cum Port Complex on a going concern basis together with the identified port assets, powers, sanctions, approvals, registrations etc., stands transferred and vested with MIDPL. The facilities to be operated by LTSB are given below:

(i) Shipbuilding (25 Ships per annum) and Ship Repair (60 Ships per Annum)

- (ii) Facilities such as South Breakwater, Ship lift, Outfitting Jetties, Dry berths, Various Shops including assembly shops, Scrap Yard, Blasting /Painting Bay, other various necessary infrastructure, utilities and services, Housing Colony etc., and
 - (iii) Modular Fabrication Facility (MFF) with Loading /Outfitting Jetties, quay wall, Work Zones, Spool Lay down Area, Various storage areas, P&M Stores and Maintenance, Various Shops including Blasting Painting Shops, other various necessary infrastructures, utilities and services etc.
 - (iv) Dredging of Shipyard/MFF area upto (-)15 m and Offshore dumping
Area: 892.11 Acres (830.25 Acres of Revenue Land and 61.86 Acres of Coastal land)
 - (v) The Permitted activities to be carried out by LTSB are as given below:
 - 1. Ship Building : 25 ships/Annum
 - 2. Ship Repair : 60 ships/Annum
 - 3. Modular Fabrication Facility: Raw Materials Receiving and Product Delivery Facility upto (-) 15 m draft and capacity of about 50,000 MT/Annum.
4. Based on the information furnished by the Project proponent and the EAC recommendations, the Ministry hereby bifurcates the Environmental & CRZ Clearance in to L&T Shipbuilding Limited (LTSB) and Marine Infrastructure Developer Private Limited (MIDPL) for the development of proposed Shipyard-cum-Minor Port Complex at Kattupalli, Ponneri Taluka, Tiruvallur District Tamil Nadu subject to strict compliance of following specific and general conditions:

Specific Conditions:

- (i) The proponent shall comply all the conditions stipulated in the letter R.C No.P1/2004/2008, dated 21.10.2008 of Department of Environment, Chennai.
- (ii) The proponent shall comply all the commitment made vide his letter No. D/Shipyard/00/07 dated 20.03.2009.
- (iii) Provision shall be made for the housing of Construction labour within the site with all necessary infrastructure and facilities such as fuel or cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project
- (iv) There shall be no withdrawal of groundwater in Coastal Regulation Zone area, for this project. In any case any ground water 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.
- (v) The paints based on 'primer non-toxic water organic co-polymer latish solvent free' shall be used to prevent VOC. No Tributyl Tin (TBT)based paints shall be used



- (vi) No dumping of dredging materials in the sea shall be undertaken. In case of sea dumping required, an integrated Modelling study to be carried out to locate the dump site so that it does not cause any problem to Ennore port.
- (vii) Suitable Screens shall be installed between the construction area and the intakes so that operations of the intakes are not affected by the construction activity.
- (viii) At least a distance of 100 meter shall be provided between intake of Chennai Water Desalination Ltd. (CWDL) and north edge of the northern breakwater as agreed in the meeting between the proponent and CWDL.
- (ix) Rehabilitation if any shall be carried out as per law / State Government.
- (x) Fire station shall be located within the project area
- (xi) The Hazardous waste generated shall be properly collected and handled as per the provisions of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- (xii) The waste water generated from the activity shall be collected, treated and reused properly.
- (xiii) Sewage Treatment Facility should be provided in accordance with the CRZ Notification.
- (xiv) No Solid Waste will be disposed of in the Coastal Regulatory Zone area. The Solid Waste shall be properly collected segregated and disposed as per the provision of Solid Waste Management Rules, 2016.
- (xv) Installation and operation of DG set if any shall comply with the guidelines of CPCB.
- (xvi) There shall be no reclamation / dredging of areas.
- (xvii) Air quality including the VOC shall be monitored regularly as per the guidelines of CPCB and reported.
- (xviii) The project proponent shall undertake green belt development all along the periphery of the project area and also alongside the road.
- (xix) All necessary clearances from the concerned agencies shall be obtained before initiating the project.
- (xx) Project proponent shall install necessary oil spill mitigation measures in the shipyard. The details of the facilities provided shall be informed to this Ministry within 3 months from the date of receipt of this letter.
- (xxi) No hazardous chemicals shall be stored in the Coastal Regulation Zone area.
- (xxii) The project shall not be commissioned till the requisite water supply and electricity to the project are provided by the PWD/ Electricity Department.
- (xxiii) Specific arrangements for rainwater harvesting shall be made in the project design and the rain water so harvested shall be optimally utilized.
- (xxiv) The facilities to be constructed in the CRZ area as part of this project shall be strictly in conformity with the provisions of the CRZ Notification, 2011 and its amendment. The facilities such as office building and residential buildings which

do not require water front and foreshore facilities shall not be constructed within the Coastal Regulation Zone area.

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 1991 & its amendments. All the construction designs /drawings relating to the proposed construction activities must have approvals of the concerned State Government Departments /Agencies.
- (ii) Adequate provisions for infrastructure facilities such as water supply, fuel, sanitation etc. shall be ensured for construction workers during the construction phase of the project so as to avoid felling of trees/mangroves and pollution of water and the surroundings.
- (iii) 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.
- (iv) 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 Tamil Nadu State Pollution Control Board before commissioning of the project and a copy of each of these shall be sent to this Ministry.
- (v) In order to carry out the environmental monitoring during the operational phase of the project, the project authorities shall establish an environmental laboratory well equipped with standard equipment and facilities and qualified manpower to carry out the testing of various environmental parameters.
- (vi) The proponents shall provide for a regular monitoring mechanism so as to ensure that the treated effluents conform to the prescribed standards. The records of analysis reports must be properly maintained and made available for inspection to the concerned State/Central officials during their visits.
- (vii) The sand dunes and mangroves, if any, on the site shall not be disturbed in any way.
- (viii) A copy of the clearance letter will be marked to the concerned Panchayat / local NGO, if any, from whom any suggestion / representation has been received while processing the proposal.
- (ix) The Tamil Nadu Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Centre and Collector's Office/Tehsildars Office for 30 days.
- (x) The funds earmarked for environment protection measures shall be maintained, in a separate account and there shall be no diversion of these funds for any other



purpose. A year-wise expenditure on Environmental safeguards shall be reported to this ministry

- (xi) Full support shall be extended to the officers (this Ministry's Regional Office at Chennai and the officers of the Central and State Pollution Control Boards by the project proponents during their inspection for monitoring purposes, by furnishing full details and action plans including the action taken reports in respect of mitigative measures and other environmental protection activities.
- (xii) In case of deviation or alteration in the project including the implementing agency, a fresh reference shall be made to this ministry for modification in the clearance conditions or imposition of new ones for ensuring environmental protection.
- (xiii) This Ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry.
- (xiv) This Ministry or any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environmental protection, which shall be complied with.
- (xv) The Project proponents shall inform the Regional Office at Chennai 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.

EC & CRZ Amendment letter No. 10-130/2007- A.III dated 12.05.2010

(2. Specific Conditions:)

- (i) The details of combined effect on both the Ports (i.e. Ennore Port and Kattupalli Port) shall be carried out to monitor the impact of the post-dumping. This model study shall be carried out for a period of one year.
 - (ii) A comparison between model study and actual dumping shall be carried out to examine the impacts both on North-East and South-West of the Ports and shall be submitted to the Ministry,
 - (iii) No reclamation of the areas outside the Port limit and Buckingham Canal shall be carried out.
 - (xxv) These stipulations would be enforced among other 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, the Hazardous Chemical (Manufacture, Storage and Import) Rules, 1989, Solid Waste Management Rules, 2016 and the Coastal Regulation Zone Notification, 2011 and its subsequent amendments made there under from time to time.
5. 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



6. The project proponent should advertise in at least two local newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental Clearance and copies of clearance letters are available with the Tamil Nadu Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at <http://envfor.nic.in>. The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Chennai.
7. Any appeal against this Environmental Clearance shall lie with the National Environment Appellate Authority, if preferred, within a period of 30 day as prescribed under section 11 of the National Environment Appellate Act, 1997.
8. Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.
9. This Environmental and CRZ Clearance is valid till 2nd July, 2019.
10. This issues with the approval of the Competent Authority.


(Kushal Vashist)
Director

Copy to:

- 1) The Secretary, Department of Environment, No.1, Jeenis Road, Panagal Building, Ground Floor, Saidapet, Chennai-600 015.
- 2) Addl. Principal Chief Conservator of Forests (Central), Ministry of Environment, Forests and Climate Change, 1st and 11nd Floor, Handloom Export Promotion Council, 34, Cathedral Garden Road, Nungambakkam, Chennai-34.
- 3) The Chairman, Central Pollution Control Board Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, New Delhi - 110 032.
- 4) The Member Secretary, Tamil Nadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai - 600 032.
- 5) Monitoring Cell, MoEF&CC, Indira Paryavaran Bhavan, New Delhi.
- 6) Guard File/ Record File/ Notice Board.
- 7) MoEF&CC Website.


(Kushal Vashist)
Director

APPENDIX A5
RAIL EC DATED 02.12.2019

F.No.11-22/2019-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA.III Section)

Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi-3
Dated: 2nd December, 2019

To,

M/s Marine Infrastructure Developer Pvt. Ltd (MIDPL),
Kattupalli Port, Katupalli village,
Ponneri Taluk, Tiruvallur - 600120,
Tamil Nadu

Sub: CRZ Clearance for development of rail corridor at Kattupalli Port at Katupalli village, Ponneri Taluk, Tiruvallur District, Tamil Nadu - reg.

Sir,

This has reference to your online proposal No. IA/TN/CRZ/110252/2019 received in this Ministry for CRZ Clearance of the above mentioned project proposal, in accordance with the provisions of the Coastal Regulation Zone (CRZ) Notification, 2011 issued under the Environment (Protection) Act, 1986.

2. The proposal was considered by the Expert Appraisal Committee (EAC) for Infrastructure Development, Coastal Regulation Zone, Building/ Construction and Miscellaneous projects, in its 219th, 221st & 224th meetings held on 25.07.2019, 19.08.2019 & 24.09.2019 respectively. The details of the project as per the documents submitted and presented during the aforesaid meeting are as under:

- (i) MIDPL, intends to develop a rail corridor for the port facility for handling port cargoes by connecting the existing port facility to the nearest existing rail connectivity that connects the Kamaraj Port to the Southern Railway line (Chennai-Gudur). The proposed rail corridor will be developed and operated by MIDPL.
- (ii) The rail corridor will be developed parallel to the Buckingham Canal on the eastern side by replacing the existing Kattupalli road and a new road connectivity will be developed east of the proposed rail corridor by shifting the KPL Port boundary to further east.
- (iii) The proposed rail corridor partly falls under CRZ-I(A), CRZ-I(B), CRZ-II, CRZ-III and CRZ-IV(B) as per CRZ Notification, 2011.
- (iv) No forest land is involved along the project route. About 2.5% area of activity in mangrove buffer zone is involved.
- (v) There are no ESA/marine park etc. within 10km of the proposed alignment.
- (vi) As part of the proposed development, Railway Yard (including R&D yard facility) will also be developed within the MIDPL port facility with associated supporting facilities.



- (vii) The salient features of the proposed rail corridor is given in the below mentioned table:

S.N	Description	Details
1.	Proposed connectivity/serving points	Existing MIDPL to existing Rail connectivity of Kamarajar Port
2.	Design Axle Load	25 tonnes
3.	Length of corridor	6.08 km
4.	Gauge	Broad Gauge (1676 mm)
5.	Ruling gradient	1 in 150
6.	Number of curves	17 nos.
7.	Bridges (including pipe/box culverts, steel girder bridges)	14 nos.
8.	Number of level crossings	2 nos.
9.	Details of rails	60 kg rail
10.	Details of sleepers	PSC sleeper with 1540 sleeper density
11.	Details of ballast	65mm size track ballast of 300mm cushion
12.	Points and crossings	Fan shaped curved switches as per latest RDSO design
13.	Signaling arrangements at serving points and proposed crossings	Not interlocked
14.	OHE and Traction	Electrified

- (viii) A new road network will be developed parallelly along the proposed rail corridor on the eastern side upto Tamil Nadu Industrial Development Corporation (TIDCO) road by shifting Kamarajar Port Boundary wall to further east which can be used for both public and port traffic activity.
- (ix) As part of the development, two level crossing and 14 bridges/culverts are proposed to have suitable cross drainage and underground pipelines.
- (x) Reception & Dispatch (R&D) yard is proposed to be developed at Ch.3842m an R&D yard is proposed with 4 lines of conventional full rake of length at 6 m c/c distance. Also, an IMWB (In-Motion Weigh Bridge) is proposed before the yard entry at CH.3700m which will be linked to FOID (Freight Operations Information System).
- (xi) Handling yard is proposed to be developed at Ch.5355m. The handling yard consist of three handling lines of conventional full rake length for handling Container, Fertilizer and agro products, coal and minerals etc. The proposed handling yard ends at Ch.6084.01m inside the port area. The following facilities that will be developed inside the handling yard viz:
- Coal handling – 1 line of conventional full rake length with manual Handling by Pay Loader/Mechanised Handling by Wagon Loader
 - Fertilizer handling – 1 Line of conventional full rake length with Manual Handling/Mechanised Handling

- Container handling yard – 1 lines of conventional full rake length with Manual handling by Reach Stacker
 - R&D yard – 4 lines (line no. 1 to 4) of conventional full rake length.
 - BV siding – 2 nos.
 - Development of 2nos. of In-Motion Weigh Bridge (IMWB). One for coal correction inside the R&D Yard and another for IMWB as a common facility for all the lines before the take-off point of R&D yard with associated FOIS building.
 - Construction of new operation/commercial building of approx. 200m2 with sanitation facility for railway crew and guard will be developed.
 - All R&D lines are proposed to be electrified with conventional OHE and handling lines are proposed to be top wired.
 - Necessary signaling and OHE arrangements for efficient operations on proposed railway line will be provided in consultation with Southern Railways.
- (xii) The proposed rail corridor will be developed over an area of 31.175 Ha. The land breakup details of the same are presented in below table:

S.No	Land Details	Area in "Ha"
1.	MIDPL Port Land	1.295
2.	LTSB Land	22.66
3.	Other Industrial Land	6.9
4.	TIDCO Land	0.32
Total Land Area		31.175

- (xiii) The power requirement of 8.11kW for the construction phase will be sourced from the existing power supply of 2500kVA from Tamil Nadu Electricity Board (TNEB). For the operation phase, additional 25kV of 50Hz Single Phase of power will be sourced from TNEB.
- (xiv) The existing water requirement of 60KLD is sourced from Chennai Metro Water Supply and Sewerage Board (CMWSSB). The same will be utilized for construction and operation phase of the proposed project. The water demand for the proposed project during construction phase will be app. 2.92 ML. No additional water will be sourced for proposed rail corridor during operation phase. No ground water withdrawal will be undertaken for sourcing water for the project requirement.
- (xv) The proposed project will cater to the direct and indirect employment potential to the average level of about 400 peoples.
- (xvi) The proposed project will be developed with above developments by the estimated cost of Rs 51.806 Crores.
- (xvii) The Tamil Nadu Coastal Zone Management Authority has recommended the above proposal for clearance vide their letter No. 9561/EC.3/2019-1, dated 20.06.2019.



3. Based on the recommendation of the Tamil Nadu Coastal Zone Management Authority issued vide its letter No. 9561/EC.3/2019-1, dated 20.06.2019, and information submitted as at para no. 2 above and information provided during the presentation before the Expert Appraisal Committee and others, the Ministry of Environment, Forest and Climate Change, in acceptance of the recommendation of the Expert Appraisal Committee (CRZ), hereby accords CRZ Clearance to the above project viz 'Development of rail corridor at Kattupalli Port at Katupalli village, Ponneri Taluk, Tiruvallur District, Tamil Nadu', under the provision of CRZ Notification, 2011 and amendments thereto and circulars issued thereon, and subject to compliance of the following specific and general conditions as under:

PART A – SPECIFIC CONDITIONS:

- (i) A revised and robust conservation, plantation of native mangroves and management plan for immediate implementation in consultation with the concerned agency in the State shall be prepared within six months and implemented during the course of execution of the project.
- (ii) No groundwater shall be extracted to meet with the water requirements during the construction and/or operation phase of the project.
- (iii) Construction camps (if any) shall be located outside the CRZ areas and any physical infrastructure setup during construction shall be removed within a month of completion of the project.
- (iv) As per the Ministry's Office Memorandum F.No. 22-65/2017-IA.III dated 1st May, 2018, and proposed by the project proponent, an amount of Rs. 1.03 crores i.e @2% of project Cost) shall be earmarked under Corporate Environment Responsibility (CER) for the activities such as support to local government, schools, sanitation and health including construction of public toilets in the surrounding villages, as per need based assessment carried out. The activities proposed under CER shall be restricted to the affected area around the project.
- (v) No construction (including cemented/concretised parking space for vehicles) shall be made in the NDZ area.
- (vi) Management of solid waste in accordance with the Solid Waste Management Rules, 2016 shall be strictly implemented.
- (vii) All conditions/recommendations stipulated by the Tamil Nadu Coastal Zone Management Authority (TNCZMA) vide their letter No. 9561/EC.3/2019-1, dated 20.06.2019, shall strictly be complied with.
- (viii) 'Consent to Establish' and /or 'Consent to Operate' shall be obtained from State Pollution Control Board under the provisions of Air (Prevention and Control of

Pollution) Act, 1981 and / or the Water (Prevention and Control of Pollution) Act, 1974, as may be applicable.

- (ix) There shall be no dressing or alteration of the sand dunes present in the vicinity and the same shall be kept undisturbed. No alteration of natural features including landscape changes shall be undertaken for beautification, recreation and other such purpose.
- (x) Construction shall be strictly in accordance with the provisions of CRZ Notification, 2011 and as amended from time to time.
- (xi) No permanent labour camp, machinery and material storage shall be allowed in CRZ area.
- (xii) Temporary toilets will be provided for all construction labour. Suitable toilet fixtures for water conservation shall be provided. Fixtures for showers, toilet flushing and drinking should be of low flow either by use of aerators or pressure reducing devices or sensor based control.
- (xiii) Disposal of muck during construction phase should not create any adverse effect on the neighbouring communities and be disposed taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.
- (xiv) All liquid waste arising from the proposed development will be disposed of as per the norms prescribed by Central/State Pollution Control Board. There shall not be any disposal of untreated effluent into the sea/coastal water bodies. It shall be ensured that the wastewater generated is treated in the STP as committed by the project proponent. The treated waste water shall be reused for landscaping, flushing and / or HVAC cooling purposes etc. within the development. The project proponent should also make alternate arrangement for situation arising due to malfunctioning of STP. There shall be regular monitoring of standard parameters of the effluent discharge from STP under intimation to the SPCB.
- (xv) Any hazardous waste generated during construction phase, shall be disposed off as per applicable rules and norms with necessary approvals of the State Pollution Control Board.
- (xvi) Project Proponent shall ensure regular operation and maintenance of the STP to meet the effluent discharge standards laid down under the rules and should also meet conditions (if any) stipulated in Consent to Establish and Consent to Operate.
- (xvii) Ambient noise levels should conform to residential standards both during day and night as per Noise Pollution (Control and Regulation) Rules, 2000.



Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the ambient noise standards.

- (xviii) Diesel power generating sets proposed as source of back-up power should conform to rules notified under the Environment (Protection) Act, 1986 for diesel generator sets.
- (xix) Energy conservation measures like installation of CFLs/TFLs for the lighting the areas outside the building should be integral part of the project design and should be in place before project commissioning. Used CFLs and TFLs should be properly collected and disposed off/sent for recycling as per the prevailing guidelines/rules of the regulatory authority to avoid mercury contamination. Use of solar panels may be done to the extent possible.

PART B - GENERAL CONDITIONS:

- (i) A copy of the clearance letter shall be uploaded on the website of the concerned State Coastal Zone Management Authority/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.
- (ii) A six-monthly monitoring report shall need to be submitted by the project proponent to the concerned regional Office of this Ministry regarding the implementation of the stipulated conditions.
- (iii) The Ministry of Environment, Forest & 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.
- (iv) Concealing factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986.
- (v) The above stipulations would be enforced among others under the provisions of the 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, the EIA Notification, 2006 and the extant CRZ regulations.
- (vi) Full co-operation shall be extended to the officials from the Regional Office of MoEF&CC, during monitoring of implementation of environmental safeguards stipulated. It shall be ensured that documents/data sought pertinent is made available to the monitoring team. A complete set of all the documents submitted

to MoEF&CC shall be forwarded to the concerned Regional Office of MoEF&CC.

- (vii) In the case of any change(s) in the scope of the project, the project would require a fresh appraisal by this Ministry.
- (viii) The Ministry reserves the right to add additional safeguard measures subsequently, if considered necessary, and to take action to ensure effective implementation of the suggested safeguard measures in a time bound and satisfactory manner, including revoking of the environment clearance under the provisions of the Environmental (Protection) Act, 1986, for non compliance.
- (ix) 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 proponent from the respective competent authorities.
- (x) The project proponent should 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 CRZ Clearance and copies of clearance letters are available with the State Pollution Control Board (SPCB) 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 concerned Regional Office of this Ministry.

4. 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.


5. 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.

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.

7. The proponent shall upload the status of compliance of the stipulated 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.



8. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of clearance conditions and shall also be sent to the respective Regional Office of the Ministry by e-mail.


(W. Bharat Singh)
Director (CRZ)

Copy to:

1. The Principal Secretary, Environment & Forests Department (EC-3), Government of Tamil Nadu, Secretariat, Chennai - 600 009
2. The Chairman, Tamil Nadu Coastal Zone Management Authority, Environment & Forests Department (EC-3), Government of Tamil Nadu, Secretariat, Chennai - 600 009
3. The Member Secretary, Central Pollution Control Board, Parivesh Bhavan, CBD cum Office Complex, East Arjun Nagar, Delhi - 32
4. The Member Secretary, Tamil Nadu Pollution Control Board, No. 76, Anna Salai, Guindy Industrial Estate, Race View Colony, Guindy, Chennai - 600 032
5. The Member Secretary, Tamil Nadu Coastal Zone Management Authority, Department of Environment, No.1, Jeenis Road, Panagal Building, Ground Floor, Saidapet, Chennai - 600 015
6. The Deputy Director General of Forests (C), Ministry of Environment, Forest and Climate Change, Regional Office (SEZ), I and II Floor, Handloom Export Promotion Council, 34, Cathedral Garden Road, Nungambakkam, Chennai - 34
7. Guard File/ Record File/ Monitoring Cell.


(W. Bharat Singh)
Director (CRZ)

APPENDIX A6
NO INCREASE IN POLLUTION LOAD
CERTIFICATE



Teoh

TAMILNADU POLLUTION CONTROL BOARD

From

Dr. S. Selvan, M.E, M.B.A, Ph.D,
Member Secretary (i/c),
Tamil Nadu Pollution Control Board,
76, Mount Salai,
Guindy, Chennai – 600 032

To

The Director,
M/s. Marine Infrastructure Developer Private Limited ,
S.F.No. 14-18B, Kattupalli Village,
Ponneri Taluk,
Tiruvallur District – 600 120

Lr. No: T1/TNPCB/ F.022882/RL/GMP/NIPL/2021 Dated:12.01.2021

Sir,

Sub: TNPC Board – Industries – M/s. Marine Infrastructure Developer Private Limited, SF.No.14-18B,15, etc., Kattupalli Village, Ponneri Taluk, Tiruvallur District – Pollution Load Assesment Committee (PLAC) Decision – Intimation –Reg.

- Ref:** 1. Your application submitted for requesting “No Increase in Pollution Load Certificate” dated 16.11.2020.
2. Pollution Load Assessment committee meeting held on 29.12.2020

In connection with your application dated.16.11.2020 and technical presentation made before the Pollution Load Assessment Committee meeting held on 29.12.2020, it is hereby informed that the Pollution Load Assessment Committee decided to certify that there is no increase in pollution load due to the proposed change in “Cargo Mix” by the unit. Hence the request of the unit to issue “ No increase in Pollution Load Certificate” shall be considered by TNPCB subject to the following conditions,

1. The unit shall comply with all the conditions imposed in the CRZ & Environment Clearance issued by MoEF vide letter Dated: 09.02.2018 and consent order conditions.
2. The unit shall follow and implement the recommendations of the Centre for Environmental Studies, Anna University, Chennai to attain no increase in Pollution Load due to the additional handling of Rock Phosphate, Dolomite, Bauxite Cargos and increase the Non-Hazardous Liquid Cargo capacity from 0.57 MMTPA to 0.72 MMTPA by optimally deploying the port infrastructure being developed without change in the overall handling capacity approved in the EC & CRZ by MoEF & CC.
3. The unit shall provide modified Effluent Treatment Plant for 150 KLD as per consented quantity considering the revised characteristics of trade effluent due to change in cargo mix.

POLLUTION PREVENTION PAYS



TAMILNADU POLLUTION CONTROL BOARD

4. The unit shall operate the existing Effluent Treatment Plant (50 KLD) without keeping idle by using rain/storm water to safeguard the components of Effluent Treatment Plant and to maintain the same in operational condition.
5. The unit shall comply with all existing norms of emission as well as changes if any made by authorities like MoEF &CC, CPCB and TNPCB from time to time.
6. The unit shall comply with all the conditions imposed by the TNPCB in the consent order when granted.
7. The unit shall not go for any expansion or installation of new machineries without prior consent of TNPCB.
8. The unit shall furnish undertaking not to carry out any additional construction/infrastructure development activities for handling of the proposed Change in cargo Mix.
9. There shall be no reclamation/dredging of areas as per CRZ & Environment Clearance issued by MoEF vide letter Dated: 09.02.2018.
10. The unit shall ensure that there shall be no additional construction and man power by virtue of the proposed change in cargo mix.
11. The unit to ensure that there shall not be any increase in pollution load due to this cargo mix during its operation.

Based on the above decision, the unit shall apply for consent through OCMMS for its proposed product mix by the unit.


For Member Secretary

Copy to:

1. Joint Chief Environmental Engineer (Monitoring),
Tamil Nadu Pollution Control Board,
Chennai – **Requested to periodically monitor the operation of the unit to ensure real time pollution load.**
2. The District Environmental Engineer,
Tamil Nadu Pollution Control Board,
Gummidipoondi.

Copy

APPENDIX A7
EC AMENDMENT DATED
10.10.2022



Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

To,

The Head - Environment
MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED
Marine Infrastructure Developer Private Limited, Kattupalli village, Ponneri
Taluk, Thiruvallur, Tamil Nadu India,,Tiruvallur,Tamil Nadu-600120

Subject: Grant of Environmental Clearance (EC) to the proposed Project Activity
under the provision of EIA Notification 2006-regarding

Sir/Madam,

This is in reference to your application for Environmental Clearance (EC)
in respect of project submitted to the Ministry vide proposal number
IA/TN/NCP/284080/2022 dated 19 Jul 2022. The particulars of the environmental
clearance granted to the project are as below.

- | | |
|---|---|
| 1. EC Identification No. | EC22A033TN110498 |
| 2. File No. | 10-130/2007-IA.III |
| 3. Project Type | ProductMix7 |
| 4. Category | A |
| 5. Project/Activity including
Schedule No. | 7(e) Ports, Harbours |
| 6. Name of Project | Change in Product Mix Under Clause 7
(ii) of EIA Notification 2006 (as amended)
in Environment & CRZ Clearance for
Kattupalli Port at Kattupalli, Ponneri
Taluka, Tiruvallur District, Tamil Nadu |
| 7. Name of Company/Organization | MARINE INFRASTRUCTURE
DEVELOPER PRIVATE LIMITED |
| 8. Location of Project | Tamil Nadu |
| 9. TOR Date | N/A |

The project details along with terms and conditions are appended herewith from page
no 2 onwards.

Date: 10/10/2022

(e-signed)
Amardeep Raju
Scientist E
IA - (INFRA-1 sector)

*Note: A valid environmental clearance shall be one that has EC identification
number & E-Sign generated from PARIVESH. Please quote identification
number in all future correspondence.*

This is a computer generated cover page.

2. The above mentioned proposal was considered by the Expert Appraisal Committee (EAC) for Infrastructure, CRZ and other miscellaneous projects in its 306th EAC meeting held during 22nd -23rd August, 2022, in the Ministry of Environment, Forest and Climate Change, New Delhi.

3. The project proponent along with EIA consultant M/s L&T Infrastructure Engineering Ltd. made a presentation through Video Conferencing and submitted the following information. The proposed project falls under 7(e), Category-A, Ports & harbors as per EIA notification 2006. The project cost is about Rs. 1546.45 Crores.

4. Initially, L&T Ship Building Limited (LTSB) has obtained EC & CRZ clearance for Shipyard cum Port Complex at Kattupalli, Thiruvallur District, Tamil Nadu vide Letter No. 10-130/2007-IA.III, dated July 03, 2009. Tamil Nadu Pollution Control Board (TNPCB) has accorded Consent to Establish (CTE) vide letter dated August 18, 2009. LTSB obtained amendment for dredging and dumping from MoEF&CC vide Letter No. 10-130/2007-IA.III, dated May 12, 2010. LTSB commenced the construction in October, 2009. Consent to Operate (CTO) was also obtained from TNPCB vide letter dated November 16, 2012 and the same is being renewed regularly. LTSB has commissioned its operations on January 30, 2013. LTSB obtained amendment to handle revised cargo traffic at the Kattupalli Port in EC & CRZ clearance along with extension of validity from MoEF&CC vide Letter No. 10-130/2007-IA.III, dated December 17, 2014. Thereafter Environmental and CRZ Clearance bifurcation completed on mutually acceptable division of responsibilities between LTSB & MIDPL and bifurcated EC was granted to MIDPL vide letter no. F. No.10-130/2007-IA.III dated February 9, 2018.

5. Now MIDPL applied for modification in environmental clearance under clause 7(ii) of EIA Notification, 2006 for change in configuration by modification within the approved cargo handling capacity of 24.65 MTPA and cargo profile. Stating that Considering the future business/market potential and keen interest shown by the major suppliers and major importers, MIDPL is proposing to strengthen their traffic by Changing the Product Mix to cater the needs of port users under the approved cargo category/profile without change in the overall handling capacity of 24.65 MTPA as approved in the Environment and CRZ clearance by MoEF&CC. The details of existing approved handling capacity and proposed changes requested is given below:

Name of the cargo	Existing Cargo Mix	Existing Cargo (MTPA) (Consented Quantity)	Final handling Capacity after amendment (MTPA)	Final Cargo Mix after amendment
Containers	Containers	21.60	16.64	Containers
Ro-Ro–Automobiles	Ro-Ro–Automobiles	0.07	0.07	Ro-Ro –Automobiles
Project Cargo	Project Cargo	0.44	0.44	Project Cargo
Break Bulk/General cargo	Barytes/Gypsu m/Limestone/ Granite/Steel Cargo/Rock Phosphate/Dolo	1.82	5.00	Barytes/Gypsum/ Limestone/Granite/ Steel Cargo/Rock Phosphate/Dolomite/ Bauxite and additional

	omite/Bauxite			handling of Agricultural Products, Fertilizers, Scrap, Soda Ash, Pig Iron, Sponge Iron, Iron products, Bentonite, Silica Sand, Clinker, Feldspar Cargos, Aluminium Ingots, Salt, Laterite, Magnesite, Cobble Stones, Cement, Piperine, Food grains including pulses, Sugar and other clean cargo under Break Bulk / General Cargo,
Non-Hazardous Liquid Cargo	Edible oil, CBFS, Base Oil, Lube Oil	0.72	2.50	Edible oil, CBFS, Base Oil, Lube Oil and additional handling of cargos Glycerine, Crude Glycerine, Fatty Acid, Mineral Oil-Light, Heavy White Oil, Tall Oil Fatty Acids, 2- Propyl Heptanol (2-PH), Di Octyl Phthalate, Bio Diesel, Castor Oil, Molasses, Oleic Acid (Composition: Oleic Acid- 70-100% By Weight Or Fatty Acids: C16-18 And C18-Unsaturated), Palm Kernel Fatty Acid, RBD Hard Palm Stearin and other Non-Hazardous Cargo.
Total Handling Capacity at Port.		24.65	24.65	

6. The certified compliance report submitted by the Ministry's regional office at Chennai vide letter dated 30/31.05.2022. The committee noted that the instant proposal has submitted under provision of para 7(ii) of the EIA notification, 2006, therefore the committee deliberated the compliance status of the earlier EC submitted by PP and found in order.



7. The total land area for the project is 336.75 Acres (321.75 Acres of Revenue Land and 15.0 Acres of Coastal land). The proposed activities will be within the existing capacity. No additional marine infrastructure such as berths, capital dredging, breakwater, reclamation is proposed as existing infrastructure is adequate to meet the requirements of proposed change in product mix. No additional land is proposed as sufficient land is available within already approved port boundary. Proposal is for the change in product mix within the approved cargo handling capacity of 24.65 MTPA and cargo profile (Containers, Ro-Ro – Automobiles, Project Cargo, Break Bulk/ General cargo and Non – Hazardous Liquid Cargo). No increase in total Cargo Handling Capacity and no change cargo profile. Extension of storage areas are in the non-CRZ area within the approved existing land. As such, no revision in the port layout is envisaged due to handling of the proposed cargo.

8. The EAC, based on the information submitted and clarifications provided by the project proponent, and detailed discussions held on all issues during 306th EAC meeting on 22nd – 23rd August, 2022 and **recommended** the project for grant of modification in Environmental Clearance under clause 7(ii) of EIA notification, 2006 for change in configuration by modification within the approved cargo handling capacity of 24.65 MTPA and cargo profile with stipulated specific conditions along with all other terms and conditions mentioned in the EC letter dated December 17, 2014.

9. The Ministry of Environment Forest and Climate change has considered the proposal based on the recommendations of the Expert Appraisal Committee (Infrastructure CRZ and Other Miscellaneous projects) and hereby decided to grant of modification in Environmental Clearance under clause 7(ii) of EIA notification, 2006 as amendment for change in configuration mentioned below by modification w.r.t. following within the approved cargo handling capacity of 24.65 MTPA and cargo profile.

Name of the cargo	Existing Cargo (MTPA) (Consented Quantity)	Final handling Capacity after amendment (MTPA)	Final Cargo Mix after amendment
Containers	21.60	16.64	Containers
Ro-Ro–Automobiles	0.07	0.07	Ro-Ro –Automobiles
Project Cargo	0.44	0.44	Project Cargo
Break Bulk/General cargo	1.82	5.00	Barytes/Gypsum/ Limestone/Granite/ Steel Cargo/Rock Phosphate/Dolomite/ Bauxite and additional handling of Agricultural Products, Fertilizers, Scrap, Soda Ash, Pig Iron, Sponge Iron , Iron products, Bentonite, Silica Sand, Clinker, Feldspar Cargos, Aluminium Ingots, Salt, Laterite, Magnesite, Cobble Stones, Cement, Piperine, Food grains including pulses, Sugar

			and other clean cargo under Break Bulk / General Cargo,
Non-Hazardous Liquid Cargo	0.72	2.50	Edible oil, CBFS, Base Oil, Lube Oil and additional handling of cargos Glycerine, Crude Glycerine, Fatty Acid, Mineral Oil-Light, Heavy White Oil, Tall Oil Fatty Acids, 2-Propyl Heptanol (2-PH), Di Octyl Phthalate, Bio Diesel, Castor Oil, Molasses, Oleic Acid (Composition: Oleic Acid-70-100% By Weight Or Fatty Acids: C16-18 And C18-Unsaturated), Palm Kernel Fatty Acid, RBD Hard Palm Stearin and other Non-Hazardous Cargo.
Total Handling Capacity at Port.	24.65	24.65	-

10. The above mentioned modifications mentioned at Para. 9 are subject to strict compliance of the following specific conditions and conditions mentioned in the EC letter dated 9th February, 2018.

- i. The greenbelt at least 5 to 10 m width shall be developed mainly along the periphery of the project. Selection of plant species will be purely native in nature and shall be as per the CPCB guidelines in consultation with the state Forest Department.
- ii. PP shall make additional arrangement if required for protection of possible fire hazards during material handling. Fire fighting system shall be as per the norms.
- iii. All other terms and conditions prescribed in the environmental clearance vide letter no. F. No.10-130/2007-IA.III dated February 9, 2018 remains unchanged.

This issues with the approval of the Competent Authority.



(Amardeep Raju)
Scientist-E

Copy to:

1. The Secretary, Department of Environment and Climate Change, Govt. of Tamil Nadu, No.1, Jeenis Road, Panagal Building, Ground Floor, Saidapet, Chennai-600 015.

2. Addl. Principal Chief Conservator of Forests (C), Ministry of Env., Forest and Climate Change, Regional Office (SEZ), Ist and IInd Floor, Handloom Export Promotion Council, 34, Cathedral Garden Road, Nungambakkam, Chennai – 34.
3. The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi–32.
4. The Member secretary, Tamil Nadu Pollution Control Board, No.76, Mount Salai, Guindy, Chennai-600032.
5. Monitoring Cell, MoEF&CC, Indira Paryavaran Bhavan, New Delhi.
6. Guard File/Record File.
7. Notice Board.



(Amardeep Raju)
Scientist-E

APPENDIX A8
CONSENT TO ESTABLISH FROM
TNPCB (AIR)



TAMILNADU POLLUTION CONTROL BOARD

CONSENT ORDER NO: 4983 DATED :18.8.09

PROCEEDINGS NO: T12/TNPCB/F-19452/AMB-TLR/RL/A/09 DATED :18.08.2009

Sub: TNPC Board-Consent for Establishment - **M/s. L&T Shipbuilding Limited**, S.F.No. 2/1, 4, 7/1,2A,2B,3A1,3A2,3A3&3Bpt, 9/1&2,18, 19, etc., Kattupalli village, Ponneri Taluk, Thiruvallur District for the establishment or take steps to establish the industry under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981, as amended in 1987

Ref: 1. Your Application No: 1549 Dated: 30.06.2009.
2. DEE IR No:F-AMB1584/RL-213/DEE/AMB/2009 Dated: 30.06.2009.
3. G.O.Ms.No.9(MIE-I) Dated: 23.01.2008.
4. Unit's Presentation on 14.08.09.

Consent to establish or take steps to establish is hereby granted under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981, as amended in 1987 and the Rules and Orders made there under to

The Director,

M/s. L&T Shipbuilding Limited,

(hereinafter referred to as 'The Applicant') authorizing him/her/them to establish or take steps to establish the industry in the site mentioned below:

S.F.No. 2/1, 4, 7/1,2A,2B,3A1,3A2,3A3&3Bpt, 9/1&2,18, 19, etc.,
Kattupalli village ,
Ponneri Taluk,
Thiruvallur District.



TAMILNADU POLLUTION CONTROL BOARD

This Consent to establish is valid for **two years**, or till the industry obtains consent to operate under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981, as amended in 1987 whichever is earlier subject to special and general conditions enclosed.

Sd/*****
CHAIRMAN
TAMILNADU POLLUTION CONTROL BOARD,
CHENNAI

To
The Director,
M/s. L&T Shipbuilding Limited,
L&T Chennai House,
No.10, Club House Road,
Anna salai,
Chennai – 600 002.

Copy to:

- (1) The District Environmental Engineer,
Tamil Nadu Pollution Control Board,
Ambattur
- (2) The Commissioner,
Minjur Panchayat Union.
- (3) BMS
- (4) Spare

//Forwarded by Order//


For CHAIRMAN.

19.8 vm



TAMILNADU POLLUTION CONTROL BOARD

SPECIAL CONDITIONS

1. This consent to establish is valid for establishing the facility for the manufacture of products/byproducts (Col. 2) at the rate (Col 3) mentioned below. Any change in the product/byproduct and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl.No	Description	Quantity /Month
	Products	
1.	Ship Building	29 ships per annum
2.	Ship Repairing	60 ships per annum
3.	Handling Container	2 million TEU/Annum
4.	Steel cargo	5,00,000 Tonns /Annum
5.	Project cargo & Break cargo	5,00,000 Tonns/Annum
	Byproduct - Nil	

2. This consent to establish is valid for establishing the facility with the below mentioned emission/noise sources along with the control measures and/or stack .Any change in the emission source/control measures/change in stack height has to be brought to the notice of the Board and fresh consent has to be obtained if necessary.

Sl. No	Source	Air pollution Control measures	Stack height in 'm'	Additional facilities to be provided	Maximum discharge in m3/Hr
I	Point source				
1-4	D.G set 1250 KVA-4nos	Stack	34 m each		
5-16	Painting Section (12 stacks)	Stacks	17m each		
17-22	Blasting section(6 stacks)	Pulse jet bag filter with stack	17 m each		
II.	Fugitive Emissions				
III.	Noise	Adequate Acoustic Measures	-	-	-



TAMILNADU POLLUTION CONTROL BOARD

Additional conditions:

3. The unit shall implement Environmental Management Plan as envisaged under Environmental Impact Assessment Study as per Environmental Impact Assessment Notification 2006, by Ministry of Environment of Forests, Government of India.
4. The unit has to implement and comply the conditions imposed in the Environmental Clearance issued vide No.10-130/2007-IA-III dated 03.07.2009 by the Ministry of Environment and Forests, Government of India.
5. The unit shall provide suitable air pollution control measures such as cyclone with dust collection system to the blasting, and fume extraction with scrubber for the welding section so as to bring the quality of emission to satisfy by the standards prescribed by the Board.
6. Continuous ambient Air quality monitoring stations with computer printing arrangements shall be installed at strategic locations inside port and ship building and container terminal for monitoring dust and shall be displayed online at the Main gate.
7. The project authorities should take appropriate community development and welfare measures for villagers in the vicinity of the project site, including drinking water facilities. A separate fund should be allocated for this purpose.
8. A well equipped laboratory with suitable instruments to monitor the quality of air and water shall be set up as to ensure that the quality of ambient air and water conforms to the prescribed standards. The laboratory will also be equipped with qualified manpower including, Environmental Engineer, marine biologist so that the marine water quality is regularly monitored in order to ensure that the marine life is not adversely affected as a result of implementation of the said project.
9. This Consent to establish is issued considering the environmental angle based on facts and figures submitted by the proponent in the application and the unit shall separately apply and obtain for all other licenses from other Government Departments.
10. 25% of the unit's land shall be developed as green belt to attenuate the noise and Air pollution.
11. The unit shall maintain good house keeping both within and outside of the factory premises.



TAMILNADU POLLUTION CONTROL BOARD

12. The unit shall furnish the proposal for providing suitable APC measures such as adsorber to the paint section.
13. The unit shall analyze and furnish a detailed proposal , with details of source of noise pollution and its control measures especially in the engineering section, etc.,
14. The unit shall furnish a detailed action plan for green belt development including the allotment for green belt development, type species, no. of saplings, budget allocation, man power deployment etc.,
15. The unit shall furnish an oil spill disaster contingency plan/management system.

Sd/*****
CHAIRMAN
TAMILNADU POLLUTION CONTROL BOARD
CHENNAI

//Forwarded by Order//


For CHAIRMAN.



TAMILNADU POLLUTION CONTROL BOARD

GENERAL CONDITIONS

1. The above consent to establish cannot be construed as consent to operate and the unit shall not commence the operation without obtaining the Consent to operate.
2. The applicant shall make a request for grant of consent to operate atleast thirty days, before the commissioning of trial production.
3. Any Change in the details furnished in the conditions has to be brought to the notice of the Board and got approved by the Board, before obtaining consent to operate under the said Act.
4. The unit has to comply with the provisions of Public Liability Insurance Act, 1991 to provide immediate relief in the event of any hazard to human beings, other living creatures/plants and properties while handling and storage of hazardous substances (wherever applicable).
5. Consent to operate will not be issued unless the unit complies with the conditions of consent to establish.
6. The unit shall provide adequate water sprinklers for the control of dust emission during the loading and unloading of construction material so as to minimize the dust emission.
7. The unit shall provide water sprinklers along the temporary roads inside the premises to avoid fugitive dust emission during the vehicle movements.
8. The unit shall develop green belt of adequate width around the premises
9. In case there is any change in the management, the unit shall inform the change with relevant documents immediately.

Sd/*****
CHAIRMAN
TAMILNADU POLLUTION CONTROL BOARD
CHENNAI

//Forwarded by Order//


For CHAIRMAN.

APPENDIX A9
CONSENT TO ESTABLISH FROM
TNPCB (WATER)



TAMILNADU POLLUTION CONTROL BOARD



CONSENT ORDER NO: 5042 DATED :18.8.2009

PROCEEDINGS NO:T12/TNPCB/F-19452/AMB-TLR/RLW/09 DATED : 18.08.2009

Sub: TNPC Board-Consent for Establishment – **M/s. L&T Shipbuilding Limited**, S.F.No. 2/1, 4, 7/1,2A,2B,3A1,3A2,3A3&3Bpt, 9/1&2,18, 19, etc., Kattupalli village ,Ponneri Taluk, Thiruvallur District for the establishment or take steps to establish the industry under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974, as amended in 1988 (Central Act 53 of 1988)

- Ref:** 1. Your Application No: 0337 Dated: 30.06.2009.
2. DEE IR No:F-AMB1584/RL-213/DEE/AMB/2009 Dated: 30.06.2009.
3. G.O.Ms.No.9(MIE-I) Dated: 23.01.2008.
4. Unit's Presentation on 14.08.09.

Consent to establish or take steps to establish is hereby granted under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974, as amended in 1988 (Central Act 53 of 1988) (hereinafter referred to as 'The Act') and the Rules and Orders made there under to

The Director,
M/s. L&T Shipbuilding Limited,

(hereinafter referred to as 'The Applicant') authorizing him to establish or take steps to establish the industry in the site mentioned below:

SF No: 2/1, 4, 7/1,2A,2B,3A1,3A2,3A3&3Bpt, 9/1&2,18, 19, etc.,
Kattupalli village ,
Ponneri Taluk,
Thiruvallur District.



TAMILNADU POLLUTION CONTROL BOARD

This Consent to establish is valid for **two years**, or till the industry obtains consent to operate Section 25 of the Water (Prevention and Control of Pollution) Act, 1974, as amended in 1988 whichever is earlier subject to special and general conditions enclosed.

Sd/*****
CHAIRMAN
TAMILNADU POLLUTION CONTROL BOARD,
CHENNAI

✓ To
The Director,
M/s. L&T Shipbuilding Limited,
L&T Chennai House,
No.10, Club House Road,
Anna salai,
Chennai – 600 002.

Copy to:

- (1) The District Environmental Engineer,
Tamil Nadu Pollution Control Board,
Ambattur
- (2) The Commissioner,
Minjur Panchayat Union.
- (3) BMS
- (4) Spare

//Forwarded by Order//


For CHAIRMAN.

19.8 vn

POLLUTION PREVENTION PAYS

அகம் தூய்மை வாய்மைக்கு! புறம் தூய்மை வாழ்வுக்கு!



TAMILNADU POLLUTION CONTROL BOARD

SPECIAL CONDITIONS

1. This consent to establish is valid for establishing the facility for the manufacture of products/byproducts (Col. 2) at the rate (Col 3) mentioned below. Any change in the product/byproduct and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl.No	Description	Quantity
	Products	
1.	Ship Building	29 ships per annum
2.	Ship Repairing	60 ships per annum
3.	Handling Container	2 million TEU/Annum
4.	Steel cargo	5,00,000 Tonns /Annum
5.	Project cargo & Break cargo	5,00,000 Tonns/Annum
	Byproduct - Nil	

2. This consent to establish is valid for establishing the facility with the below mentioned outlets for the discharge of sewage and trade effluent. Any change in the outlets has to be brought to the notice of the Board and fresh consent has to be obtained if necessary.

Outlet No.	Description of Outlet	Maximum discharge in KLD daily	Point of disposal
1.	Sewage	320 KLD	On Industry's own land
2.	Trade Effluent-1	252 KLD	On Industry's own land
	Trade Effluent-2	18 KLD	Partly reused forwashing Mechanical Evaporator



TAMILNADU POLLUTION CONTROL BOARD

3.The unit shall provide Sewage Treatment Plant and Effluent Treatment Plant as indicated below

Sl. No.	Name of the treatment unit	Dimension in M	No. of units
1	Sewage- Refer Annexure-A	----	----
2	Trade Effluent – Refer Annexure-B	----	----

Additional conditions: Refer Annexure-C

Sd/*****
CHAIRMAN
TAMILNADU POLLUTION CONTROL BOARD
CHENNAI

//Forwarded by Order//


For CHAIRMAN.



TAMILNADU POLLUTION CONTROL BOARD

GENERAL CONDITIONS

1. The above consent to establish cannot be construed as consent to operate and the unit shall not commence the operation without obtaining the Consent to operate.
2. The industry shall make a request for grant of consent to operate at least thirty days before the commissioning of trial production.
3. The unit shall construct compound wall around the boundary of the unit
4. Samples of water from the wells or any other nearby water sources have to be taken by the unit and get them analyzed by the Board Laboratory to develop base line data to assess the existing water quality.
5. The unit shall provide an alternate power source along with separate energy meter for the Effluent Treatment Plant to ensure continuous operation of the Effluent Treatment Plant.
6. The consent does not authorize or approve the construction of any physical structures or facilities, or the undertaking of any work in any natural watercourse.
7. Any change in the details furnished in the conditions has to be brought to the notice of the Board and got approved by the Board, before obtaining consent to operate under the said Act.
8. The unit has to comply with the provisions of Public Liability Insurance Act, 1991 to provide immediate relief in the event of any hazard to human beings, other living creatures/plants and properties while handling and storage of hazardous substances (if applicable).
9. Consent to operate will not be issued unless the unit complies with all the conditions of consent to establish.
10. In case there is any change in the management, the unit shall inform the change with relevant documents immediately.

Sd/*****
CHAIRMAN
TAMILNADU POLLUTION CONTROL BOARD
CHENNAI

//Forwarded by Order//


For CHAIRMAN



TAMILNADU POLLUTION CONTROL BOARD

Annexure-A

STP

S.No.	Name of the TANK	DIMENSIONS	QTY
1	Screen Chamber	1.5mx1.5mx1.5m (LD)+0.5m (FB)	1 No
2	Raw Sewage Collection Tank	7mx7mx3.5m (LD)+0.5 m (FB)	1 No
3	Bio Aeration Tank	8mx8mx3.5m(LD)+0.5m(FB)	1 No
4	Secondary Clarifier	4m diameterx3.0 (LD)+0.5m (FB)	1 No
5	Filter Feed Tank	7mx7mx3.5m (LD)+0.5m (FB)	1 No
6	Sludge Thickener	3m diameter x2.5 (LD)+0.5m (FB)	2 Nos
7	Sludge drying beds	2.5x2.5x1.0mTD	4 Nos
8	Pressure sand filter	1.3m diax 1.5m TH	1 No
9	Activated Carbon Filter	1.3m diax 1.8m TH	1 No

Sd/*****
CHAIRMAN
TAMILNADU POLLUTION CONTROL BOARD
CHENNAI

//Forwarded by Order//


For CHAIRMAN
22/1/07



TAMILNADU POLLUTION CONTROL BOARD

Annexure-B

LOW TDS ETP

S.No.	Name of the TANK	DIMENSIONS	QTY
IV	CIVIL WORKS		
1	Raw Effluent Collection Tank	7.0x4.0x3.5 (LD)+0.5 (FB)	1 No
2	Flash Mixer	1.0x1.0x1.0m (LD)+0.3 (FB)	1 No
3	Flocculator	1.0x1.0x1.0m (LD)+0.3 (FB)	1 No
4	Primary Clarifier	3m diax2.5m (SWD)+0.3 (FB)	1 No
5	Lime dosing Tank	2.0x2.0x1.5 (TD)	1 No
6	Filter Feed Tank	6mx5mx3.5 TD	1 No
7	Sludge Holding Tank	2mx2mx2.5m (TD)	1 No
8	Pressure Sand Filter	1m diax1.5m TH	1 No
9	Activated Carbon Filter	1m diax1.8m TH	1 No

Sd/*****
CHAIRMAN
TAMILNADU POLLUTION CONTROL BOARD
CHENNAI

//Forwarded by Order//


For CHAIRMAN



TAMILNADU POLLUTION CONTROL BOARD

Annexure-B HIGH TDS ETP

S.No.	Name of the TANK	DIMENSIONS	QTY
1	Bar Screen Chamber	1.0x1.2x1.0 (TD)Joined with collection tank	1 No
2	Waste water Collection Tank	3.0mx3.5mx2.5m (TD)	1 No
3	Lime Dosing Tank	1.0x1.0x1.0 (TD)	1 No
4	Flash Mixer	1.0x1.0x1.0 (TD)	1 No
5	Flocculator	1.0x1.0x1.0 (TD)	1 No
6	Primary Clarifier	3m dia x3.0 m (SWD)	1 No
7	Sludge Holding Tank	2x2x1.5m (TD)	1 No
8	Filter Feed Tank	3.0mx3.0mx2.5m (TD)	1 No
9	Pressure Sand Filter	0.6m dia x 1.5m (TH)	1 No
10	Activated Carbon Filter	0.6m dia x 2.0m (TH)	1 No
11	UF Feed Tank	3.0mx3.0mx2.5m (TD)	1 No
12	RO Feed Tank	3.0mx3.0mx2.5m (TD)	1 No
13	RO Room	11.0mx6.0mx3.5m (TH)	1 No
14	Necessary Equipment Foundation As Required		

Sd/*****
CHAIRMAN
TAMILNADU POLLUTION CONTROL BOARD
CHENNAI

//Forwarded by Order//


For CHAIRMAN



TAMILNADU POLLUTION CONTROL BOARD

Annexure-C

1. The management of M/s. Larsen & Turbo, Mumbai and the Tamilnadu Industrial Development Corporation (TIDCO) are held responsible for all the environmental issues related to this Ship building Repair & Port facility.
2. The unit shall not engaged any BOT operators in the port facility with out getting prior permission from the TamilNadu Pollution Control Board.
3. The dredged material should be utilized only for filling up the land area with in the unit premises and it shall not be dumped in the Buckingham canal area under any circumstances.
4. Adequate storm water drainage facilities should be provided in the reclaimed area and no rain water run off towards the kattupalli Village shall occur due to the implementation of the project.
5. Dredging operation must be under taken in such a way that the operation do not deteriorate the water quality and which must be maintained within the prescribed standards. The water parameters should be measured on regular intervals to monitor the water quality.
6. The unit shall ensure that the nature of drainage of the terrain should not be affected by filling of low lying areas with dredged material.
7. The project proponent should ensure that the construction and the operation of the port and shipping activity will not create any impact on the livelihood of the fisherman.
8. All development in the port should be carried out in accordance with the coastal Regulation Zone Notification 1991.
9. The unit shall undertake comprehensive hydrodynamic modeling study and to ensure that no erosion or accretion takes place in the other area due to the proposed port construction.
10. Construction of labour camps should be located outside Coastal Regulation Zone areas and should be provided with adequate sanitation waste water treatment facility.
11. The project affected people of kattupallikuppam Village should be properly compensated and rehabilitated by providing employment, housing facility, school, etc.
12. The unit shall ensure that no extraction ground water shall be carried out under any circumstances.
13. The unit shall not carrying out electroplating, Phosphating, galvanizing, casting,, forging, acid pickling operation in the proposed site.



TAMILNADU POLLUTION CONTROL BOARD

14. The unit shall segregate the high TDS bearing effluent separately and the same shall be treated in the ETP followed by RO plant. The RO reject will be disposed through mechanical evaporation system.
15. The unit shall collect all the low TDS bearing effluent separately and the same shall be treated in the ETP and the treated effluent shall be utilized for gardening with in the unit premises.
16. The project authorities should take appropriate community development and welfare measures for villagers in the vicinity of the project site, including drinking water facilities. A separate fund should be allocated for this purpose.
17. A well equipped laboratory with suitable instruments to monitor the quality of air and water shall be set up as to ensure that the quality of ambient air and water conforms to the prescribed standards. The laboratory will also be equipped with qualified manpower including, Environmental Engineer, marine biologist so that the marine water quality is regularly monitored in order to ensure that the marine life is not adversely affected as a result of implementation of the said project.
18. The unit shall ensure that the construction or port activity shall not create any adverse effects to the marine eco system or marine water quality of the sea water intake point of M/s. Chennai Water Desalination plant under any circumstances.
19. The shifting of sea water intake point, and the rerouting of pipeline laid by M/s. Chennai Petroleum Corporation Limited shall be carried out after obtaining prior permission from TNPC Board.
20. The unit shall fix the alignment of breakwater structure in such a way that there shall not be any occurrence of stagnation of sea water in the shore area.
21. The unit shall ensure that no oil spill shall occur in the marine coastal areas due to the construction activities.
22. The unit shall ensure that the construction activity of the unit shall not create any hindrances to the kattupalli village under any circumstances.
23. The unit shall provide pipe line distribution net work and to develop land irrigation/ green belt for the disposal of sewage/trade effluent.



TAMILNADU POLLUTION CONTROL BOARD

24. The unit shall implement Environmental Management Plan as envisaged under Environmental Impact Assessment Study as per Environmental Impact Assessment Notification 2006, by Ministry of Environment of Forests, Government of India.
25. The unit has to implement and comply the conditions imposed in the environmental Clearance issued vide No.10-130/2007-IA-III dated 03.07.2009 by the Ministry of Environment and Forests, Government of India.
26. The unit shall provide the STP as proposed, to treat and dispose the sewage.
27. The unit shall ensure that trade effluent, solid wastes, sewage shall not be discharged into the marine environment.
28. The unit shall ensure that all drains and roads will be cleaned before the rainy season to avoid runoff from land to sea carrying a myraid of pollutants including chemicals
29. The unit shall ensure that no Bulk material shall not be disposed into the sea.
30. The unit shall ensure that no disposal solid waste for Burial.
31. The unit shall ensure that effluent/wastes from ships barges are not discharged into sea.
32. The unit shall obtain the Authorization for handling of hazardous wastes under Hazardous wastes (Management, Handling and transboundary movement) rules 2008.
33. The unit shall furnish proposals for secured land fill to the Tamilnadu Pollution Control Board approval to treat and dispose the solid wastes
34. The unit shall not handle/store any hazardous chemicals in the unit's premises without the concurrence of the Board.
35. The unit shall dispose the non hazardous waste then and there without accumulation of the same within the premises for further beneficial purposes.
36. The unit install rain water harvesting system to facilitate the recharge of ground water.
37. This Consent to establish is issued considering the environmental angle based on facts and figures submitted by the proponent in the application and the unit shall separately apply and obtain for all other licenses from other Government Departments.
38. 25% of the unit's land shall be developed as green belt to attenuate the noise and Air Pollution.



TAMILNADU POLLUTION CONTROL BOARD

39. The unit shall maintain good house keeping both within and outside of the factory premises.
40. The unit should not carry out any ship breaking activity.
41. The unit shall not undertake old ship repairs containing Asbestos material.
42. The unit shall handle only lead free paints.
43. The unit shall not carry out Galvanizing, electroplating, surface treatment with cyanide solution as reported.
44. The unit shall furnish the proposal for adequate control measures for removing oil and grease material in the ETP. Saplings, budget allocation, manpower development etc.,
45. The unit shall furnish an oil spill disaster contingency plan/management system.

Sd/*****
CHAIRMAN
TAMILNADU POLLUTION CONTROL BOARD
CHENNAI

//Forwarded by Order//


For CHAIRMAN

JA
2018/17

APPENDIX A10
PORT CTO WATER



TAMILNADU POLLUTION CONTROL BOARD

Category of the Industry :

RED

CONSENT ORDER NO. 2105136876761

DATED: 13/09/2021.

PROCEEDINGS NO.T6/TNPCB/F.0491GMP/RL/GMP/W/2021 DATED: 13/09/2021



SUB: Tamil Nadu Pollution Control Board –CONSENT TO OPERATE – DIRECT -M/s. MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED , S.F.No. Survey Numbers : 14/18B, 15, 168/1, 168/2, 169, 170/1, 170/2, 171/1, 171/2, 172/1, 172/2, 173/1, 173/2, 174, 175, 176, 177, 178/1, 178/2, 178/3, 178/4, 179/1, 179/2, 179/3, 179/4, 180, 181, 182, 183, 184/1, 184/2, 184/3, 186, 187, 188/1, 188/2A, 188/2B, 188/2C, 189, 190, 191, 192/1, 192/2, 193/1, 193/2, 193/3, 193/4, 194, 195, 196, 197/1, 197/2, 197/3, 199, 200/1, 200/2, 202/1, 202/2, 203, 206/1, 206/2A, 206/2B, 206/3, 206/4A, 206/4B, 207/2B, 208/2, 209/1, 209/2, 209/3, 210/1, 210/2, 211/1, 211/2, 211/3, 211/4, 211/5, 211/6, 211/7, 212, 213, 214/1, 214/2, 214/3, 214/4, 215/1, 215/2, 216, 217, 218/1, 218/2, 218/3, 218/4, 218/5, 219/1, 219/2, 220, 223/1, 223/2, 224/1, 224/2, 224/3, 224/4, 224/5, 225, 226, 227, 228/1, 228/2, 228/3, 228/4, 228/5, 229, 230, 231/1, 231/2, 231/3, 231/4, 231/5, 232, 233/1, 233/2, 233/3, 233/4, 234/1, 234/2, 234/3, 234/4, 235/1B, 235/2, 235/3B, 236/3B, 236/4, 242/1, 242/2, 243/2B, 244/2, 247/1, 248/1, 248/2, 249/1A2, 249/2B, 198/1, 205/1A, 205/1B, 205/2, 205/5, 1/4A1, 1/4A2, 1/4B, 1/5, 16/1, 16/2, 17/1, 17/2, 17/3A, 17/3B, 143, 151/1, 151/2, 151/3, 151/4, 152, 153, 154/1, 154/2, 166, 167/1, 167/2, 204/1, 204/2, 204/3, 221, 221/1, 222/2, 330/1, 330/2, 330/3, 330/4, 12, 16/3, 198/2, 201, 205/3, 205/4., KATTUPALLI village Ponneri Taluk and Tiruvallur District - Consent for the operation of the plant and discharge of sewage and/or trade effluent under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988 (Central Act 6 of 1974) – Issued- Reg.

- Ref:** 1. Units application for CTO direct dt. 15.02.2021
2. IR.No : F.0491GMP/RL/DEE/GMP/2021 dated 30/06/2021
3. Board's (Consent Clearance Committee) Resolution No.281-12 dt: 13.08.2021

CONSENT TO OPERATE is hereby granted under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988 (Central Act, 6 of 1974) (hereinafter referred to as "The Act") and the rules and orders made there under to

The Chief Executive Officer,

M/s . MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED

S.F.No.Survey Numbers : 14/18B, 15, 168/1, 168/2, 169, 170/1, 170/2, 171/1, 171/2, 172/1, 172/2, 173/1, 173/2, 174, 175, 176, 177, 178/1, 178/2, 178/3, 178/4, 179/1, 179/2, 179/3, 179/4, 180, 181, 182, 183, 184/1, 184/2, 184/3, 186, 187, 188/1, 188/2A, 188/2B, 188/2C, 189, 190, 191, 192/1, 192/2, 193/1, 193/2, 193/3, 193/4, 194, 195, 196, 197/1, 197/2, 197/3, 199, 200/1, 200/2, 202/1, 202/2, 203, 206/1, 206/2A, 206/2B, 206/3, 206/4A, 206/4B, 207/2B, 208/2, 209/1, 209/2, 209/3, 210/1, 210/2, 211/1, 211/2, 211/3, 211/4, 211/5, 211/6, 211/7, 212, 213, 214/1, 214/2, 214/3, 214/4, 215/1, 215/2, 216, 217, 218/1, 218/2, 218/3, 218/4, 218/5, 219/1, 219/2, 220, 223/1, 223/2, 224/1, 224/2, 224/3, 224/4, 224/5, 225, 226, 227, 228/1, 228/2, 228/3, 228/4, 228/5, 229, 230, 231/1, 231/2, 231/3, 231/4, 231/5, 232, 233/1, 233/2, 233/3, 233/4, 234/1, 234/2, 234/3, 234/4, 235/1B, 235/2, 235/3B, 236/3B, 236/4, 242/1, 242/2, 243/2B, 244/2, 247/1, 248/1, 248/2, 249/1A2, 249/2B, 198/1, 205/1A, 205/1B, 205/2, 205/5, 1/4A1, 1/4A2, 1/4B, 1/5, 16/1, 16/2, 17/1, 17/2, 17/3A, 17/3B, 143, 151/1, 151/2, 151/3, 151/4, 152, 153, 154/1, 154/2, 166, 167/1, 167/2, 204/1, 204/2, 204/3, 221, 221/1, 222/2, 330/1, 330/2, 330/3, 330/4, 12, 16/3, 198/2, 201, 205/3, 205/4.,

KATTUPALLI Village,

Ponneri Taluk,

Tiruvallur District

Authorising the occupier to make discharge of sewage and /or trade effluent.



TAMILNADU POLLUTION CONTROL BOARD

This is subject to the provisions of the Act, the rules and the orders made there under and the terms and conditions incorporated under the Special and General conditions stipulated in the Consent Order issued earlier and subject to the special conditions annexed.

This CONSENT is valid for the period ending March 31, 2026.

JOSEPHINESAHAYARANI Digitally signed by JOSEPHINESAHAYARANI
Date: 2021.09.14 07:47:28 +05'30'

**For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai**

To
The Chief Executive Officer,
M/s.MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED,
Ramcons Fortuna Towers, 4th Floor, No:1/2 Kodambakkam High Road, Nungambakam,
Chennai - 600034,
Pin: 600034

Copy to:

- 1.The Commissioner, MEENJUR-Panchayat Union, Ponneri Taluk, Tiruvallur District .
 2. The District Environmental Engineer, Tamil Nadu Pollution Control Board, GUMMIDIPOONDI.
 3. The JCEE-Monitoring, Tamil Nadu Pollution Control Board, Chennai.
 4. File
-



TAMILNADU POLLUTION CONTROL BOARD
SPECIAL CONDITIONS

1. This consent to operate is valid for operating the facility for the manufacture of products (Col. 2) at the rate (Col. 3) mentioned below. Any change in the products and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl. No.	Description	Quantity	Unit
Product Details			
1.	Containers	21.60	MMTPA
2.	Ro-Ro – Automobiles	0.07	MMTPA
3.	Project Cargo	0.44	MMTPA
4.	Break Bulk/general cargo (Barytes / Gypsum / Limestone / Granite / Steel Cargo / Rock Phosphate / Bauxite / Dolomite cargoes)	1.82	MMTPA
5.	Edible oil, CBFS, Base Oil, Lube and Non-Hazardous Liquid Cargo	0.72	MMTPA

2. This consent to operate is valid for operating the facility with the below mentioned permitted outlets for the discharge of sewage/trade effluent. Any change in the outlets and the quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Outlet No.	Description of Outlet	Maximum daily discharge in KLD	Point of disposal
Effluent Type : Sewage			
1.	Treated Sewage Effluent - 1 (30 KLD)	30.0	On land for gardening
2.	Treated Sewage Effluent - 2 (10 KLD)	10.0	On land for gardening
3.	Treated Sewage Effluent - 3 (5 KLD)	5.0	On land for gardening
Effluent Type : Trade Effluent			
1.	Trade Effluent - 1 (RO Permeate)	41.0	On land for gardening
2.	Trade Effluent - 2 (RO Reject)	9.0	Evaporated in ATFD System

3. The effluent discharge shall not contain constituents in excess of the tolerance Limits as laid down hereunder.



TAMILNADU POLLUTION CONTROL BOARD

Sl. No.	Parameters	Unit	TOLERANCE LIMITS - OUTLETS -Nos			
			Sewage		Trade Effluent	
			1	2,3	1	2
1.	pH		5.5 to 9	5.5 to 9	5.5 to 9	5.5 to 9
2.	Temperature	oC	-	-	-	shall not exceed 5°C above the receiving water temperature
3.	Particle size of Suspended solids	-	-	-	-	shall pass 850 micron IS sieve
4.	Total Suspended Solids	mg/l	30	30	200	100
5.	Total Dissolved solids (inorganic)	mg/l	-	-	2100	2100
6.	Oil & Grease	mg/l	-	-	10	10
7.	Biochemical Oxygen Demand (3 days at 27oC)	mg/l	20	20	100	30
8.	Chemical Oxygen Demand	mg/l	-	-	-	250
9.	Chloride (as Cl)	mg/l	-	-	600	1000
10.	Sulphates (as SO4)	mg/l	-	-	1000	1000
11.	Total Residual Chlorine	mg/l	-	-	-	1
12.	Ammonical Nitrogen (as N)	mg/l	-	-	50	50
13.	Total Kjeldahl Nitrogen (as N)	mg/l	-	-	-	100
14.	Free Ammonia (as NH3)	mg/l	-	-	-	5
15.	Arsenic (as As)	mg/l	-	-	0.2	0.2
16.	Mercury (as Hg)	mg/l	-	-	0.01	0.01
17.	Lead (as Pb)	mg/l	-	-	1	0.1
18.	Cadmium(as Cd)	mg/l	-	-	1	2
19.	Hexavalent Chromium (as Cr+6)	mg/l	-	-	1	0.1
20.	Total Chromium (as Cr)	mg/l	-	-	2	2
21.	Copper (as Cu)	mg/l	-	-	3	3
22.	Zinc (as Zn)	mg/l	-	-	1.5	1
23.	Selenium (as Se)	mg/l	-	-	0.05	0.05
24.	Nickel (as Ni)	mg/l	-	-	3	3
25.	Boron (as B)	mg/l	-	-	2	2
26.	Percent Sodium	%	-	-	60	-
27.	Residual Sodium Carbonate	mg/l	-	-	5	-
28.	Cyanide (as CN)	mg/l	-	-	0.2	0.2
29.	Fluoride (as F)	mg/l	-	-	2	2
30.	Dissolved Phosphates(as P)	mg/l	-	-	-	5
31.	Sulphide (as S)	mg/l	-	-	2	2
32.	Pesticides	mg/l	-	-		
33.	Phenolic Compounds (as C6H5OH)	mg/l	-	-	5	1
34.	Radioactive materials a) Alpha emitters	micro curie/ml	-	-	10-8	10-7



TAMILNADU POLLUTION CONTROL BOARD

35.	Radioactive materials b). Beta emitters	micro curie/ml	-	-	10-6	10-6	
36.	Fecal Coliform	MPN/100ml	-	-	-	-	

4. All units of the sewage and Trade effluent treatment plants shall be operated efficiently and continuously so as to achieve the standards prescribed in Sl No.3 above or to achieve the zero liquid discharge of effluent as applicable.
5. The occupier shall maintain the Electro Magnetic Flow Meters/water Meters installed at the inlet of the water supply connection for each of the purposes mentioned below for assessing the quantity of water used and ensuring that such meters are easily accessible for inspection and maintenance and for other purposes of the Act.
 - a. Industrial Cooling, Spraying in mine pits or boiler feed.
 - b. Domestic purpose.
 - c. Process.
6. The occupier shall maintain the Electro Magnetic Flow Meters with computer recording arrangement for measuring the quantity of effluent generated and treated for the monitoring purposes of the Act.
7. Log book for each of the unit operations of ETP have to be maintained to reflect the working condition of ETP along with the readings of the Electro Magnetic Flow Meters installed to assess effluent quantity and the same shall be furnished for verification of the Board officials during inspection.
8. The occupier shall at his own cost get the samples of effluent/surface water/ground water collected in and around the unit by Board officials and analyzed by the TNPC Board Laboratory periodically.
9. Any upset condition in any of the plants of the factory which is, likely to result in increased effluent discharge and result in violation of the standards mentioned in Sl. No.3 above shall be reported to the Member Secretary / Joint Chief Environmental Engineer-Monitoring and the concerned District/Assistant Environmental Engineer of the Board by e-mail immediately and subsequently by Post with full details of such upset condition.
10. The occupier shall always comply and carryout the order/directions issued by the Board in this Consent Order and from time to time without any negligence. The occupier shall be liable for action as per provisions of the Act in case of non compliance of any order/directions issued.
11. The occupier shall develop adequate width of green belt at the rate of 400 numbers of trees per Hectare.
12. The occupier shall provide and maintain rain water harvesting facilities.
13. The occupier shall ensure that there shall not be any discharge of effluent either treated or untreated into storm water drain at any point of time.
14. In the case of zero liquid discharge of effluent units, the occupier shall adhere the following conditions as laid under.
 - i). The occupier shall ensure zero liquid discharge of effluent, thereby no discharge of untreated / treated effluent on land or into any water bodies either inside or outside the premises at any point of time.
 - ii) The occupier shall operate and maintain the Zero liquid discharge treatment components comprising of Primary, Secondary and tertiary treatment systems at all times and ensure that the RO permeate/Evaporator condensate shall be recycled in the process and the final RO reject shall be disposed off with the reject management system ensuring zero liquid discharge of effluents in the premises.
 - iii) The occupier shall operate and maintain the reject management system effectively and recover the salt from the system which shall be reused in the process if reusable or shall be disposed off as ETP sludge.
 - iv) In case of failure to achieve zero discharge of effluents for any reason, the occupier shall stop its production and operations forthwith and shall be reported to the Member Secretary/Joint Chief Environmental Engineer-Monitoring and the concerned District/Assistant Environmental Engineer of the Board by e-mail immediately and subsequently by Post with full details of such upset condition.
 - v) The occupier shall restart the production only after ascertaining that the Zero discharge treatment system can perform effectively for achieving zero discharge of effluents.

Additional Conditions:



TAMILNADU POLLUTION CONTROL BOARD

1. The unit shall operate and maintain the existing STPs efficiently and continuously so as to satisfy the standards prescribed by the Board.
2. The unit shall utilize the treated sewage on its own land for gardening purposes.
3. The unit shall operate and maintain the existing ETP, RO systems, MEE and ATFD for the treatment of trade effluent generated from the unit and the RO permeate shall be utilized for gardening purpose after satisfying the standards prescribed by the Board.
4. The unit shall ensure that operation of the Port activity does not create any impact on the livelihood of the fishermen.
5. The unit shall ensure that the operation of port activity shall not create any adverse effect on the marine eco system or marine water quality of the sea water intake point of M/s. Chennai Water Desalination Plant.
6. The unit shall ensure that the operation activity of the unit shall not create any hindrances to the Kattupalli village under any circumstances.
7. The unit shall comply with the conditions imposed in the environmental clearance accorded to the unit from the MoEF, GOI vide Lr.No. 10-130/2007-IAIII dated 09.02.2018.
8. The unit shall ensure that no oil spill shall occur in the marine coastal areas due to the operation activities.
9. The Port shall ensure that the dredged material arising from dredging operations shall not be dumped in the areas attracting CRZ Notification and the material shall be used for further beneficial use.
10. The Port shall have containment Boom facility with skimmer to contain and recover the spillages of Liquid Cargo in to the sea if any.
11. The unit shall maintain the water quality of Marine Sea so as to meet the Marine Water quality prescribed for Harbour Sea Water and ensure that the marine water quality is monitored at regular intervals by engaging competent agencies.
12. The unit shall furnish carry out impact assessment study once in a year with respect to marine and land environment and the report shall be furnished to Board.
13. The Port shall ensure that adequate oil spill response equipment shall be made available as per the Appendix B of the Tamil Nadu State Oil Spill Disaster Contingency Plan, September 2016.
14. The Port shall ensure participation in the oil spill combating training along with the State Agencies such as Tamil Nadu Maritime Board organised by the Indian Coast Guard time to time.
15. The port shall ensure the formation and regular functioning of dedicated Environment Cell and Oil Spill Contingency Response Cell in order to have timely response to incidents of oil spill and any other contingency in the Port area.
16. In case of revision of consent fee by the Government, the unit shall remit the difference in amount within one month from the date of notification. Failing to remit consent fee, this consent order will be withdrawn without any notice and further action will be initiated against the unit as per law.
17. The unit shall not use 'use and throwaway plastics' such as plastic sheets used for food wrapping, spreading on dining table etc., plastic plates, plastic coated tea cups, plastic tumbler, water pouches and packets, plastic straw, plastic carry bag and plastic flags irrespective of thickness, within the industry premises. Instead unit shall encourage use of eco friendly alternative such as banana leaf, areca nut palm plate, stainless steel, glass, porcelain plates/cups, cloth bag, jute bag etc.
18. The unit shall not undertake any activity in its premises in violation of the CRZ Rules notified by the MoEF & CC, GoI.
19. The unit shall maintain the dedicated reception facilities provided for receiving hazardous waste as per the orders of the Hon'ble NGT (PB) in OA No.804/2017.
20. The unit shall adhere to the International Convention for the prevention of pollution from Ships (MARPOL guidelines) covering the following regulations,
 - (i) Regulations for the prevention of pollution by oil
 - (ii) Regulations for the control of pollution by Noxious liquid substances in bulk
 - (iii) Prevention of pollution by sewage from ships
 - (iv) Prevention of pollution by garbage from ships
 - (v) Prevention of Air pollution from ships
21. The unit shall comply with the conditions imposed in the "No increase in Pollution Load" letter issued to the unit by the Board vide Lr. No: T1/TNPCB/ F.022882/RL/GMP/NIPL/2021 Dated:12.01.2021.
22. In case of any deviation in the Gross Fixed Assets furnished in future, the unit shall remit the difference in amount to the Board without fail.
23. The unit shall not commence its expansion activity before obtaining CTE/CTO expansion from the Board.



JOSEPHINESAHAYARANI
TAMILNADU POLLUTION CONTROL BOARD

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**For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai**



TAMILNADU POLLUTION CONTROL BOARD

GENERAL CONDITIONS

1. The occupier shall make an application along with the prescribed consent fee for grant of renewal of consent at least 60 days before the date of expiry of this Consent Order along with all the required particulars ensuring that there is no change in Production quantity and change in sewage/Trade effluent.
2. This Consent is issued by the Board in consideration of the particulars given in the application. Any change or alteration or deviation made in actual practice from the particulars furnished in the application will also be ground for review/variation/revocation of the Consent Order under Section 27 of the Act and to make such variation as deemed fit for the purpose of the Act.
3. The consent conditions imposed in this order shall continue in force until revoked under Section 27(2) of the Act.
4. After the issue of this order, all the 'Consent to Operate' orders issued previously under Water (Prevention and Control of Pollution) Act, 1974 as amended stands defunct.
5. The occupier shall maintain an Inspection Register in the factory so that the inspecting officer shall record the details of the observations and instructions issued to the unit at the time of inspection for adherence.
6. The occupier shall provide and maintain an alternate power supply along with separate energy meter for the Effluent Treatment Plant sufficient to ensure continuous operation of all pollution control equipments to maintain compliance.
7. The occupier shall provide all facilities to the Board officials for inspection and collection of samples in and around the factory at any time.
8. The occupier shall display the flow diagram of the sources of effluent generation and pollution control systems provided at the ETP site.
9. The solid waste such as sweepings, wastage, package, empty containers, residues, sludge including that from air pollution control equipments collected within the premises of the industrial plant shall be collected in an earmarked area and shall be disposed off properly.
10. The occupier shall collect, treat the solid wastes like food waste, green waste generated from the canteen and convert into organic compost.
11. The occupier shall segregate the Hazardous waste from other solid wastes and comply in accordance with Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008.
12. The occupier shall maintain good house-keeping within the factory premises.
13. All pipes, valves, sewers and drains shall be leak proof. Floor washings shall be admitted into the trade effluent collection system only and shall not be allowed to find their way in storm drains or open areas.
14. The occupier shall ensure that there shall not be any diversion or by-pass of trade effluent on land or into any water sources.
15. The occupier shall ensure that solar Evaporation pans shall be constructed in such a way that the bottom of the solar pan is at least 1 m above the Ground level (if applicable).
16. The occupier shall furnish the following returns in the prescribed formats to the concerned District office regularly.
 - a) Monthly water consumption returns of each of the purposes with water meter readings in Form-I on or before 5th of every month.
 - b) Yearly return on Hazardous wastes generated and accumulated for the period from 1st April to 31st March in Form-4 before the end of the subsequent 30th June of every year (if applicable).
 - c) Yearly Environmental Statement for the period from 1st April to 31st March in Form -V before the end of the subsequent 30th September of every year(if applicable).
17. If applicable, the occupier has to comply with the provisions of Public Liability Insurance Act, 1991 to provide immediate relief in the event of any hazard to human beings, other living creatures plants and properties while handling and storage of hazardous substances.
18. The issuance of this consent does not authorize or approve the construction of any physical structures or facilities or the undertaking of any work in any natural watercourse or in Government Poramboke lands.
19. The issuance of this Consent does not convey any property right in either real personal property or any exclusive privileges, nor does it authorize any injury to private property or Government property or any invasion of personal rights nor any infringement of Central, State laws or regulation.



TAMILNADU POLLUTION CONTROL BOARD

20. The occupier shall forth with keep the Board informed of any accident of unforeseen act or event of any poisonous, noxious or polluting matter or emissions are being discharged into stream or well or air as a result of such discharge, water or air is being polluted.
21. If due to any technological improvements or otherwise the Board is of opinion that all or any of the conditions referred to above requires variation (including the change of any treatment system, either in whole or in part) the Board shall, after giving the applicant an opportunity of being heard, vary all or any of such conditions and thereupon the applicant shall be bound to comply with the conditions as so varied.
22. In case there is any change in the constitution of the management, the occupier of the new management shall file fresh application under Water (Prevention and Control of Pollution) Act, 1974, as amended in Form-II alongwith relevant documents of change of management immediately and get the necessary amendment with renewal of consent order.
23. In case there is any change in the name of the company alone, the occupier shall inform the same with relevant documents immediately and get the necessary amendments for the change of name from the Board.
24. The occupier shall display this consent order granted to him in a prominent place for perusal of the inspecting Officers of this Board.

JOSEPHINESAHAYARANI

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**For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai**

APPENDIX A1 1
PORT CTO AIR



TAMILNADU POLLUTION CONTROL BOARD

Category of the Industry :

RED

CONSENT ORDER NO. 2105236876761

DATED: 13/09/2021.

PROCEEDINGS NO.T6/TNPCB/F.0491GMP/RL/GMP/A/2021 DATED: 13/09/2021



SUB: Tamil Nadu Pollution Control Board –CONSENT TO OPERATE –DIRECT –M/s. MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED , S.F.No. Survey Numbers : 14/18B, 15, 168/1, 168/2, 169, 170/1, 170/2, 171/1, 171/2, 172/1, 172/2, 173/1, 173/2, 174, 175, 176, 177, 178/1, 178/2, 178/3, 178/4, 179/1, 179/2, 179/3, 179/4, 180, 181, 182, 183, 184/1, 184/2, 184/3, 186, 187, 188/1, 188/2A, 188/2B, 188/2C, 189, 190, 191, 192/1, 192/2, 193/1, 193/2, 193/3, 193/4, 194, 195, 196, 197/1, 197/2, 197/3, 199, 200/1, 200/2, 202/1, 202/2, 203, 206/1, 206/2A, 206/2B, 206/3, 206/4A, 206/4B, 207/2B, 208/2, 209/1, 209/2, 209/3, 210/1, 210/2, 211/1, 211/2, 211/3, 211/4, 211/5, 211/6, 211/7, 212, 213, 214/1, 214/2, 214/3, 214/4, 215/1, 215/2, 216, 217, 218/1, 218/2, 218/3, 218/4, 218/5, 219/1, 219/2, 220, 223/1, 223/2, 224/1, 224/2, 224/3, 224/4, 224/5, 225, 226, 227, 228/1, 228/2, 228/3, 228/4, 228/5, 229, 230, 231/1, 231/2, 231/3, 231/4, 231/5, 232, 233/1, 233/2, 233/3, 233/4, 234/1, 234/2, 234/3, 234/4, 235/1B, 235/2, 235/3B, 236/3B, 236/4, 242/1, 242/2, 243/2B, 244/2, 247/1, 248/1, 248/2, 249/1A2, 249/2B, 198/1, 205/1A, 205/1B, 205/2, 205/5, 1/4A1, 1/4A2, 1/4B, 1/5, 16/1, 16/2, 17/1, 17/2, 17/3A, 17/3B, 143, 151/1, 151/2, 151/3, 151/4, 152, 153, 154/1, 154/2, 166, 167/1, 167/2, 204/1, 204/2, 204/3, 221, 221/1, 222/2, 330/1, 330/2, 330/3, 330/4, 12, 16/3, 198/2, 201, 205/3, 205/4., KATTUPALLI village Ponneri Taluk and Tiruvallur District - Consent for operation of the plant and discharge of emissions under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 (Central Act 14 of 1981) –Issued- Reg.

- Ref:** 1. Units application for CTO direct dt. 15.02.2021
2. IR.No : F.0491GMP/RL/DEE/GMP/2021 dated 30/06/2021
3. Board's (Consent Clearance Committee) Resolution No.281-12 dt: 13.08.2021

CONSENT TO OPERATE is hereby granted under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 (Central Act 14 of 1981) (hereinafter referred to as "The Act") and the rules and orders made there under to

The Chief Executive Officer,

M/s . MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED

S.F.No.Survey Numbers : 14/18B, 15, 168/1, 168/2, 169, 170/1, 170/2, 171/1, 171/2, 172/1, 172/2, 173/1, 173/2, 174, 175, 176, 177, 178/1, 178/2, 178/3, 178/4, 179/1, 179/2, 179/3, 179/4, 180, 181, 182, 183, 184/1, 184/2, 184/3, 186, 187, 188/1, 188/2A, 188/2B, 188/2C, 189, 190, 191, 192/1, 192/2, 193/1, 193/2, 193/3, 193/4, 194, 195, 196, 197/1, 197/2, 197/3, 199, 200/1, 200/2, 202/1, 202/2, 203, 206/1, 206/2A, 206/2B, 206/3, 206/4A, 206/4B, 207/2B, 208/2, 209/1, 209/2, 209/3, 210/1, 210/2, 211/1, 211/2, 211/3, 211/4, 211/5, 211/6, 211/7, 212, 213, 214/1, 214/2, 214/3, 214/4, 215/1, 215/2, 216, 217, 218/1, 218/2, 218/3, 218/4, 218/5, 219/1, 219/2, 220, 223/1, 223/2, 224/1, 224/2, 224/3, 224/4, 224/5, 225, 226, 227, 228/1, 228/2, 228/3, 228/4, 228/5, 229, 230, 231/1, 231/2, 231/3, 231/4, 231/5, 232, 233/1, 233/2, 233/3, 233/4, 234/1, 234/2, 234/3, 234/4, 235/1B, 235/2, 235/3B, 236/3B, 236/4, 242/1, 242/2, 243/2B, 244/2, 247/1, 248/1, 248/2, 249/1A2, 249/2B, 198/1, 205/1A, 205/1B, 205/2, 205/5, 1/4A1, 1/4A2, 1/4B, 1/5, 16/1, 16/2, 17/1, 17/2, 17/3A, 17/3B, 143, 151/1, 151/2, 151/3, 151/4, 152, 153, 154/1, 154/2, 166, 167/1, 167/2, 204/1, 204/2, 204/3, 221, 221/1, 222/2, 330/1, 330/2, 330/3, 330/4, 12, 16/3, 198/2, 201, 205/3, 205/4.,

KATTUPALLI Village,

Ponneri Taluk.

Tiruvallur District.

Authorizing the occupier to operate the industrial plant in the Air Pollution Control Area as notified by the Government and to make discharge of emission from the stacks/chimneys.



TAMILNADU POLLUTION CONTROL BOARD

This is subject to the provisions of the Act, the rules and the orders made there under and the terms and conditions incorporated under the Special and General conditions stipulated in the Consent Order issued earlier and subject to the special conditions annexed.

This CONSENT is valid for the period ending March 31, 2026

JOSEPHINESAHAYARANI Digitally signed by JOSEPHINESAHAYARA
Date: 2021.09.14 07:44:46 +05'30'

**For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai**

To
The Chief Executive Officer,
M/s.MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED,
Ramcons Fortuna Towers, 4th Floor, No:1/2 Kodambakkam High Road, Nungambakam,
Chennai - 600034,
Pin: 600034

Copy to:

- 1.The Commissioner, MEENJUR-Panchayat Union, Ponneri Taluk, Tiruvallur District .
 2. The District Environmental Engineer, Tamil Nadu Pollution Control Board, GUMMIDIPOONDI.
 3. The JCEE-Monitoring, Tamil Nadu Pollution Control Board, Chennai.
 4. File
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TAMILNADU POLLUTION CONTROL BOARD

SPECIAL CONDITIONS

1. This consent to operate is valid for operating the facility for the manufacture of products (Col. 2) at the rate (Col. 3) mentioned below. Any change in the products and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl. No.	Description	Quantity	Unit
Product Details			
1.	Containers	21.60	MMTPA
2.	Ro-Ro – Automobiles	0.07	MMTPA
3.	Project Cargo	0.44	MMTPA
4.	Break Bulk/general cargo (Barytes / Gypsum / Limestone / Granite / Steel Cargo / Rock Phosphate / Bauxite / Dolomite cargoes)	1.82	MMTPA
5.	Edible oil, CBFS, Base Oil, Lube and Non-Hazardous Liquid Cargo	0.72	MMTPA

2. This consent to operate is valid for operating the facility with the below mentioned emission/noise sources along with the control measures and/or stack. Any change in the emission source/control measures/change in stack height has to be brought to the notice of the Board and fresh consent/Amendment has to be obtained.

I Point source emission with stack :				
Stack No.	Point Emission Source	Air pollution Control measures	Stack height from Ground Level in m	Gaseous Discharge in Nm ³ /hr
1	DG Set - 2000 KVA - I	Acoustic enclosures with stack	30	8000
2	DG Set - 2000 KVA - II	Acoustic enclosures with stack	30	8000
3	DG Set - 500 KVA - I	Acoustic enclosures with stack	20	5000
4	DG Set - 500 KVA - II	Acoustic enclosures with stack	20	5000
5	DG Set - 125 KVA	Acoustic enclosures with stack	4	1000
6	Hot Water System (CBFS / Veg Oil Facility)	Wet scrubber with stack	31	50000
7	Hot Oil Generator (Bitumen Facility)	Wet scrubber with stack	31	50000
8	Fire DG Pump Stack - 1	Stack	2.5	
9	Fire DG Pump Stack - 2	Stack	2.5	
10	ETP Boiler Stack	Stack	12	
II Fugitive/Noise emission :				
Sl. No.	Fugitive or Noise Emission sources	Type of emission	Control measures	
1.	DG Set	Noise	Acoustic Enclosures	



TAMILNADU POLLUTION CONTROL BOARD

3(a). The emission shall not contain constituents in excess of the tolerance limits as laid down hereunder :

Sl.	Parameter	Unit	Tolerance limits	Stacks
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Annexure enclosed if applicable. :-

3.(b) The Ambient Air in the industrial plant area shall not contain constituents in excess of the tolerance limits prescribed below.

Sl. No.	Pollutant	Time Weighted Average	Unit	Tolerance Limits	
				Industrial, Residential, Rural and other area	Ecologically Sensitive Area (notified by Central Govt.)
1.	Sulphur Dioxide (SO ₂)	Annual 24 hours	microgram/m ³ microgram/m ³	50 80	20 80
2.	Nitrogen Dioxide (NO ₂)	Annual 24 hours	microgram/m ³ microgram/m ³	40 80	30 80
3.	Particulate Matter (Size Less than 10 micro M) or PM ₁₀	Annual 24 hours	microgram/m ³ microgram/m ³	60 100	60 100
4.	Particulate Matter (Size Less than 2.5 micro M) or PM _{2.5}	Annual 24 hours	microgram/m ³ microgram/m ³	40 60	40 60
5.	Ozone (O ₃)	Annual 24 hours	8 Hours 1 Hour	100 180	100 180
Sl. No.	Pollutant	Time Weighted Average	Unit	Tolerance Limits	
				Industrial, Residential, Rural and other area	Ecologically Sensitive Area (notified by Central Govt.)
6.	Lead (Pb)	Annual 24 hours	microgram/m ³ microgram/m ³	0.5 1.0	0.5 1.0
7.	Carbon Monoxide (CO)	8 Hours 1 Hour	miligram/m ³ miligram/m ³	02 04	02 04
8.	Ammonia (NH ₃)	Annual 24 hours	microgram/m ³ microgram/m ³	100 400	100 400
9.	Benzene (C ₆ H ₆)	Annual	microgram/m ³	5	5
10.	Benzo(O) Pyrene (BaP) -particulate phase only	Annual	nanogram/m ³	01	01
11.	Arsenic (As)	Annual	nanogram/m ³	06	06
12.	Nickel (Ni)	Annual	nanogram/m ³	20	20

3(c) The Ambient Noise Level in the industrial plant area shall not exceed the limits prescribed below:

Limits in L.eq.-dB(A)	Day Time	Night Time
Industrial Area	75	70

4. All units of the Air pollution control measures shall be operated efficiently and continuously so as to achieve the standards prescribed in Sl. No.3 above.



TAMILNADU POLLUTION CONTROL BOARD

5. The occupier shall not change or alter quality or quantity or the rate of emission or replace or alter the air pollution control equipment or change the raw material or manufacturing process resulting in change in quality and/or quantity of emissions without the previous written permission of the Board.
6. The occupier shall maintain log book regarding the stack monitoring system or operation of the plant or any other particulars for each of the unit operations of air pollution control systems to reflect the working condition which shall be furnished for verification of the Board officials during inspection.
7. The occupier shall at his own cost get the samples of emission/air/noise levels collected and analyzed by the TNPC Board Laboratory once in every 6 months/once in a year/periodically for the parameters as prescribed.
8. Any upset condition in any of the plants of the factory which is likely to result in increased emissions and result in violation of the standards mentioned in Sl.No.3 shall be reported to the Member Secretary / Joint Chief Environmental Engineer-Monitoring and the concerned District/Assistant Environmental Engineer of the Board by e-mail immediately and subsequently by Post with full details of such upset condition.
9. The occupier shall always comply and carryout the order/directions issued by the Board in this Consent Order and from time to time without any negligence. The occupier shall be liable for action as per provisions of the Act in case of non compliance of any order/directions issued.

Special Additional Conditions:

The unit shall install the approved retrofit emission control device/equipment with at least 70% Particulate matter reduction efficiency on all DG sets with capacity of 125 KVA and above or otherwise the unit shall be shift to gas based generators within the time frame prescribed in the notification No. TNPCB/Labs/DD(L)02151/2019 dated 10.06.2020 issued by TNPCB.

Additional Conditions:

1. The unit shall operate and maintain the APC measures efficiently and continuously so as to satisfy the Ambient Air Quality / emission standards prescribed by the Board.
2. The unit shall adhere to the Ambient Noise Level standards prescribed by the Board.
3. The unit shall conduct AAQ/ANL/SM emission survey periodically and furnish the ROA to the Board.
4. The unit shall maintain Continuous Ambient Air Quality Monitoring station provided for the parameters PM10, PM2.5 and VOC and shall transfer data to the care Air Centre, TNPCB, Guindy without any interruption.
5. The unit shall utilize the Power obtained from the DG Sets for captive use only and shall not supply Power to Grid.
6. The unit shall maintain adequate dust suppression system and take all measures to ensure that the cargo is handled by taking necessary precautions to avoid spread of fugitive dust while transporting cargo through lorries and containers.
7. The unit shall ensure that the vehicles shall not fit or use any multi toned horn giving a harsh, shrill, loud or alarming noise.
8. The unit shall provide water sprinklers to the internal roads so as to avoid dust emissions due to the vehicular movements inside the premises within a month as committed.
9. The unit shall comply with the conditions imposed in the environmental clearance accorded to the unit from the MoEF, GOI vide Lr.No. 10-130/2007-IAIII dated 09.02.2018.
10. In case of any deviation in the Gross Fixed Assets furnished in future, the unit shall remit the difference in amount to the Board without fail.
11. The unit shall continue to develop adequate green belt by planting tree saplings of native species in and around the unit premises so as to comply with the Board norms.
12. In case of revision of consent fee by the Government, the unit shall remit the difference in amount within one month from the date of notification. Failing to remit consent fee, this consent order will be withdrawn without any notice and further action will be initiated against the unit as per law.
13. The unit shall comply with the conditions imposed in the "No increase in Pollution Load" letter issued to the unit by the Board vide Lr. No: T1/TNPCB/ F.022882/RL/GMP/NIPL/2021 Dated:12.01.2021.

JOSEPHINESAHAYARANI

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JOSEPHINESAHAYARANI
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For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai



TAMILNADU POLLUTION CONTROL BOARD

GENERAL CONDITIONS

1. The occupier shall make an application along with the prescribed consent fee for grant of renewal of consent at least 60 days before the date of expiry of this Consent Order along with all the required particulars ensuring that there is no change in production quantity and emission.
2. This Consent is given by the Board in consideration of the particulars given in the application. Any change or alteration or deviation made in actual practice from the particulars furnished, in the application will also be ground for review/variation/revocation of the Consent Order under Section 21 of the Act.
3. The conditions imposed shall continue in force until revoked under Section 21 of the Act.
4. After the issue of this order, all the 'Consent to Operate' orders issued previously under Air (Prevention and Control of Pollution) Act, 1981 as amended stands defunct.
5. The occupier shall maintain an Inspection Register in the factory so that the inspecting officer shall record the details of the observations and instructions issued to the unit at the time of inspection for adherence.
6. The occupier shall provide and maintain an alternate power supply along with separate energy meter for the Air Pollution Control measures sufficient to ensure continuous operation of all pollution control equipments to ensure compliance.
7. The occupier shall provide all facilities to the Board officials for collection of samples in and around the factory at any time.
8. The applicant shall display the flow diagram of the sources of emission and pollution control systems provided at the site.
9. The liquid effluent arising out of the operation of the air pollution control equipment shall also be treated in a manner and to the satisfaction of standards prescribed by the Board in accordance with the provisions of Water (Prevention and Control of Pollution) Act, 1974 as amended.
10. The air pollution control equipments, location of inspection chambers and sampling port holes shall be made easily accessible at all time.
11. In case of any episodal discharge of emission, the industry shall take immediate action to bring down the emission within the limits prescribed by the Board.
12. If applicable, the occupier has to comply with the provisions of Public Liability Insurance Act, 1991 to provide immediate relief in the event of any hazard to human beings, other living creatures/plants and properties while handling and storage of hazardous substances.
13. The issuance of this consent does not authorize or approve the construction of any physical structures or facilities or the undertaking of any work in any natural watercourse or in Government Poramboke lands.
14. The issuance of this Consent does not convey any property right in either real personal property or any exclusive privileges, nor does it authorize any injury to private property or Government property or any invasion of personal rights nor any infringement of Central, State laws or regulation.
15. The occupier shall forth with keep the Board informed of any accident of unforeseen act or event of any poisonous, noxious or polluting matter or emissions are being discharged into stream or well or air as a result of such discharge, water or air is being polluted.
16. If due to any technological improvements or otherwise the Board is of opinion that all or any of the conditions referred to above requires variation (including the change of any treatment system, either in whole or in part) the Board shall, after giving the applicant an opportunity of being heard, vary all or any of such conditions and thereupon the applicant shall be bound to comply with the conditions as so varied.
17. In case there is any change in the constitution of the management, the occupier of the new management shall file fresh application under Air (Prevention and Control of Pollution) Act, 1981, as amended in Form-I alongwith relevant documents of change of management immediately and get the necessary amendment with renewal of consent order.
18. In case there is any change in the name of the company alone, the occupier shall inform the same with relevant documents immediately and get the necessary amendments for the change of name from the Board.



TAMILNADU POLLUTION CONTROL BOARD

19. The occupier shall display this consent order granted to him in a prominent place for perusal of the inspecting Officers of this Board.

JOSEPHINESAHAYARANI Digitally signed by JOSEPHINESAHAYARANI
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For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai

APPENDIX A12
PORT CTO- BIOMEDICAL WASTE
AUTHORIZATION

FORM III

(See Rule 10)

AUTHORISATION No: 19BAC15866575 Dated 25/04/2019

Proceeding No: T4/TNPCB/F.0420GMP/BWA/RL/GMP/2016 Dated 25/04/2019

Sub: Tamil Nadu Pollution Control Board – Bio-Medical Waste Authorization - One Time Authorisation-HCF - M/s.MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED, S.F.No.14-18B, 15, 168-1&2, 169, 170-1&2, 171-1&2, 172-1&2, 173-1&2, 174, 175, 176, 177, 178-1,2,3&4,179-1, 2, 3&4, 180, 181, 182, 183, 184-1, 2&3, 186, 187, 188-1, 2A, 2B& 2C,189, 190,191, 192-1 & 2, 193-1, 2, 3 & 4, 194, 195, 196, 197-1,2&3, 199, 200-1&2, 202-1&2, 203, 206-1,2A,2B,3,4A&4B, 207-2B, 208-2, 209-1,2&3, 210-1&2, 211-1,2,3,4,5,6&7, 212, 213, 214-1,2,3&4,215-1&2,216,217,218-1,2,3,4&5,219-1&2,220, 223-1&2, 224-1,2,3,4&5, 225, 226, 227, 228-1,2,3,4& 5, 229, 230, 231-1,2,3,4&5, 232, 233-1,2,3&4, 234-1,2,3&4, 235-1B, 2-3B, 236-3B, 4, 242-1&2, 243-2B, 244-2, 247-1, 248-1&2, 249-1A2,2B, 198-1, 205-1A,1B,2,5, 1 (part)-4A1 Pt,4A2,4B Pt,5 Pt, 11 (part), 16 (part)-1&2,17 (part)-1, 2, 3A&3B ,143 (part), 151 (part)-1,2,3&4,152 (part), 153 (part), 154 (part)-1&2, 166 (part), 167 (part)-1&2, 204(part)-1,2&3, 221(part), 222 (part)-1&2, 330 (part)-1,2,3&4, 12 (Part),16-3, 198-2, 201, 205-3, 205-4, KATTUPALLI village, PONNERI Taluk, Tiruvallur District - Authorization under Rule 10 of the Bio-Medical Waste Management Rules, 2016 enacted under Environment (Protection) Act, 1986 – Issued- Reg.

Ref: 1. Unit's application for Authorisation on 20.10.2018/ 29.01.2019
2. BMW-IR.No: F.0420GMP/BWA/RL/DEE/DEE/2019 dated 06/02/2019

AUTHORISATION FOR OPERATING A FACILITY FOR GENERATION, COLLECTION, RECEPTION, TREATMENT, STORAGE, TRANSPORT AND DISPOSAL OF BIO-MEDICAL WASTES

1. File number of authorization: 19BAC15866575 and date of issue: 25/04/2019
2. The Chief Executive Officer of M/s. MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED, an occupier or operator of the facility located at S.F.No.14-18B, 15, 168-1&2, 169, 170-1&2, 171-1&2, 172-1&2, 173-1&2, 174, 175, 176, 177, 178-1,2,3&4,179-1, 2, 3&4, 180, 181, 182, 183, 184-1, 2&3, 186, 187, 188-1, 2A, 2B& 2C,189, 190,191, 192-1 & 2, 193-1, 2, 3 & 4, 194, 195, 196, 197-1,2&3, 199, 200-1&2, 202-1&2, 203, 206-1,2A,2B,3,4A&4B, 207-2B, 208-2, 209-1,2&3, 210-1&2, 211-1,2,3,4,5,6&7, 212, 213, 214-1,2,3&4,215-1&2,216,217,218-1,2,3,4&5,219-1&2,220, 223-1&2, 224-1,2,3,4&5, 225, 226, 227, 228-1,2,3,4& 5, 229, 230, 231-1,2,3,4&5, 232, 233-1,2,3&4, 234-1,2,3&4, 235-1B, 2-3B, 236-3B, 4, 242-1&2, 243-2B, 244-2, 247-1, 248-1&2, 249-1A2,2B, 198-1, 205-1A,1B,2,5, 1 (part)-4A1 Pt,4A2,4B Pt,5 Pt, 11 (part), 16 (part)-1&2,17 (part)-1, 2, 3A&3B ,143 (part), 151 (part)-1,2,3&4,152 (part), 153 (part), 154 (part)-1&2, 166 (part), 167 (part)-1&2, 204(part)-1,2&3, 221(part), 222 (part)-1&2, 330 (part)-1,2,3&4, 12 (Part),16-3, 198-2, 201, 205-3, 205-4, KATTUPALLI Village, PONNERI Taluk, Tiruvallur District is hereby granted an Authorisation for Generation, Segregation, Collection, Storage, Packaging, Disposal of Bio-Medical Waste
3. M/s. MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED is hereby authorized for handling of Bio-Medical waste as per the capacity given below.

i)	Number of beds of HCF	0	Nos
ii)	Quantity of Bio-Medical Waste handled, treated or disposed		
	Category	Type of Waste	Quantity permitted for handling
	Yellow	a) Human Anatomical Waste	
		b) Animal Anatomical Waste	
		c) Soiled Waste	0.003
		d) Expired or Discarded Medicines	0
		e) Chemical Solid Waste	
		f) Chemical Liquid Waste in KLD	0
		g) Discarded linen, mattresses, beddings contaminated with blood or body fluid routine mask and gown	
		h) Microbiology, Biotechnology and other clinical laboratory waste	
	Category	Type of Waste	Quantity permitted for handling
	Red	Contaminated waste (Recyclable)	
	White(Translucent)	Waste sharps including Metals	
	Blue	Glassware	
		Glassware Metallic Body	

4. This one time authorization is valid for the non bedded Health Care facility only.
5. The authorization is issued subject to the conditions stated below and to such other conditions as may be specified in the rules for the time being in force under the Environment (Protection) Act, 1986.

**For Member Secretary
Tamil Nadu Pollution Control Board
Chennai**

TERMS AND CONDITIONS OF AUTHORIZATION

1. The authorization shall comply with the provisions of the Environment (Protection) Act, 1986 and the rules made there under.
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the Tamil Nadu State Pollution Control Board.
3. The person authorized shall not rent, lend, sell, transfer or otherwise transport the Bio-Medical wastes without obtaining prior permission of Tamil Nadu State Pollution Control Board.

4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the application by the person authorized shall constitute a breach of this authorization.
5. It is the duty of the authorized person to take prior permission of the Tamil Nadu Pollution Control Board to close down the facility and such other terms and conditions may be stipulated by Tamil Nadu Pollution Control Board.
6. Any other conditions for compliance as per the Guidelines issued by the MoEF&CC or CPCB from time to time.

ADDITIONAL CONDITIONS

- (1) The unit shall renew and have valid agreements with Biomedical waste facilitator at all times.
- (2) The unit shall possess valid consents of the BOARD under water and Air Acts at all times.

SPECIAL CONDITIONS - HCF

1	All the provisions of the Bio-Medical Waste Management Rules, 2016 must be complied with.
2	The HCF shall take all necessary steps to ensure that bio-medical waste is handled without any adverse effect to human health and the environment and in accordance with the Bio-Medical Waste (BMW) Management Rules, 2016.
3	The HCF shall make a provision within the premises for a safe, ventilated and secured location for storage of segregated biomedical waste in colored bags or containers in the manner as specified in Schedule I of the BMW Rules, 2016. It shall be ensured that there shall be no secondary handling, pilferage of recyclables or inadvertent scattering or spillage by animals and the bio-medical waste from such place or premises shall be directly transported in the manner as prescribed in these rules to the common bio-medical waste treatment facility or for the appropriate treatment and disposal, as the case may be, in the manner as prescribed in Schedule I of the BMW Management Rules, 2016.
4	The HCF shall pre-treat the laboratory waste, microbiological waste, blood samples and blood bags through disinfection or sterilization on-site in the manner as prescribed by the World Health Organization (WHO) guidelines on safe management of wastes from health care activities and WHO Blue Book, 2014 and then sent to the Common bio-medical waste treatment facility for final disposal
5	The HCF shall phase out use of chlorinated plastic bags(excluding blood bags) and gloves by 27 th March, 2019
6	The HCF shall dispose of solid waste other than bio-medical waste in accordance with the provisions of respective waste management rules made under the relevant laws and amended from time to time.
7	The HCF shall not give treated bio-medical waste with municipal solid waste.
8	The HCF shall establish a Bar-Code System for bags or containers containing bio-medical waste to be sent out of the premises or for the further treatment and disposal in accordance with the guidelines issued by the Central Pollution Control Board by 27 th March, 2019
9	The HCF shall ensure segregation of liquid chemical waste at source and also ensure pre-treatment or neutralization prior to mixing with other effluent generated from health care facilities
10	The HCF shall ensure treatment and disposal of liquid waste in accordance with the Water (Prevention and Control of Pollution) Act, 1974(6 of 1974).
11	The HCF shall maintain and update on day to day basis the bio-medical waste management register and display the monthly record on its website according to the bio-medical waste generated in terms of category and colour coding as specified in Schedule I of the BMW Management Rules, 2016.

12	The HCF shall inform to TNPCB immediately in case the operator of a CBMWTF does not collect the bio-medical waste within the intended time or as per the agreed time.
13	The HCF shall establish a system to review and monitor the activities related to bio-medical waste management by forming a new committee and the Committee shall meet once in every six months and the record of the minutes of the meetings of the committee shall be submitted along with the annual report to the prescribed authority.
14	It is the responsibility of the occupier of the HCF that the only segregated bio-medical waste as per the Schedule-I of the BMW Management Rules, 2016 shall be handed over to common bio-medical waste treatment facility for treatment, processing and final disposal.
15	It shall be ensured that no untreated bio-medical waste shall be mixed with other wastes.
16	The bio-medical waste shall be segregated into containers or bags at the point of generation in accordance with Schedule I of the BMW Management Rules, 2016 prior to its storage, transportation, treatment and disposal.
17	The containers or bags referred to in sub-rule (2) shall be labeled as specified in Schedule IV of the BMW Management Rules, 2016. The bar code and global positioning system shall be added by the Occupier and common bio-medical waste treatment facility in one year time.
18	Untreated human anatomical waste, animal anatomical waste, soiled waste and biotechnology waste shall not be stored beyond a period of forty-eight hours: Provided that in case for any reason it becomes necessary to store such waste beyond such a period, the occupier shall take appropriate measures to ensure that the waste does not adversely affect human health and the environment and inform the prescribed authority along with the reasons for doing so.
19	Dead Fetus below the viability period (as per the Medical Termination of Pregnancy Act 1971, amended from time to time) can be considered as human anatomical waste. Such waste should be handed over to the operator of common bio-medical waste treatment and disposal facility in yellow bag with a copy of the official Medical Termination of Pregnancy certificate from the Obstetrician or the Medical Superintendent of hospital or healthcare establishment.
20	Cytotoxic drug vials shall not be handed over to unauthorized person under any circumstances. These shall be sent back to the manufactures for necessary disposal at a single point. As a second option, these may be sent for incineration at common bio-medical waste treatment and disposal facility or TSDFs or plasma pyrolysis at temperature >1200°C.
21	Residual or discarded chemical wastes, used or discarded disinfectants and chemical sludge can be disposed at hazardous waste treatment, storage and disposal facility. In such case, the waste should be sent to hazardous waste treatment, storage and disposal facility through operator of common bio-medical waste treatment and disposal facility only.
22	On-site pre-treatment of laboratory waste, microbiological waste, blood samples, blood bags should be disinfected or sterilized as per the Guidelines of World Health Organization or National AIDS Control Organization and then given to the common bio-medical waste treatment and disposal facility.
23	Syringes should be either mutilated or needles should be cut and or stored in tamper proof, leak proof and puncture proof containers for sharps storage.
24	The HCF shall maintain records related to the generation, collection, storage, transportation, treatment, disposal or any other form of handling of bio-medical waste.
25	The HCF shall submit an Annual Report to the prescribed authority (TNPCB) in Form-IV, on or before the 30th June of every year for the period from January to December of the preceding year.
26	The HCF shall make available the annual report on its web-site within a period of two years from the date of publication of Bio-Medical Waste management (Amendment) Rules, 2018
27	In case of any change in the bio-medical waste generation, handling, treatment and disposal for which authorization was earlier granted, the occupier or operator of HCF shall intimate to the prescribed authority about the change or variation in the activity and shall submit a fresh application in Form II for modification of the conditions of Authorization.

28	In case of any major accident at any institution of HCF facility or any other site while handling bio-medical waste, the authorized person shall intimate immediately to the prescribed authority about such accident and forward a report within twenty-four hours in writing regarding the remedial steps taken in Form I.
29	The HCF shall ensure occupational safety of all its health care workers and others involved in handling of bio-medical waste by providing appropriate and adequate personal protective equipments.
30	The occupier of the HCF or an operator of a common bio-medical waste treatment facility shall be liable for all the damages caused to the environment or the public due to improper handling of bio- medical wastes. The occupier or operator of common bio-medical waste treatment facility shall be liable for action under section 5 and section 15 of the Act, in case of any violation.

31	<p>The HCF shall adopt the following treatment and disposal methods as described in the BMW Management Rules, 2016</p> <p>i. Chemical treatment using at least 1% to 2% Sodium Hypochlorite having 30% residual chlorine for twenty minutes or any other equivalent chemical reagent that should demonstrate Log104 reduction efficiency for microorganisms as given in Schedule- III.</p> <p>ii. Mutilation or shredding must be to an extent to prevent unauthorized reuse.</p>
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**For Member Secretary
Tamil Nadu Pollution Control Board
Chennai**

To

The Chief Executive Officer
MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED
Kattupalli Port, Post box no: 001, Kattupalli Village
Pin: 600120

Copy to:

1. The District Environmental Engineer, Tamil Nadu Pollution Control Board,
GUMMIDIPOONDI
 2. The JCEE-Monitoring, Tamil Nadu Pollution Control Board, Chennai
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APPENDIX A13
PORT CTO-HAZARDOUS WASTE



TAMILNADU POLLUTION CONTROL BOARD

AUTHORISATION No. 19HFC20312718 dated 30/04/2019

Proceeding No. T1/TNPCB/F.0420GMP/HWA/RL/GMP/2019 dated 30/04/2019

Sub: Tamil Nadu Pollution Control Board – Hazardous Waste Authorization-Fresh- M/s. MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED, S.F.No. 14-18B, 15, 168-1&2, 169, 170-1&2, 171-1&2, 172-1&2, 173-1&2, 174, 175, 176, 177, 178-1,2,3&4,179-1, 2, 3&4, 180, 181, 182, 183, 184-1, 2&3, 186, 187, 188-1, 2A, 2B& 2C,189, 190,191, 192-1 & 2, 193-1, 2, 3 & 4, 194, 195, 196, 197-1,2&3, 199, 200-1&2, 202-1&2, 203, 206-1,2A,2B,3,4A&4B, 207-2B, 208-2, 209-1,2&3, 210-1&2, 211-1,2,3,4,5,6&7, 212, 213, 214-1,2,3&4,215-1&2,216,217,218-1,2,3,4&5,219-1&2,220, 223-1&2, 224-1,2,3,4&5, 225, 226, 227, 228-1,2,3,4& 5, 229, 230, 231-1,2,3,4&5, 232, 233-1,2,3&4, 234-1,2,3&4, 235-1B, 2-3B, 236-3B, 4, 242-1&2, 243-2B, 244-2, 247-1, 248-1&2, 249-1A,2,2B, 198-1, 205-1A,1B,2,5, 1 (part)-4A1 Pt,4A2,4B Pt,5 Pt, 11 (part), 16 (part)-1&2,17 (part)-1, 2, 3A&3B ,143 (part), 151 (part)-1,2,3&4,152 (part), 153 (part), 154 (part)-1&2, 166 (part), 167 (part)-1&2, 204(part)-1,2&3, 221(part), 222 (part)-1&2, 330 (part)-1,2,3&4, 12 (Part),16-3, 198-2, 201, 205-3, 205-4, KATTUPALLI Village, PONNERI Taluk, Tiruvallur District - Authorization under Rule 6 (2) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 enacted under Environment (Protection) Act, 1986 – Issued- Reg.

Ref: 1. Unit's application No 20312718 Dated: 21.01.2019
2. HWA-IR.No.0420GMP/HWA/RL/DEE/GMP/2019 dated: 20.03.2019

FORM 2

[See rule 6 (2)]

FORM FOR GRANT OR RENEWAL OF AUTHORISATION TO THE OCCUPIERS, RECYCLERS, REPROCESSORS, REUSERS, USER AND OPERATORS OF DISPOSAL FACILITIES

1. Number of authorization: 19HFC20312718 and dated : 30/04/2019
2. The Chief Executive Officer of M/s. MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED is hereby granted an Authorisation based on the enclosed signed Inspection report for Generation, Collection, Storage, Reception, Disposal of hazardous or other wastes or both on the premises situated at S.F.No. 14-18B, 15, 168-1&2, 169, 170-1&2, 171-1&2, 172-1&2, 173-1&2, 174, 175, 176, 177, 178-1,2,3&4,179-1, 2, 3&4, 180, 181, 182, 183, 184-1, 2&3, 186, 187, 188-1, 2A, 2B& 2C,189, 190,191, 192-1 & 2, 193-1, 2, 3 & 4, 194, 195, 196, 197-1,2&3, 199, 200-1&2, 202-1&2, 203, 206-1,2A,2B,3,4A&4B, 207-2B, 208-2, 209-1,2&3, 210-1&2, 211-1,2,3,4,5,6&7, 212, 213, 214-1,2,3&4,215-1&2,216,217,218-1,2,3,4&5,219-1&2,220, 223-1&2, 224-1,2,3,4&5, 225, 226, 227, 228-1,2,3,4& 5, 229, 230, 231-1,2,3,4&5, 232, 233-1,2,3&4, 234-1,2,3&4, 235-1B, 2-3B, 236-3B, 4, 242-1&2, 243-2B, 244-2, 247-1, 248-1&2, 249-1A,2,2B, 198-1, 205-1A,1B,2,5, 1 (part)-4A1 Pt,4A2,4B Pt,5 Pt, 11 (part), 16 (part)-1&2,17 (part)-1, 2, 3A&3B ,143 (part), 151 (part)-1,2,3&4,152 (part), 153 (part), 154 (part)-1&2, 166 (part), 167 (part)-1&2, 204(part)-1,2&3, 221(part), 222 (part)-1&2, 330 (part)-1,2,3&4, 12 (Part),16-3, 198-2, 201, 205-3, 205-4, KATTUPALLI Village, PONNERI Taluk, Tiruvallur District.



TAMILNADU POLLUTION CONTROL BOARD

Sl No	Schedule / Name of the Processes	Name of Hazardous Waste (with category No)	Quantity	Activities for which Authorization is issued
1	Schedule I /5. Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.1-Used or spent oil	150 KL/Annum	Generation, Collection, Storage, Reception, Disposal to authorized recyclers
2	Schedule I /3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.3-Sludge and filters contaminated with oil	5 T/Annum	Generation, Collection, Storage, Reception, Disposal to authorized recyclers
3	Schedule I /33. Handling of hazardous chemicals and wastes	33.1-Empty barrels/containers/liners contaminated with hazardous chemicals /wastes	10 T/Annum	Generation, Collection, Storage, Reception, Disposal to authorized recyclers
4	Schedule I /5. Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.2-Wastes or residues containing oil	50 T/Annum	Generation, Collection, Storage, Reception, Disposal to authorized recyclers
5	Schedule I /3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.1-Cargo residue, washing water and sludge containing oil	2000 T/Annum	Generation, Collection, Storage, Reception, Disposal to authorized recyclers
6	Schedule I /35. Purification and treatment of exhaust air/gases, water and waste water from the processes in this schedule and common industrial effluent treatment plants (CETP's)	35.3-Chemical sludge from waste water treatment	1 T/Annum	Collection, Storage, Reception, Disposal to TSDF, Gummidipoondi/ authorized recyclers
7	Schedule I /3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.4-Ballast water containing oil from ships	120 KL/Annum	Generation, Collection, Storage, Reception, Disposal to authorized recyclers / for Captive Recovery and Reuse after separating oil from water using Oil Water Separator
8	Schedule I /33. Handling of hazardous chemicals and wastes	33.2-Contaminated cotton rags or other cleaning materials	50 T/Annum	Generation, Collection, Storage, Reception, Disposal to authorized recyclers
9	Schedule I /34. De-contamination of barrels/containers used for handling of hazardous wastes/chemicals	34.2-Sludge from treatment of waste water arising out of cleaning / disposal of barrels / containers	10 T/Annum	Collection, Storage, Reception, Disposal to TSDF, Gummidipoondi/ authorized recyclers
10	Schedule I /3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.1-Cargo residue, washing water and sludge containing oil	25 T/Annum	Generation, Collection, Storage, Reception, Disposal to authorized recyclers
11	Schedule I /3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.4-Ballast water containing oil from ships	1000 KL/Annum	Generation, Collection, Storage, Reception, Disposal to authorized recyclers / for Captive Recovery and Reuse after separating oil from water using Oil Water Separator

3. This authorization shall be valid for a period upto 29/04/2024.



TAMILNADU POLLUTION CONTROL BOARD

The Authorization is issued subject to the following general and special conditions annexed.

R. Kannan

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For Member Secretary
Tamil Nadu Pollution Control Board
Chennai

A. GENERAL CONDITIONS OF AUTHORIZATION

1. The authorised person shall comply with the provisions of the Environment (Protection) Act, 1986 and the rules made there under.
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by Tamil Nadu Pollution Control Board.
3. The person authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this Authorisation.
4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorization.
5. The person authorised shall implement Emergency Response procedure (ERP) for which this authorisation is being granted considering all site specific possible scenarios such as spillages, leakages, fire ,etc and their possible impacts and also carry out mock drill in this regard at regular interval of time.
6. The person authorised shall comply with the provisions outlined in the CPCB guidelines on "Implementing Liabilities for Environmental damages due to Handling and Disposal of Hazardous Wastes and Penalty".
7. It is the duty of the authorized person to take prior permission of Tamil Nadu Pollution Control Board to close down the facility.
8. The imported Hazardous and other wastes shall be fully insured for transit as well as the accidental occurrences and its clean-up operation.
9. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
10. The Hazardous and other wastes which gets generated during recycling or reuse or recovery or pre-processing or utilisation of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of Authorisation.
11. The importer or Exporter shall bear the cost of import or export or mitigation of damages if any.
12. An application for the renewal of an authorization shall be made as laid down under these Rules.
13. Any other conditions for compliance as per the Guidelines issued by the MoEF and CC or CPCB from time to time.
14. Annual returns shall be filed by June 30th for the period ending 31st March of the previous financial year.

B. SPECIFIC CONDITIONS - HW Generator

1. The occupier/generator shall be responsible for safe and environmentally sound management of hazardous and other wastes.
2. The occupier shall follow the following steps for the management of hazardous and other wastes. (a) prevention (b) minimization (c) reuse (d) recycling (e) recovery, utilisation including co-processing and (f) safe disposal
3. The occupier shall take all the steps while managing hazardous and other wastes - (a) To contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and (b) To provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.
4. The occupier shall store the hazardous and other wastes for a period not exceeding ninety days and shall maintain a record of sale, transfer, storage, recycling, recovery, pre-processing, co-processing and utilisation of such wastes and make these records available for inspection:
5. The hazardous and other wastes shall be stored temporally in an isolated area earmarked for the purpose within the occupier's premises (it shall not be accessible to rain water) till scientific disposal. The storage area shall be fenced properly and a sign of danger shall be placed at the storage site.



TAMILNADU POLLUTION CONTROL BOARD

6. The containers holding the hazardous and other wastes shall be kept in good condition and made of materials which can withstand the physical and environmental conditions during storage and transportation. Only properly cleaned containers shall be used for storage of hazardous and other wastes.
7. The occupier handling hazardous or other wastes shall maintain records of such operations of generation, handling, storage and disposal as per Form 3.
8. The hazardous and other wastes generated in the establishment of the occupier shall be sent or sold to an authorised actual user or shall be disposed of in an authorised disposal facility.
9. The occupier handling hazardous or other wastes shall ensure that the hazardous and other wastes are packaged in a manner suitable for safe handling, storage and transport as per the guidelines issued by the Central Pollution Control Board from time to time
10. The labelling of package of hazardous or other wastes shall be done as per Form 8. The label shall be of non-washable material, weather proof and easily visible.
11. The hazardous and other wastes shall be transported from the occupier's establishment to an authorised actual user or to an authorised disposal facility in accordance with the provisions of these rules.
12. The transport of the hazardous and other wastes shall be in accordance with the provisions of these rules and the rules made by the Central Government under the Motor Vehicles Act, 1988 and the guidelines issued by the Central Pollution Control Board from time to time in this regard..
13. The occupier shall provide the transporter with the relevant information in Form 9, regarding the hazardous nature of the wastes and measures to be taken in case of an emergency and shall label the hazardous and other wastes containers as per Form 8
14. The authorisation for transport shall be obtained either by the sender or the receiver on whose behalf the transport is being arranged.
15. The transporter/sender of the hazardous and other wastes shall prepare and maintain manifest in Form 10.
16. The occupier or the operator or the transporter shall immediately intimate TNPCB through telephone, e-mail about the accident and subsequently send a report in Form 11, where an accident occurs at the facility of the occupier handling hazardous or other wastes and operator of the disposal facility or during transportation
17. The occupier who intends to get its hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal.
18. The occupier shall be liable for all damages caused to the environment due to improper handling and management of the hazardous and other wastes.
19. The occupier handling hazardous and other wastes shall submit annual returns containing the details specified in Form 4 to TNPCB on or before the 30th day of June of every year for the preceding period April to March.
20. Any increase in quantity of handling of hazardous and other wastes, any change in category of hazardous and other wastes and any change in method of handling operations shall be brought to the notice of the TNPCB and fresh authorization shall be obtained.

ADDITIONAL SPECIFIC CONDITIONS

1. The unit shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.
2. The unit shall dispose 3.3 (Sludge and filters contaminated with oil), 33.1 (Empty barrels/containers/liners contaminated with hazardous chemicals /wastes), 5.2 (Wastes or residues containing oil), 3.1(Cargo residue, washing water and sludge containing oil), 35.3 (Chemical sludge from waste water treatment), 3.4(Ballast water containing oil from ships), 34.2 (Sludge from treatment of waste water arising out of cleaning / disposal of barrels / containers), 5.1 (Used or spent oil), 33.2 (Contaminated cotton rags or other cleaning materials) to registered recyclers having valid authorization of the concerned State Pollution Control Board as reported.
3. The unit shall ensure that all relevant provisions of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 are complied with.
4. The hazardous wastes shall be stored in a compatible container on an impervious platform in closed shed which shall be provided with requisite fire protection system, personal protective equipment and safety system.
5. The unit shall maintain the records of generation of hazardous waste in Form 3 and shall furnish the copy of



TAMILNADU POLLUTION CONTROL BOARD

the manifest in Form 10 endorsed by the dispatcher, transporter and receiver of Hazardous wastes.

6. The unit shall furnish the Annual returns in Form 4 of the Rules to the Board on or before 30th June for the previous year from April to March.
7. The authorization is subject to such conditions as may be specified in the Rules for the time being in force under the Environment (Protection) Act, 1986 and the conditions mentioned in the Schedule A& B.
8. The unit shall provide Oil Water Separator (OWS) for separation of oil from water. The unit shall ensure that the oil separated shall be disposed to the authorized recyclers and the balance water shall be sent to ship.
9. The Specification of fuel derived from waste oil and other oily streams loaded from ships shall meet the specifications specified in Schedule V –Part B of the Hazardous & Other Waste (M & TB) Rules 2016.
10. The unit shall hand over the oily wastes only after obtaining and undertaking to this effect from the Registered Recycler.

Digitally signed by R.
Kannan
Date: 2019.05.03 13:44:40
+05'30'
R. Kannan
For Member Secretary
Tamil Nadu Pollution Control Board
Chennai

To

The Chief Executive Officer
MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED
Kattupalli Port, Post box no: 001, Kattupalli Village
Pin:600120

Copy to:

1. The JCEE-Monitoring, Tamil Nadu Pollution Control Board, Chennai.
2. The District Environmental Engineer, Tamil Nadu Pollution Control Board, GUMMIDIPOONDI.



TAMILNADU POLLUTION CONTROL BOARD



Tamil Nadu Pollution Control Board
Inspection Report of units generating/handling Hazardous Wastes
Generator - Fresh

1	a	Name and Designation of the Inspecting Officer	DHINAKARAN M,AE and ER Ramasubbu DEE
	b	District Office	GUMMIDIPOONDI
2	a	Date of receipt of Application of Authorisation	21/01/2019
	b	Date of Inspection	27/02/2019
3	a	Name of the Industry	MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED
	b	Location of the Unit :	
		(i) S.F. No	14-18B, 15, 168-1&2, 169, 170-1&2, 171-1&2, 172-1&2, 173-1&2, 174, 175, 176, 177, 178-1,2,3&4,179-1, 2, 3&4, 180, 181, 182, 183, 184-1, 2&3, 186, 187, 188-1, 2A, 2B& 2C,189, 190,191, 192-1 & 2; 193-1, 2, 3 & 4, 194, 195, 196, 197-1,2&3, 199, 200-1&2, 202-1&2, 203, 206-1,2A,2B,3,4A&4B, 207-2B, 208-2, 209-1,2&3, 210-1&2, 211-1,2,3,4,5,6&7, 212, 213, 214-1,2,3&4,215-1&2,216,217,218-1,2,3,4&5,219-1&2,220, 223-1&2, 224-1,2,3,4&5, 225, 226, 227, 228-1,2,3,4& 5, 229, 230, 231-1,2,3,4&5, 232, 233-1,2,3&4, 234-1,2,3&4, 235-1B, 2-3B, 236-3B, 4, 242-1&2, 243-2B, 244-2, 247-1, 248-1&2, 249-1A,2,2B, 198-1, 205-1A,1B,2,5, 1 (part)-4A1 Pt,4A2,4B Pt,5 Pt, 11 (part), 16 (part)-1&2,17 (part)-1, 2, 3A&3B ,143 (part), 151 (part)-1,2,3&4,152 (part), 153 (part), 154 (part)-1&2, 166 (part), 167 (part)-1&2, 204(part)-1,2&3, 221(part), 222 (part)-1&2, 330 (part)-1,2,3&4, 12 (Part),16-3, 198-2, 201, 205-3, 205-4
		(ii) Village	KATTUPALLI
		(iii) Taluk	PONNERI
		(iv) Revenue District	Tiruvallur
		(v) Local Body	THIRUVALLUR Panchayat Union
	c	Factory address: :	Registered Office address:
		Kattupalli Port, Post box no: 001, Kattupalli Village	RAMCON FORTUNA TOWERS, 4TH FLOOR, NO. 1/2, KODAMBAKKAM HIGH ROAD, NUMGAMBAKKAM CHENNAI.
	4		Date of Commissioning
5		Total Gross Fixed Assets(Rs In Lakhs)	166711.33
6	a	Category-Classification	RED/Large
	b	Type of the industry	1065-Ports & Harbours, Jetties and Dredging Operations
7	a	Name and Designation of the Occupier	Ennarasu Karunesan ,The Chief Executive Officer

	b	Name of the Industry's representative accompanying during inspection	Thiru Vijay Asst Manager		
8	i)	Hazardous waste handling/generation ?	Yes		
	ii)	Applied for Authorisation ?	Yes		
9	Details of HWA issued status:				
	Date of Application for HWA	HWA Type	Authorisation No	Issued date	Valid date
10	Hazardous Waste quantity generated and waste Type, Storage and Disposal				

Schedule/Name of the Processes	Name of Hazardous Waste (with category No)	Quantity with unit	Waste Type	Waste Storage	Waste Disposal
Schedule I/5. Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.1-Used or spent oil	150 KL/Annum	Recyclable	MS Drums	Recovery and Reuse-Authorized recyclers
Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.3-Sludge and filters contaminated with oil	5 T/Annum	Recyclable	Concrete Storage Shed	Recovery and Reuse-Authorized recyclers
Schedule I/33. Handling of hazardous chemicals and wastes	33.1-Empty barrels/containers/liners contaminated with hazardous chemicals /wastes	10 T/Annum	Recyclable	Concrete Storage Shed	Recovery and Reuse-Authorized recyclers
Schedule I/5. Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.2-Wastes or residues containing oil	50 T/Annum	Recyclable	MS Drums	Recovery and Reuse-Authorized recyclers
Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.1-Cargo residue, washing water and sludge containing oil	2000 T/Annum	Recyclable	MS Drums	Recovery and Reuse-Authorized recyclers
Schedule I/35. Purification and treatment of exhaust air/gases, water and waste water from the processes in this schedule and common industrial effluent treatment plants (CETP's)	35.3-Chemical sludge from waste water treatment	1 T/Annum	Landfillable	MS Drums	Common Landfill-TSDF,Gummi dipondi
Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.4-Ballast water containing oil from ships	120 KL/Annum	Recyclable	MS Tanks	Recovery and Reuse-Captive
Schedule I/33. Handling of hazardous chemicals and wastes	33.2-Contaminated cotton rags or other cleaning materials	50 T/Annum	Incinerable	MS Drums	Recovery and Reuse-Authorized recyclers
Schedule I/34.De-contamination of barrels/containers used for handling of hazardous wastes/chemicals	34.2-Sludge from treatment of waste water arising out of cleaning / disposal of barrels / containers	10 T/Annum	Recyclable	MS Drums	Recovery and Reuse-Authorized recyclers
Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.1-Cargo residue, washing water and sludge containing oil	25 T/Annum	Recyclable	MS Drums	Recovery and Reuse-Authorized recyclers

Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.1-Cargo residue, washing water and sludge containing oil	25 T/Annum	Recyclable	MS Drums	Recovery and Reuse-Authorized recyclers
Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.4-Ballast water containing oil from ships	1000 KL/Annum	Recyclable	Concrete Tanks	Recovery and Reuse-Authorized recyclers

11 Description of Source of generation of waste:

Name of Hazardous Waste (with category No)	Source of generation of waste	Physical status	Quantity stored at any time	Quantity accumulated as on 31st March
5.1-Used or spent oil	Cranes and Lifting machinery	Oily	5 KL	1 KL
3.3-Sludge and filters contaminated with oil	Compressors and cranes	Solid	2.5 T	1 T
33.1-Empty barrels/containers/liners contaminated with hazardous chemicals /wastes	Paint containers, stp chemical containers, etc	Solid	1 T	0 T
5.2-Wastes or residues containing oil	Cranes and Lifting machinery	Semi solid	2.5 T	0 T
3.1-Cargo residue, washing water and sludge containing oil	Ships	Semi solid	5 T	1 T
35.3-Chemical sludge from waste water treatment	ETP	Semi solid	0.25 T	0 T
3.4-Ballast water containing oil from ships	Ships	Liquid	12 KL	0 KL
33.2-Contaminated cotton rags or other cleaning materials	Cranes and Lifting machinery	Semi solid	1 T	0.05 T
34.2-Sludge from treatment of waste water arising out of cleaning / disposal of barrels / containers	ETP treatment chemicals	Semi solid	2.5 T	0 T
3.1-Cargo residue, washing water and sludge containing oil	Oil Storage Tanks and Pipelines	Semi solid	5 T	0 T
3.4-Ballast water containing oil from ships	Oily water mixture from Ships	Liquid	50 KL	0 KL

12 a) Activities for which the issue of Authorisation may be considered::

Schedule / Name of the Processes	Name of Hazardous Waste (with category No)	Quantity with unit	Activities for which the issue of Authorization may be considered
Schedule I/5. Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.1-Used or spent oil	150 KL/Annum	Generation,Collection,Storage,Transportation,Disposal to Authorized recycler.
Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.3-Sludge and filters contaminated with oil	5 T/Annum	Generation,Collection,Storage,Transportation,Disposal to Authorized recycler.
Schedule I/33. Handling of hazardous chemicals and wastes	33.1-Empty barrels/containers/liners contaminated with hazardous chemicals /wastes	10 T/Annum	Generation,Collection,Storage,Transportation,Disposal to Authorized recycler.
Schedule I/5. Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.2-Wastes or residues containing oil	50 T/Annum	Generation,Collection,Storage,Transportation,Disposal to Authorized recycler.
Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.1-Cargo residue, washing water and sludge containing oil	2000 T/Annum	Generation,Collection,Storage,Transportation,Disposal to Authorized recycler.
Schedule I/35. Purification and treatment of exhaust air/gases, water and waste water from the processes in this schedule and common industrial effluent treatment plants (CETP's)	35.3-Chemical sludge from waste water treatment	1 T/Annum	Generation,Collection,Storage,Transportation,Disposal to Common Landfill-TSDF,Gummidipoondi
Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.4-Ballast water containing oil from ships	120 KL/Annum	Generation,Collection,Storage,Transportation,Disposal to Authorized recycler.
Schedule I/33. Handling of hazardous chemicals and wastes	33.2-Contaminated cotton rags or other cleaning materials	50 T/Annum	Generation,Collection,Storage,Transportation,Disposal to authorized recycler
Schedule I/34.De-contamination of barrels/containers used for handling of hazardous wastes/chemicals	34.2-Sludge from treatment of waste water arising out of cleaning / disposal of barrels / containers	10 T/Annum	Generation,Collection,Storage,Transportation,Disposal to authorized recycler
Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.1-Cargo residue, washing water and sludge containing oil	25 T/Annum	Generation,Collection,Storage,Transportation,Disposal to authorized recycler
Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.4-Ballast water containing oil from ships	1000 KL/Annum	Generation,Collection,Storage,Transportation,Disposal to authorized recycler
12 b)	Accumulated quantity of each waste for which Authorization require to be issued for disposal (To indicate as conditions) if any	<ul style="list-style-type: none"> The accumulated quantities are 3.1(Cargo residue, washing water and sludge containing oil) – 1T, 3.3-1T,5.1-1KL,5.2-0T, 33.1-0T, 33.2- 0.05T & 35.3- 0T, 3.1- Cargo residue, washing water and sludge containing oil – 0T & 3.4- Ballast water containing oil from ships -0T. 	

13 a)	Generator of Hazardous waste?	Yes
b)	Products and By products manufactured per Annum	The unit does not undertake any manufacturing process and only provide port services
c)	Manufacturing process with sources of HW generation	
d)	Details of characteristics and management of wastes within the plant:	

Schedule / Name of the Processes	Name of Hazardous Waste (with category No)	Quantity with unit	Characteristics of each waste	Details of utilization within the plant such as SLF, etc	If not utilised within the plant, provide details of what is done with this waste	Details of arrangements for transportation to actual users/ TSDF	Details of the environmental safeguards and environmental facilities provided for safe handling
Schedule I/5. Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.1-Used or spent oil	150 KL/Annum	Liquid	NIL	Sold to TNPCCB Authorized Recyclers	Through TNPCCB Authorized Recyclers	Storage in Integrated Waste Management Shed. All Environmental Safeguards and Facilities provided for Safe Handling
Schedule I/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.3-Sludge and filters contaminated with oil	5 T/Annum	Semi Solid	NIL	Sold to TNPCCB Authorized Recyclers	Through TNPCCB Authorized Recyclers	Storage in Integrated Waste Management Shed. All Environmental Safeguards and Facilities provided for Safe Handling
Schedule I/33. Handling of hazardous chemicals and wastes	33.1-Empty barrels/containers/liners contaminated with hazardous chemicals/wastes	10 T/Annum	Solid	NIL	Sold to TNPCCB Authorized Recyclers	Through TNPCCB Authorized Recyclers	Storage in Integrated Waste Management Shed. All Environmental Safeguards and Facilities provided for Safe Handling
Schedule I/5. Industrial operations using mineral or synthetic oil as lubricant in hydraulic systems or other applications	5.2-Wastes or residues containing oil	50 T/Annum	Semi Solid	NIL	Sold to TNPCCB Authorized Recyclers	Through TNPCCB Authorized Recyclers	Storage in Integrated Waste Management Shed. All Environmental Safeguards and Facilities provided for Safe Handling

	Schedule 1/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.1-Cargo residue, washing water and sludge containing oil	2000 T/Annunum	Liquid / Semi solid	NIL	Sold to TNPCB Authorized Recyclers	Through TNPCB Authorized Recylers	Storage in Integrated Waste Management Shed. All Environmental Safeguards and Facilities provided for Safe Handling
	Schedule 1/35. Purification and treatment of exhaust air/gases, water and waste water from the processes in this schedule and common industrial effluent treatment plants (CETP's)	35.3-Chemical sludge from waste water treatment	1 T/Annunum	Solid	NIL	Disposal to TSDF through TNPCB authorised Recycler	Through TNPCB Authorized Recylers	Storage in ETP. All Environmental Safeguards and Facilities provided for Safe Handling
	Schedule 1/3. Cleaning, emptying and maintenance of petroleum oil storage tanks including ships	3.4-Ballast water containing oil from ships	120 KL/Annunum	Liquid	Treatment in ETP and reusing in the plant	NIL	NIL	All Environmental Safeguards and Facilities provided for Safe Handling
e)	Hazardous and other wastes generated from storage of hazardous chemicals as defined under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989				Yes			
14 i)	TSDF operator ?				No			
15 a)	Recyclers or pre-processors or co-processors or actual users of hazardous or other wastes?				No			
16	Details of Consents/Renewals issued status:							
	Date of Application	Consent application(Consent s/Renewals)	Issued date	Valid date	Status and reason for pending if not issued			
	30/06/2009	CTE	18/08/2009	17/08/2011	Issued			
	28/03/2013	CTO-Renewal	04/07/2013	31/03/2014	Issued			
	22/04/2016	CTO-DIRECT	09/02/2017	31/03/2018	Issued			
	18/07/2018	CTO-RENEW	17/09/2018	31/03/2019	Issued			
17	Compliance of conditions of Authorisation issued :							
	Fresh Application							
18	Any other information::							

	<p>The unit of M/s Marine Infrastructure Developer Private Limited has applied for Hazardous Authorization under Hazardous & other Waste (MTB) Rules 2016 for handling of following hazardous waste category such as 3.1, 3.3,5.1,5.2, 33.1, 33.2, 34.2 & 35.3.</p> <p>In this regard the said unit was inspected on 27.2.2019 and following details are observed.</p> <ul style="list-style-type: none"> • The unit was in operation with valid consent from the Board under Water & Air Acts • The accumulated quantities are 3.1(Cargo residue, washing water and sludge containing oil) – 1T, 3.3- 1T,5.1- 1KL,5.2-0T, 33.1-0T, 33.2- 0.05T & 35.3- 0T, 3.1- Cargo residue, washing water and sludge containing oil – 0T & 3.4- Ballast water containing oil from ships -0T. • The unit has provided for concrete plat form for the storage of used oil collected from the unit. • The unit has furnished the proposal for integrated waste management shed in the unit premises. • The unit has furnished an agreement made with M/s TSDF for the disposal of following HW category 34.2 & 35.3.Copy enclosed. • The unit has furnished an agreement made with M/s Thirupathy oil company unit -1 for the disposal of following HW category 3.1, 3.3,5.1,5.2, 33.1, 33.2 .Copy enclosed.
19	<p>Specific recommendation on the issue of Hazardous waste Authorisation:</p>
	<p>In view of the above it is submitted and recommended that the issue of Hazardous Authorization under Hazardous and other waste (MTB) Rules 2016 for handling of the following Hazardous waste category such as 3.1(Cargo residue, washing water and sludge containing oil), 3.3,5.1,5.2, 33.1, 33.2,35.3, 3.1- Cargo residue, washing water and sludge containing oil) & 3.4 subject to the following conditions.</p> <p>1. The unit shall strictly adhere the provisions of Hazardous and other waste (MTB) Rules 2016.</p>
<p>DHINAKARAN M,AE (Name and Designation)</p>	

DEE Recommendations.

RECOMMENDED

Ramsubbu R ,DEE
(Name and Designation)

APPENDIX B

**APPENDIX B1
COMPLIANCE REPORT OF
ENVIRONMENTAL/CRZ DATED
10.10.2022**

Appendix B1 Compliance for Amendment in EC/CRZ Letter 2022

SI No.	EC CONDITIONS	COMPLIANCE
Change in Product Mix Under Clause 7 (ii) of EIA Notification 2006 (as amended) in Environment & CRZ Clearance for Kattupalli Port at Kattupalli, Ponneri Taluka, Tiruvallur District, Tamil Nadu EC Identification No: EC22A033TN110498, File No: 10-130/2007-IA.III and Date of Issue of EC: 10/10/2022		
1.	The greenbelt at least 5 to 10 m width shall be developed mainly along the periphery of the project. Selection of plant species will be purely native in nature and shall be as per the CPCB guidelines in consultation with the state Forest Department.	Noted and Shall be complied
2.	PP shall make additional arrangement if required for protection of possible fire hazards during material handling. Firefighting system shall be as per the norms.	Noted and shall be complied
3.	All other terms and conditions prescribed in the environmental clearance vide letter no. F.No.10-130/2007-IA. III dated February 9, 2018, remains unchanged.	Noted and shall be complied

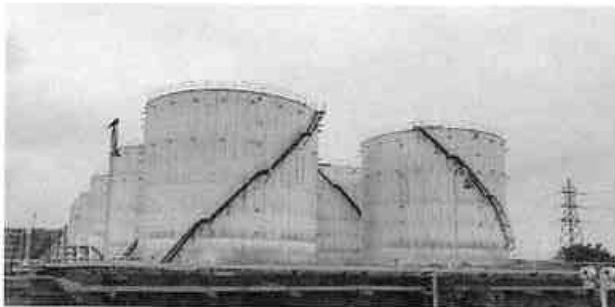
APPENDIX B2
CERTIFIED COMPLIANCE REPORT OF
ENVIRONMENTAL/CRZ DATED
09.02.2018

CERTIFIED COPY OF THE COMPLIANCE REPORT

Subject: CRZ & Environmental Clearance for the development of proposed Shipyard-cum-Minor Port Complex at Kattupalli, Ponneri Taluka Tiruvallur District, Tamil Nadu by M/s Marine Infrastructure Developer Pvt. Limited (MIDPL) - bifurcation of Environmental & CRZ Clearance reg.

Reference: EC letter No. F. No 10-130/2007 – IA.III Dated 9th February 2018

Date of site visit: 24.05.2022





भारतसरकार
GOVERNMENT OF INDIA
पर्यावरण ,वनएवंजलवायुपरिवर्तनमंत्रालय
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE
Integrated Regional Office (South Eastern Zone),
1st& 2nd floor, HEPC Building, No.34, Cathedral Garden Road,
Nungambakkam, Chennai - 600034



E.P./12.1/2017-18/35/TN/564

Dated: 30.05.2022
३१

To

Shri. Jai Singh Khurana,
Managing Director,
Marine Infrastructure Developer Private Limited,
Ramcon Fortuna Towers,
4th Floor, No1/2, Kodambakkam High Road, Nungambakkam,
Chennai-600 034

Subject: CRZ & Environmental Clearance for the development of proposed Shipyard-cum-Minor Port Complex at Kattupalli, Ponneri Taluka Tiruvallur District, Tamil Nadu by M/s Marine Infrastructure Developer Pvt. Limited (MIDPL) - bifurcation of Environmental & CRZ Clearance reg.

Reference: EC letter No. F. No 10-130/2007 – IA.III Dated 9th February 2018
Your letter No. MIDPL/EC-HYC/2022/153 dated 17.05.2022

Sir,

With reference to the above mentioned subject, please find enclosed herewith a Certified Copy of the Compliance Report. This has been approved by the DDGF(C) vide diary No. 359 dated 31.05.2022

Yours faithfully,

Encl: As above.

C. Palpandi
31.5.2022

(Dr. C. Palpandi)
Scientist 'D'

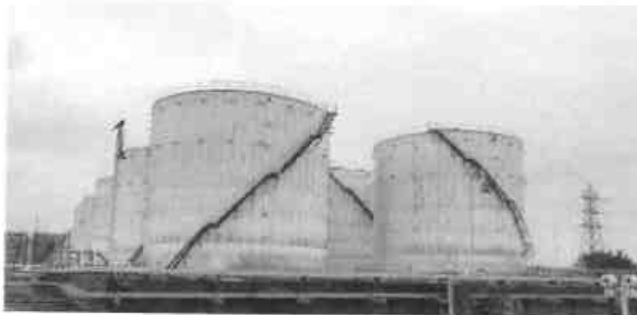
Dr. C. Palpandi,
Scientist "D"
Government of India
Min. of Environment Forest and Climate Change
Integrated Regional Office
1st Floor, Additional Office Block for GPOA,
Shastri Bhawan, Haddows Road
Nungambakkam, Chennai - 600 006.

CERTIFIED COPY OF THE COMPLIANCE REPORT

Subject: CRZ & Environmental Clearance for the development of proposed Shipyard-cum-Minor Port Complex at Kattupalli, Ponneri Taluka Tiruvallur District, Tamil Nadu by M/s Marine Infrastructure Developer Pvt. Limited (MIDPL) - bifurcation of Environmental & CRZ Clearance reg.

Reference: EC letter No. F. No 10-130/2007 – IA.III Dated 9th February 2018

Present status of the project:



(Signature)

Tamil Nadu Industrial Development Corporation Limited (TIDCO), a Government of Tamil Nadu Enterprise, is the nodal agency to identify and promote establishment of large and medium scale industries within State of Tamil Nadu. Considering the potential for ship building industry in the country, TIDCO had identified the leading technology, engineering and construction conglomerate, Larsen & Toubro Limited (L&T), for developing the Ship yard cum Port Complex on a Joint Venture (JV) basis. Subsequently, L&T Shipbuilding Limited (LTSB), a JV of L&T and TIDCO, was formed in 2008 to develop the Shipyard-cum-Port Complex at Kattupalli. Expert Appraisal Committee (EAC) on "Infrastructure Development, CRZ & Miscellaneous Projects", Ministry of Environment, Forest and Climate Change, New Delhi (MoEF&CC) accorded CRZ/Environmental Clearance (EC) for development of Kattupalli Shipyard cum Port Complex vide Letter No. 10-130/2007 IA.III dated July 03, 2009.

Tamil Nadu Pollution Control Board (TNPCB) has accorded Consent for Establish (CFE) vide letter dated August 18, 2009 (CFE-Air 4983 and CFE-Water 5042). LTSB commenced the construction of Shipyard cum Port Complex at Kattupalli, Thiruvallur District, Tamil Nadu in October, 2009. After obtaining Consent for Operation (CFO), Kattupalli Shipyard cum Port has commissioned its operations on January 30, 2013.

Considering the divergent nature of business of LTSB and to harness the potential for growth with clear focus on port business, LTSB had approached the Hon'ble National Company Law Tribunal (NCLT), Chennai with a Scheme of arrangement for demerger of port business of LTSB into a separate company Viz., M/s Marine Infrastructure Developer Private Limited (MIDPL). The Hon'ble NCLT after careful examination of the scheme had accorded its approval on March 20, 2017. Pursuant to the said NCLT Order, the Port business in Kattupalli Shipyard cum Port Complex on a going concern basis together with the identified port assets, powers, sanctions, approvals, registrations etc., stands transferred and vested with MIDPL. Accordingly, LTSB had approached MoEF&CC to bifurcate the existing Environmental and CRZ Clearance in the name of L&T Shipbuilding for Shipyard and MFF related activities and MIDPL for Port and common infrastructure related activities. MoEF&CC granted the bifurcated EC vide letter No. F. No.10-130/2007-IA.III dated February 9, 2018.

Adani Ports and Special Economic Zone Ltd. (APSEZ), India's largest port developer and part of the Adani Group, has executed Share Purchase Agreement between Larsen and Toubro Limited, Marine Infrastructure Developer Private Limited, L&T Ship building Limited and Adani Kattupalli Port Private Limited and acquired 97% shares of Marine Infrastructure Developer Private Limited (MIDPL). MIDPL is the developer and operator of Kattupalli Port.

MIDPL is having valid Consent for Operation Orders from Tamil Nadu Pollution Control Board vide Order No.2105136876761 dated 13.09.2021 under Water Act and Consent Order No. 2105236876761 dated 13.09.2021 under Air Act (Valid Till 31.03.2026). MIDPL is also having valid Hazardous Waste Authorisation vide Order No. 19HFC20312718 dated 30.04.2019 (Valid till 29.04.2024) and also having Bio Medical Waste Authorisation (One Time) vide Order No. 19BAC15866575 dated 25.04.2019 for Non-Bedded Facility.

MIDPL has obtained "No increase in Pollution Load Certificate" from TNPCB on 12.01.2021 for the proposed change in cargo Mix (additional handling of Rock Phosphate, Dolomite, Bauxite cargos and increase the non-hazardous liquid cargo capacity from 0.57

C. Dhanraj

MMTPA to 0.72 MMTPA by optimally deploying the port infrastructure being developed without change in the overall handling capacity approved in the EC & CRZ by MoEF & CC).

Based on the above mentioned Environmental/CRZ clearances, CFE and CFOs, the following activities and cargo handling have been permitted at the Kattupalli Port and details are presented in below Table.

Cargo Handling Capacity

S. No.	Description	Capacity
1	Containers	21.60 MMTPA
2	Ro-Ro – Automobiles	0.07 MMTPA
3	Project Cargo	0.44 MTPA
4	Break Bulk/general cargo (Barytes / Gypsum / Limestone / Granite / Steel Cargo / Rock Phosphate / Bauxite / Dolomite cargoes)	1.82 MTPA
5	Edible oil, CBFS, Base Oil, Lube and Non Hazardous Liquid Cargo	0.72 MTPA
Total Handling capacity at Port		24.65 MTPA

Environmental Management measures: The Project Authorities are regularly undertaking necessary environmental monitoring for ambient air, noise, DG stack emissions, marine water ecology & sediments, marine water turbidity, etc., through NABL accredited third party laboratory. The periodical monitoring reports are being regularly submitted to Integrated Regional Office (IRO), MoEF&CC, Chennai. The results of monitoring provided during the visit shows that they are complying with the norms. Commissioned and operating One Continuous Ambient Air Quality Monitoring equipment and same is linked to TNPCB CARE AIR CENTER.

For maintaining the Ambient Air Quality: Major air pollution generated by port activities includes vehicle movements, dry cargos operations and other port activities. The following is practiced for controlling of air pollutions (**Annexure – 1**) at port premises:

- Water sprinkling on truck path
- Mobile Hopper during cargo handling
- Road cleaning with sweeping machines
- Installed Vehicle Pollution Under Control (PUC) checking facility at Port.
- Tarpaulin cover over the dry cargo materials at open yard
- Using the closed warehouse for fine dry cargos materials.
- Trucks covered with Tarpaulin for dry cargo vehicle movements

MIDPL is having Emergency Preparedness and Response Plan, procured fire tender, firefighting system & equipment's and deployed trained personnel.

For maintaining the Water Quality: Developed 45 KLD STP's & 50 KLD ETP (**Annexure-2**) and the treated effluent is reused for green belt. Rainwater harvesting system

C. Palanandy

has been provided in all port buildings. Surface rainwater is collected through rainwater drainage system and is stored in the rain water collection pond (**Annexure – 3**) of 3600 m³ capacity located inside Port premises and the collected rain water is used for gardening purpose. Developed Oil Spill Contingency (OSC) Plan for Tier-2 spills, procured necessary OSC equipment (**Annexure – 4**) and chemicals and deployed trained personnel and Monitoring of Marine water quality and Marine sediment quality at regular intervals through NABL accredited laboratory (**Annexure – 5**).

For Solid Waste Management: The Solid wastes (Non- hazardous and hazardous) generated from the port activities are being collected, segregated and stored in the Integrated Waste Management Shed (IWMS)(**Annexure – 6**) and are handled as per 5R (Reduce, Reuse, Recycle, Reprocess and Recover) principle. The Biodegradable wastes are composted & used as manure. The Used Oils and other Hazardous wastes are sold to the TNPCB approved vendors and used batteries are disposed to the manufacturers on buy back basis.

Green Belt: Kattupalli Port is continuously developing and maintaining green belt in the port premises. Adequate greenbelt covering in an area of around 25.06 Ha which includes a green belt (Inside Port premises) of 9.81 Ha and Outside Port area (Palm Tree plantation along Buckingham canal) of 15.25Ha. is developed and are being well maintained. Port has planted around 27,407 Trees, 33,699 Sq.M shrub plants and 14,898 Sq.M lawn areas and further Green belt development is also in progress. They have developed and maintaining adequate nursery for greenbelt development with local species (**Annexure-7**).

Under the CSR activities, MIDPL have been implementing several CSR activities in the neighboring villages to improve overall living standards catering to area like housing, education, health & medical aid, vocational skills, provision of Ice Boxes to the fishermen, schemes for women empowerment and community infrastructure development, desilting of Village water ponds, drinking water RO Units supply, etc. (**Annexure-8**). Project Authority have informed that CSR expenditure for the FY 2019-20 is around Rs.82.71 Lakhs, FY 2020-21 is around 126.50 Lakhs and FY 2021-22 is around Rs. 240.71 Lakhs. The key CSR activities carried out by Project Authorities includes;

- A total of 514 bicycles were distributed to GHS, Kattupalli, GHSS, Thiruvellavoyal, GHSS, Kattur, MPUMS, KoraiKuppam, Ornambedu and Karungkali
- Distributed Television to the Minjur Panchayat Union Primary schools in Karungkali and Mouthambedu which lacked TV for screening lessons through electronic media.
- Around 60 students on every day are benefitted from Shuttle service transport arrangement made to Athipattu railway station and prime focus is given to students above SSLC, teachers of Govt. High school, Kattupalli and Minjur Panchayat union, Kaalanji. The same vehicle is then used by primary and middle grade students of Kaalanji and Kattur. This transportation facility is available both in the mornings and evenings.
- Made arrangements with Multispecialty hospital and Eye care hospital for expert consultation. Team of professionals (Obstetrician and Gynecology, Dermatology, Orthopedic, Ophthalmology) from multispecialty hospitals visited villages for diagnosing and prescribing treatment.
 - Total 6 Multispecialty camps conducted covering 10 villages and around 661 peoples got benefitted.
 - Total 11 Eye camps conducted covering 18 villages and around 1234 peoples got benefitted. Around 715 peoples are provided with spectacles.

C. Pillay

- Natural Terafil water filter – 50 Nos. distributed at Senghazhanirmedu colony village
- Fortune SuPoshan project aims to utilize a community-based approach to address malnutrition and anemia issues in about 22 villages in Minjur block.
- A training session on organic farming was organized which was handled by an expert recognized by Tamil Nadu Agricultural University. Around 40 farmers benefited from the session and received bio fertilizers for experimenting in half an acre.
- Around 8 Nos. of Veterinary treatments cum awareness camps were organized during 2019-20 in collaboration with Madras Vet. College-MVC (Tamil Nadu Veterinary and Animal Sciences University). Around 2916 animals got treated and around 328 families got benefited.
- About 5.2 tons of concentrated cattle feed were distributed in four Panchayats – Kattur, Thiruvellavoyal, Voyalur and Kadapakkam which benefited 245 livestock owners by increasing their milch animals milk yield by 15% which consequently resulted in improvement of their monthly income.
- Around 30,000 Palm seeds planted along the Buckingham canal covering 10 Km length.
- Around 5,000 nos. of Palm seeds have planted on the bunds of water bodies in collaboration with Pasumai Bhoomi Trust.
- Adani foundation, Kattupalli arranged 1168 & 5170 sets of food materials including rice 5 kg and Dhoor Dhall 1 kg, and Cooking Oil 1 lt. at the cost of Rs. 22 Lakhs to the poor fisherman (90%) and agricultural coolies (10%) families living in 25 hamlets spread in 6 of our intervention Panchyats in respective phase 1 & 2. Have also distributed PPE & Infrared thermometer to Govt. Hospital located in Pulicat and Kattur for screening patients in OP.
- Adani Skill Development Centre in Kattur have inaugurated with Tailoring and Beautician courses with National Skill Development Corporation guidelines. 30 students in each trade getting trained in well-established training centre.
- Adani Foundation have carried out restoring water bodies at the cost of around Rs.20 Lakhs in K.R. Palayam of Neidhayvoyal Panchayat and Throwpathy Amman Koil Pond in Ornambedu village of Voyalur Panchayat
- Distribution of Insulated ice boxes worth of Rs. 8.50 Lakhs to the deep sea fishing groups in and around Pulicat. Around 240 groups got benefited.
- Distributed Tarpaulin covers to 500 deprived families for covering thatched huts in 4 panchayats to protect from Rain.
- Distributed 6 numbers of Refrigerators for storing covid testing Kits RT – Polymerase Chain reaction, Viral Transport Medium (VTM), Ante Snake Venom, Anti Rabies Vaccine. 2 Computers with Printer for documenting Covid 19 treatments and 10 Numbers “3 seat chair” for patients in the waiting hall.
- Food distributed to 350 economically backward individuals in the flood hit coastal areas, who are in the Relief Camps have three meals a day during NIVAR Cyclone.
- Distributed around 200 Sweaters to the people above 60 years of age in cyclone affected areas.
- Distributed around 800 fishing nets to those lost the net due to cyclone.

Considering the future business potential/ market potential and keen interest shown by the major Suppliers and Major Importers, MIDPL is proposing for Change in Product Mix as per the following table to cater to needs of port users without change in the overall handling capacity of 24.65 MMTPA as approved in the EC by MoEF & CC.

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S. No.	Name of the cargo	Existing Cargo (MTPA) (Consented Quantity)	Proposed Change in Product Mix (MTPA)
1	Containers (MTPA)	21.6	16.64
2	Ro-Ro (MTPA)	0.07	0.07
3	Project Cargo (MTPA)	0.44	0.44
4	Break Bulk/general cargo (Barytes/Gypsum/Limestone/Granite/Steel Cargo/Rock Phosphate/Dolomite/Bauxite)(MTPA)	1.82	5.00*
5	Edible oil, CBFS, Base Oil, Lube Oil and Non- Hazardous Liquid Cargo (MTPA)	0.72	2.50**
	Total	24.65	24.65

*General Cargo includes Agri Products, Fertilizers, Scrap, Silica Sand, Clinker, Soda Ash, Bentonite, Feldspar Cargos, Iron products, aluminum ingots, pig iron, Food grains including pulses, Sugar and other clean cargo.

**Liquid Cargo includes Glycerine, Groundnut oil, Crude Palm Oil, Fatty acid, Crude Mineral Oil, Heavy white Oil, Tall Oil Fatty acids, 2-Propyl Heptanol (2-PH), Di octyl Phthalate, Di-Iso Nonyl Phthalates, Bio-Diesel, Castor Oil, Molasses, Alpha Olefin C24-28, Oleic acid, splitter grade crude Glycerine, Distilled top Palm Kernel Fatty acid, Split RBD Palm Stearin Fatty Acid, Crude Palmolein, Expeller Groundnut oil, RBD Palm Olein, Split Palm Kernel fatty acid, Alpha Olifin C-14, Alpha Plus C-16, Linear Alpha Olefin C14 - C18, Octane – 1, Rubber Process Oil, Hydrogenated Veg Oil, etc.,

To process their Change in Product Mix proposal, the Project Authorities have requested the Integrated Regional Office of the Ministry, Chennai for providing Certified Copy of the Compliance Report vide letter No. MIDPL/EC-HYC/2022/153 dated 17.05.2022.

This monitoring report is filed on the basis of the field visit and as per the information provided by the project authority. Detailed point wise compliance status is given below in part III.

Date of site visit: 24.05.2022

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PART-III

S. No.	CONDITIONS	COMPLIANCE STATUS
SPECIFIC CONDITIONS		
(i)	The proponent shall comply all the conditions stipulated in the letter R.C.No. P1/2004/2008, dated 21.10.2008 of the Department of Environment, Chennai.	Refer below. The Project Authority has Complied all the conditions stipulated in the letter No. R.C.No. P1/2004/2008, dated 21.10.2008 of the Department of Environment, Chennai (Annexure – 9).
(ii)	The proponent shall comply all the commitment made vide his letter No. D/Shipyard/00/07 dated 20.03.2009.	Refer below. This Environmental Clearance (EC) is just a bifurcation of original EC of LTSB in the name of MIDPL & LTSB.
(iii)	Provision shall be made for the housing of Construction labour within the site with all necessary infrastructure and facilities such as fuel or cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	Complied. It was informed by the PA that the required infrastructure facilities such as housing, drinking water, mobile toilets, medical health care and canteen were provided during the construction time. It was in the form of temporary structure and removed after completion of the work.
(iv)	There shall be no withdrawal of groundwater in Coastal Regulation Zone area, for this project. In any case any ground water 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.	Complied. The source of water is from M/s. Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB), Chennai. At present, the water requirement is 300 KLD as informed. During the site visit, the PA informed that no groundwater is withdrawal from Coastal Regulation Zone area.
(v)	No dumping of dredging materials in the sea shall be undertaken. In case of sea dumping required, an integrated Modelling study to be carried out to locate the dump site so that it does not cause any problem to Ennore port.	Complied. No dumping of dredging material was observed during site visit. Dredge material dumping location has already been identified by LTSB through modelling studies.

C. Dairandy

(vi)	Shoreline changes due the project shall be monitored continuously nourishment of northern shoreline shall be carried out using the sediments from beach acceleration on the southern shoreline.	<p>Complied.</p> <p>The Project Authority has engaged Institute of Ocean Management, Anna University, Chennai for shoreline Change study and the report is under preparation for the year 2021. However, PA has submitted the report for the year 2020.</p> <p>Cover page of the Report is attached as Annexure – 10.</p>
(vii)	Suitable Screens shall be installed between the construction area and the intakes so that operations of the intakes are not affected by the construction activity.	<p>Complied.</p> <p>The PA informed that all works were completed and the port is in operation phase. No impact envisaged as informed.</p>
(viii)	At least a distance of 100 meter shall be provided between intake of Chennai Water Desalination Ltd. (CWDL) and north edge of the northern breakwater as agreed in the meeting between the proponent and CWDL.	<p>Complied.</p> <p>During the site visit, it was observed that distance is maintained between intake of Chennai Water Desalination Ltd. (CWDL) and North edge of the Northern breakwater as agreed in the meeting between the proponent and CWDL. Image showing the distance between Northern Breakwater and Intake of CWDL is attached as Annexure – 13.</p>
(ix)	Independent port connectivity shall be developed.	<p>Complied.</p> <p>During the site visit, it was observed that the PA has developed independent port connectivity. Photos of the independent Port connectivity attached as Annexure - 14.</p>
(x)	Rehabilitation if any shall be carried out as per law / State Government.	<p>Refer below.</p> <p>The PA informed that the Rehabilitation was carried out completely as per law / State Government at the time of project implementation by M/s. LTSB.</p>
(xi)	Fire station shall be located within the project area	<p>Complied.</p> <p>The PA has established dedicated fire station with fire tender, Firefighting system, Fire extinguishers, Fire deduction system and also having dedicated fire crew</p> <p>Photos are at Annexure – 15.</p>

C. Narayana

(xii)	The Hazardous waste generated shall be properly collected and handled as per the provisions of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.	<p>Complied.</p> <p>The PA has obtained Hazardous waste authorization from Tamil Nadu Pollution Control Board (TNPCB) vide letter No. HWMA No: 19HFC20312718 dated 30.04.2019 which is valid till 29.04.2024.</p> <p>All the Hazardous wastes generated are properly collected and handled inline to Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 as amended. As informed, details of the same are submitted to TNPCB as a part of Hazardous waste annual return - Form 4 on regular basis (Annexure – 16).</p>
(xiii)	The wastewater generated from the activity shall be collected, treated and reused properly.	<p>Complied.</p> <p>The PA have installed 45 KLD Sewage Treatment Plant (STP) and 50 KLD Effluent Treatment Plant (ETP).</p> <p>All the domestic effluents are being treated in the STP.</p> <p>The treated water is being used for the plantation purpose as per the CTO accorded by the TNPCB.</p> <p>Monitoring of STP inlet & outlet water, DM water is being carried out on monthly basis through NABL accredited third party laboratory. The monitored data shows that the values are within the limits</p> <p>STP and Monitoring data is at Annexure – 2 & 12.</p> <p>Process Effluent generated from Liquid Tank washings is treated in ETP. However, at present the ETP is not in operation due to no generation of Liquid Effluent. PA informed that trail run of ETP is done through Raw water on monthly basis.</p>
(xiv)	Sewage Treatment Facility should be provided in accordance with the CRZ Notification.	<p>Complied.</p> <p>The PA has provided 45 KLD Sewage Treatment Plant (STP) in accordance</p>

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		with the CRZ Notification.
(xv)	No Solid Waste will be disposed of in the Coastal Regulatory Zone area. The Solid Waste shall be properly collected segregated and disposed as per the provision of Solid Waste Management Rules, 2016.	<p>Complied.</p> <p>During the visit, it was observed that no solid waste is being disposed off in the CRZ area.</p> <p>All the solid waste generated is properly collected, source segregation of all types of Solid Waste is practiced and are disposed as per the provision of Solid Waste Management Rules 2016, as amended.</p> <p>Integrated Waste Management system is in place and all wastes are being handled inline to 5R principle - Reduce, Reuse, Reprocess, Recycle & Recover.</p> <p>Photo is at Annexure – 6.</p>
(xvi)	Installation and operation of DG set if any shall comply with the guidelines of CPCB.	<p>Complied</p> <p>Five numbers (2000 KVA – 2 Nos, 500 KVA – 2 Nos. and 125 KVA – 1 No) of Diesel Generating Sets are installed in line to CPCB guidelines. Flue gas analysis report of the DG Set stack for the period October 2021 to March 2022 is enclosed as Annexure-12.</p>
(xvii)	Air quality including the VOC shall be monitored regularly as per the guidelines of CPCB and reported.	<p>Complied.</p> <p>Monitoring of ambient air quality is being carried out at four locations on weekly basis through MoEF&CC recognized third party laboratory. The monitored data shows that the values are within the limits. Air Quality Monitoring Reports for the period October 2021 to March 2022 is enclosed as Annexure-12.</p> <p>The PA has installed one Online Continuous Monitoring station in consultation with State Pollution Control Board, Tamil Nadu to monitor SO₂, NO_x, CO, PM₁₀, PM_{2.5}, including BTX analyser to monitor VOC.</p> <p>The real time online monitored data is being transmitted to TNPCCB's server. All the parameters are well with the prescribed standards</p>

C. Parameswari

		Photo is at Annexure – 17.
(xviii)	The project proponent shall undertake green belt development all along the periphery of the project area and also alongside the road.	<p>Complied.</p> <p>The PA has developed greenbelt covering in an area of around 25.06 ha. which includes a green belt (Inside Port premises) of 9.81 ha and Outside Port area (Palm Tree plantation along Buckingham canal) of 15.25 ha. is developed and are being well maintained. Port has planted around 27,407 Trees, 33,699 Sq.M shrub plants and 14,898 Sq.M lawn area and further Green belt development is also in progress. They have developed and maintaining adequate nursery for greenbelt development with local species.</p> <p>Green belt development photo is at Annexure-7.</p>
(xix)	All necessary clearances from the concerned agencies shall be obtained before initiating the project.	<p>Complied.</p> <p>The project is in operation phase. As informed, the PA has obtained all the necessary statutory clearances from the concerned agencies.</p>
(xx)	Project proponent shall install necessary oil spill mitigation measures in the shipyard. The details of the facilities provided shall be informed to this Ministry within 3 months from the date of receipt of this letter.	<p>Refer below.</p> <p>It was informed that Oil Spill Contingency Response Plan is in place. In pursuance, the PA provided the following facilities.</p> <ul style="list-style-type: none"> (i) Spill response equipment and chemicals to handle Tier-1 Oil Spills (ii) Shoreline cleaning equipment (iii) A team of well-trained professionals to handle Oil Spill Contingencies / emergencies with the coordination of Indian Coast Guard. <p>The PA has provided adequate Oil spill equipments (Annexure – 4).</p>
(xxi)	No hazardous chemicals shall be stored in the Coastal Regulation Zone area.	Refer below.

C. Ramnandy

		During the visit, it was observed that no hazardous chemical is stored in the CRZ Area.
(xxii)	The project shall not be commissioned till the requisite water supply and electricity to the project are provided by the PWD/ Electricity Department.	Complied. The PA has obtained requisite permission for Water Supply and Electricity from Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) and Tamil Nadu Electricity Board respectively before commissioning the project.
(xxiii)	Specific arrangements for rainwater harvesting shall be made in the project design and the rain water so harvested shall be optimally utilized.	Complied. Rainwater harvesting pit of 3600 m ³ capacity is constructed for harvesting rainwater from the roof-tops of the buildings and storm water drains to recharge the ground water. The collected rain water from the reservoir is utilized for greenbelt requirements. Photo is at Annexure-3.
(xxiv)	The facilities to be constructed in the CRZ area as part of this project shall be strictly in conformity with the provisions of the CRZ Notification, 2011 and its amendment. The facilities such as office building and residential buildings which do not require water front and foreshore facilities shall not be constructed within the Coastal Regulation Zone area.	Complied. All construction has been done in line to CRZ Notification, 2011 & Environmental Clearance & CRZ clearance obtained.
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 1991 & its amendments. All the construction designs /drawings relating to the proposed construction activities must have approvals of the concerned State Government Departments /Agencies.	Complied. The Project is in operation phase. All construction activity has been done in line to the existing Central/local rules including CRZ Notification, 2011 and EC & CRZ clearance obtained. The PA informed that they have obtained approvals from the concerned State Government Departments / Agencies for the construction designs / drawings relating to the construction activities.

O. Palanandi

(ii)	Adequate provisions for infrastructure facilities such as water supply, fuel, sanitation etc. shall be ensured for construction workers during the construction phase of the project so as to avoid felling of trees/mangroves and pollution of water and the surroundings.	<p>Complied.</p> <p>It was informed by the PA that the required infrastructure facilities such as housing, drinking water, mobile toilets, medical health care and canteen were provided during the construction time. It was in the form of temporary structure and removed after completion of the work.</p>
(iii)	The project authorities shall make necessary arrangements for disposal of solid wastes and for the treatment of effluents by providing a proper wastewater treatment plant outside the CRZ area. The quality of treated effluents, solid wastes and noise level etc. must conform to the standards laid down by the competent authorities including the Central/State Pollution Control Board and the Union Ministry of Environment and Forests under the Environment (Protection) Act, 1986, whichever are more stringent.	<p>Complied.</p> <p>During the visit, it was observed that no solid waste is being disposed off in the CRZ area.</p> <p>All the solid waste generated is properly collected, source segregation of all types of Solid Waste is practiced and are disposed as per the provision of Solid Waste Management Rules 2016, as amended.</p> <p>Integrated waste Management system is in place and all wastes are being handled inline to 5R principle - Reduce, Reuse, Reprocess, Recycle & Recover. (Annexure – 6)</p> <p>The PA have installed 45 KLD Sewage Treatment Plant (STP) and 50 KLD Effluent Treatment Plant (ETP).</p> <p>All the domestic effluents are being treated in the STP. The treated water is being used for the plantation purpose as per the CTO accorded by the TNPCB.</p> <p>Monitoring of STP inlet & outlet water, DM water is being carried out on monthly basis through NABL accredited third party laboratory. The monitored data shows that the values are within the limits. (Annexure – 2 & 12)</p> <p>Process Effluent generated from Liquid Tank washings is treated in ETP. However, at present the ETP is not in operation due to no generation of Liquid Effluent. The PA informed that trail run</p>

c. Dalwadi,

		of ETP is done through Raw water on monthly basis.
(iv)	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 Tamil Nadu State Pollution Control Board before commissioning of the project and a copy of each of these shall be sent to this Ministry.	Complied. 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 were obtained before commissioning of the project and submitted to Ministry. Project is in operation phase and Consent to Operate has been obtained from the Tamil Nadu State Pollution Control Board vide Consent Order No. 2105136876761 dated 13.09.2021 under Water Act and Consent Order No. 2105236876761 dated 13.09.2021 under Air Act (Valid Till 31.03.2026).
(v)	In order to carry out the environmental monitoring during the operational phase of the project, the project authorities shall establish an environmental laboratory well equipped with standard equipment and facilities and qualified manpower to carry out the testing of various environmental parameters.	Complied. A Separate Environment Management Cell has been established with the following composition: (i) Deputy General Manager-Environment (ii) One Assistant Manager and One Environment Engineer and (iii) Supporting Staffs Environmental monitoring is being carried out by a third party (NABL accredited laboratory) on weekly basis.
(vi)	The proponents shall provide for a regular monitoring mechanism so as to ensure that the treated effluents conform to the prescribed standards. The records of analysis reports must be properly maintained and made available for inspection to the concerned State/Central officials during their visits.	Complied. The PA has installed 45 KLD Sewage Treatment Plant (STP) and 50 KLD Effluent Treatment Plant (ETP). All the domestic effluents are being treated in the STP. The treated water is being used for the plantation purpose as per the CFO accorded by the TNPCB. Monitoring of STP inlet & outlet water is being carried out on monthly basis

C. Nainandhi

		<p>through MoEF&CC recognized third party laboratory. The monitored data shows that the values are within the limits.</p> <p>Process Effluent generated is treated in ETP. However, at present the ETP is not in operation (Annexure – 2).</p> <p>The PA has made available all Records during the visit.</p>												
(vii)	The sand dunes and mangroves, if any, on the site shall not be disturbed in any way.	<p>Complied.</p> <p>During the site visit, it was observed that there is no Sand dune and mangroves are present within the premises.</p>												
(viii)	A copy of the clearance letter will be marked to the concerned Panchayat / local NGO, if any, from whom any suggestion / representation has been received while processing the proposal.	<p>Reportedly complied.</p> <p>Copy of the EC was submitted to Local Panchayat as informed.</p>												
(ix)	The Tamil Nadu Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Centre and Collector's Office/Tehsildars Office for 30 days.	<p>Refer below.</p> <p>The condition does not pertain to project proponent</p>												
(x)	The funds earmarked for environment protection measures shall be maintained, in a separate account and there shall be no diversion of these funds for any other purpose. A year-wise expenditure on Environmental safeguards shall be reported to this ministry	<p>Complied.</p> <p>The Project Authorities have informed that Separate budget for the Environment Protection is earmarked every year. All the expenses are recorded in advanced accounting system of the organization.</p> <p>Expenditure for Environment Management measures during October'21 to March'22 is Rs. 231.3 Lakhs. The breakup details are as follows;</p> <table border="1"> <thead> <tr> <th>S. No.</th> <th>Description of Work</th> <th>Cost (Rs.) in Lakhs</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Comprehensive Environmental Monitoring</td> <td>37.89</td> </tr> <tr> <td>2</td> <td>Retrofitting of DG sets</td> <td>56.57</td> </tr> <tr> <td>3</td> <td>Integrated Waste Management &</td> <td>0.2</td> </tr> </tbody> </table>	S. No.	Description of Work	Cost (Rs.) in Lakhs	1	Comprehensive Environmental Monitoring	37.89	2	Retrofitting of DG sets	56.57	3	Integrated Waste Management &	0.2
S. No.	Description of Work	Cost (Rs.) in Lakhs												
1	Comprehensive Environmental Monitoring	37.89												
2	Retrofitting of DG sets	56.57												
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			Pollution Under Check Facility	
		4	O&M of STP's& ETP	0.7
		5	Housekeeping	4.2
		6	Greenbelt Maintenance	36.8
		7	EMC	31.96
(xi)	Full support shall be extended to the officers (this Ministry's Regional Office at Chennai and the officers of the Central and State Pollution Control Boards by the project proponents during their inspection for monitoring purposes, by furnishing full details and action plans including the action taken reports in respect of mitigative measures and other environmental protection activities.	Agreed upon. Extended full co-operation during the visit.		
(xii)	In case of deviation or alteration in the project including the implementing agency, a fresh reference shall be made to this ministry for modification in the clearance conditions or imposition of new ones for ensuring environmental protection.	Noted for compliance. There is no deviation or alteration in the project including implementing agency.		
(xiii)	This Ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry.	Agreed to comply. It was submitted that this condition is noted and assured to abide by this condition.		
(xiv)	This Ministry or any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environmental protection, which shall be complied with.	Agreed to comply. It was submitted that this condition is noted and assured to abide by this condition.		
(xv)	The Project proponents shall inform the Regional Office at Chennai 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.	Noted for compliance. The PA has agreed to intimate the date of financial closure, final approval of the project and the date of start of land development work to IRO, MoEF&CC Chennai in future.		
EC & CRZ Amendment letter No. 10-130/2007- A.III dated 12.05.2010				
(i)	The details of combined effect on both the Ports (i.e. Ennore Port and Kattupalli Port) shall be carried out to monitor the impact of the post-dumping. This model study	Refer below. M/s LTSB has already carried out detailed modeling study to understand		

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	<p>shall be carried out for a period of one year.</p>	<p>impact of post dumping and report was submitted to the Ministry.</p> <p>Annual maintenance dredging of around 0.18 Mcum was carried out during the compliance period October 2021 to March 2022. Dredge materials were dumped in the spoil ground which has already been identified by LTSB through modelling studies.</p> <p>The Project Authority has engaged Institute of Ocean Management, Anna University, Chennai for shoreline Change study and the report is under preparation for the year 2021. However, PA has submitted the report for the year 2020.</p> <p>Cover page of the Report is attached as Annexure – 10.</p>
(ii)	<p>A comparison between model study and actual dumping shall be carried out to examine the impacts both on North-East and South-West of the Ports and shall be submitted to the Ministry,</p>	<p>Refer below.</p> <p>As informed by the PA that a comparison between model study and actual dumping was made to examine the impacts and report was submitted to the Ministry by the LTSB.</p> <p>Annual maintenance dredging of around 0.18 Mcum was carried out during the compliance period October 2021 to March 2022. Dredge materials were dumped in the spoil ground which has already been identified by LTSB through modelling studies.</p> <p>The Project Authority has engaged Institute of Ocean Management, Anna University, Chennai for shoreline Change study and the report is under preparation for the year 2021. However, PA has submitted the report for the year 2020.</p> <p>Cover page of the Report is attached as Annexure – 10.</p>
(iii)	<p>No reclamation of the areas outside the Port limit and Buckingham Canal shall be carried out.</p>	<p>Being complied.</p> <p>No reclamation of the areas outside</p>

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		Port Limit and Buckingham Canal is being carried out.
EC & CRZ Extension of validity letter No. 10-130/2007- XIII dated 17.12.2014		
(i)	The cargo should only include (i) Container 21.60 MTPA, (ii) Ro-Ro – 0.22 MTPA, (iii) Project cargo – 0.44 MTPA, (iv) Break bulk/General cargo (Barytes/Gypsum/Limestone/Granite/Steel cargo) – 1.82 MTPA and (v) Edible oil, CBFS, Base oil and Lube oil and non-hazardous liquid cargo - 0.57 MTPA	Complied. The project authority is handing Containers, Ro-Ro, Project Cargo, Break bulk / General Cargo, Edible Oil, CBFS, Base oil and Lube Oil & Other Non-Hazardous liquid cargo only.
(ii)	All the conditions stipulated by the Tamil Nadu Coastal Zone Management Authority (TNCZMA) vide letter no. 6064/EC.3/2014-1 dated 26.06.2014, shall be strictly complied with.	Refer below. All the conditions stipulated by the Tamil Nadu Coastal Zone Management Authority (TNCZMA) vide letter no. 6064/EC.3/2014-1 dated 26.06.2014 are being complied. Compliance status of the same is enclosed as Annexure – 18.
(iii)	No additional land should be utilized for the proposed development.	Complied. As informed, no additional land utilized for the port development.
(iv)	As committed, the local traffic should not be disturbed.	Complied. Separate road network is available for Port and there is no disturbance to Local Traffic. Adequate Lay Bays, Parking yards are also provided in the Port (Annexure – 14)
5	These stipulations would be enforced among other 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, the Hazardous Chemical (Manufacture, storage and Import) Rules, 1989, Solid Waste Management Rules, 2016 and the Coastal Regulation Zone Notification, 2011 and its subsequent amendments made there under from time to time.	Refer below. They have obtained CFO and is valid up to 31.03.2026.
6	All other statutory clearances such as the	Complied.

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	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.	The PA has obtained all the statutory approvals from the concerned authorities.
7	The project proponent should advertise in at least two local newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental Clearance and copies of clearance letters are available with the Tamil Nadu Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at http://envfonnic.in . The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Chennai.	Complied. They had given advertisement both in English and Tamil (Hindu) on 28.2.2018 in two local newspapers and provided a copy of the same during the visit. They have forwarded copies of the newspaper advertisements to IRO, MoEF&CC, Chennai (Annexure – 20).
8	Any appeal against this Environmental Clearance shall lie with the National Environment Appellate Authority, if preferred, within a period of 30 day as prescribed under section 11 of the National Environment Appellate Act, 1997.	Complied The PA informed that no such appeals are made against this Environmental Clearance.
9	Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.	Complied. The PA has uploaded the status of compliance of the stipulated environment clearance conditions, inter-alia including results of monitored data (Stack/AAQ/noise) on their company website regularly (https://www.adaniports.com/ports-downloads). The PA has submitted Form V for the year 2020-2021 was submitted to TNPCB vide letter No. MIDPL/TNPCB/2021-22/119 dated 23.09.2021. Copy of the same has also provided during the visit. The PA has submitted Form V to the IRO, MoEF&CC, Chennai by e-mail on 23.09.2021. Copy of the same is

C. Parthasarathy

		attached as Annexure 21. They have uploaded Form V on the company's website.
10	This Environmental and CRZ Clearance is valid till 2 nd July, 2019.	Noted for compliance. It was submitted that this condition is noted and assured to abide by this conditions.

This has the approval of the competent authority vide diary No..... dated.....³⁵⁹ 31.05.2022

r. Palpandi
(Dr. C. Palpandi)
Scientist 'D'

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Chennai - 600 006.

Fig. Air pollution control measures



Closed Warehouse

Fig. Air pollution control measures



Water sprinkling on Roads



Road cleaning



Mobile Hopper

Fig. Air pollution control measures



Water sprinkling on Roads



Road cleaning



Mobile Hopper



Covered with Tarpaulin

“Pollution Under Check (PUC)” CENTER



Fig. Air pollution control measures

Fig. Air pollution control measures



Retrofit Equipment at DG sets

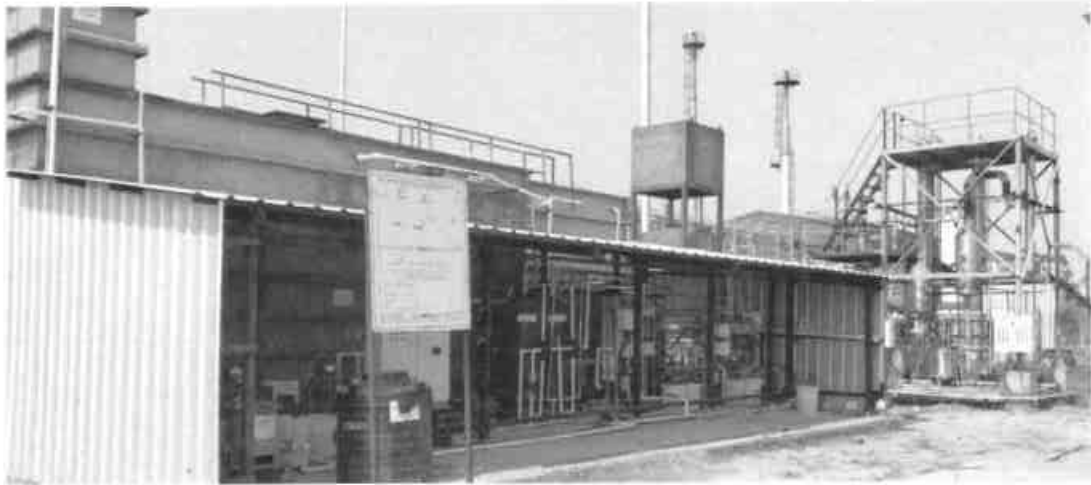


Fig. Effluent Treatment Plant (50 KLD)



30 KLD



5 KLD



10 KLD

Fig. Sewage Treatment Plant (30 KLD, 10 KLD and 5 KLD)

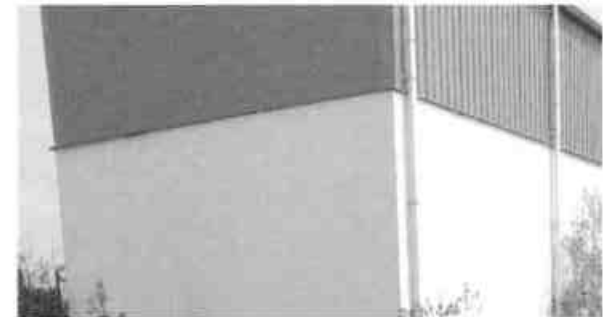


Fig. Rainwater harvesting in Port buildings



Fig. Surface Runoff Rainwater at collection Pond

Annexure - 4

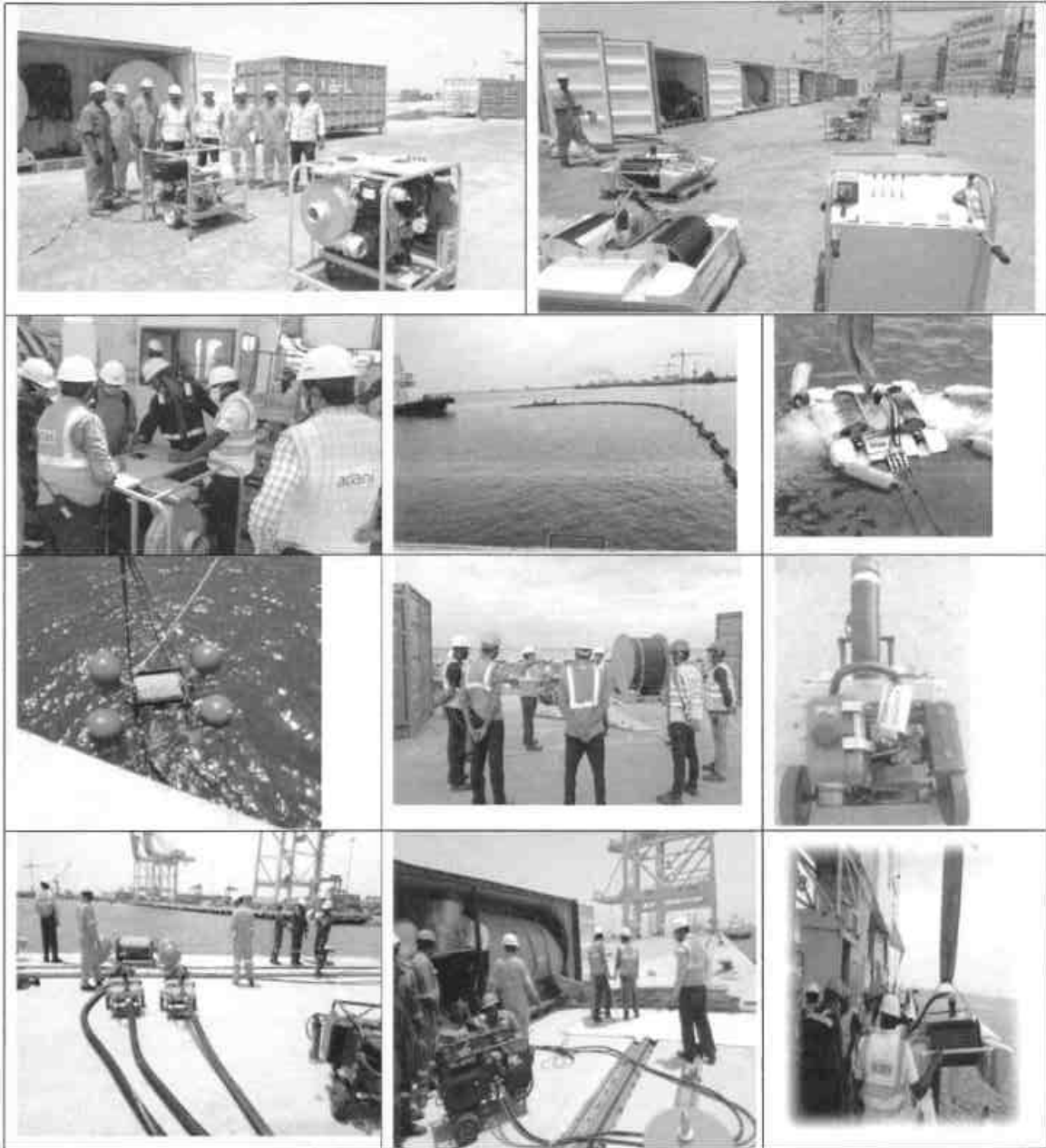
MIDPL-OIL SPILL CONTROL EQUIPMENT INVENTORY					
1	Name of Port / Oil Spill Handling Agency	Kattupalli Port			
		DESCRIPTION	LENGTH	QUANTITY	OPERATIONAL STATUS
2	Container Equipment	Fence boom FE 2000 800 PVC ASTM, Freeboard 240 mm, draft 385 mm	600 m	1	Operational
		Book Reel ER12CP		1	Operational
		Towing equipment with ASTM connector		2	Operational
		Anti-abrasion mat	6 X 3 (m)	1	Operational
		Hydraulic hose with quick connector	10 m	1	Operational
		Mooring equipment of 15 KG		13	Operational
		Inflatable Boom	1000	4*250m	Operational
		DESCRIPTION	CAPACITY	QUANTITY	OPERATIONAL STATUS
3	Recovery Equipment	Weir Skimmer SK 30W with aluminium camlock connector with accessories	30 cum / hr.	1	Operational
		Selwood Spate 75 motor pump, suction lift 9.1 mm, max solid size 6 mm	30 cum / hr.	1	Operational
		Multi skimmer SK30M with aluminium camlock connector with accessories	30 cum / hr.	1	Operational
		Discharge hose with 3" camlock connector	20 m	1	Operational
		Suction hose with 3" camlock connector	20 m	1	Operational
		Hydraulic Power Pack EP04D1CA_I	4 KW	1	Operational
		Multi Skimmer(Disk / Brush)	30 cum / hr.	2	Operational
		Sorbent boom (3m*20cm)		200	Operational
Sorbent pads	40 X 50 CM	2000	Operational		
		DESCRIPTION	CAPACITY	QUANTITY	OPERATIONAL STATUS
4	Temporary storage facility	Towable floating Tank EFT12 with towing ropes & aluminium coupling	12 cum	2	Operational
		DESCRIPTION	CAPACITY	QUANTITY	OPERATIONAL STATUS
5	OSD Spraying system	OSD Boom spray system each 3 m length with 6 nozzle	860 Lt. / Hr. each	4	Operational

6	Oil Spill Dispersant	Make	QUANTITY	Expiry Date	
		Spill Care ADT Concentrate Type 2 & 3	1000 Lt.	22.06.2022	
		DESCRIPTION	CAPACITY	QUANTITY	OPERATIONAL STATUS

7	Shore Line Response Equipment	Manual Capability	2 cum / Man-days	20 cum / day	Operational
		RO Boom Beach	10 m	40	Operational
		High Pressure water jet Pump		1	Operational

Photos:





Environmental monitoring through NABL accredited laboratory



INTREGATED WASTE MANAGEMENT SHED





Fig. Green belt development

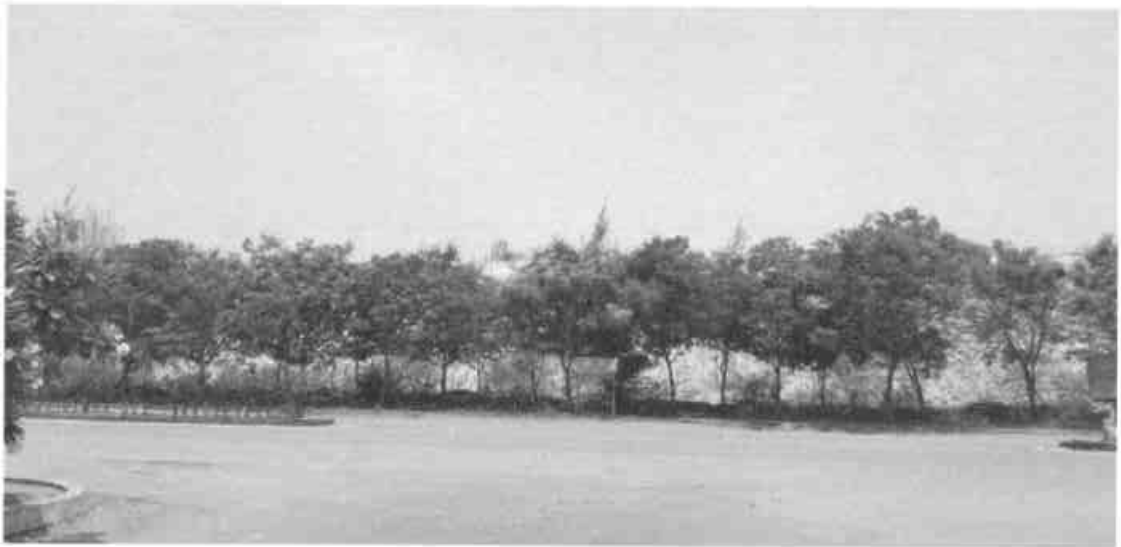


Fig. Green belt development



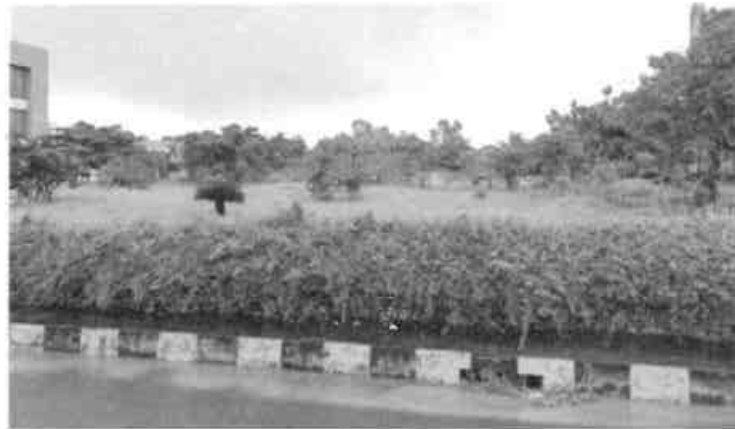


Fig. Green belt development



Fig. Green belt development



Fig. Green belt development



Fig. Green belt development



Fig. CSR activities

Status of Compliance to RC No. P1/2004/2008, dated 21.10.2008 of Department of Environment, Chennai

S. No	Conditions	Compliance Status
i.	The unit shall carry out dumping/ land filling at dredged material only on land which is not covered under CRZ	<p>Complied.</p> <p>The Project Authority has not carried out any dumping / Land filling of dredged material in CRZ area.</p>
ii.	The unit shall not carry out any ship breaking activity	<p>Not applicable.</p> <p>Applicable for L&T Ship Building (LTSB).</p>
iii.	The unit should design that the waste water should be recycled 100% and to be used for developing greenery etc., and there should not be any waste water let out.	<p>Complied.</p> <p>The PA have installed 45 KLD Sewage Treatment Plant (STP) and 50 KLD Effluent Treatment Plant (ETP).</p> <p>All the domestic effluents are being treated in the STP.</p> <p>The treated water is being used for the plantation purpose as per the CFO accorded by the TNPCB.</p> <p>Monitoring of STP inlet & outlet water, DM water is being carried out on monthly basis through MoEF&CC recognized third party laboratory. The monitored data shows that the values are within the limits.</p> <p>Process Effluent generated is treated in ETP. However, at present the ETP is not in operation (Annexure – 2).</p>
iv.	The unit should tie - up with institutions like Centre for Environmental Studies or IIT for the periodical monitoring during construction phase so as to ensure the adoption of Safety measures as per the Environmental Management Plan [EMP].	<p>Refer below.</p> <p>The PA informed that the LTSB carried out the periodical monitoring during Construction Phase.</p>

C. Rajan

v.	Before commencing construction activities, Proper resettlement for the local the unit should ensure the proper resettlement of local inhabitants residing at the project area to the satisfaction of District Collector and submit a report to the Department of Environment.	<p>Not applicable.</p> <p>The PA informed that this condition is Complied by M/s. LTSB. Rehabilitation & resettlement was carried out completely as per law / State Government at the time of project implementation.</p> <p>Bifurcations of original CRZ & EC of LTSB obtained vide File no: 10-130/2007- A.III dated 09/02/2018.</p>
General Conditions		
a)	There should not be any extraction of Ground Water in CRZ.	<p>Complied.</p> <p>The PA informed that no groundwater is withdrawal from the CRZ Area. Presently the PA is procuring desalinated water from M/s. Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB), Chennai.</p>
b)	The unit should obtain planning permission for their constructions from the CMDA/Department of Environment before commencing the constructions	<p>Not applicable.</p> <p>The Project is in operation phase. Bifurcations of original CRZ & EC of LTSB obtained vide File no: 10-130/2007- A.III dated 09/02/2018. Required permission from concerned authorities was taken by M/s. LTSB before commencing the constructions.</p>
c)	The proposed activities should not cause coastal erosion and alter the beach configuration	<p>Complied.</p> <p>The Project Authority has engaged Institute of Ocean Management, Anna University, Chennai for shoreline Change study and submitted the report to the Ministry.</p> <p>Copy of the Report is attached as Annexure – 10.</p>
d)	No fencing or barricading along the pipeline alignment and parallel to the coast is permissible in CRZ.	<p>Complied.</p> <p>During site visit, it is observed that there is no fencing or barricading along the pipeline alignment and parallel to the coast.</p>
e)	No blasting or drilling activities in	<p>Complied.</p>

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	CRZ is permissible.	As informed by the PA that there is no blasting or drilling activity is carried out in the CRZ area.
f)	The proponent should not prevent public from easy access to the beach.	Complied. During the visit, it is observed that the Project Authority have not blocked the access point to beach for the public.
g)	Chemical waste generated and the sewage generated, if any should not be discharged in to the sea.	Complied. The PA has not discharged any chemical waste and sewage generated. The PA have installed 45 KLD Sewage Treatment Plant (STP) and 50 KLD Effluent Treatment Plant (ETP). All the domestic effluents are being treated in the STP. The treated water is being used for the plantation purpose as per the CFO accorded by the TNPCB. Monitoring of STP inlet & outlet water, DM water is being carried out on monthly basis through MoEF&CC recognized third party laboratory. The monitored data shows that the values are within the limits. Process Effluent generated is treated in ETP. However, at present the ETP is not in operation (Annexure – 2).
h)	The proponent should implement the EMP including the Green Belt as envisaged in the EIA report.	Complied. Total area of the project is 136 ha. Out of this, the PA has developed Green belt in an area of more than 18 ha within the factory premises by planting <i>Azadirachta indica</i> , <i>Cassia fistula</i> , <i>Casuarina equisetifolia</i> , <i>Delonix regia</i> , <i>Tamarindus indicus</i> , <i>Terminalia arjuna</i> , <i>Magnifera indica</i> and <i>Cocos nucifera</i> etc. They have planted around 6,050 numbers of trees & around 3,978 Numbers of shrub plants and further Green belt development is also in progress. They have developed and maintaining adequate nursery for

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		greenbelt development with local species. As informed, they have followed CPCB guidelines in consultation with local DFO for development of Green belt and survival of the Green belt is good (Annexure-7). EMP compliance status is enclosed as Annexure – 11 .
i)	The project activity should not affect the coastal ecosystem including marine flora and fauna.	Complied Marine water & Sediment quality are being monitored through MoEF&CC authorised third party laboratory on monthly basis. There is no impact on water quality in the vicinity. The details of Marine Water quality monitoring report for the period April 2020 to September 2020 is enclosed as Annexure-12 .
j)	The proponent should not undertake any activity, which is violate of provisions of CRZ Notification 1991 and the subsequent amendments.	Complied. As informed by the PA that all activities permissible as per CRZ notification 2011 & EC&CRZ clearance only carried out.
k)	The CRZ Clearance will be revoked if any of the conditions stipulated in not complied with.	Noted for compliance. It was submitted that this condition is noted and assured to abide by this conditions.

This has the approval of the competent authority vide diary No.....³⁵⁹ dated.....^{31.05.2022}

C. Palpandi
(Dr. C. Palpandi)
Scientist 'D'

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Nungambakkam, Chennai - 600 006.

PROJECT REPORT ON

**SHORELINE CHANGE STUDY IN AND AROUND KATTUPALLI
PORT, PONNERI TALUK, TAMIL NADU**

Prepared for

**M/S MARINE INFRASTRUCTURE DEVELOPER PRIVATE
LIMITED(MIDPL)
KATTUPALLI PORT, KATTUPALLI**

Prepared By












**INSTITUTE FOR OCEAN MANAGEMENT
ANNA UNIVERSITY
CHENNAI-600025.**

MARCH-2020

EMP COMPLIANCE STATUS

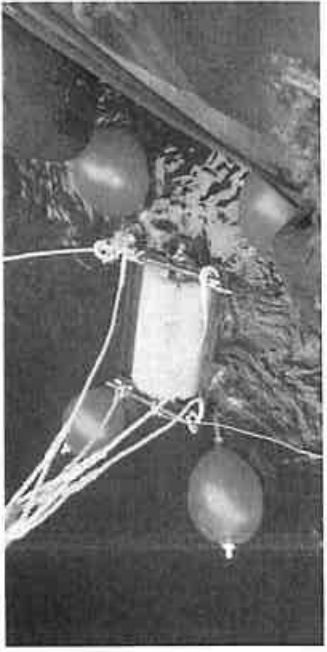
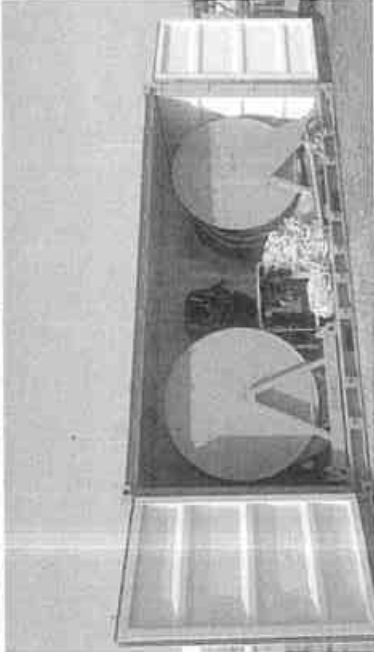
EMP (OPERATIONAL PHASE) - COMPLIANCE STATUS				
S.No.	Activity	Relevant Environmental components likely to be impacted	Proposed Mitigation Measures	Compliance Status
1.	Cargo handling and Inland Cargo movement and storage areas.	Air Quality	<ul style="list-style-type: none"> • Use of dust suppression system etc., • Use of low Sulphur diesel fuel is proposed • Dust suppression measures at loading/unloading points, storage area and at internal roads • Regularization of truck movement • Periodic cleaning of cargo spills, • Speed regulations for vehicles engaged in transportation • Greenbelt Development 	<p>Complied.</p> <p>The Major air pollution generated by port activities include vehicle movements, dry cargos operations and other port activities. The following is practiced controlling of air pollutions at port premises:</p> <ul style="list-style-type: none"> • Water sprinkling on truck path • Mobile Hopper during cargo handling • Road cleaning with sweeping machines • Installed Vehicle Pollution Under Control (PUC) checking facility at Port. • Ensuring Tarpaulin cover over the dry cargo materials at open yard • Using the closed warehouse for storage of fine dry cargos materials. • Trucks covered with Tarpaulin for dry cargo vehicle movements • Using low Sulphur diesel fuel for DG sets. • Installed Retrofitting of DG Sets for reduction of emission level to the norms prescribed. • Adequate Greenbelt has been developed & is being maintained in the port area. 27,407 Nos. of trees has been planted as on date.

			<ul style="list-style-type: none"> • Personal Equipment (PPE) • Greenbelt Development • Counselling and traffic regulation 	<p>Noise</p> <p>Complied.</p> <p>Traffic and noise level control measures is monitored regularly for all vehicle movements like containers, trucks movements and dumpers & other road equipment operating for import /export of cargos at various locations of port premises.Following control</p>
 <p>Water sprinkling</p>  <p>Mobile Hopper</p>  <p>Road cleaning</p>  <p>Covered with Tarpaulin</p>  <p>closed warehouse</p>   				

			<p>measures are implemented at Kattupalli Port for Noise Control.</p> <ul style="list-style-type: none"> • Adequate Greenbelt development with avenue plantation • DG sets are having acoustic enclosures as per the standard practice. • Musical Horns are completely banned inside the port premises • Vehicle speed limit is restricted to 30 Km/ Hr. • Adopting latest technology operation to restrict the vehicular movements inside terminal 	<p>Complied.</p> <p>Kattupalli Port is having a dedicated road connectivity connecting State Highways and National Highways. NH-5 (Chennai – Kolkata) is about 30 km from Port. The cargo handled are directly goes to the roads mentioned above which are outside the City Limits of Chennai. Handling of cargo in Kattupalli Port does not affect the regular traffic.</p> <p>The Outer Ring Road from NH-45 connecting NH 4 – NH 205 – NH 5 is getting take-off from Minjur. Further, the Outer ring road is proposed to</p>
	Traffic Addition	<ul style="list-style-type: none"> • The existing Kattupalli Port site is well connected by existing road and rail. In addition, port approach road is developed as a part of initial development. All the roads are in good condition to accommodate traffic. 		

				<p>beconnected to Section I (NPAR Project) of ChennaiPeripheral Ring Road on an extent of 134 km starting from Kattupalli to Mahabalipuram. The project isgetting commenced shortly, which will furtherenhance the cargo carrying capacity of KattupalliPort.</p> <p>Kattupalli Port is located Close proximity to majority of CFSS serving immediate hinterland and enabling faster evacuation of cargo.</p>
2	Aqueous discharges in harbour basin	Marine water quality and ecology	<ul style="list-style-type: none"> Ships are prohibited from discharging wastewater, bilge, oil wastes, etc. into the near-shore as well as harbour waters. Ships would also comply with the MARPOL convention. As a part of mitigation measure for accidental spillage of Oil, Construction Contractor/ Kattupalli Port n Oil spill contingency plan is prepared and in place. Provision of waste reception facility Ballast Water Management Guideline as issued by Ministry of Shipping – India Shall be adhered. 	<p>Complied.</p> <ul style="list-style-type: none"> Ships/vessels calling at port are not permitted to dump any wastes/bilge water/ballast water during the berthing period. The waste reception facilities developed at Kattupalli Port as per the Guidelines issued by Government of India (GoI) and MARPOL regulation is strictly implemented. Hazardous wastes are handled as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (as amended). Hazardous wastes are disposed through approved TNPCC /CPCB vendor. Oil Spill contingency Plan is in place and MIDPL is maintaining oil spill equipment as per Coast Guard guidelines and conducting oil spill mock drills at regular intervals. Management Guideline as issued by Ministry of Shipping – India are being adhered to. Regular monitoring of Marine Water and Sediment quality are being carried out by NABL accredited laboratory.

3	Cargo and Oil spills	Marine water quality and ecology	<ul style="list-style-type: none"> • In case of any cargo spillage during transfer from/to ships, it will be attempted to recover the spills. • Oil spill control equipment such as booms / barriers will be provided for containment and skimmers will be provided for recovery. • Response time for shutting down the fuelling, containment and recovery will be quicker. 	<ul style="list-style-type: none"> • Oil Spill contingency Plan is in place and MIDPL is maintaining oil spill equipment as per Coast Guard guidelines and conducting oil spill mock drills at regular intervals.
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4	Maintenance dredging	Maintenance dredging Marine Ecology	<ul style="list-style-type: none"> Maintenance dredging material is being disposed of at identified disposal location at sea. It will be ensured that dumping of the excess/unusable dredge material would be uniform. Additional Environmental Monitoring Program comprising of monitoring of marine water quality, marine sediment quality and marine ecology will be initiated one week prior to commencement of dredging and will be carried out during the dredging period. 	<p>Complied.</p> <ul style="list-style-type: none"> Annual maintenance dredging of around 0.18 Mcum was carried out during the compliance period October 2021 to March 2022. Dredge materials were dumped in the spoil ground which has already been identified by LTSB through modelling studies. However Marine Water, sediment & ecology is being monitored on regular basis and reports of the same are being submitted to all the concerned authorities. Monitoring report for the period Oct'21 to Mar'22 is attached as Annexure-III.
5	Water Supply	Water resources	<ul style="list-style-type: none"> The water requirement proposed activities shall be met by existing water supply as it was considered during initial development 	<p>Complied.</p> <p>The main source of raw water is from existing Chennai Metropolitan Water Supply and Sewage Board (CMWSSB), Desalination plant, Kattupalli, which is located adjacent to Kattupalli Port.</p>
6	Wastewater Discharge	Water Quality	<ul style="list-style-type: none"> Collection of runoff from stock piles and directing into settling tanks Available Sewage treatment plant within port area will be utilized. Treated wastewater from STP will be used for irrigating the greenbelt 	<p>Complied.</p> <p>Domestic wastewater generated are being collected, treated in STP's and the entire treated sewage water is reused for green belt maintenance after confirming the treated water quality parameters are meeting the prescribed norms. Inlet & outlet characteristic of Sewage water is regularly analysed by NABL accredited laboratory. The monitoring results for the period Oct'21 to Mar'22 is enclosed as Annexure - III.</p>
7	Solid Waste Management	Groundwater and Soil quality	<ul style="list-style-type: none"> Composted biodegradable waste will be used as manure in greenbelt. Other recyclable wastes will be sold. 	<p>Complied.</p> <ul style="list-style-type: none"> 100% utilization of STP sludge for greenbelt maintenance as manure. All the non-hazardous wastes like paper, wood, metal scraps generated from the terminal are also collected, stored in the Integrated Waste

				<p>Management Shed (IWMS) and are handled as per 5R principle.</p> <ul style="list-style-type: none"> The recyclable and the bio-degradable waste are recycled by the composting method. The compost is used in the nursery and for the gardening purposes.
8	Handling of hazardous wastes	Fire accidents due to products handling	<ul style="list-style-type: none"> No Hazardous cargo Handling /storage is envisaged Hazardous wastes (used oil & used battery if any) will be sent to TSDF located at Gummidipoondi, along with other shipyard wastes. The consent for the same was already obtained and the same can be extended. Medical facilities including first aid will be available for attending to injured workers Emergency alarms, provision of fire hydrant system and fire station. Effective Disaster Management Plan (DMP) which covers onsite and offsite emergency plans. Recovery of spills to the extent possible. 	<p>Complied.</p> <ul style="list-style-type: none"> No Hazardous cargo is handled. Hazardous wastes are handled as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (as amended). Hazardous wastes are disposed through approved TNPCB/CPCB vendor. MIDPL has obtained Hazardous Waste Authorization from TNPCB for handling and disposal of the wastes. Details of the same are submitted to TNPCB as a part of Hazardous waste annual return (Form 4) on regular basis. Annual Hazardous Waste Return for FY 2020-21 is attached as Annexure - II. Occupational Health Centre is available at Kattupalli Port on 24 X 7 basis. Emergency alarms, fire hydrant system and Fire station equipped with Fire Tender and Fire crew are available at Kattupalli Port. Disaster Management Plan (DMP) is in place which covers both onsite and offsite emergency plans. MIDPL is equipped with adequate facility for recovery of spills.



9	Fishing activity	Fishermen livelihood	<ul style="list-style-type: none"> The cargo handling activities involved in operation phase are confined to the project area and hence no hindrance to fishing is anticipated Continuing to Educate the fishermen about Port activities Regular Interactions will be carried out with the fishing community Conflicts if any with fishing community will be amicably resolved in all cases 	<p>Complied.</p> <ul style="list-style-type: none"> Our activities are confined to approved Port Limits and there is no hindrance to fishing activity.
10	Operation of port - Handling of Proposed Traffic	Socio-economic conditions of the region	<p>The present employment potential of Port is around 250 Nos. and Total Shipyard cum Port is around 2000 nos. The employment potential will increase about 20 nos as direct employment due to proposed activity and will also enhance indirect employment potential in the region. Together with this employment potential, project will help to enhance the socio economic conditions of the area with better schooling, communication and transport facilities that will be developed/ triggered as a part of overall economic development of the region.</p>	<p>Being Complied.</p> <p>Major CSR activities carried out during the compliance period are as follows;</p> <p>1. Education: 431 Students benefited during compliance period.</p> <ul style="list-style-type: none"> Conducting evening education centres in 10 places for the students, through which 310 students benefits from this program. 42 students from our project area who are government school have written Aakash entrance exam 84 Students from Pulicat region visited the Defense Expo, Ministry of Defense, AVADI.



2. Community Health:

- Medical care for the community through MHCUCU- 3088 persons benefited.
- SuPoshan:
 - Nutrition program we reached 2049 persons
 - Celebrated Newborn Week in

November 21, family counselling and FGD on nutrition awareness for SAM/MAM children - 550 people benefitted.

- Our Port CEO Sir has officially inaugurated the Mobile Health Care Unit.
- Emergency Response: Nov 21 Flood Relief support for 11 villages, food provided for 4000 persons
- 11th March 22 provided three tractors provided towards SWM to maintain overall cleanliness in villages-benefiting 7800 families from three panchayats.
- Mobilized 2408 persons Covid-19 Vaccination.







3. Sustainable Livelihood Development:

- 30 model farmers started their cultivation using organic protocols
- Harvesting of 30 farmers' first organic yield
- Promotion of Kitchen garden - 1550 families.
- Skill Development Program: 72 students under training.
- Supporting beneficiaries linking with government schemes by our AF project field team – 453 persons
- Organic rice sale for port employees-25 of them bought from the vendor directly.
- 30 Model farmers received inputs
- 30 Model farmers provided sprayers
- Value added training for farmers from KVK -

55 beneficiaries.

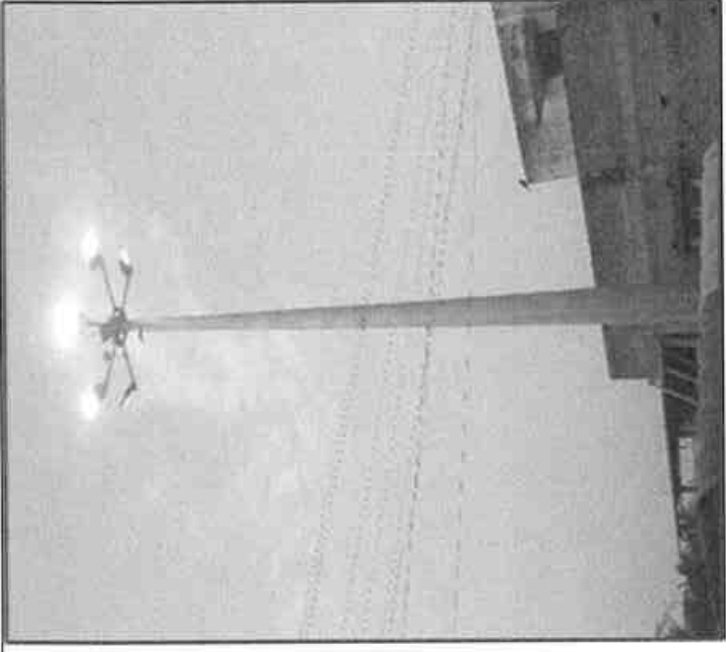
- 15 persons from Iulas community were trained on fishing in less water by Fisheries Department
- Women have acquired skilling in Tailoring and Beautician. Undertraining: 57
- Supporting beneficiaries linking with government schemes by our AF project field team – 278 beneficiaries.





- 4. Community Infrastructure Development:**
- Drinking water facility- RO plant installed in KR Palayam- 450 Families are benefited.
 - Five High Mast Lights has been installed at five locations - 500 families are benefited.



				
			<p>The existing Disaster Management Plan (DMP) will be implemented at the time of disaster; COO will act as the overall in-charge of the control of educative, protective and rehabilitation activities to ensure least damage to life and property.</p>	<p>Noted for Compliance.</p> <p>Disaster Management Plan (DMP) is in place which covers both onsite and offsite emergency plans. Regular Mock Drills are conducted as per the Disaster Management Plan. The details of drills conducted for the period October'21 to March'22 is enclosed as Annexure- 5.</p>
	<p>Natural Hazards</p>			

		<p>Induced Development</p>	<p>Offers an efficient and cost effective supply chain/ value proposition to the local importers and exporters in states of Tamil Nadu, Andhra Pradesh, Kerala and Karnataka.</p>	<p>Being Complied.</p> <p>Kattupalli Port is having a dedicated road connectivity connecting State Highways and National Highways, which offers an efficient and cost-effective supply chain/ value proposition to the local importers and exporters in the states of Tamil Nadu, Andhra Pradesh, Kerala and Karnataka.</p> <p>We are presently moving Inland Container Depot (ICD) rail bound Containers ex Kattupalli through Concor's ICD at Tondiarpet to ICD Bangalore. The containers are road bridged by Concor to/from Kattupalli Port to Tondiarpet and vice versa. This service the customers and facilitates the EXIM trade.</p>
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**REPORT ON
COMPREHENSIVE ENVIRONMENTAL MONITORING
FOR**

**MARINE INFRASTRUCTURE DEVELOPER PRIVATE LIMITED (MIDPL)
KATTUPALLI VILLAGE, PONNERI TALUK,
THIRUVALLUR DISTRICT, TAMILNADU - 600 120**

OCTOBER 2021 - MARCH 2022



PREPARED BY:



Green Chem Solutions Pvt. Ltd.

No.883, 11th Street,
Syndicate Bank Colony,
Anna Nagar West Extension,
Chennai - 600 101.

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I. INTRODUCTION

Marine Infrastructure Developer Private Limited (MIDPL), subsidiary of Adani Ports and Special Economic Zone Limited (APSEZ) is operating Kattupalli Port, having the latest technology of Terminal Operating System which is the first of its kind in India, which can support the entire supply chain in doing business smoothly.

MIDPL have engaged M/s. Green Chem Solutions (P) Ltd, an Accredited Consultant by NABL to carry out the Comprehensive Environmental monitoring studies in the Port site continuously as per the norms. This report covers the monitored environmental data for the Period Oct 2021 to Mar 2022.

II. LOCATION OF THE PROJECT

The Project site is located at Port area, Kattupalli Port Area.

The location map is shown in Fig - 1

Fig - 1 - Location Map



III. SCOPE OF WORK

The scope of Comprehensive Environmental monitoring includes the following environmental components;

1. Meteorological data
2. Ambient Air Quality
3. Ambient Noise Level
4. Marine Sampling
5. Treated STP / ETP Water.
6. Potable water
7. DG Set emission

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

SCOPE OF WORK

S.No	Attribute	Scope	Frequency
1.	Meteorological Data	Collection of micrometeorological data on hourly basis by installing an auto weather monitoring station at plant site covering the following parameters : <ul style="list-style-type: none"> • Wind speed • Wind direction • Rainfall • Relative Humidity • Temperature • Barometric pressure • Solar Radiation 	Daily
2.	Ambient Air Quality	Sampling of ambient air at 04 stations for analyzing the following parameters: <ul style="list-style-type: none"> • PM10 • PM2.5 • SO₂ • NO₂ • CO • Lead • Ozone • Ammonia • Benzene • BenzoPyrene • Arsenic • Nickel 	Weekly Twice
3.	Ambient Noise	Collection of Noise levels on hourly basis at 4 locations <ul style="list-style-type: none"> • L_{eq} - Day (Max and Min) • L_{eq} - Night (Max and Min) 	Monthly Once
4.	Marine Sampling		

4a.	Surface and Bottom Water	<p>Collection of Surface and Bottom Water analyzed for - 2 location</p> <ul style="list-style-type: none"> • Temperature • pH @ 25° C • Total Suspended Solids • BOD at 27 °C for 3 days • Dissolved oxygen • Salinity at 25 °C • Oil & Grease • Nitrate as No₃ • Nitrite as No₂ • Ammonical Nitrogen as N • Ammonia as NH₃ • Kjeldahl Nitrogen as NI • Total phosphates as PO₄ • Total Nitrogen, • Total Dissolved Solids • COD • Total bacterial count, • Coliforms • Escherichia coli • Salmonella • Shigella • Vibrio cholera • Vibrio parahaemolyticus • Enterococci • Colour • Odour • Taste • Turbidity • Calcium as Ca • Chloride as Cl • Cyanide as CN • Fluoride as F • Magnesium as Mg • Total Iron as Fe • Residual Free Chlorine • Phenolic Compounds as C₆ H₅ OH • Total Hardness as CaCO₃ • Total Alkalinity as CaCO₃ • Sulphide as H₂S • Sulphate as SO₄ • Anionic surfactants as MBAS • Monocrotophos • Atrazine • Ethion • Chiorpyrifos • Phorate • Mehyle parathion • Malathion • DDT (o,p and p,p-Isomers of • DDT, DDE and DDD • Gamma HCH (Lindane) • Alpha HCH • Beta HCH • Delta HCH 	Monthly Once
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		<ul style="list-style-type: none"> • Endosulfan (Alpha,betaandsulphate) • Butachlor • Alachlor • Aldrin/Dieldrin • Isoproturon • 2,4-D • Polychlorinated Biphenyls(PCB) • Polynuclear aromatic hydrocarbons (PAH) • Arsenic as As • Mercury as Hg • Cadmium as Cd • Total Chromium as C • Copper as Cu • Lead as Pb • Manganese as Mn • Nickel as Ni • Selenium as Se • Barium as Ba • Silver as Ag • Molybdenum as Mo • Octane • Nonane • Decane • Undecane • Tridecane • Tetradecane • Pentadecane • Hexadecane • Heptadecane • Octadecane • Nonadecane • Elcosan 	
4b.	Sea Sediment	<p>Collection of sea sediment analyzed for - 2 location</p> <ul style="list-style-type: none"> • pH • Organic Matter • Moisture Content • Conductivity • Iron • Sodium • Copper • Nickel • Zinc • Manganese • Lead • Boron • Phosphate • Chloride • Sulphate • Sulphide • Pesticide • Potassium 	Monthly Once

		<ul style="list-style-type: none"> • Total Chromium • Petroleum Hydrocarbon • Aluminium • Total Nitrogen • Organic Nitrogen • Phosphorus • Texture 	
4c.	Phytoplankton Monitoring	<ul style="list-style-type: none"> • Total Count • No. of species • Chlorophyll-a • Major Species 	Monthly Once
4d.	Zooplankton Monitoring	<ul style="list-style-type: none"> • Total Count • No. of species • Major 	Monthly Once
4e.	Microbiological Monitoring	<ul style="list-style-type: none"> • Total Bacteria count • Total Coliform • Faecal Coliform • E.Coli • Enterococcus • Salmonella • Sheigella • Vibrio 	Monthly Once
4f.	Primary Productivity Monitoring	<ul style="list-style-type: none"> • Gross primary productivity • Net Primary productivity 	Monthly Once
4g.	Phytobenthos Monitoring data	<ul style="list-style-type: none"> • Fungus • Total Count • No. of species • Diversity Index • Major species 	Monthly Once
4h.	Total Fauna Monitoring	<ul style="list-style-type: none"> • Name of phylum • Class • Number of Individuals encountered • Total no. of species encountered • Total fauna 	Monthly Once
5.	STP Treated Water	<p>Collection of STP Treated water analyzed for - 2 locations</p> <ul style="list-style-type: none"> • pH • TSS • BOD • Faecal Coliforms 	Monthly Once
6.	Potable Water analysis	<p>Collection of Drinking water analyzed for - 1 locations - As per IS 10500 2012 - 36 Parameters</p>	Monthly Once
7	DG Set Emissions - 3Nos & Liquid Terminal oil Generator	<p>Sampling of Emission at 04 stations for analyzing the following parameters:</p> <ul style="list-style-type: none"> • PM • Carbon Monoxide • NO_x - NO₂ • SO₂ 	Monthly Once

IV. METHODOLOGY

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

1	Meteorological parameters	
	Auto weather station	
2	Ambient Air Quality	
	Parameters	Method
	RespirableSuspendedParticulateMatter(PM10)	IS5182Part23:2006
	ParticulateMatter PM2.5	GCS/Lab/SOP/087, CPCB Guidelines
	SulphurdioxideasSO ₂	IS5182 Part2 :2001(Reaff.2006)
	OxidesofNitrogenas NO ₂	IS5182 Part6 :2006
	LeadasPb	IS5182 Part22:2004(Reaff.2009)
	ArsenicAs	GCS/Lab/SOP/089, CPCB Guidelines
	NickelasNi	GCS/Lab/SOP/090, CPCB Guidelines
	Carbonmonoxide as CO	IS5182Part10:1999(Reaff.2009)
	OzoneasO ₃	IS5182Part9:1974[Reaff.2009]
	AmmoniaasNH ₃	GCS/Lab/SOP/086, CPCB Guidelines
	Benzene (α) pyrene	IS 5182 - Part 12
	BenzeneasC ₆ H ₆	IS5182Part11:2006
3	Ambient Noise Monitoring	
	L _{eq} Day & Night	InstrumentManual, GCS/LAB/SOP/Noise/001
4	Marine Sampling	
	Surface and Bottom Water	APHA Methods 23 rd Edition, 2017 Standard Methods for examination of Water and Waste water and IS 3025 & USEPA Test Methods
	Sea Sediment	
	Phytoplankton Monitoring	
	Zooplankton Monitoring	
	Microbiological Monitoring	
	Primary Productivity Monitoring	
	Phytobenthos Monitoring data	
Total Fauna Monitoring		
5	STP Water Analysis	
	pH , TSS, BOD , Faecal Coliforms	APHA Methods 23 rd Edition, 2017 Standard Methods for examination of Water and Waste water and IS 3025
6	New Water Analysis	
	As per IS 10500 : 2012-36 Parameters	APHA Methods 23 rd Edition, 2017 Standard Methods for examination of Water and Waste water and IS 3025
7	Emission Monitoring	
	PM, Carbon Monoxide, NO _x - NO ₂ , SO ₂	IS 11255 Methods of measurement of emissions from Stationary source

V. ENVIRONMENTAL STUDIES - Oct 2021 - Mar2022

S.No	ATTRIBUTE	SCOPE
1.	Meteorological parameters	Collection of micrometeorological data at project site on daily basis with hourly frequency
2.	Ambient Air Quality	Collection of ambient air at 4 locations.
3.	STP water	Collection of STP outlet water at two locations
4.	Ambient Noise	Collection of Ambient noise levels for day and night at 4 locations
5.	Drinking Water	Collection of Drinking water at Canteen Building
6.	Marine Water and Marine Sediments	Collection of Marine water and Marine Sediments at Three locations
7	DG Set Emissions	Collection of DG Set Emissions.

i. METEOROLOGICAL DATA

Meteorological data was collected on hourly basis by installing an auto weather monitoring station at Plant site. The report depicted hereunder represents the data for the period Oct 2021 - Mar2022.

The following parameters were recorded

- Wind speed
- Wind direction
- Ambient Temperature
- Ambient Pressure
- Relative humidity
- Rainfall

ANNEXURE - 1 MICROMETEOROLOGY DATA
Oct - 2021

Marine Infrastructure Developer Private Ltd							
Report Type: Average Report							
From: 01-10-2021 00:00:00 To: 31-10-2021 23:59:59							
Created By: ADANI Created At: 01.11.2021 11:05:35							
Date	AQMS-Wind_Speed (km/h)	AQMS-Wind_Direction (Degree)	AQMS-RH (%)	AQMS Total Rain Fall (mm)	AQMS-Atm. Pressure (mBar)	AQMS-Atm. Temperature (Degree)	AQMS-Solar_Radiation (w/m2)
<i>Avg</i>	4.4	185.2	95.0	152.0	1004.1	31.3	205.8
<i>Min</i>	2.9	81.5	89.0	-	998.4	29.5	94.3
<i>Max</i>	7.2	245.5	99.6	-	1008.5	33.0	269.9
01-10-2021	3.6	81	97.6	0.0	1004.0	32.0	247.1
02-10-2021	4.5	105	96.5	4.0	1003.9	31.9	255.7
03-10-2021	3.6	122	97.8	3.5	1003.7	31.7	262.9
04-10-2021	4.1	121	95.7	0.0	1002.9	32.1	269.9
05-10-2021	4.9	168	99.6	25.0	1002.5	30.1	151.7
06-10-2021	3.0	194	94.8	1.0	1001.5	31.7	253.7
07-10-2021	3.9	231	96.3	2.5	1002.2	31.8	231.0
08-10-2021	4.4	237	93.0	2.0	1002.4	31.6	195.5
09-10-2021	4.7	237	92.9	8.0	1003.1	31.3	211.0
10-10-2021	4.2	229	94.3	0.5	1003.0	31.4	181.0
11-10-2021	3.6	210	97.9	0.0	1001.9	31.2	110.1
12-10-2021	5.0	201	94.1	0.0	1001.7	31.1	218.7
13-10-2021	5.8	182	93.7	0.0	1001.3	30.6	244.6
14-10-2021	4.8	203	92.8	0.0	1000.6	31.3	235.6
15-10-2021	5.2	231	94.2	0.0	998.4	31.8	209.4
16-10-2021	4.1	234	97.1	0.0	998.6	31.5	187.7
17-10-2021	2.9	239	94.0	6.0	999.8	31.3	212.4
18-10-2021	4.1	245	91.5	0.0	1002.2	32.2	167.3
19-10-2021	4.6	188	90.9	0.0	1004.8	33.0	239.5
20-10-2021	3.5	190	95.6	0.0	1006.9	32.6	186.4
21-10-2021	3.7	202	94.9	0.0	1007.6	31.6	194.4
22-10-2021	3.6	207	91.1	0.0	1007.8	32.0	201.7
23-10-2021	3.2	213	92.2	18.5	1008.3	32.0	232.4
24-10-2021	3.1	181	95.7	8.0	1008.2	30.8	237.1
25-10-2021	5.3	155	92.4	11.0	1007.0	30.5	209.4
26-10-2021	5.0	98	89.0	0.0	1005.9	31.4	211.6
27-10-2021	7.2	159	92.7	0.0	1006.3	31.0	214.3
28-10-2021	6.1	224	98.4	1.0	1006.3	29.6	94.3
29-10-2021	3.5	197	98.9	7.0	1007.3	29.5	168.2
30-10-2021	5.2	128	99.3	27.5	1008.5	29.8	153.3
31-10-2021	5.1	128	99.0	26.5	1007.9	30.1	192.4

- 2021

Nov

Marine Infrastructure Developer Private Ltd

Report Type: Average Report

From: 01-11-2021 00:00:00 To: 30-11-2021 23:59:59

Created By: ADANI Created At: 05.12.2021 10:47:20

Date	AQMS-Wind_Speed (km/h)	AQMS-Wind_Direction (Degree)	AQMS-RH (%)	AQMS Total Rain Fall (mm)	AQMS-Atm. Pressure (mBar)	AQMS-Atm. Temperature (Degree)	AQMS-Solar_Radiation (w/m2)
<i>Avg</i>	5.5	155.1	99.3	516.0	1005.3	29.1	119.7
<i>Min</i>	1.2	74.2	96.1	-	998.8	24.9	32.0
<i>Max</i>	13.6	281.0	99.9	-	1008.6	31.1	253.7
01-11-2021	4.6	155	99.9	3.0	1007.4	29.3	101.0
02-11-2021	2.6	156	99.9	2.0	1007.5	28.4	32.0
03-11-2021	3.3	165	99.8	18.0	1007.3	29.1	121.8
04-11-2021	1.3	251	99.9	13.0	1007.0	27.8	57.7
05-11-2021	4.3	196	99.7	0.0	1006.3	29.0	140.5
06-11-2021	3.4	224	99.9	46.0	1005.2	28.1	110.7
07-11-2021	7.6	102	99.6	17.0	1004.7	28.8	73.1
08-11-2021	7.4	159	96.9	2.0	1006.0	29.2	56.7
09-11-2021	12.1	88	99.7	0.5	1006.3	29.4	78.8
10-11-2021	9.0	281	99.9	33.0	1004.1	24.9	47.9
11-11-2021	13.5	184	99.9	168.5	998.8	26.5	43.9
12-11-2021	3.2	191	99.7	6.0	1002.5	29.1	164.8
13-11-2021	2.0	212	97.7	0.5	1004.2	29.9	179.8
14-11-2021	2.6	126	99.2	0.0	1004.5	30.5	226.2
15-11-2021	1.2	146	99.9	8.5	1003.4	29.5	110.9
16-11-2021	1.6	174	98.1	2.5	1003.8	29.9	207.5
17-11-2021	4.2	136	99.9	12.0	1005.3	29.7	103.3
18-11-2021	13.6	86	99.9	30.0	1001.5	29.6	63.4
19-11-2021	6.2	205	99.9	2.5	1000.0	29.5	109.8
20-11-2021	3.4	229	99.9	5.5	1001.5	28.5	56.7
21-11-2021	NA	NA	NA	NA	NA	NA	NA
22-11-2021	4.8	110	99.7	10.0	1006.9	30.2	253.7
23-11-2021	3.7	119	98.7	0.5	1006.7	30.5	202.3
24-11-2021	4.2	74	96.1	0.0	1006.5	31.1	207.2
25-11-2021	10.0	79	98.6	6.0	1006.5	30.9	181.5
26-11-2021	10.9	81	99.9	22.0	1006.8	29.5	78.5
27-11-2021	5.7	148	99.9	31.5	1007.2	28.3	97.3
28-11-2021	4.1	153	99.9	64.0	1008.0	27.8	87.0
29-11-2021	2.4	169	99.9	11.5	1008.6	28.9	95.3
30-11-2021	6.4	96	98.3	0.0	1008.5	30.5	180.8

Dec - 2021

Marine Infrastructure Developer Private Ltd

Report Type: Average Report

From: 01-12-2021 00:00:00 To: 31-12-2021 23:59:59

Created By: ADANI Created At: 03.01.2022 11:30:35

Date	AQMS-Wind_Speed (km/h)	AQMS-Wind_Direction (Degree)	AQMS-RH (%)	AQMS Total Rain Fall (mm)	AQMS-Atm. Pressure (mBar)	AQMS-Atm. Temperature (Degree)	AQMS-Solar_Radiation (w/m2)
<i>Avg</i>	5.7	116.2	89.7	30.7	1009.7	29.0	181.1
<i>Min</i>	1.4	34.0	76.2	-	1007.4	26.6	21.5
<i>Max</i>	11.5	206.0	99.9	-	1011.9	30.5	229.7
01-12-2021	6.0	86	92.7	0.0	1007.8	30.4	185.4
02-12-2021	7.7	82	85.9	0.0	1007.7	30.0	220.6
03-12-2021	6.7	153	93.4	0.5	1007.4	29.5	179.7
04-12-2021	3.1	180	86.3	0.0	1007.4	29.4	218.4
05-12-2021	1.9	206	97.1	0.0	1007.4	29.7	170.0
06-12-2021	2.4	152	97.2	0.0	1007.5	30.0	182.9
07-12-2021	4.9	110	97.6	0.0	1008.2	29.7	215.5
08-12-2021	5.8	34	99.9	0.0	1008.5	29.9	21.5
09-12-2021	NA	NA	NA	0.0	NA	NA	NA
10-12-2021	7.1	94	97.5	0.0	1010.9	29.3	28.9
11-12-2021	6.7	77	94.2	0.0	1010.0	30.5	222.6
12-12-2021	8.3	86	97.4	0.0	1010.2	30.0	188.5
13-12-2021	7.6	91	95.9	0.0	1009.1	30.1	175.0
14-12-2021	6.5	84	88.5	0.0	1008.9	30.2	145.7
15-12-2021	9.1	77	81.0	0.0	1009.5	29.9	194.9
16-12-2021	11.5	74	78.5	0.0	1010.3	29.4	194.5
17-12-2021	8.4	134	86.5	0.0	1010.7	28.5	166.8
18-12-2021	10.5	76	79.3	0.0	1010.1	28.8	200.2
19-12-2021	7.8	107	76.2	0.0	1011.2	28.4	212.6
20-12-2021	7.7	97	80.4	0.0	1011.2	28.5	160.1
21-12-2021	4.1	165	87.0	0.0	1011.4	27.5	208.8
22-12-2021	1.8	141	82.8	0.0	1010.1	27.2	210.1
23-12-2021	2.0	143	82.6	0.0	1009.7	26.6	229.7
24-12-2021	2.6	156	85.8	0.0	1009.7	27.2	218.9
25-12-2021	2.5	158	85.8	0.0	1010.1	27.4	224.5
26-12-2021	1.4	154	88.9	0.0	1011.3	27.5	208.9
27-12-2021	3.0	149	89.2	0.0	1011.8	28.1	221.1
28-12-2021	4.7	98	97.6	0.0	1010.7	28.3	121.6
29-12-2021	4.0	151	90.0	0.0	1010.0	28.8	215.5
30-12-2021	8.4	87	98.0	0.0	1011.0	29.3	132.8
31-12-2021	8.6	85	98.7	30.2	1011.9	29.3	156.6

Jan - 2022

Marine Infrastructure Developer Private Ltd

Report Type: Average Report

From: 01-01-2022 00:00:00 To: 31-01-2022 23:59:59

Created By: ADANI Created At: 01.01.2022 11:10:32

Date	AQMS-Wind Speed (km/h)	AQMS-Wind Direction (Degree)	AQMS-RH (%)	AQMS Total Rain Fall (mm)	AQMS-Atm. Pressure (mBar)	AQMS-Atm. Temperature (Degree)	AQMS-Solar Radiation (w/m2)
<i>Avg</i>	5.1	137	90.7	0.0	1008.9	28.9	199.3
<i>Min</i>	2.1	76	79.4	-	1005.5	26.2	55.0
<i>Max</i>	9.1	247	99.1	-	1012.4	30.4	237.3
01-01-2022	8.5	89	97.1	0.0	1012.4	29.3	140.2
02-01-2022	6.8	83	91.3	0.0	1011.5	29.3	207.2
03-01-2022	5.3	81	84.8	0.0	1010.8	29.1	204.2
04-01-2022	6.6	78	79.4	0.0	1011.2	28.6	215.2
05-01-2022	5.2	133	88.6	0.0	1011.1	27.7	205.9
06-01-2022	4.1	118	92.4	0.0	1010.2	28.2	225.1
07-01-2022	5.2	97	89.7	0.0	1010.3	29.2	179.4
08-01-2022	5.7	85	88.4	0.0	1010.7	29.5	228.1
09-01-2022	4.6	94	88.9	0.0	1009.2	29.1	224.2
10-01-2022	5.0	120	92.9	0.0	1009.2	28.9	237.3
11-01-2022	5.2	87	93.7	0.0	1008.8	29.6	236.3
12-01-2022	6.2	116	91.9	0.0	1008.3	29.8	224.8
13-01-2022	5.1	162	92.8	0.0	1007.6	30.4	221.5
14-01-2022	4.3	156	97.4	0.0	1007.4	29.7	187.0
15-01-2022	4.8	106	96.6	0.0	1008.4	29.8	216.3
16-01-2022	5.9	83	93.1	0.0	1010.1	29.9	234.7
17-01-2022	4.5	212	99.1	0.0	1012.3	26.2	55.0
18-01-2022	3.8	164	90.7	0.0	1011.1	27.8	210.9
19-01-2022	3.4	152	87.5	0.0	1009.5	27.8	232.6
20-01-2022	3.9	164	83.6	0.0	1007.6	27.9	219.2
21-01-2022	3.3	241	89.8	0.0	1007.2	28.1	225.5
22-01-2022	4.3	234	96.6	0.0	1005.6	28.7	213.8
23-01-2022	4.6	236	94.3	0.0	1005.6	29.5	210.7
24-01-2022	2.1	247	94.5	0.0	1005.5	28.8	92.2
25-01-2022	2.3	219	94.1	0.0	1006.0	28.5	174.8
26-01-2022	3.9	179	88.4	0.0	1006.7	29.2	145.2
27-01-2022	5.9	92	86.5	0.0	1007.4	29.5	204.6
28-01-2022	9.1	76	86.1	0.0	1008.9	29.6	236.1
29-01-2022	8.4	93	86.5	0.0	1009.8	29.0	121.6
30-01-2022	4.8	102	86.5	0.0	1008.9	29.0	214.8
31-01-2022	4.1	142	88.1	0.0	1008.1	28.6	235.4

Feb - 2022

Marine Infrastructure Developer Private Ltd

Report Type: Average Report

From: 01-02-2022 00:00:00 To: 28-02-2022 23:59:59

Created By: ADANI Created At: 01.02.2022 10:00:45

Date	AQMS-Wind Speed (km/h)	AQMS-Wind Direction (Degree)	AQMS-RH (%)	AQMS Total Rain Fall (mm)	AQMS-Atm. Pressure (mBar)	AQMS-Atm. Temperature (Degree)	AQMS-Solar Radiation (w/m2)
<i>Avg</i>	5.0	124	82.3	0.0	1008.1	29.3	245.4
<i>Min</i>	2.4	78	73.9	-	1004.4	27.8	217.4
<i>Max</i>	7.4	236	93.5	-	1011.3	30.2	276.2
01-02-2022	3.2	157	85.5	0.0	1007.6	28.1	244.7
02-02-2022	2.4	198	83.2	0.0	1008.3	27.8	253.3
03-02-2022	3.1	229	82.4	0.0	1007.8	28.1	228.6
04-02-2022	3.6	215	87.5	0.0	1006.0	28.8	217.4
05-02-2022	4.7	171	91.7	0.0	1007.0	29.1	225.6
06-02-2022	5.9	98	83.8	0.0	1009.6	29.9	230.8
07-02-2022	3.9	102	80.2	0.0	1010.0	29.3	239.2
08-02-2022	5.2	92	75.4	0.0	1008.9	29.4	256.9
09-02-2022	6.5	97	73.9	0.0	1009.0	29.5	237.8
10-02-2022	5.9	107	79.5	0.0	1008.4	29.0	254.3
11-02-2022	6.1	101	82.5	0.0	1008.3	29.3	245.0
12-02-2022	6.3	78	81.0	0.0	1007.8	29.9	232.5
13-02-2022	4.1	93	80.3	0.0	1007.1	29.6	248.0
14-02-2022	7.4	88	81.2	0.0	1007.0	29.4	224.6
15-02-2022	6.3	87	74.9	0.0	1007.2	29.1	240.0
16-02-2022	4.9	84	75.8	0.0	1005.3	29.1	237.2
17-02-2022	4.6	114	79.5	0.0	1004.4	28.7	273.1
18-02-2022	7.4	88	79.5	0.0	1006.1	29.7	237.1
19-02-2022	4.9	83	82.9	0.0	1008.1	29.8	236.5
20-02-2022	2.9	201	88.3	0.0	1007.0	29.0	251.9
21-02-2022	4.6	236	93.5	0.0	1005.4	29.2	231.2
22-02-2022	4.1	171	91.7	0.0	1007.7	29.6	239.6
23-02-2022	6.2	101	84.0	0.0	1010.3	30.2	276.2
24-02-2022	5.4	88	80.5	0.0	1011.3	29.8	262.9
25-02-2022	4.7	113	77.6	0.0	1010.5	29.2	266.0
26-02-2022	5.8	88	80.6	0.0	1010.6	29.7	248.7
27-02-2022	5.7	82	80.7	0.0	1010.5	29.9	269.2
28-02-2022	5.5	110	87.5	0.0	1009.9	29.4	263.0

Mar - 2022

Marine Infrastructure Developer Private Ltd							
Report Type: Average Report							
From: 01-03-2022 00:00:00 To: 31-03-2022 23:59:59							
Created By: ADANI Created At: 01.04.2022 10:30:15							
Date	AQMS-Wind_Speed (km/h)	AQMS-Wind_Direction (Degree)	AQMS-RH (%)	AQMS Total Rain Fall (mm)	AQMS-Atm. Pressure (mBar)	AQMS-Atm. Temperature (Degree)	AQMS-Solar_Radiation (w/m2)
<i>Avg</i>	4.6	178	89.3	0.0	1005.6	30.8	226.2
<i>Min</i>	2.6	71	72.9	-	1002.3	28.4	183.8
<i>Max</i>	9.5	242	96.1	-	1009.8	32.7	261.4
01-03-2022	4.2	107	86.1	0.0	1009.8	29.4	211.3
02-03-2022	5.4	141	91.9	0.0	1009.3	28.4	230.6
03-03-2022	7.8	106	92.7	0.0	1008.7	29.4	206.0
04-03-2022	9.0	71	82.9	0.0	1008.1	30.3	195.5
05-03-2022	8.6	110	81.8	0.0	1007.4	30.3	250.9
06-03-2022	9.5	84	72.9	0.0	1007.4	30.2	199.7
07-03-2022	7.1	86	82.8	0.0	1007.7	30.8	224.3
08-03-2022	3.4	115	90.2	0.0	1007.6	29.8	261.4
09-03-2022	3.8	152	87.4	0.0	1007.1	29.5	242.6
10-03-2022	3.3	136	91.0	0.0	1006.9	29.2	250.2
11-03-2022	3.5	121	90.2	0.0	1006.5	29.4	249.9
12-03-2022	3.8	133	90.8	0.0	1006.1	29.1	248.4
13-03-2022	3.2	136	87.1	0.0	1006.4	29.8	224.6
14-03-2022	3.6	155	88.8	0.0	1006.5	29.9	234.5
15-03-2022	3.6	181	84.4	0.0	1005.0	30.0	233.9
16-03-2022	3.9	231	83.2	0.0	1003.5	30.3	235.7
17-03-2022	3.8	242	80.0	0.0	1002.8	30.8	233.2
18-03-2022	3.9	226	90.9	0.0	1002.9	30.4	238.6
19-03-2022	4.4	203	94.3	0.0	1002.8	30.9	214.5
20-03-2022	2.6	242	95.5	0.0	1002.4	31.7	183.8
21-03-2022	2.6	228	96.1	0.0	1002.3	32.2	211.0
22-03-2022	4.5	195	88.1	0.0	1002.7	32.7	215.4
23-03-2022	2.9	237	96.1	0.0	1003.2	32.3	207.7
24-03-2022	3.4	241	94.0	0.0	1003.8	32.1	210.1
25-03-2022	3.5	236	92.6	0.0	1005.0	32.2	233.2
26-03-2022	4.2	237	92.5	0.0	1006.6	32.1	233.6
27-03-2022	4.6	238	93.6	0.0	1006.8	32.0	219.3
28-03-2022	4.4	236	93.2	0.0	1006.0	32.1	225.0
29-03-2022	5.1	234	93.3	0.0	1004.6	32.1	222.0
30-03-2022	5.5	232	92.9	0.0	1004.0	32.4	207.8
31-03-2022	4.8	227	92.7	0.0	1004.6	32.3	256.2

ii. AMBIENT AIR QUALITY

Ambient air quality monitoring is required to determine the existing quality of air, evaluation of the effectiveness of control system and to identify areas in need of restoration and their prioritization. In order to generate background data, air quality monitoring is conducted to

assess existing level of contamination and to assess possible effects of air contamination occurring in future.

Frequency of Monitoring

The frequency of monitoring that has been followed for sampling of ambient air quality is that one sample per weekly twice at three locations.

DETAILS OF AMBIENT AIR QUALITY MONITORING LOCATIONS

Station code	Location	Geographical location	Environmental setting
AAQ1	Near Marine Control Tower	13° 18' 55" N 80° 20' 45" E	Industrial
AAQ2	Near Port Main Gate	13° 18' 51" N 80° 19' 28" E	Industrial
AAQ3	Kattupalli village	13° 18' 18" N 80° 19' 48" E	Village
AAQ4	Kalanji village	13° 20' 8" N 80° 20' 0" E	Village
CAAQM 1	Port Operating Building	13° 18' 45.68" N 80° 20' 25.50" E	Industrial

Fig - 2. AMBIENT AIR SAMPLING STATIONS LOCATION MAP



Fig.3.AMBIENT AIR SAMPLINGS STATIONS WITH RESPECT TO WIND



TECHNIQUES USED FOR AMBIENT AIR QUALITY MONITORING

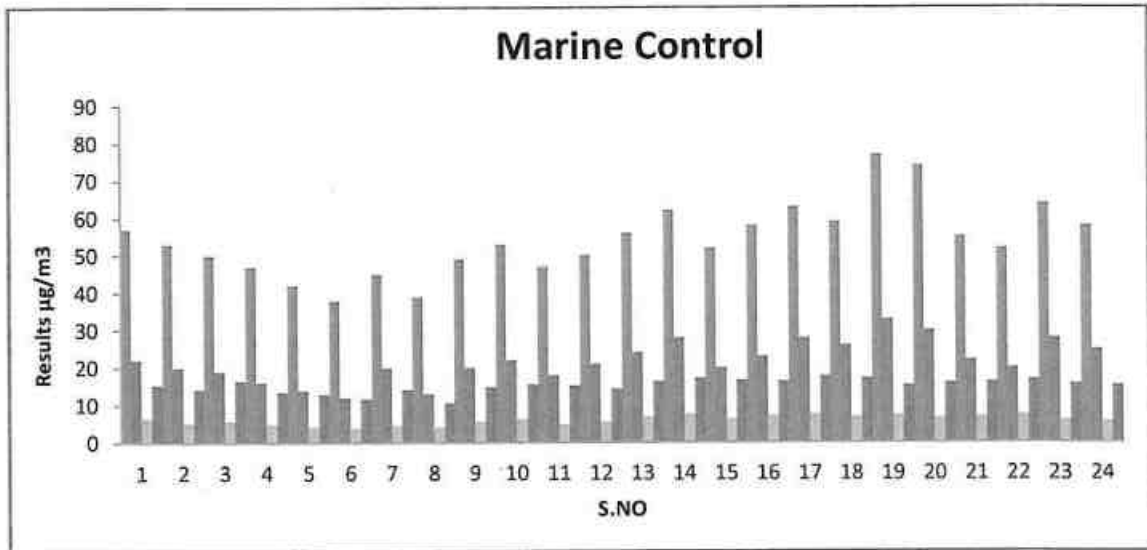
S.No	Parameter	Technique	Unit	Minimum Detectable Limit
1	PM ₁₀	Respirable Dust Sampler (Gravimetric method)	µg/m ³	1.0
2	PM _{2.5}	Fine particle Sampler (Gravimetric method)	µg/m ³	5.0
3	Sulphur Dioxide	Modified West and Gaeke method	µg/m ³	4.0
4	Nitrogen Oxide	Jacob & Hochheiser method	µg/m ³	6.0
5	Lead	Atomic Absorption Spectrometry	µg/m ³	0.5
6	Carbon Monoxide	Draggers Tube	mg/m ³	0.1
7	Ozone	UV Photometric	µg/m ³	2.0
8	Ammonia	Indophenol blue method	µg/m ³	2.0
9	Benzene	Gas Chromatography	µg/m ³	1.0
10	Benzene (α) pyrene	Gas Chromatography	ng/m ³	0.1
11	Arsenic	Atomic Absorption Spectrometry	ng/m ³	1.0
12	Nickel	Atomic Absorption Spectrometry	ng/m ³	5.0

Results and Discussion

The results of the ambient air quality for the study period are submitted. The minimum, maximum 98th percentile and average values have been computed from the observed raw data for all the AAQ monitoring stations. The summary of these results for all the locations is presented in the Table and the detailed analytical results are shown in Annexure - 2. These are compared with the standards prescribed by Central Pollution Control Board (CPCB) for "Industrial, Rural, Residential and other areas"

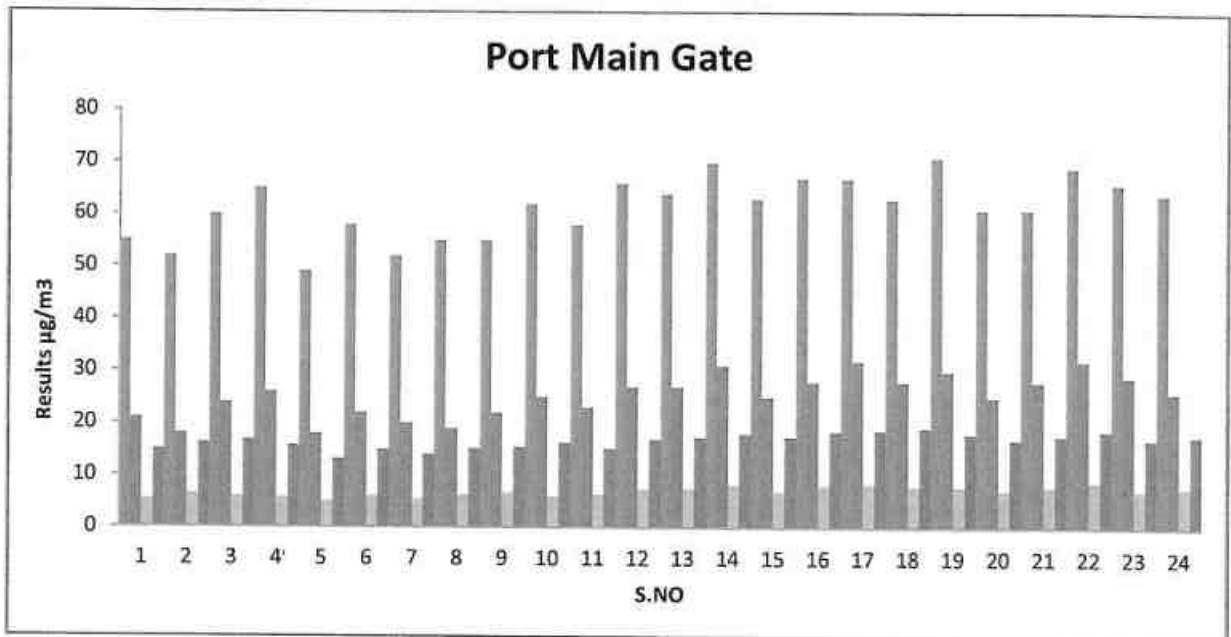
ANNEXURE - 2 RESULTS OF AMBIENT AIR QUALITY MONITORING DATA

MARINE CONTROL TOWER (AAQ1)														
Parameters			Particular matter PM10	Particular matter PM2.5	Sulphur dioxide as SO2	Nitrogen dioxide as NO2	Lead as Pb	Carbon monoxide as CO	Ozone as O3	Ammonia as NH3	Arsenic as As	Nickel as Ni	Benzene as C6H6	Benzo (a) pyrene as BaP
Unit			µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	mg/m3	µg/m3	µg/m3	ng/m3	ng/m3	µg/m3	ng/m3
National AAQM Standard			100	60	80	80	1	4	180	400	6	20	5	1
S.No.	Sampling	Report Number												
1	11.10.2021	GCS/LAB/S/3835/21-22	57	22	5.5	15.3	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
2	13.10.2021	GCS/LAB/S/3835/21-22	53	20	5.2	14.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
3	25.10.2021	GCS/LAB/S/3835/21-22	50	19	5.8	16.5	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
4	27.10.2021	GCS/LAB/S/3835/21-22	47	16	5.0	13.5	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
5	09.11.2021	GCS/LAB/S/3873/21-22	42	14	4.3	13.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
6	12.11.2021	GCS/LAB/S/3873/21-22	38	12	3.9	11.7	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
7	22.11.2021	GCS/LAB/S/3873/21-22	45	20	4.7	14.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
8	24.11.2021	GCS/LAB/S/3873/21-22	39	13	4.1	10.6	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
9	06.12.2021	GCS/LAB/S/3964/21-22	49	20	5.5	14.8	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
10	10.12.2021	GCS/LAB/S/3964/21-22	53	22	6.4	15.6	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
11	20.12.2021	GCS/LAB/S/3964/21-22	47	18	5.0	15.2	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
12	23.12.2021	GCS/LAB/S/3964/21-22	50	21	5.5	14.3	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
13	10.01.2022	GCS/LAB/S/1110/21-22	56	24	6.8	16.3	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
14	12.01.2022	GCS/LAB/S/1110/21-22	62	28	7.7	17.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
15	24.01.2022	GCS/LAB/S/1110/21-22	52	20	6.3	16.7	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
16	27.01.2022	GCS/LAB/S/1110/21-22	58	23	7.1	16.4	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
17	07.02.2022	GCS/LAB/S/1163/21-22	63	28	7.5	17.7	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
18	11.02.2022	GCS/LAB/S/1163/21-22	59	26	6.9	17.2	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
19	21.02.2022	GCS/LAB/S/1163/21-22	67	33	7.4	15.2	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
20	23.02.2022	GCS/LAB/S/1163/21-22	54	30	6.5	16.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
21	07.03.2022	GCS/LAB/S/1230/21-22	55	22	7.0	16.2	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
22	11.03.2022	GCS/LAB/S/1230/21-22	52	20	7.3	16.8	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
23	21.03.2022	GCS/LAB/S/1230/21-22	64	28	6.1	15.7	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
24	25.03.2022	GCS/LAB/S/1230/21-22	58	25	5.7	15.2	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1



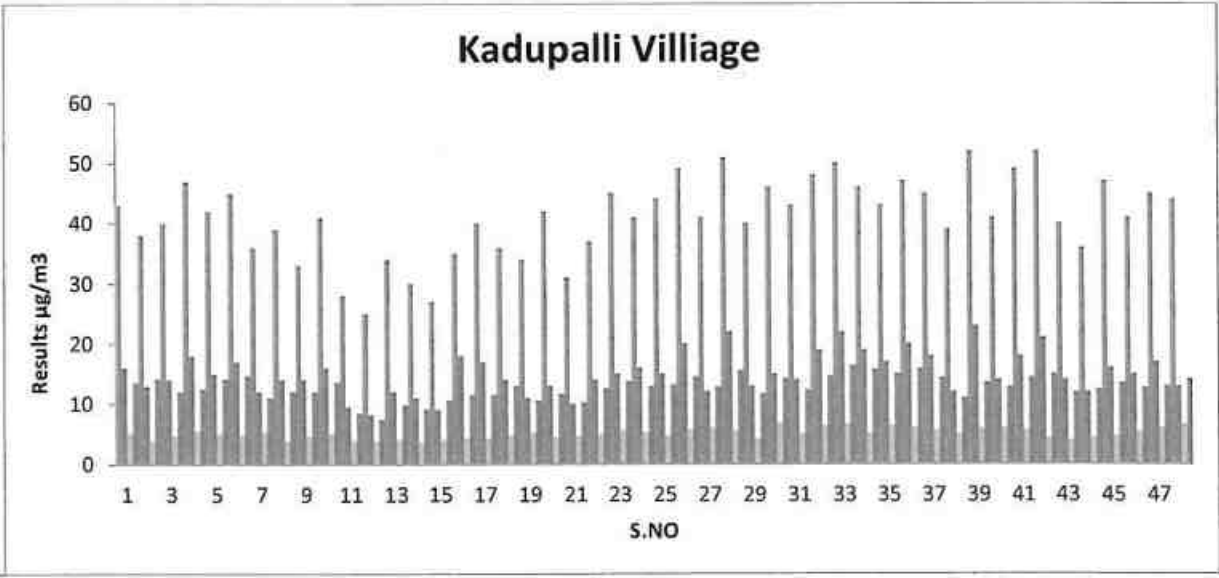
PORT MAIN GATE (AAQ2)

Parameters			Particular matter PM10	Particular matter PM2.5	Sulphur dioxide as SO2	Nitrogen dioxide as NO2	Lead as Pb	Carbon monoxide as CO	Ozone as O3	Ammonia as NH3	Arsenic as As	Nickel as Ni	Benzene as C6H6	Benzo (a) pyrene as BaP
Unit			µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	µg/m ³	µg/m ³	ng/m ³	ng/m ³	µg/m ³	ng/m ³
National AAQM Standard			100	60	80	80	1	4	180	400	6	20	5	1
S.No.	Sampling	Report Number												
1	04.10.2021	GCS/LAB/S/3835/21-22	55	21	3.4	15.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
2	08.10.2021	GCS/LAB/S/3835/21-22	52	18	6.5	16.3	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
3	18.10.2021	GCS/LAB/S/3835/21-22	60	24	5.8	16.8	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
4	22.10.2021	GCS/LAB/S/3835/21-22	65	26	5.8	15.7	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
5	01.11.2021	GCS/LAB/S/3873/21-22	49	18	5.0	13.2	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
6	05.11.2021	GCS/LAB/S/3873/21-22	58	22	6.1	14.9	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
7	15.11.2021	GCS/LAB/S/3873/21-22	52	20	5.5	14.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
8	19.11.2021	GCS/LAB/S/3873/21-22	55	19	6.3	15.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
9	01.12.2021	GCS/LAB/S/3964/21-22	55	22	6.7	15.4	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
10	03.12.2021	GCS/LAB/S/3964/21-22	62	25	8.0	16.3	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
11	13.12.2021	GCS/LAB/S/3964/21-22	58	23	5.4	15.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
12	16.12.2021	GCS/LAB/S/3964/21-22	65	27	7.4	16.9	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
13	03.01.2022	GCS/LAB/S/1110/21-22	64	27	7.5	17.3	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
14	07.01.2022	GCS/LAB/S/1110/21-22	60	31	8.3	17.9	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
15	17.01.2022	GCS/LAB/S/1110/21-22	63	25	7.0	17.4	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
16	21.01.2022	GCS/LAB/S/1110/21-22	67	26	8.1	18.5	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
17	01.02.2022	GCS/LAB/S/1163/21-22	67	32	8.4	18.7	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
18	04.02.2022	GCS/LAB/S/1163/21-22	63	28	8.0	19.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
19	14.02.2022	GCS/LAB/S/1163/21-22	61	30	7.9	18.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
20	18.02.2022	GCS/LAB/S/1163/21-22	61	25	7.2	16.9	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
21	01.03.2022	GCS/LAB/S/1230/21-22	61	28	8.0	17.6	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
22	04.03.2022	GCS/LAB/S/1230/21-22	59	26	8.9	18.6	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
23	14.03.2022	GCS/LAB/S/1230/21-22	56	23	7.3	17.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
24	18.03.2022	GCS/LAB/S/1230/21-22	54	21	7.8	17.7	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1

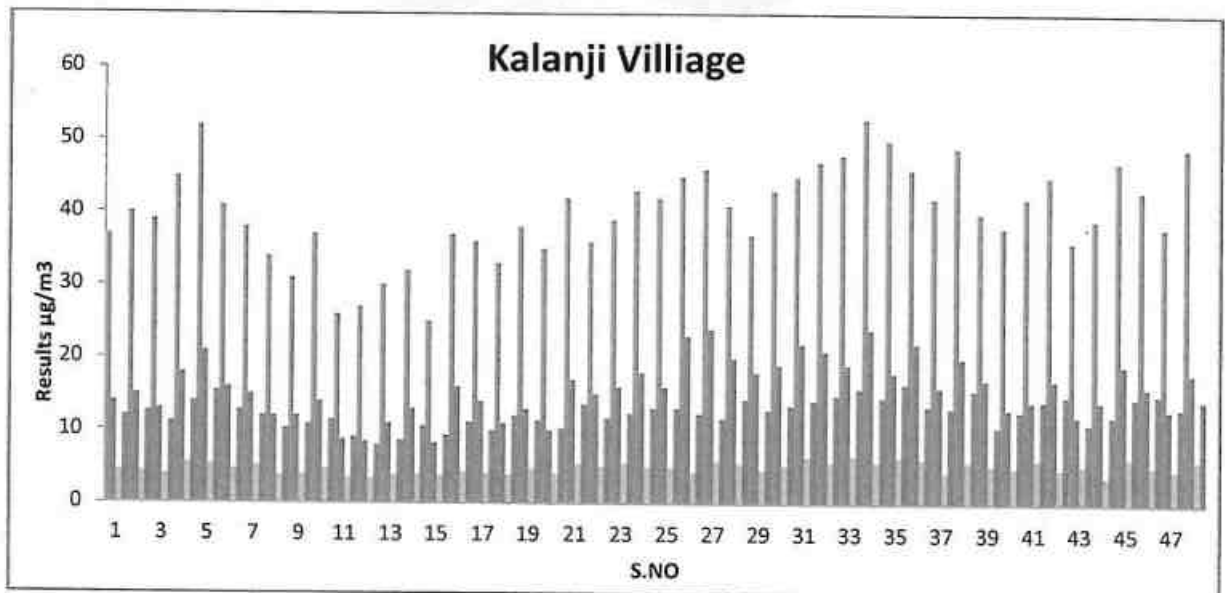


KATTUPALLI VILLAGE (AAQ3)

Parameters		Particular matter PM10	Particular matter PM2.5	Sulphur dioxide as SO2	Nitrogen dioxide as NO2	Lead as Pb	Carbon monoxide as CO	Ozone as O3	Ammonia as NH3	Arsenic as As	Nickel as Ni	Benzene as C6H6	Benzo (a) pyrene as BaP
Unit		µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	µg/m ³	µg/m ³	ng/m ³	ng/m ³	µg/m ³	ng/m ³
National AAQM Standard		100	60	80	80	1	4	180	400	6	20	5	1
S.No.	Sampling	Report Number											
1	04.10.2021	GCS/LAB/S/3835/21-22	43	16	5.2	13.5	<0.1	<1.0	<10	<2	<2	<1	<0.1
2	08.10.2021	GCS/LAB/S/3835/21-22	38	13	4.0	14.2	<0.1	<1.0	<10	<2	<2	<1	<0.1
3	11.10.2021	GCS/LAB/S/3835/21-22	40	14	4.7	12.0	<0.1	<1.0	<10	<2	<2	<1	<0.1
4	13.10.2021	GCS/LAB/S/3835/21-22	47	18	5.5	12.5	<0.1	<1.0	<10	<2	<2	<1	<0.1
5	18.10.2021	GCS/LAB/S/3835/21-22	47	15	5.1	14.1	<0.1	<1.0	<10	<2	<2	<1	<0.1
6	22.10.2021	GCS/LAB/S/3835/21-22	45	17	4.9	14.8	<0.1	<1.0	<10	<2	<2	<1	<0.1
7	25.10.2021	GCS/LAB/S/3835/21-22	35	12	4.3	11.0	<0.1	<1.0	<10	<2	<2	<1	<0.1
8	27.10.2021	GCS/LAB/S/3835/21-22	39	14	5.3	12.1	<0.1	<1.0	<10	<2	<2	<1	<0.1
9	01.11.2021	GCS/LAB/S/3873/21-22	33	14	4.2	12.0	<0.1	<1.0	<10	<2	<2	<1	<0.1
10	05.11.2021	GCS/LAB/S/3873/21-22	41	16	5.2	13.7	<0.1	<1.0	<10	<2	<2	<1	<0.1
11	09.11.2021	GCS/LAB/S/3873/21-22	28	11	4.0	8.5	<0.1	<1.0	<10	<2	<2	<1	<0.1
12	12.11.2021	GCS/LAB/S/3873/21-22	25	8.2	3.8	7.4	<0.1	<1.0	<10	<2	<2	<1	<0.1
13	15.11.2021	GCS/LAB/S/3873/21-22	34	12	4.1	9.8	<0.1	<1.0	<10	<2	<2	<1	<0.1
14	19.11.2021	GCS/LAB/S/3873/21-22	30	11	3.9	9.1	<0.1	<1.0	<10	<2	<2	<1	<0.1
15	22.11.2021	GCS/LAB/S/3873/21-22	27	9	4.1	10.6	<0.1	<1.0	<10	<2	<2	<1	<0.1
16	24.11.2021	GCS/LAB/S/3873/21-22	35	18	4.4	11.6	<0.1	<1.0	<10	<2	<2	<1	<0.1
17	01.12.2021	GCS/LAB/S/3964/21-22	40	17	4.8	11.5	<0.1	<1.0	<10	<2	<2	<1	<0.1
18	03.12.2021	GCS/LAB/S/3964/21-22	36	14	4.8	13.0	<0.1	<1.0	<10	<2	<2	<1	<0.1
19	06.12.2021	GCS/LAB/S/3964/21-22	34	11	5.2	10.6	<0.1	<1.0	<10	<2	<2	<1	<0.1
20	07.12.2021	GCS/LAB/S/3964/21-22	42	13	4.5	11.7	<0.1	<1.0	<10	<2	<2	<1	<0.1
21	13.12.2021	GCS/LAB/S/3964/21-22	31	10	4.7	10.3	<0.1	<1.0	<10	<2	<2	<1	<0.1
22	16.12.2021	GCS/LAB/S/3964/21-22	37	14	5.0	12.6	<0.1	<1.0	<10	<2	<2	<1	<0.1
23	20.12.2021	GCS/LAB/S/3964/21-22	45	15	5.6	13.8	<0.1	<1.0	<10	<2	<2	<1	<0.1
24	23.12.2021	GCS/LAB/S/3964/21-22	41	16	5.3	12.9	<0.1	<1.0	<10	<2	<2	<1	<0.1
25	03.01.2022	GCS/LAB/S/1110/21-22	44	15	4.8	13.2	<0.1	<1.0	<10	<2	<2	<1	<0.1
26	07.01.2022	GCS/LAB/S/1110/21-22	49	20	5.7	14.5	<0.1	<1.0	<10	<2	<2	<1	<0.1
27	10.01.2022	GCS/LAB/S/1110/21-22	41	12	6.1	12.8	<0.1	<1.0	<10	<2	<2	<1	<0.1
28	11.01.2022	GCS/LAB/S/1110/21-22	51	22	5.6	15.6	<0.1	<1.0	<10	<2	<2	<1	<0.1
29	17.01.2022	GCS/LAB/S/1110/21-22	40	13	4.2	11.7	<0.1	<1.0	<10	<2	<2	<1	<0.1
30	21.01.2022	GCS/LAB/S/1110/21-22	46	15	5.3	14.2	<0.1	<1.0	<10	<2	<2	<1	<0.1
31	24.01.2022	GCS/LAB/S/1110/21-22	43	14	5.0	12.3	<0.1	<1.0	<10	<2	<2	<1	<0.1
32	27.01.2022	GCS/LAB/S/1110/21-22	48	19	6.4	14.6	<0.1	<1.0	<10	<2	<2	<1	<0.1
33	01.02.2022	GCS/LAB/S/1163/21-22	50	22	5.7	16.3	<0.1	<1.0	<10	<2	<2	<1	<0.1
34	04.02.2022	GCS/LAB/S/1163/21-22	46	19	5.2	15.7	<0.1	<1.0	<10	<2	<2	<1	<0.1
35	07.02.2022	GCS/LAB/S/1163/21-22	43	17	6.4	15.0	<0.1	<1.0	<10	<2	<2	<1	<0.1
36	11.02.2022	GCS/LAB/S/1163/21-22	47	20	6.2	15.8	<0.1	<1.0	<10	<2	<2	<1	<0.1
37	14.02.2022	GCS/LAB/S/1163/21-22	45	18	5.5	14.4	<0.1	<1.0	<10	<2	<2	<1	<0.1
38	18.02.2022	GCS/LAB/S/1163/21-22	39	12	5.0	10.9	<0.1	<1.0	<10	<2	<2	<1	<0.1
39	21.02.2022	GCS/LAB/S/1163/21-22	52	23	5.9	13.6	<0.1	<1.0	<10	<2	<2	<1	<0.1
40	23.02.2022	GCS/LAB/S/1163/21-22	41	14	5.0	12.8	<0.1	<1.0	<10	<2	<2	<1	<0.1
41	01.03.2022	GCS/LAB/S/1230/21-22	49	18	5.5	14.4	<0.1	<1.0	<10	<2	<2	<1	<0.1
42	04.03.2022	GCS/LAB/S/1230/21-22	52	21	4.1	15.0	<0.1	<1.0	<10	<2	<2	<1	<0.1
43	07.03.2022	GCS/LAB/S/1230/21-22	40	14	4.0	11.9	<0.1	<1.0	<10	<2	<2	<1	<0.1
44	11.03.2022	GCS/LAB/S/1230/21-22	36	12	4.5	12.4	<0.1	<1.0	<10	<2	<2	<1	<0.1
45	14.03.2022	GCS/LAB/S/1230/21-22	47	16	4.9	13.5	<0.1	<1.0	<10	<2	<2	<1	<0.1
46	18.03.2022	GCS/LAB/S/1230/21-22	41	15	5.4	12.7	<0.1	<1.0	<10	<2	<2	<1	<0.1
47	21.03.2022	GCS/LAB/S/1230/21-22	45	17	6.1	13.0	<0.1	<1.0	<10	<2	<2	<1	<0.1
48	25.03.2022	GCS/LAB/S/1230/21-22	44	13	6.7	14.1	<0.1	<1.0	<10	<2	<2	<1	<0.1



Parameters			Particular matter PM10	Particular matter PM2.5	Sulphur dioxide as SO2	Nitrogen dioxide as NO2	Lead as Pb	Carbon monoxide as CO	Ozone as O3	Ammonia as NH3	Arsenic as As	Nickel as Ni	Benzene as C6H6	Benzo (a) pyrene as BaP
Unit			µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	mg/m3	µg/m3	µg/m3	ng/m3	ng/m3	µg/m3	ng/m3
National AAQM Standard			100	60	80	80	1	4	180	400	6	20	5	1
S.No.	Sampling	Report Number												
1	04.10.2021	GCS/LAB/S/3835/21-22	37	14	4.5	12.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
2	08.10.2021	GCS/LAB/S/3835/21-22	40	15	4.5	12.6	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
3	11.10.2021	GCS/LAB/S/3835/21-22	39	13	4.0	11.2	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
4	13.10.2021	GCS/LAB/S/3835/21-22	45	18	5.3	14.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
5	18.10.2021	GCS/LAB/S/3835/21-22	52	21	6.1	15.5	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
6	22.10.2021	GCS/LAB/S/3835/21-22	41	16	4.7	12.8	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
7	25.10.2021	GCS/LAB/S/3835/21-22	38	15	5.2	12.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
8	27.10.2021	GCS/LAB/S/3835/21-22	34	12	3.9	10.3	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
9	01.11.2021	GCS/LAB/S/3873/21-22	31	12	4.0	10.9	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
10	05.11.2021	GCS/LAB/S/3873/21-22	37	14	4.8	11.5	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
11	09.11.2021	GCS/LAB/S/3873/21-22	26	8.8	3.8	9.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
12	12.11.2021	GCS/LAB/S/3873/21-22	27	8.5	3.4	8.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
13	15.11.2021	GCS/LAB/S/3873/21-22	30	11	3.9	8.6	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
14	19.11.2021	GCS/LAB/S/3873/21-22	32	13	4.0	10.6	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
15	22.11.2021	GCS/LAB/S/3873/21-22	25	8.3	3.8	9.4	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
16	24.11.2021	GCS/LAB/S/3873/21-22	37	16	4.3	11.2	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
17	01.12.2021	GCS/LAB/S/3964/21-22	36	14	4.3	10.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
18	03.12.2021	GCS/LAB/S/3964/21-22	33	11	3.9	12.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
19	06.12.2021	GCS/LAB/S/3964/21-22	38	13	4.0	11.4	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
20	07.12.2021	GCS/LAB/S/3964/21-22	35	10	4.1	10.3	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
21	13.12.2021	GCS/LAB/S/3964/21-22	43	17	5.4	13.6	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
22	16.12.2021	GCS/LAB/S/3964/21-22	36	15	5.1	11.7	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
23	20.12.2021	GCS/LAB/S/3964/21-22	39	16	5.5	12.4	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
24	23.12.2021	GCS/LAB/S/3964/21-22	43	18	5.0	13.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
25	03.01.2022	GCS/LAB/S/1110/21-22	42	16	5.0	13.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
26	07.01.2022	GCS/LAB/S/1110/21-22	45	23	6.4	12.4	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
27	10.01.2022	GCS/LAB/S/1110/21-22	46	24	5.9	11.7	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
28	11.01.2022	GCS/LAB/S/1110/21-22	41	20	5.3	14.3	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
29	17.01.2022	GCS/LAB/S/1110/21-22	37	18	4.6	12.8	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
30	21.01.2022	GCS/LAB/S/1110/21-22	43	19	5.3	13.5	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
31	24.01.2022	GCS/LAB/S/1110/21-22	45	22	5.4	16.2	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
32	27.01.2022	GCS/LAB/S/1110/21-22	42	21	5.3	14.9	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
33	01.02.2022	GCS/LAB/S/1163/21-22	48	19	6.6	15.8	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
34	04.02.2022	GCS/LAB/S/1163/21-22	53	24	5.7	14.6	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
35	07.02.2022	GCS/LAB/S/1163/21-22	50	18	5.4	16.5	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
36	11.02.2022	GCS/LAB/S/1163/21-22	46	22	6.1	13.4	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
37	14.02.2022	GCS/LAB/S/1163/21-22	42	16	4.4	13.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
38	18.02.2022	GCS/LAB/S/1163/21-22	49	20	3.8	15.6	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
39	21.02.2022	GCS/LAB/S/1163/21-22	40	17	3.3	10.5	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
40	23.02.2022	GCS/LAB/S/1163/21-22	38	13	5.0	12.7	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
41	01.03.2022	GCS/LAB/S/1230/21-22	42	14	6.0	14.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
42	04.03.2022	GCS/LAB/S/1230/21-22	45	17	4.3	14.8	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
43	07.03.2022	GCS/LAB/S/1230/21-22	36	12	5.3	11.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
44	11.03.2022	GCS/LAB/S/1230/21-22	39	14	5.4	12.1	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
45	14.03.2022	GCS/LAB/S/1230/21-22	47	19	6.3	14.6	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
46	18.03.2022	GCS/LAB/S/1230/21-22	43	16	5.2	15.0	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
47	21.03.2022	GCS/LAB/S/1230/21-22	38	13	4.7	13.2	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1
48	25.03.2022	GCS/LAB/S/1230/21-22	49	19	6.1	14.3	<0.1	<1.0	<10	<2	<2	<2	<1	<0.1



**NATIONAL AMBIENT AIR QUALITY STANDARDS
CENTRAL POLLUTION CONTROL BOARD**

NOTIFICATION

New Delhi, the 18th November, 2009

No.B-29018/2009/PCCL—In exercise of the powers conferred by Sub-section (2) (b) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No. 14 of 1981), and in super session of the Notification No(s). S.O. 354(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1995, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect, namely:-

NATIONAL AMBIENT AIR QUALITY STANDARDS

S. No.	Pollutant	Time Weighted average	Concentration in Ambient Air		Methods of Measurement
			Industrial, Residential, Rural and Other Area	Ecologically sensitive area (notified by Central Govt.)	
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO ₂), µg/m ³	Annual*	50	20	<ul style="list-style-type: none"> Improved West and Gaeke Ultraviolet Fluorescence
		24 hours**	80	30	
2	Nitrogen Dioxide (NO ₂), µg/m ³	Annual*	40	20	<ul style="list-style-type: none"> Modified Jacob & Hochheiser (Na-Arsenite) Chemiluminescence
		24 hours**	80	30	
3	Particulate Matter (size less than 10 µm) or PM ₁₀ , µg/m ³	Annual*	60	60	<ul style="list-style-type: none"> Gravimetric TOEM Beta attenuation
		24 hours**	100	100	
4	Particulate Matter (size less than 2.5 microns) or PM _{2.5} , µg/m ³	Annual*	40	40	<ul style="list-style-type: none"> Gravimetric TOEM Beta attenuation
		24 hours**	60	60	
5	Ozone (O ₃), µg/m ³	8 hours**	100	100	<ul style="list-style-type: none"> UV photometric Chemiluminescence Chemical method
		1 hour**	180	150	
6	Lead (Pb), µg/m ³	Annual*	0.5	0.5	<ul style="list-style-type: none"> AAS / ICP method after sampling on EPM 2000 or equivalent filter paper ED - NRP using Teflon filter
		24 hours**	1.0	1.0	

7	Carbon Monoxide (CO), mg/m ³	8 hours**	2	2	Non Dispersive Infra RED (NDIR) Spectroscopy
		1 hour**	4	4	
8	Ammonia (NH ₃), µg/m ³	Annual*	100	100	<ul style="list-style-type: none"> Chemiluminescence Indophenol blue method
		24 hours**	400	400	
9	Benzene (C ₆ H ₆), µg/m ³	Annual*	5	5	<ul style="list-style-type: none"> Gas chromatography based continuous analyser Absorption and desorption followed by GC analysis
10	Benzo (a) Pyrene (BaP) - particulate phase only, ng/m ³	Annual*	1	1	Solvent extraction followed by HPLC / GC analysis
11	Arsenic (As), ng/m ³	Annual*	6	5	AAS / ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m ³	Annual*	20	20	AAS / ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

iii. AMBIENT NOISE LEVEL INTENSITY

Collection of ambient noise levels at four locations. Spot noise levels were measured with a precalibrated Noise Level Meter - SL- 4023 SD for day and night periods.

DETAILS OF NOISE MONITORING LOCATIONS

STATION CODE	LOCATIONS	Geographical Location
N1	Port main gate	N 13° 18.856' E 080° 19.478'
N2	Marine control tower	N 13° 18.909' E 080° 20.756'

N3	Kattupalli village	N 13° 18.342' E 080° 19.806'
N4	Kalanji village	N 13° 20.156' E 080° 20.023'

Fig - 4. Noise Level Sampling Locations

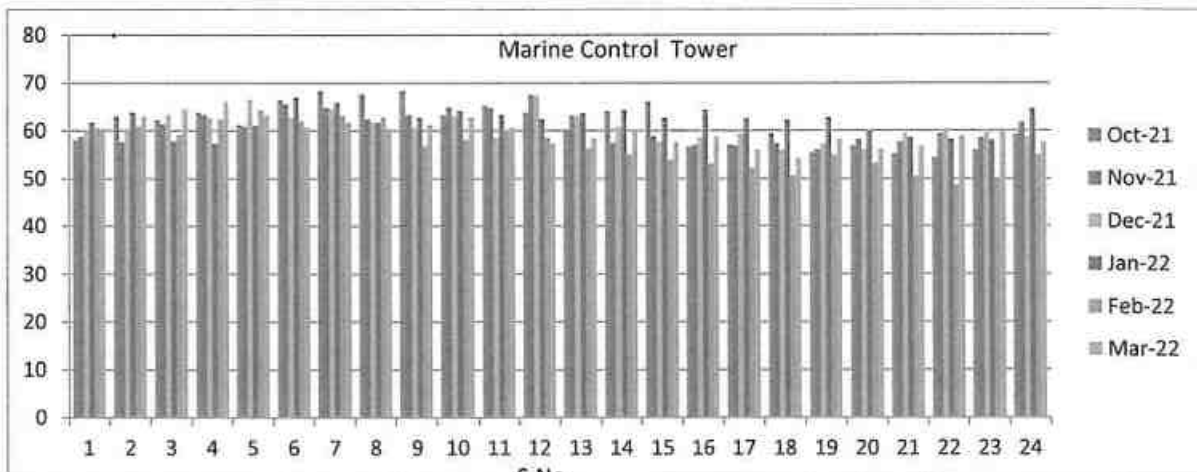
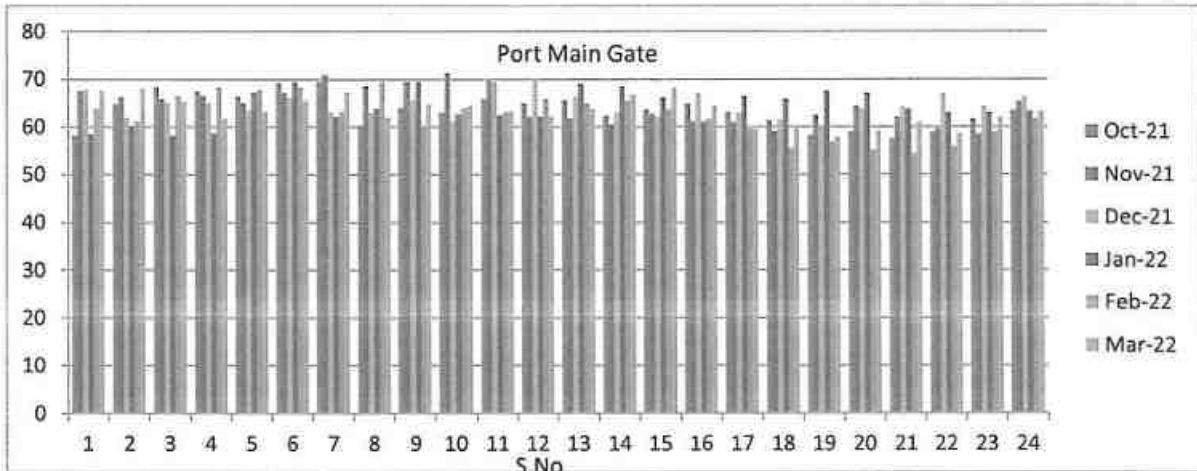


The noise levels monitored during the study period are given hereunder in form of Leq day, Leq night compared with CPCB Standards.

ANNEXURE - 3 RESULTS OF AMBIENT NOISE LEVEL MONITORING DATA

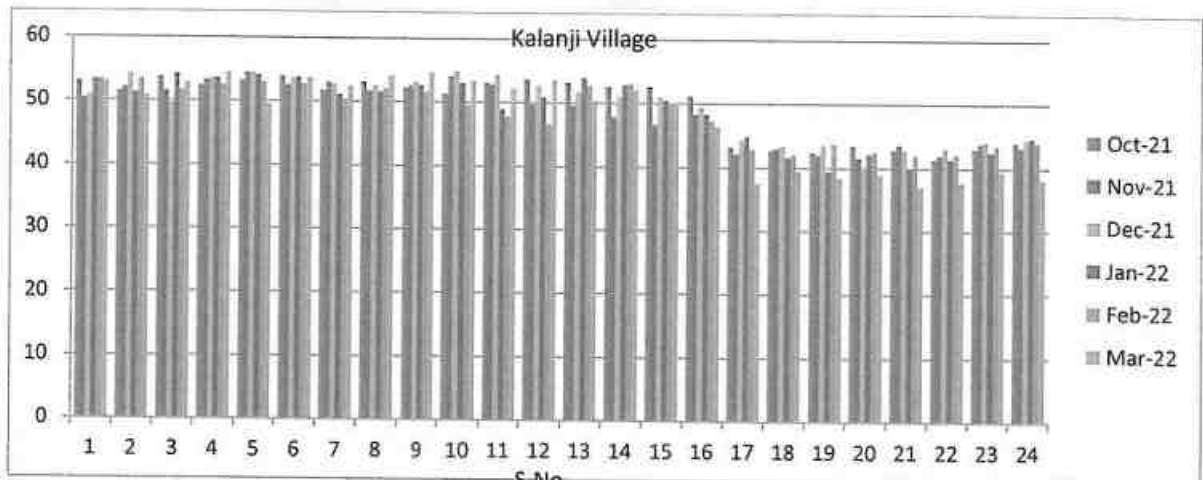
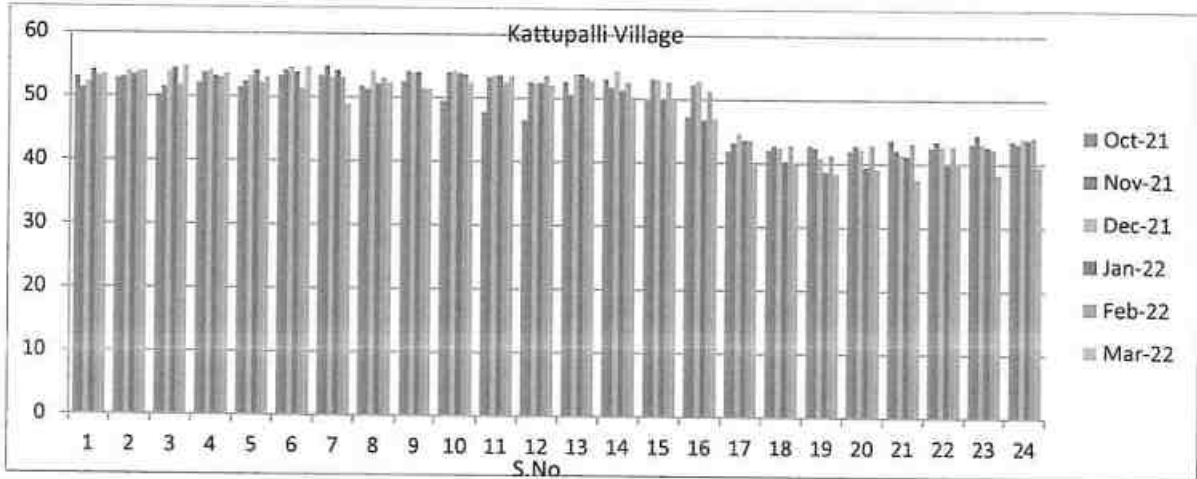
Location		PORT MAIN GATE						MARINE CONTROL TOWER					
Month & Year		Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22	Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22
Parameter & Unit		Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)
S.No	Time of Sampling												
1	06.00 – 07.00 (Day)	58.1	67.5	61.8	58.4	61.8	57.6	58	58.7	61.2	61.7	60.6	60.3
2	07.00 – 08.00	64.7	66.2	61.8	60.2	61.2	66.1	63	57.6	60.2	63.9	60.9	62.9
3	08.00 – 09.00	68.4	65.9	66	58.1	66.4	65.2	62.2	61.4	67.7	57.7	59.1	64.4
4	09.00 – 10.00	67.5	66.4	61.3	58.6	66.3	61.7	63.8	63.3	66.9	57.3	62.4	66.1
5	10.00 – 11.00	66.3	65	63.6	67.2	67.7	63.2	61.2	60.9	66.9	61.1	64.3	63.2
6	11.00 – 12.00	69.1	67.1	63.1	69.4	66.3	65.4	66.4	65.6	67.7	66.9	61	60.8
7	12.00 – 13.00	69.4	60.8	61.1	62.1	63.2	67.3	68.3	64.8	64.9	65.8	63.1	61.7
8	13.00 – 14.00	60.3	68.6	66	63.8	66.4	62	67.7	62.4	61.9	61.7	62.3	60.4
9	14.00 – 15.00	63.9	69.4	61.1	69.4	60.5	64.7	68.3	63.2	66.7	62.6	66.0	61.2
10	15.00 – 16.00	63.1	61.3	61.2	62.6	63.3	64.3	53.2	65	67.9	64.1	60.2	62.8
11	16.00 – 17.00	65.9	66.7	63.1	62.4	63.1	63.1	65.2	64.7	66.6	63.3	60.7	60.7
12	17.00 – 18.00	64.8	62	60.7	62	63.3	62.1	63.8	67.5	67.9	62.4	60.4	67.6
13	18.00 – 19.00	65.5	61.8	61.3	69	64.3	63.3	60.2	63.1	66.2	63.7	64.3	68.4
14	19.00 – 20.00	62.2	60.5	61.3	68.5	63.5	66.7	64	57.4	60.9	64.2	55	60.2

15	20.00 – 21.00	63.6	62.6		66.1	63.8	58.1	66	58.8		62.7	61.7	67.5
16	21.00 – 22.00	64.7	61.1		61	61.7	54.3	56.5	57		64.3	61.1	63.7
17	22.00 – 23.00 (Night)	63.1	60.9		66.3	59.5	59.5	57	56.8		62.5	62.1	63.9
18	23.00 – 00.00	61.3	59.1		65.9	55.4	50.3	59.5	57.3		62.2	50.5	64.2
19	00.00 – 01.00	58.2	62.4		67.5	55.0	57.3	55.4	58		62.7	54.8	59.1
20	01.00 – 02.00	59	64.3		67.1	55.1	59.1	56.8	58.1		59.8	51.1	58
21	02.00 – 03.00	57.5	62		63.7	54.1	60.9	55.1	57.6		58.4	50.3	66.7
22	03.00 – 04.00	58.9	59.7		62.9	55.9	50.5	54.3	59.4		58.2	43.8	53.8
23	04.00 – 05.00	61.7	58.4		63.1	53.0	61.9	55.9	58.5		58	50.1	60.3
24	05.00 – 06.00	63.4	65.3		63.2	61.7	63.2	59.2	61.7		64.5	54.8	67.5



S.No	Location Month & Year	KATTUPALLI VILLAGE						KALANJI VILLAGE					
		Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22	Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22
Parameter & Unit	Time of Sampling	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)	Leq dB(A)
1	06.00 – 07.00 (Day)	53	51.2	51.5	54.1	51.1	53.5	53	50.3	50.9	53.3	53.3	53
2	07.00 – 08.00	52.8	53	53.5	53.3	53.9	54	51.5	52.1	54.2	51.3	53.4	50.8
3	08.00 – 09.00	50.3	51.5	51.8	54.4	51.8	54.5	53.7	51.5	50.2	54.2	51.7	52.9
4	09.00 – 10.00	52.1	53.7	51.1	53.2	53.1	53.6	52.4	53.3	52.7	53.6	52.5	54.5
5	10.00 – 11.00	51.5	52.4	51.3	54.1	52.2	53.1	53.2	54.4	52.5	54.1	53	49.6
6	11.00 – 12.00	53.3	54.2	51.7	53.9	51.3	54.7	53.9	52.6	53.4	53.8	52.5	51.7
7	12.00 – 13.00	53.4	54.9	51.1	54.2	53.1	48.9	51.8	53	52.8	51.1	50.3	52.4
8	13.00 – 14.00	51.7	51.3	51.5	52.2	53	52.3	53.1	51.7	50.9	51.5	52.1	54
9	14.00 – 15.00	52.5	54.1	53.7	54	51.5	51.5	52.2	52.5	53.1	52.5	51.5	54.6
10	15.00 – 16.00	49.5	54	51.1	53.8	52.7	52.4	51.3	54	54.2	53	49.5	53.3
11	16.00 – 17.00	47.8	53.2	51.8	53.6	52.4	53.5	53.1	52.8	50.9	48.9	47.3	52.1
12	17.00 – 18.00	46.6	52.5	51.1	52.4	53.5	52	53.6	49.8	52.8	50.8	46.9	53.5
13	18.00 – 19.00	52.6	50.6	51.9	53.9	53.2	52.8	53.2	49.5	51.7	53.9	52.5	50.3
14	19.00 – 20.00	53	51.8	54.3	51.3	52.5	50.3	52.5	47.8	51	52.8	53	52
15	20.00 – 21.00	49.8	53.1	52.9	50	51.6	50.2	52.6	46.6	52.5	50.4	49.2	49.3
16	21.00 – 22.00	47.2	52.2	52.9	46.8	51.1	47	51.2	48.3	50.1	48.3	47.3	46.4

17	22.00 – 23.00 (Night)	41.9	43.7	43.6	41.2	39.7	43.2	42.1	44.8	42.9	37.5
18	23.00 – 00.00	42.1	42.7	40.3	42.8	40.2	42.7	42.9	41.6	42	39.3
19	00.00 – 01.00	42.8	42.4	38.7	41.7	38.4	42.4	42	39.4	42.7	38.3
20	01.00 – 02.00	42	42.8	39.4	41.7	39.1	43.5	41.6	42.1	42.5	38.9
21	02.00 – 03.00	43.7	42.1	41.2	41.2	37.5	42.8	43.7	40	41.9	37
22	03.00 – 04.00	42.5	43.5	39.9	42.7	40.2	41.3	41.9	41.3	42.1	37.7
23	04.00 – 05.00	43.1	44.5	42.6	41.1	38.4	42.9	43.8	42.5	43.5	39.4
24	05.00 – 06.00	43.6	43.2	43.8	41.2	39.5	44	43.2	44.7	41	38.2



Ambient Air Quality Standards in respect of Noise

Area Code	Category of Area / Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

- Note:-
1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
 2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
 3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority
 4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

iv. DG

Flue of Set its were along

* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.

"A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq: It is an energy mean of the noise level over a specified period.

SET EMISSIONS

Sampling of gas emission 2000 KVA DG was done and emissions determined with its noise intensity. The

Detailed report has been is enclosed as Annexure - 4

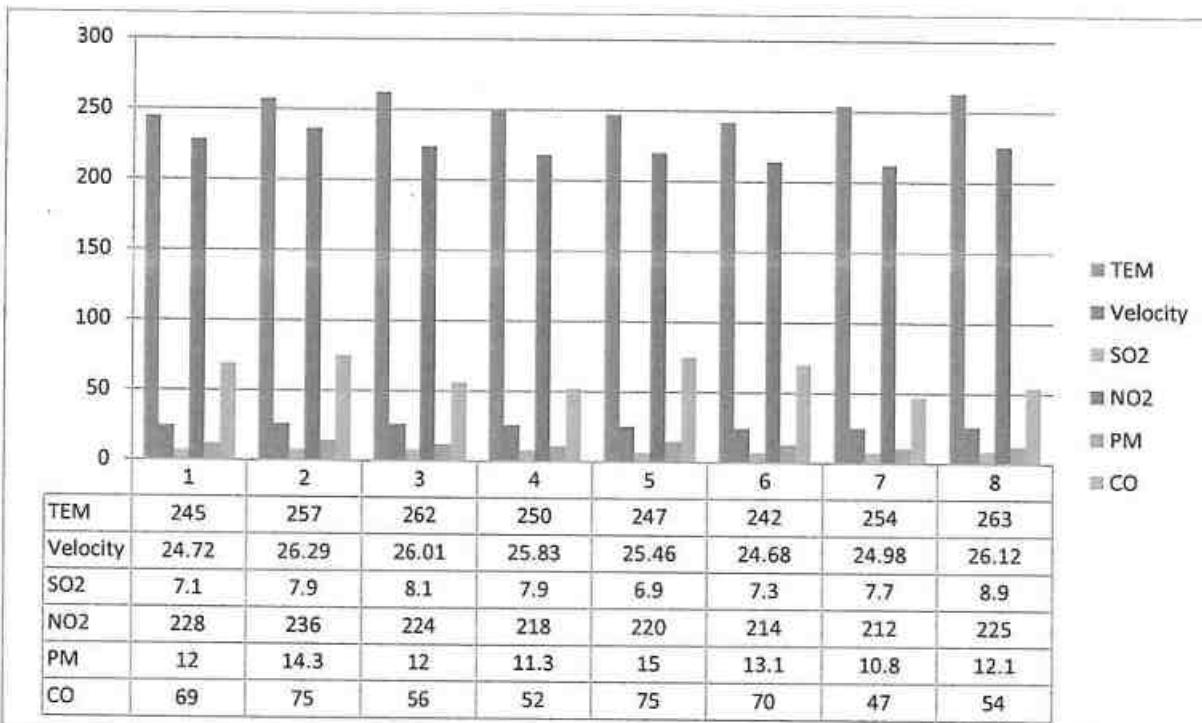
DETAILS OF EMISSION MONITORING LOCATIONS

STATION CODE	LOCATIONS	Geographical Location
SM - 1	DG - 1 2000 KVA	13° 19' 6" N 80° 19' 34" E
SM - 2	DG - 2 2000 KVA	
SM - 3	DG 125 KVA	13° 18' 36" N 80° 20' 25" E
SM - 3	Liquid Terminal Hot Oil Generator Stack	13° 19' 2.38" N 80° 20' 6.81" E

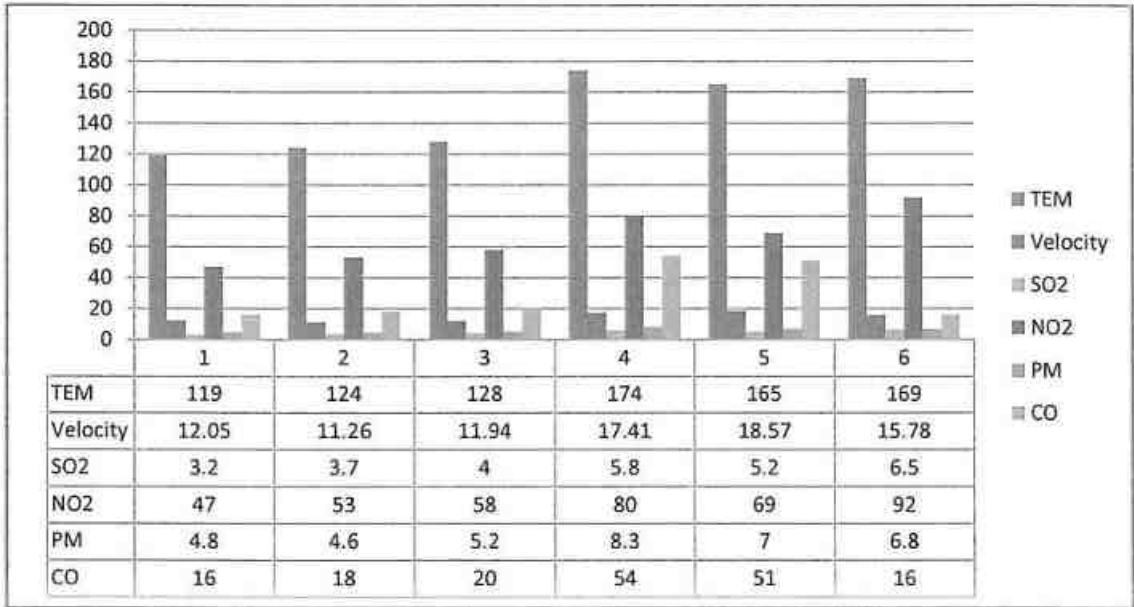
ANNEXURE - 4 RESULTS OF SOURCE EMISSION MONITORING DATA

STACK MONITORING									
Location		DG 2000KVA - 1				DG 2000KVA - 2			
Month & Year		Oct-21	Nov-21	Jan-22	Mar-22	Oct-21	Dec-21	Feb-22	Mar-22
S.No.	Parameters								

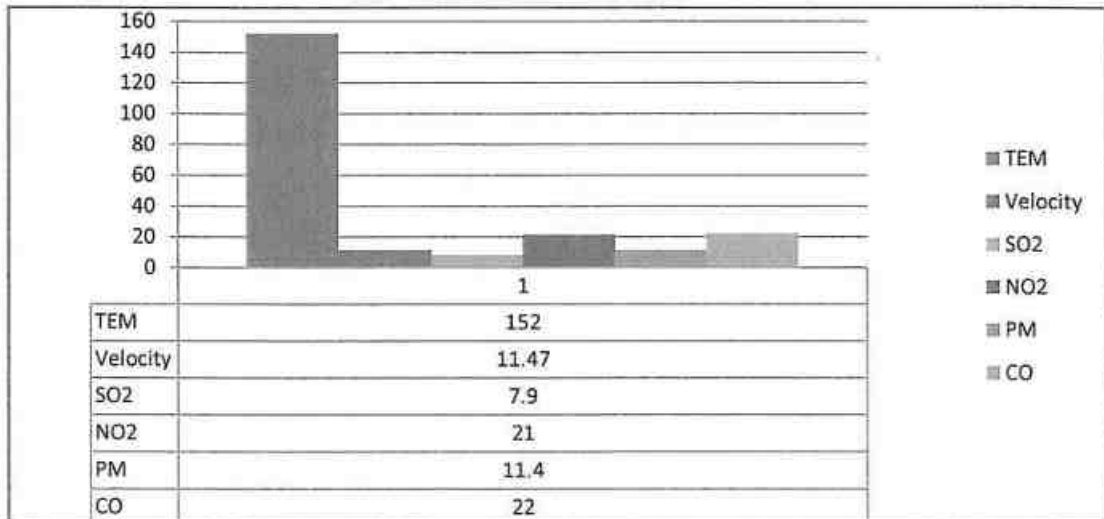
1	Stack Temperature, °C	245	257	262	250	247	242	254	263
2	Flue Gas Velocity, m/s	24.72	26.29	26.01	25.83	25.46	24.68	24.98	26.12
3	Sulphur Dioxide, mg/Nm3	7.1	7.9	8.1	7.9	6.9	7.3	7.7	8.9
4	NOX (as NO2) in ppmv	228	236	224	218	220	214	212	225
5	Particular matter, mg/Nm3	12	14.3	12	11.3	15	13.1	10.8	12.1
6	Carbon Monoxide, mg/Nm3	69	75	56	52	75	70	47	54
7	Gas Discharge, Nm3/hr	6420	6674	6543	6645	6587	6447	6376	6557



STACK MONITORING							
Location		DG 125 KVA			DG 500 KVA		
Month & Year		Oct-21	Dec-21	Mar -22	Oct-21	Nov-21	Jan-22
S.No.	Parameters						
1	Stack Temperature, °C	119	124	128	174	165	169
2	Flue Gas Velocity, m/s	12.05	11.26	11.94	17.41	18.57	15.78
3	Sulphur Dioxide, mg/Nm3	7.1	7.9	8.1	7.3	7.7	8.9
4	NOX (as NO2) in ppmv	47	53	58	80	69	92
5	Particular matter, mg/Nm3	4.5	4.8	5.2	6.3	5	6.1
6	Carbon Monoxide, mg/Nm3	69	75	56	70	47	54
7	Gas Discharge, Nm3/hr	581	535	563	1732	1886	1588



STACK MONITORING		
Location		Liquid Terminal Hot Oil Generator
Month & Year		Feb-22
S.No.	Parameters	
1	Stack Temperature, °C	152
2	Flue Gas Velocity, m/s	11.47
3	Sulphur Dioxide, mg/Nm3	7.9
4	NOX (as NO2) in ppmv	21
5	Particular matter, mg/Nm3	11.4
6	Carbon Monoxide, mg/Nm3	22
7	Gas Discharge, Nm3/hr	36254



Parameter	Area Category	Total engine rating of the plant (includes existing as well as new generator sets)	Generator sets commissioning date		
			Before 1.7.2003	Between 1.7.2003 and 1.7.2005	On or after 1.7.2005
NO _x (as NO ₂) (At 15% O ₂ , dry basis, in ppmv)	A	Up to 75 MW	1100	970	710
	B	Up to 150 MW			
	A	More than 75 MW	1100	710	360
	B	More than 150 MW			
NMHC (as C) (at 15% O ₂), mg/Nm ³	Both A and B		150	100	
PM (at 15% O ₂), mg/Nm ³	Diesel Fuels- HSD & LDO	Both A and B	75	75	
	Furnace Oils- LSHS & FO	Both A and B	150	100	
CO (at 15% O ₂), mg/Nm ³	Both A and B		150	150	

¹ Inserted by Rule 2(b) of the Environment (Protection) Second Amendment Rules, 2008 notified by G.S.R. 280(E), dated 11.4.2008.

² Serial No.96 and entries relating thereto inserted by Rule 2 of the Environment (Protection) Third Amendment Rules, 2002 notified vide Notification G.S.R. 489(E), dated 9.7.2002.

v. STP WATER SAMPLE ANALYSIS

Water samples were collected at the following points.

- 30 KLD Treated Water Outlet
- 5 KLD Treated Water Outlet

DETAILS OF STP WATER LOCATIONS

STATION CODE	LOCATIONS	Geographical Location
STP - 1	30 KLD	13° 18' 36" N 80° 20' 25" E
STP - 2	5 KLD	13° 19' 6" N 80° 19' 35" E

Analysis results of the water sample collected from the above location are enclosed as Annexure - 5.

ANNEXURE - 5 RESULTS OF STP WATER QUALITY DATA

STP WATER													
Location		STP 5KLD INLET					STP 5KLD OUTLET						
Month & Year		Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22	Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22
S.No	Parameters												
1	pH @ 25°C	7.02	6.91	7.18	7.11	7.4	6.92	7.39	7.34	7.63	7.73	7.68	7.27
2	Total Suspended Solids	86	54	27	54	26	40	2.8	26	3.6	4	2.1	8.4
3	BOD at 27°C for 3 days	62	46	36	72	56	72	4.5	8	5.2	5.9	4.8	7.8
4	Fecal Coliform	540	410	210	340	300	520	8.4	120	60	78	86	110
5	COD	296	262	189	268	296	364	20	44	28	35	30	34
6	Oil & Grease	7.4	5.7	2.5	3.6	3.9	4.3	BDL	BDL	BDL	BDL	BDL	BDL
7	Total Dissolved Solids	1382	848	824	981	1048	1186	1078	782	690	656	794	892
8	Chlorides (as Cl)	548	402	245	274	382	402	445	377	313	284	367	188
9	Sulphates (as SO ₄)	38	5.45	23	29	42	38	16	30	38	100	23	21

STP WATER													
Location		STP 10KLD INLET					STP 10KLD OUTLET						
Month & Year		Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22	Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22
S.No	Parameters												
1	pH @ 25°C	7.74	7.36	7.16	7.32	7.19	7.25	7.98	7.42	7.6	7.56	7.57	7.86
2	Total Suspended Solids	46	128	48	64	52	64	7.2	26	7.8	7	19	11
3	BOD at 27°C for 3 days	68	55	51	82	75	82	4.8	12	16	15	15	9.6
4	Fecal Coliform	410	360	280	320	410	510	82	90	140	110	146	110
5	COD	312	274	209	324	346	378	36	76	97	58	37	28
6	Oil & Grease	4.5	4.8	3.6	5	5.4	5.2	BDL	BDL	BDL	BDL	BDL	BDL
7	Total Dissolved Solids	1268	1330	1088	926	908	1140	374	750	794	842	821	918
8	Chlorides (as Cl)	479	519	435	367	352	398	44	269	288	333	305	326
9	Sulphates (as SO ₄)	41	2.42	30	45	33	26	30	1.45	87	5.6	17	15

STP WATER													
Location		STP 30KLD INLET					STP 30KLD OUTLET						
Month & Year		Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22	Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22
S.No	Parameters												
1	pH @ 25°C	6.5	6.46	7.25	6.98	7.38	7.20	7.12	7.03	7.41	7.57	7.71	7.63
2	Total Suspended Solids	118	98	158	176	82	94	18	22	20	12.0	19	17
3	BOD at 27°C for 3 days	319	172	346	314	196	226	5	11	7	7	11	12
4	Fecal Coliform	1480	1320	2400	2100	1780	1840	190	240	94	80	146	160
5	COD	362	424	1292	1156	814	962	38	72	36	40	58	46
6	Oil & Grease	9.3	8.5	10	8.2	7.7	9.4	BDL	BDL	BDL	BDL	BDL	BDL
7	Total Dissolved Solids	1758	918	1136	918	1362	1518	1302	812	842	734	804	1126
8	Chlorides (as Cl)	665	430	401	338	551	604	313	372	308	296	412	238
9	Sulphates (as SO ₄)	40	82	60	34	28	32	14	39	84	5.2	14	20

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 13th October, 2017

G.S.R. 1265(E).—In exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely:—

1. **Short title and commencement.**—(1) These rules may be called the Environment (Protection) Amendment Rules, 2017.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Environment (Protection) Rules, 1986, in Schedule - I, after serial number 104 and the entries relating thereto, the following serial number and entries shall be inserted, namely:—

Sl. No.	Industry	Parameters	Standards
1	2	3	4
		Effluent discharge standards (applicable to all mode of disposal)	
105	Sewage Treatment Plants (STPs)		Location
			Concentration not to exceed
		pH	(a) Anywhere in the country (b) 6.5-9.0
		Bio-Chemical Oxygen Demand (BOD)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir, and Union territory of
			Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep
			Areas/regions other than mentioned above
		Total Suspended Solids (TSS)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep
			Areas/regions other than mentioned above
		Fecal Coliform (FC) (Most Probable Number per 100 milliliter, MPN/100ml)	Anywhere in the country
			<50
			<100
			<1000

*Metro Cities are Mumbai, Delhi, Kolkata, Chennai, Bengaluru, Hyderabad, Ahmedabad and Pune.

vi. DRINKING WATER SAMPLE ANALYSIS

Drinking Water samples were collected at the Canteen or Office Building. Analysis results of the water sample collected from the above location are enclosed as Annexure - 6.

vii. RAW WATER SAMPLE ANALYSIS

Raw water samples were collected at the Pond. Analysis results of the water sample collected from the above location are enclosed as Annexure - 7.

DRINKING WATER								
Month & Year		Unit	Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22
S.No.	Parameters							
1	pH @ 25°C	-	8.20	7.06	6.76	7.61	7.46	7.78
2	Total Hardness as CaCo ₃	mg/L	5.9	BDL(DL:1.0)	6.0	34	BDL(DL:1.0)	BDL(DL:1.0)
3	Chloride as Cl	mg/L	19	14	27	100	12	22
4	Total Dissolved Solids	mg/L	38	22	42	196	26	30
5	Calcium as Ca	mg/L	0.79	BDL(DL:0.4)	1.6	3.2	BDL(DL:0.4)	BDL(DL:0.4)
6	Sulphate as SO ₄	mg/L	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)
7	Total Alkalinity as CaCo ₃	mg/L	5.05	6.5	11	15	11	13
8	Magnesium as Mg	mg/L	0.96	BDL(DL:0.24)	0.48	6.3	BDL(DL:0.24)	BDL(DL:0.24)
9	Color	Hazen	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
10	Odour	-	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
11	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
12	Turbidity	NTU	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
13	Nitrate as No ₃	mg/L	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)
14	Iron as Fe	mg/L	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)
15	Total Residual Chlorine	mg/L	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
16	Copper as Cu	mg/L	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)
17	Manganese as Mn	mg/L	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)
18	Fluoride as F	mg/L	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
19	Phenolic compounds as C ₆ H ₅ OH	mg/L	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)
20	Mercury as Hg	mg/L	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)
21	Cadmium as Cd	mg/L	BDL(DL 0.003)	BDL(DL 0.003)	BDL(DL 0.003)	BDL(DL 0.003)	BDL(DL 0.003)	BDL(DL 0.003)
22	Selenium as Se	mg/L	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)
23	Arsenic as As	mg/L	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)
24	Lead as Pb	mg/L	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)
25	Zinc as Zn	mg/L	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)
26	Anionic Detergents as MBAS	mg/L	Nil	Nil	Nil	Nil	Nil	Nil
27	Total Chromium as Cr	mg/L	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)
28	Phenolphthalein Alkalinity as CaCO ₃	mg/L	Nil	Nil	Nil	Nil	Nil	Nil
29	Aluminium as Al	mg/L	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)
30	Boron as B	mg/L	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
31	Mineral Oil	mg/L	Nil	Nil	Nil	Nil	Nil	Nil
32	Polynuclear Aromatic Hydrocarbons as	mg/L	Nil	Nil	Nil	Nil	Nil	Nil
33	Pesticides	mg/L	Nil	Nil	Nil	Nil	Nil	Nil
34	Cyanide as CN	mg/L	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
35	E. coli	MPN/100ml	Absence	Absence	Absence	Absence	Absence	Absence
36	Total Coliform	MPN/100ml	Absence	Absence	Absence	Absence	Absence	Absence

ANNEXURE - 7 RESULTS OF RAINWATER HARVESTING POND WATER SAMPLE QUALITY DATA

RAW WATER SAMPLE						
Month & Year		Unit	Dec - 21	Jan - 22	Feb - 22	Mar - 22
S.No.	Parameters					
1	pH @ 25°C	-	8.25	8.03	7.68	7.96
2	Total Hardness as CaCO ₃	mg/L	103	77	65	92
3	Chloride as Cl	mg/L	269	303	147	210
4	Total Dissolved Solids	mg/L	648	612	582	858
5	Calcium as Ca	mg/L	20	14.5	11	16
6	Sulphate as SO ₄	mg/L	47	28	18	32
7	Total Alkalinity as CaCO ₃	mg/L	43	32	33	120
8	Magnesium as Mg	mg/L	13	9.9	8.9	13
9	Color	Hazen	<1.0	<1.0	<1.0	<1.0
10	Odour	-	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
11	Taste	-	Agreeable	Dis Agreeable	Dis Agreeable	Dis Agreeable
12	Turbidity	NTU	1.6	0.6	0.5	1.1
13	Nitrate as No ₃	mg/L	3.45	2.45	2.13	3.86
14	Iron as Fe	mg/L	0.11	0.08	0.06	0.11
15	Total Residual Chlorine	mg/L	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
16	Copper as Cu	mg/L	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)
17	Manganese as Mn	mg/L	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)
18	Fluoride as F	mg/L	0.19	0.22	0.27	0.51
19	Phenolic compounds as C ₆ H ₅ OH	mg/L	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)
20	Mercury as Hg	mg/L	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)	BDL(DL 0.001)
21	Cadmium as Cd	mg/L	BDL(DL 0.003)	BDL(DL 0.003)	BDL(DL 0.003)	BDL(DL 0.003)
22	Selenium as Se	mg/L	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)
23	Arsenic as As	mg/L	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)
24	Lead as Pb	mg/L	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)	BDL(DL 0.01)
25	Zinc as Zn	mg/L	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)
26	Anionic Detergents as MBAS	mg/L	Nil	Nil	Nil	Nil
27	Total Chromium as Cr	mg/L	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)
28	Phenolphthalein Alkalinity as CaCO ₃	mg/L	Nil	Nil	Nil	Nil
29	Aluminium as Al	mg/L	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)	BDL(DL 0.05)
30	Boron as B	mg/L	0.27	0.37	0.31	0.47
31	Mineral Oil	mg/L	Nil	Nil	Nil	Nil
32	Polynuclear Aromatic Hydrocarbons as	mg/L	Nil	Nil	Nil	Nil
33	Pesticides	mg/L	Nil	Nil	Nil	Nil
34	Cyanide as CN	mg/L	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
35	E. coli	MPN/100ml	Absence	Absence	Absence	Absence
36	Total Coliform	MPN/100ml	Absence	Absence	Absence	Absence

Marine Water samples and sediment samples were collected at locations South side berth and North side berth. Analysis data of Marine and sediments as represented in Annexure - 8 & 9.

DETAILS OF MARINE WATER AND SEDIMENT LOCATIONS

STATION CODE	LOCATIONS	Geographical Location
MW - 1 / MS - 1	CB - 1	13° 18' 50" N 80° 20' 51" E
MW - 2 / MS - 2	CB - 2	13° 18' 46" N 80° 20' 49" E
MW - 3 / MS - 3	BERTH - 3	13° 18' 41" N 80° 21' 4" E

Fig - 5. Water and Marine Sampling Locations



ANNEXURE - 8 RESULTS OF MARINE WATER QUALITY DATA

MARINE WATER

S.NO	PARAMETER	UNITS	CB - 1											
			Oct - 21		Nov - 21		Dec - 21		Jan - 22		Feb - 22		Mar - 22	
			Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom
Physicochemical Parameters														
1	Colour	Hazan	20	35	15	40	20	35	15	45	20	35	15	40
2	Odour	-	Unobjectionable											
3	pH @ 25°C	-	8.27	8.36	8.14	8.24	8.03	8.13	7.90	8.06	7.93	8.25	7.94	8.05
4	Temperature	°C	28	28	27	27	28	28	29	29	28	28	30	30
5	Turbidity	NTU	14	31	9.2	34	7.5	26	9.2	44	7.8	35	12	39
6	Total Suspended Solids	mg/L	18	25	15	28	10	20	14	31	12	27	21	30
7	BOD at 27 oC for 3	mg/L	4.1	4.0	4.1	4.5	4.3	4.7	4.6	4.5	4.8	4.8	4.6	4.5
8	COD	mg/L	120	130	135	162	126	152	132	144	124	135	122	136
9	Dissolved oxygen	mg/L	2.6	2.5	2.5	2.3	2.8	2.5	2.9	2.6	2.8	2.7	2.8	2.5
10	Salinity at 25 °C	ppt	31.8	34.8	30.4	28.5	31.2	29.8	39.6	40.7	37.7	38.0	39.5	40.8
11	Oil & Grease	mg/L	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
Nutrient Parameters														
12	Nitrate as No3	mg/L	7.05	8.45	5.98	7.42	6.75	9.14	6.94	9.49	6.03	7.12	6.96	8.46
13	Nitrite as No2	mg/L	2.41	3.01	2.64	3.44	2.09	3.98	2.57	4.06	2.15	3.68	2.48	3.53
14	Ammonical Nitrogen	mg/L	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
15	Total Nitrogen	mg/L	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
16	Inorganic phosphates as PO4	mg/L	4.83	5.42	3.71	5.98	3.12	6.56	4.99	7.40	4.46	6.19	4.92	7.40
17	Silica as SiO2	mg/L	5.47	7.17	5.98	8.03	4.86	9.42	5.23	8.12	5.12	8.84	5.78	6.97
18	Particulate Organic Carbon	µgC/L	15	20	18	23	15	20	14	17	11	15	14	19
19	Pertroleum Hydrocarbons	µg/L	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)
Heavy Metals														
20	Cadmium as Cd	mg/L	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)
21	Copper as Cu	mg/L	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
22	Total Iron as Fe	mg/L	0.58	0.74	0.47	0.81	0.52	0.73	0.49	0.69	0.57	0.78	0.50	0.73
23	Zinc as Zn	mg/L	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)
24	Lead as Pb	mg/L	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)
25	Mercury as Hg	mg/L	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)
26	Nickel as Ni	mg/L	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
27	Total Chromium as Cr	mg/L	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
Bacteriological Parameters														
28	Escherichia Coll (E.CLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
29	Faecal Coliform (F.CLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
30	Pseudomonas aeruginosa (PALO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
31	Streptococcus faecalis (SFLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
32	Shigella (SHLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
33	Salmonella (SLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
34	Total Coliform (TC)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
35	Total Viable Count (TVC)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
36	Vibrio cholera (VC)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
37	Vibrio	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence

		CB - 1												
Month & Year		Oct - 21		Nov - 21		Dec - 21		Jan - 22		Feb - 22		Mar - 22		
S.N	Parameters	Unit	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom

38	Primary Productivity	mg C/m ³ /hr	9.48	11.07	9.15	11.46	8.48	10.52	9.05	10.12	9.86	10.42	9.05	10.12
39	Chlorophyll a	mg /m ³	6.05	6.83	5.29	6.32	6.15	6.86	6.58	7.21	7.21	7.96	6.58	7.21
40	Phaeopigment	mg /m ³	2.14	3.52	2.48	3.91	2.47	3.28	3.13	3.75	2.87	3.59	3.13	3.75
41	Total Biomass	ml /100 m ³	1.83	1.56	1.74	1.98	1.63	1.80	2.37	2.06	1.65	2.03	2.37	2.06
PHYTOPLANKTON														
42	Bacteriastrum hyalinum	nos/ml	11	15	10	13	15	17	13	12	12	15	13	12
43	Bacteriastrum varians	nos/ml	14	16	12	18	9	12	8	6	7	12	8	6
44	Chaetoceros didymus	nos/ml	12	10	15	17	13	19	19	21	10	13	19	21
45	Chaetoceros decipiens	nos/ml	10	13	8	10	11	6	12	14	8	17	12	14
46	Biddulphia mobiliensis	nos/ml	17	11	14	7	10	13	18	10	6	11	18	10
47	Ditylum brightwellii	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
48	Gyrosigma sp	nos/ml	5	8	6	10	12	15	9	11	13	16	9	11
49	Cladophyxis sps	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
50	Coscinodiscus centralis	nos/ml	13	17	11	14	17	20	16	19	11	9	16	19
51	Coscinodiscus granii	nos/ml	15	19	18	15	8	11	18	22	14	18	18	22
52	Cylcotella sps	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
53	Hemidiscus hardmanianus	nos/ml	23	25	20	22	16	20	17	18	9	7	17	20
54	Laudaria annulata	nos/ml	14	19	13	16	6	8	11	7	13	15	11	7
55	Pyropacus horologicum	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
56	Pleurosigma angulatum	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
57	Leptocylindrus danicus	nos/ml	19	22	9	12	14	16	13	12	19	24	13	12
58	Gulnardia flaccida	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
59	Rhizosolenia alata	nos/ml	16	18	17	21	19	24	14	16	12	18	14	16
60	Rhizosolenia impricata	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
61	Rhizosolenia semispina	nos/ml	20	24	22	26	14	18	21	23	17	25	21	23
62	Thalassionema nitzschioides	nos/ml	6	8	5	7	9	6	15	17	21	23	15	17
63	Triceratium reticulatum	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
64	Ceratium trichoceros	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
65	Ceratium furca	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
66	Ceratium macroceros	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
67	Ceracium longipes	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
ZOOPLANKTONS														
68	Acrocalanus gracilis	nos/ml	11	14	9	12	7	9	19	23	11	15	19	23
69	Acrocalanus sp	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
70	Paracalanus parvus	nos/ml	8	10	11	14	13	16	16	17	9	18	16	17
71	Eutintinus sps	nos/ml	13	16	15	11	10	6	13	14	14	17	13	14
72	Centropages furcatus	nos/ml	12	15	16	19	12	17	11	13	12	10	11	13
73	Corycaeus dana	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
74	Oithona brevicornis	nos/ml	7	5	10	8	15	12	14	11	18	20	14	11
75	Euterpina acutifrons	nos/ml	16	12	14	10	18	15	10	8	11	14	10	8
76	Metacalanus aurivillii	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
77	Copepod nauplii	nos/ml	15	21	17	22	9	13	15	12	17	19	15	12
78	Cirripede nauplii	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
79	Bivalve veliger	nos/ml	19	18	12	15	16	19	11	10	9	13	11	10
80	Gastropod veliger	nos/ml	17	20	8	17	11	14	20	25	16	20	20	25

S.NO	PARAMETER	UNITS	CB - 2											
			Oct - 21		Nov - 21		Dec - 21		Jan - 22		Feb - 22		Mar - 22	
Physicochemical Parameters			Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom

1	Colour	Hazan	10	40	25	40	20	45	15	40	25	35	15	40
2	Odour	-	Unobjectionable											
3	pH @ 25°C	-	8.21	8.29	8.29	8.32	8.09	8.21	7.82	8.09	7.97	8.19	7.86	8.12
4	Temperature	°C	28	28	27	27	28	28	29	29	28	28	30	30
5	Turbidity	NTU	17	37	13	35	8.4	31	10	37	8.5	31	10	37
6	Total Suspended Solids	mg/L	20	30	18	26	12	22	16	26	14	24	20	28
7	BOD at 27 oC for 3	mg/L	4.9	4.6	4.0	4.8	4.4	4.9	4.5	4.4	4.7	4.7	4.3	4.6
8	COD	mg/L	116	142	142	154	120	160	128	137	121	130	115	128
9	Dissolved oxygen	mg/L	2.7	2.4	2.4	2.6	2.6	2.5	2.7	2.6	2.9	2.8	2.7	2.6
10	Salinity at 25 °C	ppt	33.5	36.2	29.6	29.1	30.8	30.3	39.2	39.1	38.2	38.6	39.1	40.0
11	Oil & Grease	mg/L	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
Nutrient Parameters														
12	Nitrate as No3	mg/L	7.42	10	6.42	8.93	6.96	8.07	6.28	9.21	5.27	8.24	6.27	10.25
13	Nitrite as No2	mg/L	2.78	3.78	2.15	3.56	2.43	4.23	2.23	3.52	2.01	3.96	2.13	2.98
14	Ammonical Nitrogen	mg/L	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
15	Total Nitrogen	mg/L	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
16	Inorganic phosphates as PO4	mg/L	4.45	6.96	43.14	6.25	3.07	7.12	5.67	7.85	4.89	7.12	5.59	6.86
17	Silica as SiO2	mg/L	6.13	7.43	5.27	7.98	5.92	8.65	4.35	8.09	4.86	8.92	4.28	7.41
18	Particulate Organic Carbon	µgC/L	12	18	16	21	14	24	16	20	14	17	16	18
19	Pertroleum Hydrocarbons	µg/L	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)
Heavy Metals														
20	Cadmium as Cd	mg/L	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)
21	Copper as Cu	mg/L	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
22	Total Iron as Fe	mg/L	0.41	0.71	0.50	0.78	0.58	0.87	0.453	0.74	0.61	0.70	0.54	0.67
23	Zinc as Zn	mg/L	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)
24	Lead as Pb	mg/L	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)
25	Mercury as Hg	mg/L	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)
26	Nickel as Ni	mg/L	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
27	Total Chromium as Cr	mg/L	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
Bacteriological Parameters														
28	Escherichia Coli (ECLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
29	Faecal Coliform (FCLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
30	Pseudomonas aeruginosa (PALO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
31	Streptococcus faecalis (SFLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
32	Shigella (SHLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
33	Salmonella (SLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
34	Total Coliform (TC)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
35	Total Viable Count (TVC)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
36	Vibrio cholera (VC)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
37	Vibrio	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence

CB - 2														
Month & Year			Oct - 21		Nov - 21		Dec - 21		Jan - 22		Feb - 22		Mar - 22	
S.N	Parameters	Unit	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom
38	Primary Productivity	mg C/m ³ /hr	9.72	10.90	8.27	10.03	8.91	10.37	8.86	10.21	8.12	9.05	8.86	10.21
39	Chlorophyll a	mg /m ³	6.01	7.47	6.85	7.91	6.00	7.34	5.74	5.82	7.45	6.12	5.74	5.82
40	Phaeopigment	mg /m ³	2.68	3.12	2.12	3.86	2.73	3.51	2.86	3.91	3.54	3.96	2.86	3.91

41	Total Biomass	ml/100 m3	2.14	1.85	2.49	1.62	1.95	2.08	1.69	1.45	1.58	2.12	1.69	1.45
PHYTOPLANKTON														
42	Bacteriastrum hyalinum	nos/ml	7	11	8	6	11	13	14	12	10	18	14	12
43	Bacteriastrum varians	nos/ml	5	9	9	11	7	10	12	13	9	11	12	13
44	Chaetoceros didymus	nos/ml	13	17	11	14	15	17	10	8	11	14	10	8
45	Chaetoceros decipiens	nos/ml	15	16	7	12	9	8	16	9	13	12	16	9
46	Biddulphia mobiliensis	nos/ml	12	14	10	9	8	12	21	17	12	15	21	17
47	Ditylum brightwellii	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
48	Gyrosigma sp	nos/ml	10	12	13	15	10	13	11	5	10	8	11	5
49	Cladophyxis sps	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
50	Coscinodiscus centralis	nos/ml	19	23	16	13	14	18	9	7	8	13	9	7
51	Coscinodiscus granii	nos/ml	20	25	14	18	12	15	17	14	15	20	17	14
52	Cylcotella sps	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
53	Hemidiscus hardmanianus	nos/ml	14	11	19	16	22	19	20	11	14	9	20	11
54	Laudaria annulata	nos/ml	16	13	12	10	13	7	8	15	19	10	8	15
55	Pyropacus horologicum	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
56	Pleurosigma angulatum	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
57	Leptocylindrus danicus	nos/ml	17	21	6	15	9	12	19	23	21	17	19	23
58	Guinardia flaccida	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
59	Rhizosolenia alata	nos/ml	9	10	15	19	20	26	13	10	10	19	13	10
60	Rhizosolenia impricata	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
61	Rhizosolenia semispina	nos/ml	23	26	17	20	12	15	25	22	20	18	25	22
62	Thalassionema nitzschioides	nos/ml	18	20	10	9	8	5	14	10	18	15	14	10
63	Triceratium reticulatum	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
64	Ceratium trichoceros	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
65	Ceratium furca	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
66	Ceratium macroceros	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
67	Ceracium longipes	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
ZOOPLANKTONS														
68	Acrocalanus gracilis	nos/ml	15	17	6	10	11	14	10	16	13	16	16	13
69	Acrocalanus sp	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
70	Paracalanus parvus	nos/ml	12	14	15	18	10	8	7	14	16	14	14	17
71	Eutimnus sps	nos/ml	10	11	8	13	5	9	16	10	14	10	10	9
72	Centropages furcatus	nos/ml	9	10	14	17	16	20	5	8	10	16	8	10
73	Corycaeus dana	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
74	Oithona brevicornis	nos/ml	11	9	7	11	14	17	10	11	12	15	11	17
75	Euterpina acutifrons	nos/ml	15	12	11	16	13	21	17	21	9	13	21	18
76	Metacalanus aurivillii	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
77	Copepod nauplii	nos/ml	17	19	13	16	10	7	6	19	13	17	19	20
78	Cirripede nauplii	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
79	Bivalve veliger	nos/ml	13	15	10	9	18	23	15	17	12	15	17	14
80	Gastropod veliger	nos/ml	23	21	12	14	9	10	11	22	10	21	22	24

S.NO	PARAMETER	UNITS	BERTH - 3											
			Oct - 21		Nov - 21		Dec - 21		Jan - 22		Feb - 22		Mar - 22	
Physicochemical Parameters			Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom
1	Colour	Hazan	20	30	25	45	15	30	25	40	15	30	20	35
2	Odour	-	Unobjectionable											
3	pH @ 25°C	-	8.17	8.31	8.26	8.37	8.03	8.14	8.15	8.14	8.11	8.24	8.20	8.38

4	Temperature	°C	28	28	27	27	28	28	29	29	28	28	30	30
5	Turbidity	NTU	11	27	14	30	7.6	22	13	20	11	22	8.9	24
6	Total Suspended Solids	mg/L	13	24	16	36	11	18	16	23	14	28	12	30
7	BOD at 27 °C for 3	mg/L	4.9	4.5	4.2	4.4	4.4	4.6	4.6	4.0	4.3	4.5	4.6	5.1
8	COD	mg/L	112	146	135	168	120	148	108	156	105	138	112	147
9	Dissolved oxygen	mg/L	2.8	2.5	2.7	2.3	2.8	2.5	2.7	2.4	2.6	2.5	2.5	2.4
10	Salinity at 25 °C	ppt	37.0	41.2	30.1	34.9	31.5	33.0	34.5	36.1	34.2	35.9	36.9	38.2
11	Oil & Grease	mg/L	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
Nutrient Parameters														
12	Nitrate as No3	mg/L	6.96	7.42	6.14	7.83	6.86	7.52	6.15	7.89	4.96	6.50	6.12	7.74
13	Nitrite as No2	mg/L	1.84	2.70	1.59	2.11	1.91	2.79	2.13	3.10	1.87	2.42	2.07	3.29
14	Ammonical Nitrogen	mg/L	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
15	Total Nitrogen	mg/L	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
16	Inorganic phosphates as PO4	mg/L	3.12	4.75	3.78	5.15	3.05	4.27	3.91	5.10	3.13	5.56	3.84	5.08
17	Silica as SiO2	mg/L	5.49	6.92	6.13	7.09	7.83	9.12	6.57	8.19	5.92	7.14	4.86	6.23
18	Particulate Organic Carbon	µgC/L	18	20	15	23	11	19	15	17	12	15	14	17
19	Pertoleum Hydrocarbons	µg/L	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)
Heavy Metals														
20	Cadmium as Cd	mg/L	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)	BDL (DL: 0.003)
21	Copper as Cu	mg/L	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
22	Total Iron as Fe	mg/L	0.47	0.61	0.54	0.78	0.42	0.65	0.48	0.71	0.53	0.79	0.50	0.63
23	Zinc as Zn	mg/L	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)
24	Lead as Pb	mg/L	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)	BDL (DL: 0.01)
25	Mercury as Hg	mg/L	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)	BDL (DL: 0.001)
26	Nickel as Ni	mg/L	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
27	Total Chromium as Cr	mg/L	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
Bacteriological Parameters														
28	Escherichia Coli (E.CLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
29	Faecal Coliform (FCLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
30	Pseudomonas aeruginosa (PALO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
31	Streptococcus faecalis (SFLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
32	Shigella (SHLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
33	Salmonella (SLO)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
34	Total Coliform (TC)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
35	Total Viable Count (TVC)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
36	Vibrio cholera (VC)	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
37	Vibrio	cfu/ml	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence

BERTH - 3														
Month & Year			Oct - 21		Nov - 21		Dec - 21		Jan - 22		Feb - 22		Mar - 22	
S.N	Parameters	Unit	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom
38	Primary Productivity	mg C/m3 /hr	8.14	9.92	8.78	10.15	7.68	9.05	8.52	9.74	9.04	10.26	8.71	9.54
39	Chlorophyll a	mg /m3	6.76	8.08	6.91	8.77	7.42	8.37	6.35	7.49	6.47	7.21	5.96	7.48
40	Phaeopigment	mg /m3	3.10	4.83	2.65	3.89	2.14	3.01	3.86	4.27	2.93	3.58	3.78	4.52

41	Total Biomass	ml /100 m3	1.91	2.56	2.13	2.96	2.47	2.80	2.08	2.32	1.85	2.03	1.63	2.17
PHYTOPLANKTON														
42	Bacteriastrum hyalinum	nos/ml	10	15	16	18	14	10	11	15	12	19	9	11
43	Bacteriastrum varians	nos/ml	13	10	10	7	9	13	13	7	16	14	11	13
44	Chaetoceros didymus	nos/ml	7	9	5	11	7	15	15	18	7	12	12	15
45	Chaetoceros decipiens	nos/ml	18	14	13	10	15	17	12	20	11	16	16	18
46	Biddulphia mobilensis	nos/ml	9	13	11	15	13	18	10	15	13	10	14	16
47	Ditylum brightwellii	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
48	Gyrosigma sp	nos/ml	20	22	17	13	12	10	8	6	Nil	Nil	10	12
49	Cladophyxys sps	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
50	Coscinodiscus centralis	nos/ml	11	17	9	12	7	9	16	12	10	8	9	10
51	Coscinodiscus granii	nos/ml	11	19	14	18	16	12	9	14	14	16	6	8
52	Cylcotella sps	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
53	Hemidiscus hardmanianus	nos/ml	20	16	12	9	19	16	21	18	18	20	15	17
54	Laudaria annulata	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
55	Pyropacus horologicum	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
56	Pleurosigma angulatum	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
57	Leptocylindrus danicus	nos/ml	11	7	15	14	10	17	13	15	17	19	14	9
58	Guinardia flaccida	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
59	Rhizosolenia alata	nos/ml	11	18	15	21	18	24	21	25	14	21	10	13
60	Rhizosolenia impricata	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
61	Rhizosolenia semispina	nos/ml	21	25	20	23	17	20	19	23	18	24	21	25
62	Thalassionema nitzschioides	nos/ml	17	21	8	16	11	18	7	12	11	16	18	19
63	Triceratium reticulatum	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
64	Ceratium trichoceros	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
65	Ceratium furca	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
66	Ceratium macroceros	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
67	Ceracium longipes	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
ZOOPLANKTONS														
68	Acrocalanus gracilis	nos/ml	11	14	13	17	10	14	7	16	15	12	13	15
69	Acrocalanus sp	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
70	Paracalanus parvus	nos/ml	8	12	10	14	15	18	14	12	13	17	14	12
71	Eutimnus sps	nos/ml	10	8	7	9	11	13	9	14	19	13	17	19
72	Centropages furcatus	nos/ml	19	21	12	16	16	19	6	10	12	10	15	21
73	Corycaeus dana	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
74	Oithona brevicornis	nos/ml	13	15	14	18	8	10	13	11	13	16	10	13
75	Euterpina acutifrons	nos/ml	14	10	9	13	5	7	15	9	16	20	11	16
76	Metacalanus aurivillii	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
77	Copepod nauplii	nos/ml	16	18	11	15	13	17	12	15	18	22	12	14
78	Cirripede nauplii	nos/ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
79	Bivalve veliger	nos/ml	20	25	16	18	18	20	10	22	21	18	18	21
80	Gastropod veliger	nos/ml	16	19	8	12	12	15	21	17	11	16	9	13

ANNEXURE - 9 RESULTS OF MARINE SEDIMENT QUALITY DATA

SEA SEDIMENT								
Location		CB - 1						
Month & Year		Unit	Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22
S.No.	Parameters							
1	Total organic matter	%	0.75	0.78	0.85	0.73	0.68	0.64

2	% Sand	%	16	13	12	16	14	17
3	%silt	%	32	34	35	35	33	32
4	%Clay	%	52	53	53	49	53	51
5	Iron (as Fe)	mg/kg	20.4	21.7	25.8	19.4	18.3	17.5
6	Aluminium (as Al)	mg/kg	11264	10012	9476	9948	8964	9428
7	Chromium (as cr)	mg/kg	39	32	39	41	33	43
8	Copper (as cu)	mg/kg	70	58	46	86	79	94
9	Manganese (as Mn)	mg/kg	132	124	115	128	221	160
10	Nickel (as Ni)	mg/kg	14	17	19	20	11.6	19
11	Lead (as Pb)	mg/kg	36	31	22	28	41	21
12	Zinc (as Zn)	mg/kg	252	206	236	324	228	337
13	Mercury(as Hg)	mg/kg	0.37	0.34	0.32	0.31	0.42	0.36
14	Total phosphorus as P	mg/kg	143	156	140	150	130	162
15	Octane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
16	Nonane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
17	Decane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
18	Undecane	mg/kg	0.75	0.78	0.73	0.77	0.69	0.63
19	Dodecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
20	Tridecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
21	Tetradecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
22	Phntadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
23	Hexadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
24	Heptadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
25	Octadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
26	Nonadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
27	Elcosane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
I. Nematoda								
28	Oncholaimussp	nos/m ²	11	8	11	13	16	15
29	Tricomasp	nos/m ²	12	14	17	11	13	10
II. Foraminifera								
30	Ammoniaabeccharli	nos/m ²	17	12	10	19	15	11
31	Quinquilinasp	nos/m ²	24	21	15	14	11	18
32	Discorbinellasp.,	nos/m ²	18	13	19	18	10	9
33	Bolivinaspathulata	nos/m ²	6	10	13	22	21	17
34	Elphidiumsp	nos/m ²	15	11	18	16	14	13
35	Noniondepressula	nos/m ²	20	23	20	12	23	22
III. Molluscs-Bivalvia								
36	Meretrixveligers	nos/m ²	26	27	24	20	17	24
37	Anadoraveligers	nos/m ²	19	15	22	19	24	16
	Total No. of individuals	nos/m ²	168	154	169	164	161	157
	Shanon Weaver Diversity Index		2.24	2.23	2.27	2.28	2.27	2.26

Location		CB - 2						
Month & Year		Unit	Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22
S.No.	Parameters							
1	Total organic matter	%	0.69	0.72	0.80	0.64	0.60	0.71
2	% Sand	%	14	15	11	17	16	18
3	%silt	%	33	31	34	32	34	31
4	%Clay	%	53	54	55	51	50	51

Green Chem Solutions Pvt. Limited.

5	Iron (as Fe)	mg/kg	22.5	23.8	26.2	17.5	17.1	18.6
6	Aluminium (as Al)	mg/kg	10058	8964	9048	9428	9005	10123
7	Chromium (as cr)	mg/kg	42	35	42	43	31	35
8	Copper (as cu)	mg/kg	81	64	55	94	93	78
9	Manganese (as Mn)	mg/kg	137	108	123	160	164	141
10	Nickel (as Ni)	mg/kg	21	20	15	19	14.0	17
11	Lead (as Pb)	mg/kg	33	26	28	21	25	32
12	Zinc (as Zn)	mg/kg	291	242	258	337	272	286
13	Mercury(as Hg)	mg/kg	0.33	0.30	0.37	0.36	0.30	0.38
14	Total phosphorus as P	mg/kg	164	139	135	162	133	175
15	Octane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
16	Nonane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
17	Decane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
18	Undecane	mg/kg	0.64	0.71	0.74	0.70	0.74	0.77
19	Dodecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
20	Tridecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
21	Tetradecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
22	Phntadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
23	Hexadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
24	Heptadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
25	Octadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
26	Nonadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
27	Elcosane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
I. Nematoda								
28	Oncholaimussp	nos/m ²	17	14	9	14	18	13
29	Tricomasp	nos/m ²	9	11	15	8	15	11
I. Foraminifera								
30	Ammoniaebecarii	nos/m ²	13	10	13	15	13	19
31	Quinquinasp	nos/m ²	11	19	12	21	14	15
32	Discorbineilasp.,	nos/m ²	15	17	21	16	19	18
33	Bolivinaspathulata	nos/m ²	10	13	18	18	15	22
34	Elphidiumsp	nos/m ²	18	15	11	19	10	16
35	Noniondepressula	nos/m ²	24	26	22	17	24	12
III. Molluscs-Bivalvia								
36	Meretrixveligers	nos/m ²	21	24	27	21	18	20
37	Anadoraveligers	nos/m ²	23	20	25	23	24	19
	Total No. of individuals	nos/m ²	161	169	173	172	170	165
	Shanon Weaver Diversity Index		2.25	2.26	2.24	2.27	2.27	2.28

Location		BERTH - 3						
Month & Year		Unit	Oct - 21	Nov - 21	Dec - 21	Jan - 22	Feb - 22	Mar - 22
S.No.	Parameters							
1	Total organic matter	%	0.67	0.75	0.83	0.71	0.64	0.73
2	% Sand	%	16	14	12	18	17	16
3	%silt	%	34	35	36	31	32	35
4	%Clay	%	50	51	52	51	51	49

5	Iron (as Fe)	mg/kg	19.8	17.1	20.4	18.6	17.3	19.4
6	Aluminium (as Al)	mg/kg	9895	9017	9217	10123	9724	9948
7	Chromium (as cr)	mg/kg	37	29	33	35	30	41
8	Copper (as cu)	mg/kg	75	70	49	78	86	74
9	Manganese (as Mn)	mg/kg	149	114	102	141	183	129
10	Nickel (as Ni)	mg/kg	15	13	17	15	12.9	20
11	Lead (as Pb)	mg/kg	28	25	20	32	27	28
12	Zinc (as Zn)	mg/kg	350	310	281	286	256	324
13	Mercury(as Hg)	mg/kg	0.29	0.31	0.35	0.38	0.32	0.31
14	Total phosphorus as P	mg/kg	178	134	127	175	135	150
15	Octane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
16	Nonane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
17	Decane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
18	Undecane	mg/kg	0.70	0.65	0.69	0.75	0.79	0.71
19	Dodecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
20	Tridecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
21	Tetradecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
22	Phntadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
23	Hexadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
24	Heptadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
25	Octadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
26	Nonadecane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
27	Elcosane	mg/kg	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)	BDL(DL 0.1)
I. Nematoda								
28	Oncholaimussp	nos/m ²	10	12	15	17	14	15
29	Tricornasp	nos/m ²	16	15	10	12	11	8
II. Foraminifera								
30	Ammoniaebecarii	nos/m ²	14	8	12	11	17	14
31	Quinquilinasp	nos/m ²	20	25	17	18	15	21
32	Discorbinellasp.,	nos/m ²	12	14	18	9	22	16
33	Bolivinaspathulata	nos/m ²	13	16	20	17	18	10
34	Elphidiumsp	nos/m ²	21	18	14	13	12	19
35	Noniondepressula	nos/m ²	17	20	25	22	20	17
III. Molluscs-Bivalvia								
36	Meretrixveligers	nos/m ²	23	19	21	24	19	21
37	Anadoraveligers	nos/m ²	12	15	19	16	23	25
	Total No. of individuals	nos/m ²	158	162	171	159	171	166
	Shanon Weaver Diversity Index		2.27	2.26	2.27	2.26	2.28	2.26



Fig. Distance between Northern Breakwater and Intake of CWDL



Fig. Independent Port Connectivity



Fig. Independent Port Connectivity

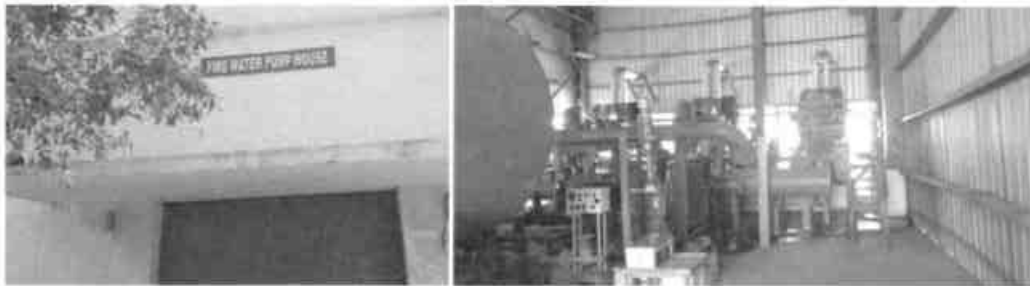


Fig. Fire station & Fire tender



KATTUPALLI PORT
CHENNAI'S NEW GATEWAY

MIDPL/TNPCCB/GMP/HWR-2021/90

Date: 24/06/2021

To,
The District Environmental Engineer,
Tamil Nadu Pollution Control Board,
88A, First Cross Road,
SIPCOT Industrial Complex,
Gummidipoondi - 601201.

Dear Sir,

Sub: Submission of Annual Hazardous Waste Returns (FORM 4) for the period
April 2020 to March 2021- Reg.

With reference to captioned subject, M/s. Marine Infrastructure Developer Private
Limited is submitting the Annual Hazardous Waste Returns in Form 4 for the period
April 2020 to March 2021.

Submitted for your kind records.

Kindly acknowledge us the receipt of the same.

for, M/s. Marine Infrastructure Developer Pvt Ltd


R. Sathish Kumar
Head - Environment



Encl: As above

Marine Infrastructure Developer Pvt Ltd
(Kattupalli Port)
Kattupalli Village, Panneri Taluk,
Tiruvallur District 600 120,
Tamil Nadu, India

Tel: +91 44 2824 3062

CIN: U74999TN2016PTC103769

Registered Office: Ramcon Fortuna Towers, 4th floor No 1/2, Kodambakkam High Road, Nungambakkam, Chennai 600014



FORM 4

[See rules 6(5), 13(8), 16(6) and 20 (2)]

FORM FOR FILING ANNUAL RETURNS[To be submitted to State Pollution Control Board by 30th day of June of every year for the proceeding period April 2020 to March 2021]

1	Name and address of facility:	M/s. Marine Infrastructure Developer Pvt Ltd (MIDPL) Kattupalli Village, Ponneri Taluk, Tiruvallur District - 600120
2	Authorisation No. and Date of issue:	Authorization No. 19HFC2031271B & dated 30.04.2019
3	Name of the authorised person and full address with telephone, fax number and e-mail:	Mr. Jai Khurana Managing Director Marine Infrastructure Developer Pvt Ltd. Kattupalli Village, Ponneri Taluk, Tiruvallur District - 600120. Tel: +91 44 2824 3062. Mail: Jai.Khurana@adani.com
4	Production during the year (product wise), wherever applicable	Not Applicable

Part A. To be filled by hazardous waste generators

1	Total quantity of waste generated category wise	Cargo residue, washing water and sludge containing Oil	Discarded Containers / Barrels	Used / Waste / Spent Oil
	Category	3.1	33.1	5.1
	Quantity	44.42 MT	3.57 MT	5.4 MT
2	Quantity dispatched	-	-	-
	(i) to disposal facility	NIL	NIL	NIL
	(ii) to recycler or co-processors or pre-processor	44.42 MT	3.57 MT	5.4 MT
	(iii) others	NIL	NIL	NIL
3	Quantity utilised in-house, if any -	Cargo residue, washing water and sludge containing Oil: NIL Waste containing oil: NIL Oil contaminated filter element: NIL		
4	Quantity in storage at the end of the year -	Oil Sludge: NIL Waste containing oil: NIL Oil contaminated filter element: NIL		

Part B. To be filled by Treatment, Storage and Disposal Facility operators

1	Total quantity received -	Not Applicable
2	Quantity in stock at the beginning of the year -	
3	Quantity treated -	
4	Quantity disposed in landfills as such and after treatment -	
5	Quantity incinerated (if applicable) -	
6	Quantity processed other than specified above -	
7	Quantity in storage at the end of the year -	

Part C. To be filled by recyclers or co-processors or other users

1	Quantity of waste received during the year - (i) domestic sources (ii) imported (if applicable)	Not Applicable
2	Quantity in stock at the beginning of the year -	
3	Quantity recycled or co-processed or used -	
4	Quantity of products dispatched (wherever applicable) -	
5	Quantity of waste generated -	
6	Quantity of waste disposed -	
7	Quantity re-exported (wherever applicable)-	
8	Quantity in storage at the end of the year -	

Date: 24.06.2021
Place: Chennai


 Signature of the Occupier
 



Fig. Continuous Ambient Air Quality Monitoring Station

Compliance to Tamil Nadu Coastal Zone Management Authority (TNCZMA)
Conditions vide letter no. 6064/EC.3/2014-1 dated 26.06.2014

S. No	Conditions	Compliance status
i	The unit shall compliance with all the conditions stipulated in Environment Clearance issued in No. 10-130/2007-IA-III, Ministry of Environment & Forest, Government of India, dated 3rd July 2009	<p>Refer below.</p> <p>The PA informed that all the stipulations made by the Ministry of Environment & Forest, Government of India, vide letter No. Environment Clearance issued in No. 10-130/2007-IA-III dated 3rd July 2009 are being implemented.</p>
ii	The proposed activities should not cause coastal erosion and alter the beach configuration. The shoreline changes shall be monitored continuously	<p>Complied.</p> <p>The Project Authority has engaged Institute of Ocean Management, Anna University, Chennai for shoreline Change study and the report is under preparation for the year 2021. However, PA has submitted the report for the year 2020.</p> <p>Cover page of the Report is attached as Annexure – 10.</p>
iii	Chemical waste generated and the sewage generated, if any should not be discharged in to the sea and shall be properly handled	<p>Complied.</p> <p>The Project Authority has developed 45 KLD STPs and 50 KLD ETP. Domestic wastewater generated is being treated in STP's. Process Effluent generated is treated in ETP. The entire treated water is being reused for Horticulture / green belt purpose.</p> <p>STP & ETP photo is at Annexure – 2.</p>
iv	The waste water generated shall be collected, treated and reused properly	<p>Complied.</p> <p>The Project Authority has developed 45 KLD STPs and 50 KLD ETP. Domestic wastewater generated is being treated in STP's. Process Effluent generated is treated in ETP. The entire treated water is being reused for Horticulture / green belt purpose.</p> <p>STP & ETP photo is at Annexure – 2.</p>

C. Prasad

v	The proponent shall implement oil spill mitigation measures without fail	<p>Complied.</p> <p>All necessary precaution has been taken to avoid any kind of spillages. Oil Spill Contingency Plan has been prepared and is being followed. MIDPL is having adequate oil spill equipments.</p> <p>Photo is at Annexure – 4.</p>
vi	Disaster management plan shall be implemented and mock drills shall be carried out properly and periodically.	<p>Complied.</p> <p>MIDPL has already formulated detailed Disaster Preparedness & Management Plan to handle any Natural and industrial hazards at site.</p> <p>Regular Mock Drills are conducted as per the Crisis Management Plan. The details of drills conducted towards dock safety for the period Apr-2020 to Sep-2020 is enclosed as Annexure- 19.</p>

This has the approval of the Competent Authority vide diary No..... dated.....

259 31.05.2022

C. Palpandi
 (Dr. C. Palpandi)
 Scientist 'D'

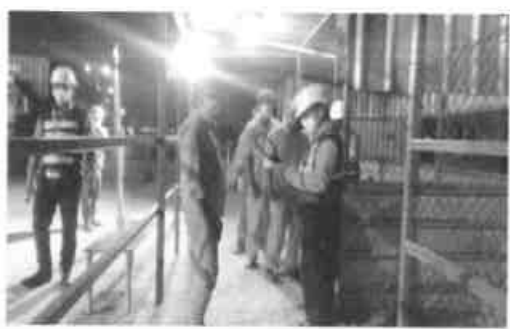
Dr. C. Palpandi,
 Scientist "D"
 Government of India
 Min. of Environment Forest and Climate Change
 Integrated Regional Office
 1st Floor, Additional Office Block for GPOA,
 Shastri Bhawan, Haddows Road
 Nungambakkam, Chennai - 600 006.

Annexure 19

Marine Infrastructure Developer Pvt. Ltd, Kattupalli Port. Mock Drills – Oct'21 to Mar'22				
S. No	Date	Time	Scenario	Participants
1	09.10.2021	16:30 Hrs	Smuggling Of Weapons and Other Equipment's by Hiding inside The Cargo Vehicle	12
2	10.10.2021	04:30 Hrs	Failure of total power supply at night.	12
3	06.11.2021	16:10 Hrs	An empty car lying parked dg room for last 03 days	17
4	17.12.2021	17:10 Hrs	Attempt To Forcible Entry Carrying Weapons.	12
5	19.12.2021	12:30 Hrs	Scuffle Between Workers Inside	17
6	22.12.2021	23:30 Hrs	Attempt to Hijack the Cargo	10
7	25.12.2021	16:30 Hrs	Scuffle Between Cargo Vehicle	16
8	04.01.2022	15:30 Hrs	Attempt to intrusion through boundary wall.	16
9	08.01.2022	15:30 Hrs	An empty truck made force entry and disappeared inside port premises.	16
10	24.02.2022	16:25 Hrs	Perimeter fencing forced breached.	20
11	24.02.2022	21:45 Hrs	Entry on other EP through access control lane.	15
12	25.03.2022	16:30 Hrs	Thread to Explode Hijacked Vessel in Port.	10

Mock Drills – Oct'21 to Mar'22
(Photos)





Marine Infrastructure Developer Pvt. Ltd (MIDPL)

Mock Drills - Oct 2021 to March 2022

S.No.	Date	Time	Scenario	Participants
1	16.10.2021	15:52 Hrs	Minor Fire at Backside of the CFS	23
2	08.12.2021	11:12 Hrs	Man Down near ALL warehouse (MIDPL)	8
3	12.03.2022	12.00 Hrs	Short Circuit in LT Substation	12







Fig. Paper advertisements

adani

Ports and
LogisticsKATTUPALLI PORT
CHENNAI'S NEW GATEWAY

MIDPL/TNPCB/2021-22/119

Date: 23/09/2021

To,
The Member Secretary,
Tamil Nadu Pollution Control Board,
76, Mount Salai,
Guindy,
Chennai - 600 032

MS

ET082426163DH ITR:6984082426163
SP ANNA ROAD H.O (600002)
Counter No:18,23/09/2021,13:08
To:MEMBER SECRET, TN POLLUTION CONT
PIN:600032, Guindy Industrial Estate S.O
From:R SATHISHKU, SR MANAGER EHWIR
Wt:140gms
Amt:29.50(Cash)Tax:4.50
<Track on www.indiapost.gov.in>
<Dial 18002666888> <Wear Masks, Stay Safe>

Dear Sir,

Sub: Submission of Environmental Statement (Form V) for the financial year ending 31st March, 2021 of Marine Infrastructure Developer Private Limited, Kattupalli Port, Chennai

Ref: 1. Consent Order No. 2105136876761 under Water Act dated 13.09.2021
2. Consent Order No. 2105236876761 under Air Act dated 13.09.2021

With reference to the captioned subject and cited references above, we submit herewith the Environmental Statement of **M/s Marine Infrastructure Developer Private Limited**, in Form-V prescribed under Rule 14 of the Environment (Protection) Rules 1986 for the financial year ending 31st March 2021.

Submitted for your kind information and records.

Thanking you,

JCEE

For, **M/s. Marine Infrastructure Developer Private Limited**

ET082426150IH ITR:6984082426150
SP ANNA ROAD H.O (600002)
Counter No:18,23/09/2021,13:08
To:JOINT CHIEF E, TN POLLUTION CONT
PIN:600106, Arumbakkam S.O
From:R SATHISHKU, SR MANAGER EHWIR
Wt:140gms
Amt:29.50(Cash)Tax:4.50
<Track on www.indiapost.gov.in>

Jai Singh Khurana
23/9/21
Jai Singh Khurana
Managing Director

Encl: As above

DEE

Copy To:

ET082426163DH ITR:6984082426163
SP ANNA ROAD H.O (600002)
Counter No:18,23/09/2021,13:08
To:DEE ENVIRONMENT, TN POLLUTION CONT
PIN:601201, Gummidipoondi S.O
From:R SATHISHKU, SR MANAGER EHWIR
Wt:140gms
Amt:41.30(Cash)Tax:6.30
<Track on www.indiapost.gov.in>
<Dial 18002666888> <Wear Masks, Stay Safe>

- 1) The Joint Chief Environmental Engineer, Tamilnadu Pollution Control Board, First Floor, 950/1, Poonamallee High Road, Arumbakkam, Chennai-600 106
- 2) The District Environmental Engineer, Tamil Nadu Pollution Control Board, Gummidipoondi - 601201.



Marine Infrastructure Developer Pvt Ltd
(Kattupalli Port)
Kattupalli Village, Ponneri Taluk,
Tiruvalluvar District 600 120,
Tamil Nadu, India

Tel +91 44 2824 3062

CIN: U74999TN2016PTC103769

Vijayasankar K

From: Sathish Kumar R
Sent: Thursday, September 23, 2021 1:02 PM
To: ecompliance-tn@gov.in
Cc: Jai Khurana; Milind Sangtiani; Vijayasankar K; Subramanian A
Subject: Submission of Environmental Statement (Form V) for the financial year ending 31st March, 2021 of Marine Infrastructure Developer Private Limited, Kattupalli Port, Chennai
Attachments: MIDPL Form V 2020-21 23.09.2021.pdf
Importance: High

Dear Sir / Madam,

With reference to the captioned subject, we submit herewith the Environmental Statement of M/s Marine Infrastructure Developer Private Limited, in Form-V prescribed under Rule 14 of the Environment (Protection) Rules 1986 for the financial year ending 31st March 2021.

Submitted for your kind information and records.

Thanks and Regards

R. Sathish Kumar

Head - Environment (Southern Ports) | Adani Ports and Special Economic Zone Limited |
Mob +91 91760 00959 | Direct: +91 44 2796 8177 | Extn. 69177 |
sathish.r@adani.com | www.adaniports.com |

adani

Growth
with
Goodness

Our Values: Courage | Trust | Commitment



Form-V

(See rule 14 of Environment (Protection) Rules, 1986)

Environmental Statement for the financial year ending 31st March 2021

PART - A

i) Name and Address of the owner/occupier of the industry operation or process	: Mr. Jai Singh Khurana Managing Director Marine Infrastructure Developer Private Limited Kattupalli Port, Kattupalli Village, Ponneri Taluk, Thiruvallur District - 600 120 Tamil Nadu, India
ii) Industry Category	: Primary : Red Secondary : 1065- Ports & Harbour, Jetties and Dredging Operations.
iii) Production Capacity	: Cargo Handling Capacity : 24.65 MMTPA <ul style="list-style-type: none">• Containers - 21.60 MTPA• Ro-Ro (automobiles) - 0.22 MTPA• Project cargo - 0.44 MTPA• Breakbulk / General Cargo (Barytes/ Gypsum/ Limestone/ Granite/ Steel Cargo) - 1.82 MTPA• Edible oil, CBFS, Base Oil, Lube Oil and Non-Hazardous Liquid Cargo - 0.57 MMTPA.
iv) Year of establishment	: 2009, with the issue of Environmental Clearance to L&T Ship Building. Bifurcation of Environmental Clearance of L&T Ship Building to Marine Infrastructure Developer Private Limited on 09 th February 2018.
v) Date of the last environmental statement submitted	: Vide our Letter No. MIDPL/TNPCB/2020-21/32 dated 21.09.2020.



PART - B

WATER AND RAW MATERIAL CONSUMPTION

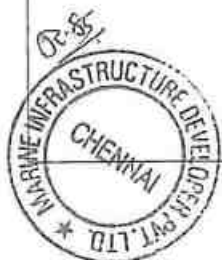
(i) Water Consumption

S. No	Water Consumption (m ³ / Day)	During the previous Financial year (2019-2020)	During the Current Financial year (2020-2021)
1.	Process	NIL	NIL
2.	Cooling	NIL	NIL
3.	Domestic	138.25	124.66

(ii) Raw Material Consumption

S. No	Name of the Raw Material	Name of the Product	Consumption during the financial year 2019-20.	Consumption during the financial year 2020-21.
1	Not Applicable	Not Applicable	NIL	NIL

The unit does not undergo any manufacturing process. The water consumed is mainly for Firefighting, dust suppression on roads, Greenbelt development and maintenance, etc.



PART - C

POLLUTION DISCHARGE TO ENVIRONMENT/ UNIT OF OUTPUT
(Parameters as specified in the consent issued)

Pollutants	Quality of Pollutants Discharged (Mass/day)	Concentration of Pollutants discharges (mass/volume)	Percentage of variation from prescribed standards with reasons			
a) Water	STP Treated Water Characteristics: -					
	Parameter	Consent Limit	Actual			% Variation with prescribed standard
			30 KLD	10 KLD	5 KLD	
	pH	5.5-9	7.32	7.21	7.57	-Nil-
	Total Suspended Solids (mg/l)	30	18.54	8.0	17.18	-Nil-
BOD (3 days at 27°C) (mg/l)	20	15.27	3.0	13.68	-Nil-	
b) Air	DG sets are provided as standby power source and are used during power failure only. The Height of DG stacks as per CPCB/TNPCB Standards. All the monitored parameters are well within the prescribed standards.					
Particulate Matter (mg/Nm ³)	DG stack emission report is enclosed as Annexure 1 .					
Sulphur Dioxide (ppm)						
Nitrogen Oxide (ppm)						



PART-D

HAZARDOUS WASTES

(As specified under Hazardous Waste Management and Handling Rules 1989)

Hazardous Wastes	Total Quantity (Kg)	
	During the previous financial Year (2019-20)	During the current financial Year (2020-21)
(a) From Process	<ul style="list-style-type: none">• Cargo residue, washing water and sludge containing oil (3.1) - 50.310 T	<ul style="list-style-type: none">• Cargo residue, washing water and sludge containing Oil (3.1)- 44.42 MT• Discarded Containers/ Barrels (33.1)- 3.57 MT• Used/Waste/ Spent Oil (5.1)- 5.4 MT
(b) From Pollution control facilities	NA	NA

PART-E

SOLID WASTES

TOTAL QUANTITY GENERATED			
Solid Waste		During the previous Financial Year (2019-20)	During the current Financial Year (2020-21)
a)	From process	NIL	NIL
b)	From pollution control facilities- STP	192 kgs	168 kgs
c)	1. Quantity recycled or reutilized within the Unit	192 kgs	168 kgs
	2. Sold	NIL	NIL
	3. Disposed	NIL	NIL



PART-F

Please specify the characterization (in terms of composition and quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes.

- **"Zero Waste to Landfill" Initiative** - No waste is being sent to landfill or incineration facility. MIDPL is having Integrated Waste Management System (IWMS) to proper segregate & recover the materials and are handled as per 5R (Reuse, Recycle, Recover and Reprocess) principle.
- MIDPL has awarded with Zero Waste to Landfill Management System (ZWTL MS 2020) from TÜV Rheinland India Pvt. Ltd (Annexure – 2).
- Hazardous waste includes Cargo residue, washing water and sludge containing oil, Discarded Containers/ Barrels and Used/Waste/ Spent Oil. All the hazardous wastes are collected and stored properly in Integrated Waste Management Shed & are being disposed to TNPCB authorized /registered recyclers in line with the Hazardous and Other Waste (Management & Transboundary Movement) Rules, 2016 (As amended).
- The used batteries and E-waste are stored in Integrated Waste Management Shed and disposed through TNPCB approved vendors as per the E-waste Management Rules 2016 (as amended).
- Hazardous Waste Annual returns in Form 4 was submitted in line with the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
- 100% utilization of STP sludge for greenbelt maintenance as manure.
- MIDPL certified as "Single Use Plastic (SUP) Free" site from CII –ITC Centre of Excellence for Sustainable Development (Annexure – 3)
- **Plastic free Drive:**
 - MIDPL has displayed stickers at various places at the facility, spreading awareness as plastic are prohibited now.



- Awareness sessions organized among department and contract workers. Made shop keepers and canteen owners to stop providing plastic carry bags to carry the material.
- Confirms to stop usage of plastic cups to serve tea and water pouches within the premises of MIDPL.
- Regular supervision by Team Members at Port Canteens for verification of prohibition of plastic.

PART-G

Impact on pollution control measures on conservation of natural resources and consequently on the cost of production

- Solar panels of 450 kW were installed at MIDPL and the power generated from solar panel ranges between 55,000-65,000 units per months. MIDPL has invested nearly Rs.2 Crs. for developing this solar plant there by achieved reduction of conventional energy and contributed for resource conservation.
- 15 RTGs retrofitted into Electrical power-driven system at the project cost of Rs.44 Crs. Key Cost benefits includes reduction in diesel consumption and emission level.
- Sewage Treatment Plants (30 KLD,10 KLD and 5 KLD STPs) are in continuous operation and the treated effluent water quality is meeting the TNPCB norms. STP treated water is used for Gardening purpose, thereby reducing freshwater consumption. The total cost spent on STP operation and maintenance during the year 2020-21 is Rs. 11.62 Lakhs.
- Biogas facility was setup at MIDPL to convert the kitchen waste to useful heat energy. The biogas unit generates output of 3kg / day. The plant capacity is 6 cubic meter / day.
- Unit is undertaking Regular Environmental Monitoring in port through NABL accredited laboratory. We have also installed and operating Continuous Ambient Air Quality Monitoring Station (SO₂, NO_x, CO, PM₁₀ & 2.5, BTX analyser to monitor VOC) and Meteorological Station (Wind Speed, Wind Direction, Ambient Temperature, Atmospheric Pressure, Relative Humidity, Rainfall and Solar Radiation). Real time data of CAAQMS is connected to TNPCB server. All the monitored environmental parameters are well within the prescribed standards and the details of monitored data



is regularly being submitting to TNPCB, CPCB, MoEF&CC and other concerned authorities.

- All the domestic effluent generated at port is treated at existing Sewage Treatment Plants (30 KLD, 10 KLD and 5 KLD) and the entire treated sewage water is being reused within port premises for gardening.
- Motion sensor and timers installed at buildings to reduce energy consumption.
- Installed and operating Vehicle Pollution Under Control (PUC) checking facility to control vehicular emission in port premises.
- RTG Container Stacking monitoring system implemented and achieved energy saving up to 18000 Units per year amounting to Rs. 1.35 L/Year.
- Air conditioners fitted with energy saving device "Eco Plug"
- Streetlight and High mast lighting controlled by light intensity sensor.
- 12,320 trees & 9,600 Shrubs planted as part of Greenbelt development program in the year 2020-21. Drip Line and Sprinkler Irrigation System is provided at MIDPL during the year 2020-21.

PART-H

Additional investment proposal for Environment protection including abatement of pollution, prevention of pollution

<u>Regular Expenditure (cost in INR lakhs/year)</u>		
S. No	Description	Cost
1	Comprehensive Environmental Monitoring	4.93
2	AAQ/NL/SM Survey & STP Treated Water Quality Analysis	0.48
3	Environment Studies	52.86
4	Training & Awareness program	0.20
5	Integrated Waste Management & Pollution Under Check Facility	1.85
6	O&M of STP's	11.62
7	Housekeeping	77.8
8	Greenbelt Maintenance	79.47
	Total	229.2

7 | Page



PART-I

ANY OTHER PARTICULARS IN RESPECT TO ENVIRONMENT

- Working towards achieving "Zero Waste Inventory" as per our Group Environment Policy and all wastes are being handled in line with 5R Principle.
- Paperless Operation is in place (Except for Statutory requirements) using application tools and Software – Terminal Info Gateway (TIG).
- Energy Conservation Committee to measure the amount of energy consumed and to actions to reduce the energy consumed through port operations.
- Water Warriors Committee to identify and reduce the water consumption. The committee would propose innovative water solutions
- Integrated Management System (ISO 9001:2015, 14001:2015 and 45001:2018) certified Port.
- Working towards Implementation and obtaining "5S" Certification at MIDPL
- Working towards Implementing Energy Management System ISO 50001:2018
- Environmental benchmarking has been performed for GHG Emission with global ports.

Date: 23.09.2021

(Signature of a person carrying out an industry operation or process)

Name : **Jai Singh Khurana**

Designation: **Managing Director**

Address : Marine Infrastructure Developer Pvt Ltd (MIDPL)
Kattupalli Village, Ponneri Taluk,
Thiruvallur District – 600 120
Tamil Nadu, India.



Location		MIDPL- STACK MONITORING (MAY'2020 TO MARCH'2021)												Avg
Month & Year		DG 2000KVA - 1												
S. No.	Parameters	April'2020	May'2020	June'2020	July'2020	Aug'2020	Sep'2020	Oct'2020	Nov'2020	Dec'2020	Jan'2021	Feb'2021	March'2021	
1	Stack Temperature, °C		255	267	260	274	262	268	261	249	256	242	269	260.27
2	Flue Gas Velocity, m/s		24.98	25.44	24.25	25.37	26.01	26.94	25.68	26.92	27.42	25.96	24.12	25.74
3	Sulphur Dioxide, mg/Nm ³	The sampling was not taken Due to Covid 19 lockdown	6.2	6.7	7.2	8.4	8.9	9.4	9	7.8	8.3	7.5	9.3	8.06
4	NOX (as NO ₂) in ppmv		201	219	227	236	228	235	227	217	234	221	236	225.55
5	Particulate Matter, mg/Nm ³		32.1	34.5	32.8	34.1	36.8	34.1	36.1	38.4	35.1	32.9	34.2	34.65
6	Carbon Monoxide, mg/Nm ³		75	86	90	95	87	92	94	87	89	80	91	87.82
7	Gas Discharge, Nm ³ /hr		6337	6311	6127	6213	6512	6670	6442	6908	6943	6753	5961	6470.64
Location		MIDPL- STACK MONITORING (May'2020 to March'2021)												Avg
Month & Year		DG 2000KVA - 2												
S. No.	Parameters	April'2020	May'2020	June'2020	July'2020	Sep'2020	Oct'2020	Nov'2020	Dec'2020	Jan'2021	Feb'2021	March'2021		
1	Stack Temperature, °C		251	261	249		264	257	252	239	220	261	250.90	
2	Flue Gas Velocity, m/s		25.12	23.98	24.98		26.27	26.09	26.92	27.51	24.43	23.75	25.46	
3	Sulphur Dioxide, mg/Nm ³	The sampling was not taken Due to Covid 19 lockdown	6.5	5.9	6.8		8.6	8	8.5	8	7.1	8.8	7.59	
4	NOX (as NO ₂) in ppmv		209	214	218		232	221	223	218	210	234	219.40	
5	Particulate Matter, mg/Nm ³		30.9	33.1	31.7		33.4	33.2	36.2	32.4	31.9	32.9	33.16	
6	Carbon Monoxide, mg/Nm ³		81	83	96		83	93	91	78	75	88	85.80	
7	Gas Discharge, Nm ³ /hr		6420	6015	6445		6478	6553	6925	7197	6638	5957	6522.20	
Location		MIDPL- STACK MONITORING (Aug'20, Oct'20 to March'2021)												Avg
Month & Year		DG 125 KVA												
S. No.	Parameters	Aug'2020	Oct'2020	Nov'2020	Dec'2020	Jan'2021	Feb'2021	March'2021						
1	Stack Temperature, °C	420	146	140	130	124	117	124	171.57					
2	Flue Gas Velocity, m/s	9.87	9.98	10.17	11.02	11.98	11.08	12.41	10.93					
3	Sulphur Dioxide, mg/Nm ³		4.7	4.5	4.1	4.3	4	4.9	4.42					
4	NOX (as NO ₂) in ppmv		85	78	70	66	54	62	69.17					
5	Particulate Matter, mg/Nm ³		15.8	16.7	14.3	15.7	16.8	18.1	16.23					
6	Carbon Monoxide, mg/Nm ³	<0.2	21	25	19	22	19	23	21.50					
7	Gas Discharge, Nm ³ /hr	443	449	463	515	569	535	592	509.43					



Certificate

Standard: Zero Waste to Landfill Management System
(ZWTL MS 2020)

Certificate Holder: Marine Infrastructure Developer Private Limited
Kattupalli Port, Tiruvallur - 600120
Tamil Nadu, India

Scope: Providing Port Facilities for Handling and Storage
of Bulk Cargo, Containerized Cargo and Liquid
Terminal Operations

Proof has been furnished by means of an audit that the
Requirements of ZWTL MS 2020 are met, with the
achievement of waste diversion rate of above 99%

Validity: This certificate is valid from 01-06-2021 until 31-05-2024
Subject to satisfactory annual surveillance audits.

Certificate No. TUV/ZWLMS/2021/Adani Ports/0502

A handwritten signature in black ink, appearing to be 'G. Srinivas'.

New Delhi, 01-06-2021

TÜV Rheinland India Pvt. Ltd.
Office 610, 6th Floor, iThum
Tower, A-40, Sector-62,
Noida- 201301, India



CII-ITC Centre of Excellence
for Sustainable Development



Confederation of Indian Industry

Certificate

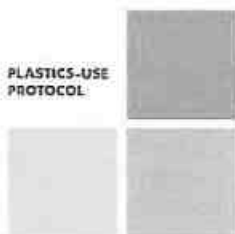
Single-use Plastic Free

Marine Infrastructure Developer Private Limited

Kattupalli Village, Ponneri Taluk, Tiruvallur District, Tamil Nadu 600 120. India.

This is to certify that Marine Infrastructure Developer Private Limited at the location mentioned above is Single-use Plastic Free as verified by the Confederation of Indian Industry for the period 01 April 2020 to 31 March 2021 under the provisions of the **Plastics-use Protocol: Verification and Certification (1.0)**.

PLASTICS-USE
PROTOCOL



Ms Seema Arora

Deputy Director General

Confederation of Indian Industry (CII)

Centre of Excellence for Sustainable Development (CESD)

Certificate Date: 6 May 2021

Certificate No: CII/PuP/2021/011

This certificate has been awarded after the company fulfilled the requirements for phasing-out single-use plastics and providing evidence for it. Responsibility for the data provided to CII rests solely with the company. The conditions of certification are detailed in the Annex.



Annex

The certification applies to the following single-use plastic items identified and phased out by Marine Infrastructure Developer Private Limited:

- Cutlery (knives, forks, spoons, chopsticks)
- Crockery (plates, glasses, cups) and plastic food containers
- Straws
- Stirrers
- Carry bags
- Items of decoration (polystyrene)
- Garbage bags
- Sheets for food wrapping and spreading on dining tables
- Plastic coated teacups and tumblers
- Water pouches
- Flags
- Gloves

This certification is based on the verification of data set for the period from 1 April 2020 to 31 March 2021.

Organizational Boundary: Marine Infrastructure Developer Private Limited

Operational Boundary: Administrative, canteen, kitchen and operational areas

Material Boundary: Single-use Plastics

Reference

Verification date: 8 April 2021

Verification Report No: PuP/Verification/2021/AdaniPort/003

Mode: On account of the COVID-19 pandemic, the verification process was virtual and followed provisions outlined in the Verification Procedure 1.0 of the Protocol

APPENDIX C
SURVEYS NUMBERS PERTAINING TO
REVISED MASTER PLAN

Kattupalli RMP Survey Number List

Ebrahamapuram:

68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92

Kattur:

915, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952

Voyalur:

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APPENDIX D
TOR LETTER FOR THE RMP
DEVELOPMENT OF KATTUPALLI PORT

F.No. 10-7/2019-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA.III Section)

Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi - 3

Date: 15th October, 2019

To,

M/s Marine Infrastructure Developer Private Limited (MIDPL)
4th Floor, Ramcons Fortuna towers, No.1/2,
Kodambakkam High Road, Nungambakkam,
Chennai, Tamil Nadu
E- Mail- environment.kattupal@adani.com

Subject: Proposed Revised Master Plan development of Kattupalli Port by Marine Infrastructure Developer Private Limited (MIDPL) at Kattupalli, Ponneri Taluka, Tiruvallur District, Tamil Nadu by M/s Marine Infrastructure Developer Private Limited (MIDPL) - Terms of Reference reg.

Sir,

This has reference to your proposal No. IA/TN/MIS/85584/2018 dated 15th November, 2018, submitting the above proposal to this Ministry for seeking Terms of Reference (ToR) in terms of the provisions of the Environment Impact Assessment (EIA) Notification, 2006 under the Environment (Protection) Act, 1986.

2. The proposal for grant of Terms of Reference (ToR) to the project 'Proposed Revised Master Plan development of Kattupalli Port by Marine Infrastructure Developer Private Limited (MIDPL) at Kattupalli, Ponneri Taluka, Tiruvallur District, Tamil Nadu by M/s Marine Infrastructure Developer Private Limited (MIDPL) was considered by the Expert Appraisal Committee (Infra-2) in its 38th meeting held during 6-8 February, 2019, 39th meeting held during 26-28 March, 2019 and 42nd meeting held on 10-12 July, 2019.

3. The details of the project, as per the documents submitted by the project proponent, and also as informed during the above said meeting, are under:-

- (i) Marine Infrastructure Developer Private Limited (MIDPL) is a company incorporated under the provisions of Companies Act, 2013. Expert Appraisal Committee (Infra-2) during its 23rd meeting dated 13th October, 2017 recommended the bifurcation proposal on the mutually acceptable division of responsibilities between L&T Shipbuilding Limited (LTSB) and MIDPL and granted the bifurcation of EC&CRZ vide letter F.No.10-130/2007-IA.III dated 9th February, 2018.
- (ii) For Port development total five berths are approved, out of which two berths are constructed and operational since 30th January, 2013 and third berth is under construction.
- (iii) Considering the future business potential MIDPL is now proposing its Revised Master Plan development of Kattupalli port.
- (iv) Development of 5 Berths with total quay length of ~1900m and 2 Port Craft Berths are approved as a part of existing Clearance, out of which 2 berths are already developed and operational and 3rd berth is in construction phase. Remaining berths are under planning stage, however all existing and approved berths are forming part of revised master Plan development. As part of Revised Master Plan development, additional Quay length of ~9567m berth length, quay length of 1250m Barge berths and ~12 Port Craft facilities are proposed (including existing approved 2 port craft). Total quay length of berth proposed as a part of revised master plan development will be ~11467m in addition to 1250m long barge berths and 2 no SPM's are being

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- proposed. Port Craft facilities will be executed progressively with the berth execution and location of port craft to be finalized adjacent to the berth for smoother operation. Type of berth and type of cargo is commercial and business requirement. Hence revised master plan is proposed with flexibilities to accommodate all berths (existing as well as proposed) as Multipurpose
- (v) Along with berths, transloading facilities, SPM's, backup facilities and independent port craft facilities, waste reception facilities, conveyor systems, drainage, water supply, electrical works, internal roads, railway works and other utilities, amenities and bunkering will be developed to accommodate all multipurpose cargo such as Liquid, Bulk, Break Bulk, Project Cargo, dry cargo, General Cargo, Container, Ro-Ro, Automobile and any other non-hazardous cargoes & Liquid /Gas/ cryogenic cargo (Cryogenic Gases (Up to -162 degree Celsius, Pressurized Gases). Depending on the business requirements, LNG will also be handled through FSRU and LPG will be handed through FSO, in addition to land based terminal as part of Revised Master Plan development.
 - (vi) In addition to these, as per the business requirement, it is proposed to develop Port backup Industries and Industrial development area and its associated infrastructure.
 - (vii) Apart from existing Breakwater, two new Breakwater of about total 12.10 km length is proposed, out of which new Northern Breakwaters will be about 9.02 & 1.22 km and new Southern Breakwater will be about 1.86 km.
 - (viii) It is estimated that ~ 85 Mm³ of dredged material will be generated. Entire dredged material will be used for reclamation. Additional material for reclamation will be borrowed from identified borrow area (onshore/offshore). Total proposed quantity for Reclamation including land filling and level raising (ground improvement) is estimated about 138 Mm³ which will be used for reclaiming 1145 Ha area.
 - (ix) Maintenance dredging quantity is estimated as 1.25 - 2.0 Mm³/annum. The maintenance dredging material will be disposed at the offshore disposal ground to be identified through hydro dynamic modelling study.
 - (x) Total cargo handling capacity will be approximately 320 MMTPA. Average dredge depth at berths will be (-) 20.5m CD to (-) 25m CD.
 - (xi) For easy evacuation of cargo, a new rail, road and utility corridor is also proposed within existing Port boundary. However, feasibility of alignment of proposed corridor will be checked during detailed study. This rail line will connect Kattupalli port with nearby southern rail link at Ennore Rail-yard and proposed Northern Rail Link at L&T Spur location. However, in parallel to this Revised Master Plan development to cater immediate cargo evacuation requirement, connecting to southern rail link is being taken up and separate CRZ clearances are in progress.
 - (xii) Revised Master Plan development of Kattupalli Port will be carried out in total area of 2472.85 ha which includes 133.50 ha of existing area, 761.8 Ha of govt. land, 781.4 ha of Private and proposed sea reclamation of 796.15 ha. Present land use is Sea, intertidal area, sandy area/beach, abandon salt pans, land with/without scrub and sparse vegetation (*Prosopis juliflora*/Casuarina/Eucalyptus). Apart from port backup area, external road, rail and utility corridor is proposed in an area of around 30 ha to provide connectivity.
 - (xiii) Estimated water requirement for the construction phase is 0.8 MLD and same shall be met through the bowsers and existing water supply system. Water will be sourced from existing source for construction phase. 30 MLD capacity desalination plant will be constructed in modular manner for operation of Revised the Master Plan. The source of water for this desalination plant is Sea Water. Process water for Cryogenic facilities will be taken from sea and discharged back in to the sea. Estimated quantity of process water is approximately 120,000 cu.m/hr for Revised Master Plan. Best suitable location of intake and outfall, for desalination plant and regasification will be finalized after detailed study. Sea water may be utilized for fire-fighting purpose.

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- (xiv) Power required for port expansion during construction phase will be approximately 2 MVA which will be sourced from the existing power source and 125 KVA from DG Sets. Power required for Revised Master Plan operation is estimated as 100 MVA respectively and Tamil Nadu Electricity Board (TNEB). Use of Renewable energy sources like wind and solar will also be explored.
- (xv) Sewage generated will be treated in Sewage Treatment Plant and Effluent Treatment Plant respectively. Modular STP of 240 KLD capacity and Modular ETP of 1500 KLD capacity will also be developed within the port premises for operational requirement. Treated sewage will be used for irrigating greenbelt and treated ETP water will be discharged into sea after attaining discharge standards.
- (xvi) The estimated quantity of MSW generated will be about 0.75 TPD of which 60% will be biodegradable and 40% non-biodegradable during Revised Master Plan. Material Recover Facilities (MRF) facilities to handle solid waste will be developed within the port premises. Municipal wastes generated will be handled as per prevailing norms. The hazardous waste such as used oil, spent oil, Wastes/Residue containing oil, Pig wastes, Oil soaked rags, Cotton waste, discarded containers, barrels & Used Battery and Sludge from ETP will be handled as per Hazardous Waste Management Rules (as amended). Hazardous wastes will be disposed through approved TNPCB/CPCB vendors.
- (xvii) Total capital cost for the proposed development of Revised Master Plan is estimated at Rs. 53,031 Crores.
- (xviii) The project when fully operational also brings in direct employment potential of about 1500 nos. hereby opening up employment opportunities for the youth in the catchment region. Additionally, the induced development due to the Port Expansion can bring indirect employment about 4500 people.

4. The project/activity is covered under category 'A' of item 7 (e) i.e. 'Ports, harbours, break waters, dredging' of the schedule to the EIA Notification, 2006 and its subsequent amendments, and requires appraisal at Central level by sectoral EAC.

5. The EAC noted that during its 39th meeting held during 26-28 March, 2019, it was observed that there are some other representations including earlier again received in the Ministry and to the Committee Chairman and Members also. In view, the committee recommended that a sub-committee consisting of Dr. H. C. Sharatchandra, Dr. V. S. Naidu and Dr. M. V. Ramana Murthy, Member of the EAC (Infra-2) may conduct a site visit and give its report for further deliberation. The sub-committee visited the site on 3rd and 4th June, 2019 and submitted its report suggesting that ToR can be issued to the M/s MIDPL with the following additional studies:

1. Protection of general ecosystem of Kosattalaiyar estuary including mangroves.
2. Three season's data should be collected in the coastal region as well as estuarine region at proposed site. Data should be collected at mouth present in northern end of the project and saltpans present in the western Kosattalaiyar particularly during monsoon along with the other places.
3. The impact of the proposed project on the fragile barrier island of Pulicat Lake and tidal inlets and direct impact on Pulicat Lake should be studied.
4. A comprehensive study, including all existing developments, like, Ennore port, L&T shipyard etc, should be performed. Since berths and breakwaters are planned along the coast, the impact of these constructions on the littoral drift, which causes the sand accretion and deposition in the region, should be studied using a numerical model.
5. Shoreline change Management Plan covering the area from Ennore Creek to Pulicat Lake to be included in EIA report.

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6. Impact of proposed project on Ennore Shoals that were protecting the coast from Cyclone and Tsunami need to be studied in EIA.
7. Detailed study on drainage pattern within and outside the port area including Ennore Creek, Pulicat Lake and Buckingham Canal need to be studied as part of EIA.
8. Oil spill risk assessment and contingency plan to be incorporated as 2 SPMs are planned. Even oil spill risk assessment should be made to the accidental spill at proposed berths and nearby places.
9. Biodiversity of the area, viz, estuary and coastal region, should be studied.
10. Socio-economic study should be carried out in the surrounding villages of the project especially on the use of common property resources/government lands.
11. Baseline air quality should be established. The impact of port activity on the air quality should be assessed using air quality and noise quality modelling.

6. Accordingly, after detailed deliberations on the proposal and sub-committee report, the EAC recommended following additional ToR points in addition to the Terms of Reference as specified by the Ministry as Standard ToR in April, 2015 for the said project/activity for preparation of EIA-EMP report. On the basis of the recommendation of EAC and the submission given by the Project proponent, the Ministry of Environment, Forest and Climate Change hereby accords ToR to the project 'Proposed Revised Master Plan development of Kattupalli Port by Marine Infrastructure Developer Private Limited (MIDPL) at Kattupalli, Ponneri Taluka, Tiruvallur District, Tamil Nadu by M/s Marine Infrastructure Developer Private Limited (MIDPL) for preparation of the Environment Impact Assessment (EIA) Report and Environment Management Plan (EMP) with the following specific and general conditions in addition to Standard ToR provided at **Annexure -1:-**

- (i) Importance and benefits of the project.
- (ii) Submit a copy of layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale.
- (iii) Recommendation of the SCZMA.
- (iv) Submit superimposing of latest CZMP as per CRZ (2011) on the CRZ map.
- (v) Submit a complete set of documents required as per para 4.2 (i) of CRZ Notification, 2011.
- (vi) Submit Certified Compliance Report issued by the MoEF&CC, Regional Office or concerned Regional Office of Central Pollution Control Board or the Member Secretary of the respective State Pollution Control Board for the conditions stipulated in the earlier environmental clearance issued for the project along with an action taken report on issues which have been stated to be partially complied or non/not complied.
- (vii) Measures for protection of general ecosystem of Kosattalaiyar estuary including mangroves.
- (viii) Three season's data should be collected in the coastal region as well as estuarine region at proposed site. Data should be collected at mouth present in northern end of the project and salt pans present in the western Kosattalaiyar particularly during monsoon along with the other places.
- (ix) The impact of the proposed project on the fragile barrier island of Pulicat Lake and tidal inlets and direct impact on Pulicat Lake should be studied.
- (x) A comprehensive study, including all existing developments, like, Ennore port, L&T shipyard etc, should be performed. Since berths and breakwaters are planned along the coast, the impact of these constructions on the littoral drift, which causes the sand accretion and deposition in the region, should be studied using a numerical model.

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- (xi) Shoreline change Management Plan covering the area from Ennore Creek to Pulicat Lake to be included in EIA report.
- (xii) Impact of proposed project on Ennore Shoals that were protecting the coast from Cyclone and Tsunami need to be studied in EIA.
- (xiii) Detailed study on drainage pattern within and outside the port area including Ennore Creek, Pulicat Lake and Buckingham Canal need to be studied as part of EIA.
- (xiv) Oil spill risk assessment and contingency plan to be incorporated as 2 SPMs are planned. Even oil spill risk assessment should be made to the accidental spill at proposed berths and nearby places.
- (xv) Biodiversity of the area, viz, estuary and coastal region, should be studied.
- (xvi) Socio-economic study should be carried out in the surrounding villages of the project especially on the use of common property resources/government lands.
- (xvii) Baseline air quality should be established. The impact of port activity on the air quality should be assessed using air quality and noise quality modeling.
- (xviii) Hydrodynamics study on impact of dredging on flow characteristics.
- (xix) Flooding and related impact on creek and control area during the cyclonic storm should be studied.
- (xx) Ship navigational studies for the entrance channel should be carried out.
- (xxi) The project proponents shall satisfactorily address all the complaints/suggestions that are received against the project till the date of submission of proposals for Appraisal. A report to this effect shall be submitted along with the EC proposal.
- (xxii) The EIA would give a detailed analysis of the Impacts of storage and handling and the management plan of each cargo type along with the proposed compliance to the Hazardous Chemicals Storage rules.
- (xxiii) Study the impact of dredging and dumping on marine ecology and draw up a management plan through the NIO or any other institute specializing in marine ecology.
- (xxiv) Details of Emission, effluents, solid waste and hazardous waste generation and their management in the existing and proposed facilities.
- (xxv) Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract).
- (xxvi) Permission from CGWA in case of groundwater use being proposed for the project.
- (xxvii) Wastewater Management Plan.
- (xxviii) Details of Environmental Monitoring Plan.
- (xxix) To prepare a detailed biodiversity impact assessment report and management plan through the NIO or any other institute of repute on marine, brackish water and fresh water ecology and biodiversity. The report shall study the impact on the rivers, estuary and the sea and include the intertidal biotopes, corals and coral communities, molluscs, sea grasses, sea weeds, subtidal habitats, fishes, other marine and aquatic micro, macro and mega flora and fauna including benthos, plankton, turtles, birds etc. as also the productivity. The data collection and impact assessment shall be as per standard survey methods.
- (xxx) A certificate from the competent authority for discharging treated effluent/ untreated effluents into the Public sewer/ disposal/drainage systems along with the final disposal point.
- (xxxi) A certificate from the local body supplying water, specifying the total annual water availability with the local authority, the quantity of water already committed, the

J. Rose

- quantity of water allotted to the project under consideration and the balance water available. This should be specified separately for ground water and surface water sources, ensuring that there is no impact on other users.
- (xxxii) A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project.
 - (xxxiii) A certificate from the competent authority handling municipal solid wastes, indicating the existing civic capacities of handling and their adequacy to cater to the M.S.W. generated from project.
 - (xxxiv) An assessment of the cumulative impact of all development and increased inhabitation being carried out or proposed to be carried out by the project or other agencies in the core area, shall be made for traffic densities and parking capabilities in a 05 kms radius from the site. A detailed traffic management and a traffic decongestion plan drawn up through an organization of repute and specializing in Transport Planning shall be submitted with the EIA.
 - (xxxv) Disaster Management Plan for the project.
 - (xxxvi) Details and status of court case pending against the project, if any.
 - (xxxvii) Public hearing to be conducted and issues raised and commitments made by the project proponent on the same should be included in EIA/EMP Report in the form of tabular chart with financial budget for complying with the commitments made.
 - (xxxviii) Plan for Corporate Environment Responsibility (CER) as specified under Ministry's Office Memorandum vide F.No. 22-65/2017-IA.III dated 1st May 2018 shall be prepared and submitted along with EIA Report.
 - (xxxix) A tabular chart with index for point wise compliance of above ToRs.

General Guidelines

- (i) The EIA document shall be printed on both sides, as far as possible.
- (ii) All documents should be properly indexed, page numbered.
- (iii) Period/date of data collection should be clearly indicated.
- (iv) Authenticated English translation of all material provided in Regional languages.
- (v) The letter/application for EC should quote the MoEF&CC File No. and also attach a copy of the letter prescribing the ToR.
- (vi) The copy of the letter received from the Ministry on the ToR prescribed for the project should be attached as an annexure to the final EIA-EMP Report.
- (vii) The final EIA-EMP report submitted to the Ministry must incorporate the issues mentioned in ToR and that raised in Public Hearing. The index of the final EIA-EMP report, must indicate the specific chapter and page no. of the EIA-EMP Report where the specific ToR prescribed by the Ministry and the issue raised in the Public Hearing have been incorporated. Questionnaire related to the project (posted on MoEF&CC website) with all sections duly filled in shall also be submitted at the time of applying for EC.
- (viii) Grant of ToR does not mean grant of EC.
- (ix) The status of accreditation of the EIA consultant with NABET/QCI shall be specifically mentioned. The consultant shall certify that his accreditation is for the sector for which this EIA is prepared.
- (x) On the front page of EIA/EMP reports, the name of the consultant/consultancy firm along with their complete details including their accreditation, if any shall be indicated. The consultant while submitting the EIA/EMP report shall give an undertaking to the effect that the prescribed ToRs (ToR proposed by the project

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proponent and additional ToR given by the MoEF&CC) have been complied with and the data submitted is factually correct (Refer MoEF&CC Office memorandum dated 4th August, 2009).

- (xi) While submitting the EIA/EMP reports, the name of the experts associated with/involved in the preparation of these reports and the laboratories through which the samples have been got analysed should be stated in the report. It shall clearly be indicated whether these laboratories are approved under the Environment (Protection) Act, 1986 and the rules made there under (Please refer MoEF&CC Office Memorandum dated 4th August, 2009). The project leader of the EIA study shall also be mentioned.
- (xii) All the ToR points as presented before the Expert Appraisal Committee (EAC) shall be covered.
7. The above ToR should be considered for the project Proposed Revised Master Plan development of Kattupalli Port by Marine Infrastructure Developer Private Limited (MIDPL) at Kattupalli, Ponneri Taluka, Tiruvallur District, Tamil Nadu by M/s Marine Infrastructure Developer Private Limited (MIDPL), in addition to all the relevant information as per the 'Generic Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006.
8. The project proponent shall submit the detailed final EIA/EMP prepared as per ToR to the Ministry for considering the proposal for environmental clearance within 3 years as per the MoEF&CC O.M. No.J-11013/41/2006-IA-II(I) (P) dated 08.10.2014.
9. The consultants involved in preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other Organization(s)/ Laboratories including their status of approvals etc. vide Notification of the MoEF&CC dated 19.07.2013.
10. The prescribed ToR would be valid for a period of three years for submission of the EIA/EMP Reports.
11. Enclosed all complaints/suggestions received in the Ministry for point wise reply.
12. This issues with the approval of the competent authority.


(Dr. Subrata Bose)
Scientist F

Copy to:

The Member Secretary, Tamil Nadu Pollution Control Board, 76, Anna Salai, Guindy Industrial Estate, Race View Colony, Guindy, Chennai, Tamil Nadu 600032.



7(e): STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR PORTS, HARBOURS AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

- i. Reasons for selecting the site with details of alternate sites examined/rejected/selected on merit with comparative statement and reason/basis for selection. The examination should justify site suitability in terms of environmental angle, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site.
- ii. Details of the land use break-up for the proposed project. Details of land use around 10 km radius of the project site. Examine and submit detail of land use around 10 km radius of the project site and map of the project area and 10 km area from boundary of the proposed/existing project area, delineating project areas notified under the wild life (Protection) Act, 1972/critically polluted areas as identified by the CPCB from time to time/notified eco-sensitive areas/interstate boundaries and international boundaries. Analysis should be made based on latest satellite imagery for land use with raw images.
- iii. Submit the present land use and permission required for any conversion such as forest, agriculture etc. land acquisition status, rehabilitation of communities/villages and present status of such activities.
- iv. Examine and submit the water bodies including the seasonal ones within the corridor of impacts along with their status, volumetric capacity, quality likely impacts on them due to the project.
- v. Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area.
- vi. Submit the details of terrain, level with respect to MSL, filling required, source of filling materials and transportation details etc.
- vii. Examine road/rail connectivity to the project site and impact on the existing traffic network due to the proposed project/activities. A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.
- viii. Submit details regarding R&R involved in the project.
- ix. Submit a copy of layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale along with the recommendation of the SCZMA.
- x. Submit the status of shore line change at the project site
- xi. Details of the layout plan including details of channel, breakwaters, dredging, disposal and reclamation.
- xii. Details of handling of each cargo, storage, transport along with spillage control, dust preventive measures. In case of coal, mineral cargo, details of storage and closed conveyance, dust suppression and prevention filters.
- xiii. Submit the details of fishing activity and likely impacts on the fishing activity due to the project. Specific study on effects of construction activity and pile driving on marine life.
- xiv. Details of oil spill contingency plan.

- xv. Details of bathymetry study.
- xvi. Details of ship tranquillity study.
- xvii. Examine the details of water requirement, impact on competitive user, treatment details, use of treated waste water. Prepare a water balance chart.
- xviii. Details of rainwater harvesting and utilization of rain water.
- xix. Examine details of Solid waste generation treatment and its disposal.
- xx. Details of desalination plant and the study for outfall and intake.
- xxi. Examine baseline environmental quality along with projected incremental load due to the proposed project/activities.
- xxii. The air quality monitoring should be carried out according to the notification issued on 16th November, 2009.
- xxiii. Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.
- xxiv. Submit details of a comprehensive Risk Assessment and Disaster Management Plan including emergency evacuation during natural and man-made disasters
- xxv. Submit details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measures taken to reduce the number of the trees to be removed should be explained in detail. Submit the details of compensatory plantation. Explore the possibilities of relocating the existing trees.
- xxvi. Examine the details of afforestation measures indicating land and financial outlay. Landscape plan, green belts and open spaces may be described. A thick green belt should be planned all around the nearest settlement to mitigate noise and vibrations. The identification of species/ plants should be made based on the botanical studies.
- xxvii. The Public Hearing should be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the web-site.
- xxviii. A detailed draft EIA/EMP report should be prepared in accordance with the above additional TOR and should be submitted to the Ministry in accordance with the Notification.
- xxix. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
- xxx. The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
- xxxi. Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "<http://moef.nic.in/Manual/Port and harbour>".

APPENDIX E

APPENDIX E1
COMPLIANCE TO TOR

Appendix E1 Compliance to MoEF&CC Approved ToR and Standard ToR

S. NO.	TERMS OF REFERENCE	COMPLIANCE
Project Specific Conditions		
(i)	Importance and benefits of the project	Importance/Need and Benefits of the project is discussed in Section 1.5 of Chapter 1 and in Chapter 8 respectively.
(ii)	Submit a copy of layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale	CRZ compatibility for proposed development is discussed in Section 2.6 of Chapter 2 . Copy of layout superimposed on the draft HTL/LTL map prepared by National Centre for Sustainable Coastal Management (NCSCM), Anna University a MoEF&CC authorized agency on 1:25000 scale and 1:4000 scale are given as Attachment 1 .
(iii)	Recommendation of the SCZMA	Tamil Nadu State Coastal Zone Management Authority (TNSCZMA) recommendation will be obtained and submitted to MoEF&CC during Appraisal after Public Hearing along with Final CEIA/EMP Report.
(iv)	Submit superimposing of latest CZMP as per CRZ (2011) on the CRZ map	Proposed Revised Master Plan layout was superimposed on approved CZMP and presented as Attachment 2 .
(v)	Submit a complete set of documents required as per para 4.2 (i) of CRZ Notification, 2011	Noted and will be adhered
(vi)	Submit Certified Compliance Report issued by the MoEF&CC, Regional Office or concerned Regional Office of Central Pollution Control Board or the Member Secretary of the respective State Pollution Control Board for the conditions stipulated in the earlier environmental clearance issued for the project along with an action taken report on issues which have been stated to be partially complied or non/not complied	Certified half yearly compliance report for April to September 2020 is attached as Appendix B .
(vii)	Measures for protection of general ecosystem of Kosattalaiyar estuary including mangroves	Kosasthalaiyar River drainage pattern was studied and presented in Section 2.4.9 of Chapter 2 . Three season's baseline data was collected and presented for Kosasthalaiyar River in Section 3.8 and 3.9 of Chapter 3 . Flood Model study to understand the hydraulic behavior of the Kosasthalaiyar River, Ennore Creek and their floodplains, to determine the flood paths along the proposed Kattupalli port expansion area is presented in Section 7.4 of Chapter 7 . Mitigation

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		measures for Mangrove habitats and other ecosystems of Ennore Creek, Kosasthalaiyar River, Buckingham Canal and Pulicat Lake were presented in Section 4.5.1 of Chapter 4 and 10.5.4 of Chapter 10 . Twenty Three (23) monitoring locations on the Kosattalaiyar eco system were proposed during construction and Operational phase of RMP as part of EMP for Kosasthalaiyar River eco system and presented in Section 6.1 of Chapter 6 .
(viii)	Three season's data should be collected in the coastal region as well as estuarine region at proposed site. Data should be collected at mouth present in northern end of the project and salt pans present in the western Kosattalaiyar particularly during monsoon along with the other places	Three season study has been carried out for coastal region as well as estuarine region and results are presented in Section 3.7 and 3.8 of Chapter 3 .
(ix)	The impact of the proposed project on the fragile barrier island of Pulicat Lake and tidal inlets and direct impact on Pulicat Lake should be studied	Study on Pulicat lake is given in Section 2.4.9 of Chapter 2 . Impacts are studied and mitigations proposed are presented in Section 4.2.3.5 of Chapter 4 . Four dedicated monitoring locations were proposed during construction and Operational phase of RMP as part of EMP are presented in Section 6.1 of Chapter 6 . Details of Flood Modelling Study covering Pulicat lake is provided in Section 7.4 of Chapter 7 .
(x)	A comprehensive study, including all existing developments, like, Ennore port, L&T shipyard etc., should be performed. Since berths and breakwaters are planned along the coast, the impact of these constructions on the littoral drift, which causes the sand accretion and deposition in the region, should be studied using a numerical model	All the coastal environmental modelling studies have been carried out considering Kamarajar port and L&T Ship Buildings facility. Littoral drift and coastline evolution were studied using numerical models and presented in Section 4.2.3.5 of Chapter 4 .
(xi)	Shoreline change Management Plan covering the area from Ennore Creek to Pulicat Lake to be included in EIA report	Littoral drift and coastline evolution were studied using numerical models and presented in Section 4.2.3.5 of Chapter 4 . Shoreline Management during port operation phase is detailed in Section 4.2.3.6 of Chapter 4 .
(xii)	Impact of proposed project on Ennore Shoals that were protecting the coast from Cyclone and Tsunami need to be studied in EIA	Wave Transformation Modelling Section 2.4.3 of Chapter 2 . Study on Ennore Shoals are presented in Section 2.4.16 of Chapter 2 . Navigation Aspects and Impact due to Approach Channel on Shoals were presented in Section

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		4.9.2.4 of Chapter 4.
(xiii)	Detailed study on drainage pattern within and outside the port area including Ennore Creek, Pulicat Lake and Buckingham Canal need to be studies as part of EIA	The drainage pattern of Ennore Creek, Pulicat lake and Buckingham Canal were studied and presented in Section 2.4.9 of Chapter 2. Baseline Drainage Pattern of Study Area is presented in Section 3.6.1.1 of Chapter 3. Impact and mitigation measures proposed on Existing Drainage Pattern Section 4.3.2.3 of Chapter 4. Details of Flood Modelling Study covering Storm water management plan is provided in Section 7.4 of Chapter 7.
(xiv)	Oil spill risk assessment and contingency plan to be incorporated as 2 SPMs are planned. Even oil spill risk assessment should be made to the accidental spill at proposed berths and nearby places	Oil Spill Risk Assessment Studies in Section 2.4.15 of Chapter 2 and Section 4.3.3.3 of Chapter 4. Details of Oil Spill Contingency Plan are given in Section 7.8 of Chapter 7.
(xv)	Biodiversity of the area, viz., estuary and coastal region, should be studied	Biodiversity of Marine, Brackish Water and Fresh Water, Terrestrial Ecosystems were studied and presented in Section 3.7, 3.8 3.9 and Section 3.10 of Chapter 3. Impacts due to Reclamation on Biodiversity, Impact on Mangrove Areas, Mangrove Conservation Measures are studied and presented in Section 4.2.1.4, 4.5.1.1 and 4.5.1.2, Impacts on Biodiversity due changes in Seabed Profile is discussed in Section 4.4.2.5, 4.4.2.6, Biodiversity Conservation and Management Plan is discussed in Section 4.5.2.7 of Chapter 4. Detailed monitoring of biodiversity during construction and operational phases including Marine Water Quality/ Plankton and Benthic Communities/ Sediment Quality, Fish Population Monitoring, Rapid underwater biodiversity Assessment Mangrove Area Monitoring were presented in Section 6.1 of Chapter 6. Conservation Strategies for Terrestrial Biodiversity Section 10.4 Marine Biodiversity Management Plan are presented in Section 10.5 of Chapter 10.
(xvi)	Socio-economic study should be carried out in the surrounding villages of the project especially on the use of common property resources/government lands	Socio-Economic Profile of Project Study Area is presented in Section 3.14 of Chapter 3. Social Impact Assessment presented in Section 7.10 of Chapter 7.
(xvii)	Baseline air quality should be established. The impact of port activity on the air quality should be assessed using air quality and noise quality	Baseline details of Ambient Air Quality is presented in Section 3.11.3, 3.12 of Chapter 3. Details of Air quality Modelling Studies are given

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	modelling	in Section 4.6.2., 4.7.2.1 of Chapter 4
(xviii)	Hydrodynamics study on impact of dredging on flow characteristics	Details of Hydrodynamics study are given in Section 2.4.1.1, Hydrodynamic Modelling Section 2.4.2 of Chapter 2 . Impact due to Port Location on Hydrodynamic and Sedimentation were studied and presented in Section 4.4.1.1 of Chapter 4 . Numerical modelling studies on hydrodynamics, littoral drift and sediment transport resulting from dredging and disposal have been carried and presented in Section 4.4.2 of Chapter 4 .
(xix)	Flooding and related impact on creek and control area during the cyclonic storm should be studied	Flood Model study to understand the hydraulic behavior of the Kosasthalaiyar River, Ennore Creek and their floodplains, to determine the flood paths along the proposed Kattupalli port expansion area is presented in Section 7.4 of Chapter 7 . Details of Cyclone modelling is presented in Section 2.4.8 of Chapter 2 and Section 7.6 of Chapter 7 .
(xx)	Ship navigational studies for the entrance channel should be carried out	Navigation Facilities Section 2.5.9 of Chapter 2 . Navigation Simulation Study Section 4.4.3.1 and Navigation Aspects and Impact due to Approach Channel Section 4.9.2.4 of Chapter 4 .
(xxi)	The project proponents shall satisfactorily address to all the complaints/suggestions that have been received against the project till the date of submission of proposals for Appraisal	Replies to representations were attached as Appendix E2 .
(xxii)	The EIA would give a detailed analysis of the Impacts of storage and handling and the management plan of each cargo type along with the proposed compliance to the Hazardous Chemicals Storage rules	Impacts and mitigation measures due to Storage and Handling of all the proposed cargo is given Chapter 4. Risk assessment and Disaster management Plan of the same are presented in Section 7.2 and 7.3 of Chapter 7 .
(xxiii)	Study the impact of dredging and dumping on marine ecology and draw up a management plan through the NIO or any other institute specializing in marine ecology	Dredging and Reclamation details are provided in Section 2.5.17 of Chapter 2 . Impact of dredging and dumping on marine ecology were studied and presented Section 4.4.2, 4.5.2.8, 4.5.3.4 of Chapter 4 . Impact on Marine Biodiversity Management Plan Section 10.5 of Chapter 10 .
(xxiv)	Details of Emission, effluents, solid waste and hazardous waste generation and their management in the existing and proposed facilities	Potential Impact due to emissions were studied in Section 4.6.2 of Chapter 4 . Sewage and Effluent Treatment were presented in section 2.5.25.2, Solid Waste Management at Port areas in Section 2.5.25.3 and 2.5.23.4 of Chapter 2 . Details of solid waste Management plan are given in Section 4.8, Hazardous Materials Management

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		in Section 4.8.1.2 of Chapter 4.
(xxv)	Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)	Details of water and power are given in Section 2.5.22 of Chapter 2. Details of employment opportunities are given in Section 8.2 of Chapter 8.
(xxvi)	Permission from CGWA in case of groundwater use being proposed for the project	No groundwater will be utilized in construction and operation phase.
(xxvii)	Wastewater Management Plan	Details of wastewater management are provided in Section 2.5.25.2 of Chapter 2.
(xxviii)	Details of Environmental Monitoring Plan	Details are provided in Chapter 6.
(xxix)	To prepare a detailed biodiversity impact assessment report and management plan through the NIO or any other institute of repute on marine, brackish water and fresh water ecology and biodiversity. The report shall study the impact on the rivers, estuary and the sea and include the intertidal biotopes, corals and coral communities, molluscs, sea grasses, sea weeds, subtidal habitats, fishes, other marine and aquatic micro, macro and mega flora and fauna including benthos, plankton, turtles, birds etc. as also the productivity. The data collection and impact assessment shall be as per standard survey methods	Marine Biodiversity Impact Assessment and Management Plan for marine, brackish water and fresh water eco system was carried out by Suganthi Devadason Marine Research Institute (SDMRI), Tuticorin. The findings of the study are incorporated in the relevant chapter of EIA report namely Chapter 3, 4,6 10. The report on the biodiversity is attached as Volume II.
(xxx)	A certificate from the competent authority for discharging treated effluent/ untreated effluents into the Public sewer/ disposal/drainage systems along with the final disposal point	No discharge from the dredgers or work boats shall be allowed into marine waters. Treated Sewage and effluents shall be reused for dust suppression, irrigating greenbelt and other requirements. No objection Certificate from TNPCB for Marine Disposal of Desalination Plant Reject as well as LNG/LPG Regasification Facility will be obtained and submitted to TNCZMA and MoEF&CC.
(xxxi)	A certificate from the local body supplying water, specifying the total annual water availability with the local authority, the quantity of water already committed the quantity of water allotted to the project under consideration and the balance water available. This should be specified separately for ground water and surface water sources, ensuring that	Water requirement during construction activity will be approximately 0.8 MLD, which will be met through the bowsers and existing water supply system. Water requirement during operation phase of RMP will be 30 MLD, which will be met by proposed desalination plant of total capacity 30 MLD. Water supply for proposed RMP development is discussed in Section 2.5.22.1 of Chapter 2. No withdrawal of groundwater is not

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	there is no impact on other users	envisaged.
(xxxii)	A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project	Details of power are given in Section 2.5.22.3 of Chapter 2 . The additional power requirement will be met from TNEB as well as proposed renewable energy system.
(xxxiii)	A certificate from the competent authority handling municipal solid wastes, indicating the existing civic capacities of handling and their adequacy to cater to the M.S.W. generated from project	The collected MSW Bio-Degradable waste shall be subjected to composting and the compost will be used as manure for the development of green belt within the port. The non-biodegradable waste shall be handed over to approved vendors. Hazardous waste authorization obtained through vide Authorization No. 19HFC20312718 dated 30/04/2019 Proceeding No. T1/TNPCBIF.0420GMP/HW/RL/GMP/2019 dated 30/04/2019 from TNPCB and Biomedical waste authorization through vide AUTHORISATION No: 19BAC15866575 Dated 25/04/2019 Proceeding No: T4/TNPCB/F.0420GMP/BWA/RL/GMP/2016 Dated 25/04/2019. Provided in Appendix 12 and Appendix 13
(xxxiv)	An assessment of the cumulative impact of all development and increased inhabitation being carried out or proposed to be carried out by the project or other agencies in the core area, shall be made for traffic densities and parking capabilities in a 05 kms radius from the site. A detailed traffic management and a traffic decongestion plan drawn up through an organization of repute and specializing in Transport Planning shall be submitted with the EIA	Details of the traffic assessment and management Plan are provided in Section 7.9. of Chapter 7 .
(xxxv)	Disaster Management Plan for the project	Details of Disaster Management Plan are provided in Section 7.3 of Chapter 7 .
(xxxvi)	Details and status of court case pending against the project, if any	-
(xxxvii)	Public hearing to be conducted and issues raised and commitments made by the project proponent on the same should be included in EIA/EMP Report in the form of tabular chart with financial budget for complying with the commitments made	This Draft CEIA/EMP will be submitted to TNPCB along with executive summaries (Both Local and English language) with the request to conduct the Public Hearing (PH).

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(xxxviii)	Plan for Corporate Environment Responsibility (CER) as specified under Ministry's Office Memorandum vide F. No. 22-65/2017-IA.III dated 1 st May 2018 shall be prepared and submitted along with EIA Report	Ministry's Office Memorandum vide F. No. 22-65/2017-IA.III dated 30 th September 2020 directed that all the CER activities proposed by the project proponent or prescribed by the Expert Appraisal Committee or State Level Expert Appraisal Committee, as the case may be, shall be part of the Environment Management Plan. Existing Kattupalli Port CSR Activities are presented in Section 8.3 Chapter 8 .
(xxxix)	A tabular chart with index for point wise compliance of above ToRs	Complied and provided as Appendix E1 .
7(e): STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR PORTS, HARBOURS AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT		
1)	Reasons for selecting the site with details of alternate sites examined/rejected/selected on merit with comparative statement and reason/basis for selection. The examination should justify site suitability in terms of environmental angle, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site.	As the proposed project has already been established & operational, is being an Expansion/revision of Master Plan of existing Kattupalli port, study of site alternatives has least significance. LTSB and Kamarajar Port are located on South side and therefore there is no much scope for expansion in southern part of the existing port. Port expansion is being proposed mostly towards, North, East and West directions.
2)	Details of the land use break-up for the proposed project. Details of land use around 10 km radius of the project site. Examine and submit detail of land use around 10 km radius of the project site and map of the project area and 10 km area from boundary of the proposed/existing project area, delineating project areas notified under the wild life (Protection) Act, 1972/critically polluted areas as identified by the CPCB from time to time/notified eco-sensitive areas/interstate boundaries and international boundaries. Analysis should be made based on latest satellite imagery for land use with raw images.	Land Use pattern in Project Site is given in Section 3.5.1.1 and Chapter 3 . Details of land use around 10 km radius of the project site is given in Section 3.5.1.2 of Chapter 3 . The Environmentally/ Ecologically sensitive areas are discussed in Section 3.3 of Chapter 3 . Impacts due to Changes in Land Use Pattern Section 4.2.1.2 of Chapter 4 .
3)	Submit the present land use and permission required for any conversion such as forest, agriculture etc. land acquisition status, rehabilitation of communities/ villages and present status of such activities.	Present land use is sea, intertidal area, sandy area/beach, abandon salt pans, and land with/without scrub and sparse vegetation (<i>Prosopis juliflora</i> /Casuarina/Eucalyptus). Revised Master Plan development of Kattupalli Port will be carried out in total area of 2472.85 ha

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		which includes 136.28 ha of existing area, 927.11 Ha of government land, 613.31 ha of private and proposed sea reclamation of 796.15 hectares including basin and all developable area. There is no conversion of Forest Land. No R&R is envisaged.
4)	Examine and submit the water bodies including the seasonal ones within the corridor of impacts along with their status, volumetric capacity, quality likely impacts on them due to the project.	Impact on Existing Water Resource are presented in Section 4.3.1.1, 4.4.3.4 of Chapter 4.
5)	Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area	Project site is sloping towards East i.e., towards Sea side. Topography and sloop of the region is discussed in Section 3.5.3 of Chapter 3. Drainage pattern was studied and presented in Section 2.4.9 of Chapter 2.
6)	Submit the details of terrain, level with respect to MSL, filling required, source of filling materials and transportation details etc.	<p>The port backup area alongside the river has a low elevation ranging from -2 to +3 m with respect to MSL. The modelling study carried out shows that raising the port backup area along to riverbanks to the proposed +4.4 m MSL (which is equal to +5 CD) would be an effective measure to protect the backup area from flooding.</p> <p>Project site is sloping towards East i.e., towards Sea side. Approximately 85 MCM of dredged material will be used for reclamation of proposed backup yard and as well as berth area and level rising upto +5 m CD are given in Section 4.2.1.2 of Chapter 4. The total proposed quantity for reclamation including landfilling is estimated about 138 Mm³ which will be used for reclaiming 1145 Ha area. Additional material will be sourced tentatively from Satyavedu (Chittoor District, Andhra Pradesh) - 65 km from the site, Walajah (Tamil Nadu) - 140 km from the site; Karadipudur (Tamil Nadu) - 80 km from the site. Impacts and mitigations to reclamation is presented in Section 4.2.1.4 of Chapter 2.</p>
7)	Examine road/rail connectivity to the project site and impact on the existing traffic network due to the proposed project/activities. A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.	<p>External connectivity covering Road/Rail/Water way is presented in Section 2.5.20.</p> <p>The details of traffic and transportation study for road are given in Section 7.9 of Chapter 7.</p>
8)	Submit details regarding R&R involved in the	No R&R is envisaged as a part of the proposed revised master Plan development.

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	project	
9)	Submit a copy of layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale along with the recommendation of the SCZMA.	CRZ compatibility for proposed development is discussed in Section 2.6 of Chapter 2 . Copy of layout superimposed on the draft HTL/LTL map prepared by National Centre for Sustainable Coastal Management (NCSCM), Anna University a MoEF&CC authorized agency on 1:25000 scale and 1:4000 scale are given as Attachment 1 . TNCZMA recommendation will be obtained and submitted to MoEF&CC.
10)	Submit the status of shoreline change at the project site	Status of shoreline changes in the project region is presented in Section 2.4.4. Littoral drift and coastline evolution were studied using numerical models and presented in Section 4.2.3.5 of Chapter 4 . Shoreline Management during port operation phase is detailed in Section 4.2.3.6 of Chapter 4 .
11)	Details of the layout plan including details of channel, breakwaters, dredging, disposal and reclamation.	The details of the development of Revised Master Plan are given in Section 2.5 of Chapter 2 . The layout plan for Revised Master is given as Figure FD0202 .
12)	Details of handling of each cargo, storage, transport along with spillage control, dust preventive measures. In case of coal, mineral cargo, details of storage and closed conveyance, dust suppression and prevention filters.	The details about the cargo handling, storage and transport are given from Section 2.5.6 of Chapter 2 . Impact on Water Quality due to Cargo Operations in Section 4.3.3.1 , Oil Spill Assessment in Section 4.3.3.3 , Potential Impact due to Cargo Operations in Section 4.5.3.2 of Chapter 4 . Hazardous cargo to be Handled and Storage Details and Risk assessment of the same are presented in Section 7.2 of Chapter 7 . Impact and Mitigation measures proposed to control air pollution are given in Section 4.6 of Chapter 4 .
13)	Submit the details of fishing activity and likely impacts on the fishing activity due to the project. Specific study on effects of construction activity and pile driving on marine life.	Details of Fishing activity in the study area are discussed in Section 3.14.7 of Chapter 3 . Impact the fishing activity are presented in Section 4.9.1.2 of Chapter 4 and Section 7.10.1.8 of Chapter 7 . Impact due to pile driving for various offshore structures are given in Section 4.4.2.7 of Chapter 4 .
14)	Details of oil spill contingency plan.	Details of Oil Spill Contingency Plan are given in Section 7.8 of Chapter 7 .
15)	Details of bathymetry study.	The details of the bathymetry are given in Section 2.3.1 of Chapter 2 .
16)	Details of ship tranquillity study.	Details of tranquillity study are given in Section

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		2.4.11 of Chapter 4.
17)	Examine the details of water requirement, impact on competitive user, treatment details, use of treated wastewater. Prepare a water balance chart.	The water requirement during construction activity will be approximately 0.8 MLD, which will be met through the bowsers and existing water supply system. The water requirement during the operation phase of RMP will be 30 MLD, which will be met by proposed desalination plant of total capacity 30 MLD. Water supply for proposed RMP development is discussed in Section 2.5.22.1 of Chapter 2 . The seawater intake quantity is 1,20,000 m ³ /h for proposed LNG/LPG terminal. Wastewater management Section 2.5.25.2 of Chapter 2 . Details on Impact on Existing Water Resource (Competing User) are given in Section 4.3.1.1 of Chapter 4 .
18)	Details of rainwater harvesting and utilization of rain water.	The details of rainwater harvesting are discussed in Section 10.6 of Chapter 10
19)	Examine details of Solid waste generation treatment and its disposal.	Solid Waste Management at Port areas in Section 2.5.25.3 of Chapter 2 . Details of solid waste Management plan are given in Section 4.8, Hazardous Materials Management in Section 4.8.1.2 of Chapter 4 .
20)	Details of desalination plant and the study for outfall and intake.	The details are given in Section 2.5.22.2 of Chapter 2 and The recirculation study of 30 MLD Seawater Desalination Plant is given Desalination Plant System details are provided in Section 4.4.3.4 of Chapter 4 . Impact due to Aqueous Discharges and Mitigation Measures presented in Section 4.5.3.1 of Chapter 4 and Management of Desalination and ETP Discharges in Section 10.5.2.10 of Chapter 10
21)	Examine baseline environmental quality along with projected incremental load due to the proposed project/activities.	The baseline environment quality is given in Chapter 3 and incremental load/ Impacts are given in Section 4.6.2 of Chapter 4 .
22)	The air quality monitoring should be carried out according to the notification issued on 16 th November, 2009.	Baseline details of Ambient Air Quality is presented in Section 3.11.3 of Chapter 3 . Details of Air quality Modelling Studies are given in Section 4.6.2 of Chapter 4
23)	Examine separately the details for construction	Details of Environmental Monitoring Plan is

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	and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.	Discussed in Chapter 6 and Environmental Management Plan along with Budgetary Estimate is discussed in Chapter 10
24)	Submit details of a comprehensive Risk Assessment and Disaster Management Plan including emergency evacuation during natural and man-made disasters	Details of Risk Assessment are discussed in Section 7.2 and DMP including emergency evacuation is discussed in Section 7.3 of Chapter 7 .
25)	Submit details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measures taken to reduce the number of the trees to be removed should be explained in detail. Submit the details of compensatory plantation. Explore the possibilities of relocating the existing trees.	Present land use is sea, intertidal area, sandy area/beach, abandon salt pans, and land with/without scrub and sparse vegetation (<i>Prosopis juliflora</i> / <i>Casuarina</i> / <i>Eucalyptus</i>). Land Use pattern in Project Site is given in Section 3.5.1.1 and Chapter 3 . Details of land use around 10 km radius of the project site is given in Section 3.5.1.2 of Chapter 3 . The Environmentally/ Ecologically sensitive areas are discussed in Section 3.3 of Chapter 3 . Impacts due to Changes in Land Use Pattern of Section 4.2.1.2 of Chapter 4 . Clearance of vegetation is envisaged as per the project requirements. Greenbelt Development Plan given in Section 10.3 of Chapter 10 .
26)	Examine the details of afforestation measures indicating land and financial outlay. Landscape plan, green belts and open spaces may be described. A thick green belt should be planned all around the nearest settlement to mitigate noise and vibrations. The identification of species/ plants should be made based on the botanical studies.	Greenbelt will be developed in an area of about 241 Ac. An estimated approx. capital cost of about INR 9.55 Crore will be earmarked for this purpose as a part of Revised Master Plan. Details of Green belt development plan including species/ plants are given in Section 10.3 of Chapter 10 .
27)	The Public Hearing should be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the web-site.	This Draft CEIA/EMP will be submitted to TNPCB along with executive summaries (Both Local and English language) with the request to conduct the Public Hearing (PH).
28)	A detailed draft EIA/EMP report should be prepared in accordance with the above additional TOR and should be submitted to the	The draft CEIA/ EMP is prepared considering ToR issued, Appendix III and III (A) of EIA Notification 2006 (as amended), Standard ToR and also

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	Ministry in accordance with the Notification.	considering also EIA Guidance Manual for Ports and Harbours, 2010 released by MoEF&CC. On completion of PH and receipt of PH proceedings, MIDPL replies/commitment against the issues raised by Public will be included in Tabular form along with budget if any in the final CEIA/EMP and the same will be submitted to MoEF&CC for further consideration/appraisal.
29)	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	-
30)	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The budgetary estimate for Capital Environmental Management Cost for Revised Master Plan is ~INR 2324.11 crores and the annual budgetary estimate during operational phase is ~INR 120.19 crore. Budgetary Estimates are provided in Section 10.10 of Chapter 10.
31)	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "http://moef.nic.in/Manual/Port and harbour".	The draft CEIA/ EMP is prepared considering ToR issued, Appendix III and III (A) of EIA Notification 2006 (as amended), Standard ToR and also considering also EIA Guidance Manual for Ports and Harbours, 2010 released by MoEF&CC.
General Guidelines		
(I)	The EIA document shall be printed on both sides, as far as possible	Noted and adhered
(II)	All documents should be properly indexed, page numbered	Noted and adhered
(III)	Period/date of data collection should be clearly indicated	Noted and adhered
(IV)	Authenticated English translation of all material provided in Regional languages	Noted and will be adhered as appropriate
(V)	The letter/application for EC should quote the MoEF&CC File No. and also attach a copy of the letter prescribing the ToR	Noted and will be adhered
(VI)	The copy of the letter received from the Ministry on the ToR prescribed for the project should be attached as an annexure to the final	Noted and incorporated

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	EIA-EMP Report	
(VII)	The final EIA-EMP report submitted to the Ministry must incorporate the issues mentioned in ToR and that raised in Public Hearing. The index of the final EIA-EMP report, must indicate the specific chapter and page no. of the EIA-EMP Report where the specific ToR prescribed by the Ministry and the issue raised in the Public Hearing have been incorporated. Questionnaire related to the project (posted on MoEF&CC website) with all sections duly filled in shall also be submitted at the time of applying for EC.	Noted and will be incorporated
(VIII)	Grant of ToR does not mean grant of EC.	Noted
(IX)	The status of accreditation of the EIA consultant with NABET/QCI shall be specifically mentioned. The consultant shall certify that his accreditation is for the sector for which this EIA is prepared	Noted and incorporated
(X)	On the front page of EIA/EMP reports, the name of the consultant/consultancy firm along with their complete details including their accreditation, if any shall be indicated. The consultant while submitting the EIA/EMP report shall give an undertaking to the effect that the prescribed ToRs (ToR proposed by the project proponent and additional ToR given by the MoEF&CC) have been complied with and the data submitted is factually correct (Refer MoEF&CC Office memorandum dated 4 th August, 2009).	As per October 05, 2011 OM, the Proponent undertaking is mandatory, this is furnished in the EIA Report.
(XI)	While submitting the EIA/EMP reports, the name of the experts associated with/involved in the preparation of these reports and the laboratories through which the samples have been got analysed should be stated in the report. It shall clearly be indicated whether these laboratories are approved under the Environment (Protection) Act, 1986 and the rules made there under (Please refer MoEF&CC Office Memorandum dated 4 th August, 2009). The project leader of the EIA	The details of experts engaged in the Draft EIA report preparation is given in the beginning of the report. Also in the Chapter 12 – Disclosure of Consultants all the consultants engaged were provided.

S. NO.	TERMS OF REFERENCE	COMPLIANCE
	study shall also be mentioned.	
(XII)	All the ToR points as presented before the Expert Appraisal Committee (EAC) shall be covered.	Complied
(XIII)	The above ToR should be considered for the project Proposed Revised Master Plan development of Kattupalli Port by Marine Infrastructure Developer Private Limited (MIDPL) at Kattupalli, Ponneri Taluka, Tiruvallur District, Tamil Nadu by M/s Marine Infrastructure Developer Private Limited (MIDPL), in addition to all the relevant information as per the 'Generic Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006.	Complied
(XIV)	The project proponent shall submit the detailed final EIA/EMP prepared as per ToR to the Ministry for considering the proposal for environmental clearance within 3 years as per the MoEF&CC O.M. No.J-11013/41/2006-IA-II(I) (P) dated 08.10.2014.	Noted and Final CEIA/EMP report will be submitted to MoEF&CC within the validity period based on the prevailing O.Ms.
(XV)	The consultants involved in preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other Organization(s)/ Laboratories including their status of approvals etc. vide Notification of the MoEF&CC dated 19.07.2013.	Noted and incorporated
(XVI)	The prescribed ToR would be valid for a period of three years for submission of the EIA/EMP Reports.	Noted and Final CEIA/EMP report will be submitted to MoEF&CC within the validity period based on the prevailing O.Ms.
(XVII)	Enclosed all complaints/suggestions received in the Ministry for point wise reply.	Replies to representations were attached as Appendix E2.
(XVIII)	This issues with the approval of the competent authority	Noted

APPENDIX E2
REPLIES TO REPRESENTATIONS
RECEIVED ALONG WITH TOR (TAMIL
& ENGLISH)

Appendix E2 Compliance for Received Representations - Tamil and English

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
Representations received in Tamil Language and Translated to English			
1.	Sengalanirmmedu Podumakal, Vayalur Panchayat, Ponneri Taluk, Tiruvallur District, Tamilnadu, India - dated on 03.06.2019	<p>We would like to respect the people who came on behalf of Adani port project. My family from the past four generations has been living near at Vayalur, Kattur, Kalanji, Kattupalli village's river bank and forest areas. We are using fishing nets or bare hands to catch fishes, prawns, crabs for our livelihood. With the income earned from selling fishes, we were hardly able to pay for our children education, meet our daily expenses and maintenance. We don't know any other occupation rather than fishing. It is the only livelihood for us. We got the information that Adani port will remove the river banks for project purpose. This won't affect not only our village but also Ooranamedu, Ramanathapuram and Kattur villages. Because of this project around 800 fisherman families will be affected. We would like to say that these river banks should not be privatised which is a violation in legal terms. So, we i.e. fisher man will never allow these kind of activities. We request you to reject the project which has been proposed by Adani port.</p>	<ul style="list-style-type: none"> The revised master plan of Kattupalli Port will be developed in an area of about 2472.85 ha which is majorly reclaimed land and balance is uninhabited vacant government land. Present land use is Sea, Intertidal area, Sandy area/beach, Abandon salt pans, and Land with/without Scrub and Sparse Vegetation (<i>Prosopis juliflora</i> /Casuarina/Eucalyptus). MIDPL Kattupalli port's proposed back up area falls between Kosasthalaiyar River, Buckingham canal and Bay of Bengal. The RMP area doesn't involve any Eari/Grassing Land/kullam etc. Flood Model study to understand the hydraulic behaviour of the Kosasthalaiyar River, Ennore Creek and their floodplains, to determine the flood paths along the proposed Kattupalli port expansion area is presented in Section 74 of Chapter 7 suggested that the existing open channel towards the western side and periphery of the

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
			<p>port backup is recommended to be retained for mitigation of flooding in this area. The de-silting of this canal is also proposed to have a quick recession of flood water</p> <ul style="list-style-type: none"> • MIDPL will implement the canal/river strengthening activities abutting the port area • MIDPL master plan development will not disturb the flow pattern of the Kosistalaiyar River and Buckingham canal etc., and further the backwaters will be strengthened. • Under CSR program, sustainable livelihood projects is proposed to be carried out in consultation with local communities that exists within project influence area • MIDPL is also committed to carry out comprehensive CSR programs in the areas of Education, Community Health, Sustainable Livelihood opportunities and Rural Infrastructure Development in the region. The aim is to walk with the communities, help people look ahead, make the right choices and secure a bright and beautiful future,

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
			together.
2.	Ramanathapuram Village, Vayalur Panchayat -Minjur Panchayat Union, Ponneri Taluk, Tiruvallur District, Tamilnadu, India - dated on 03.06.2019	Surrounding the Ramanthapuram village, around 200 Agricultural dependent families depend on around 1500 acres of Agricultural lands for their livelihood and they don't have/know any other occupation rather than the Agriculture. With at most dejection, we would like to inform you that we are opposing the project proposal. Note: if the land surrounding our village has to be taken for the project, then our livelihood will be adversely affected. So, we are opposing the proposed project.	<ul style="list-style-type: none"> The revised master plan development area is falling under Six (06) villages namely Kalanji, Kattupalli, Kattur -II, Ebrahampuram, Puzhudevakkam and Voyalur. The RMP area doesn't involve any Eari/Grassing Land/kullam etc. The land classification of RMP area is as per the VAO's certificates are Dry/Wet and land use is either Vacant/Agricultural land under the possession of both government and private ownership
3.	Ramanathapuram Village, Vayalur Panchayat -Minjur Panchayat Union, Ponneri Taluk, Tiruvallur District, Tamilnadu, India - dated on 03.06.2019	Surrounding the Ramanthapuram village, around 900 acres of land has been used by 1050 cattle's for grazing, which in turn gives milk/ milk products. This is the livelihood for around 250 families around the village. Note: if the land surrounding our village has to be taken for the project, then our livelihood will be adversely affected. So, we are opposing the proposed project.	<ul style="list-style-type: none"> No land acquisition is proposed near Ramanathapuram village and land proposed for present development is under the possession of Govt. body. No private lands are being proposed for development near this village
4.	Ramanathapuram Village, Vayalur Panchayat -Minjur Panchayat Union, Ponneri Taluk, Tiruvallur District, Tamilnadu, India - dated on 03.06.2019	Surrounding the Ramanthapuram village, around 700 acres of land are brine (salt) pits. The villagers/ fisherman used to catch fishes for their livelihood/ work in the prawn farms which will get affected by the proposed project. The people who used to collect fire wood for the cooking on daily basis will be affected by the proposed project. Note: if the land surrounding our village has to be taken for the project, then our livelihood will be adversely affected. So, we are opposing the proposed project.	<ul style="list-style-type: none"> Existing Land use of project site is comprised of Sea, abandoned Salt pans, Agriculture Lands, Scrub Land, Plantation, Built-up-Industrial, River/Stream/Canals, Aquaculture etc. Field level Primary socio-economic assessment was done by the Madras School of Social Works, Chennai It was observed

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
			<p>that 19.8% of the respondents are into agriculture and most of the farmers are small farmers and marginal farmers only.</p> <ul style="list-style-type: none"> • MIDPL promoting Sustainable Livelihood Development in the region through Livelihood restoration programmes under CSR activities • MIDPL is also committed to carry out comprehensive CSR programs in the areas of Education, Community Health, Sustainable Livelihood opportunities and Rural Infrastructure Development in the region. The aim is to walk with the communities, help people look ahead, make the right choices and secure a bright and beautiful future, together.
5.	Kupraj, Sattangkuppam, Pulicat-601205, Tiruvallur District.	<p>I used to collect Oysters from Kattupalli, Kalanji and Karangali village areas. I feed my family from the income earned by selling these Oysters. I got information that Adani port has proposed a new project. All of sudden so many questions have risen in my mind about the future of my family and livelihood.</p> <p>I have heard that a committee has been formed to examine the effect on present condition by the proposed project. I would like to inform the committee members that the plan area of the proposed project has been falling in the area where I used to collect more number of Oysters. Not only self, around 250 members have the same occupation and around 50 people will collect oysters from us for selling in outer market. Because of the proposed project, there is a direct impact on</p>	<ul style="list-style-type: none"> • The RMP area doesn't involve any Eari/Grassing Land/kullam etc. The land classification of RMP area as per the VAO's certificates are Dry/Wet and land use is either Vacant/Agricultural land under the possession of both government and private ownership • Additional ToR study was prescribed by the committee after the site visit viz. Three

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
		<p>around 300 families. If the project gets the approval, our livelihood will be on stake. So, please this into consideration and reject the proposed Adani port project.</p>	<p>season data on coastal region as well as estuarine region, protection of general ecosystem of Kosastaliyar Estuary, Biodiversity of Estuary and Coastal Areas, Socio-Economic Study of the Surrounding villages, detailed study on drainage pattern within and outside port area, impact of proposed port on fragile barrier island of Pulicat Lake etc. All these components have been comprehensively studied, outcomes have been analyzed and presented in EIA Report.</p> <ul style="list-style-type: none"> • No fishing grounds are reported in the proposed areas for revised master Plan development • Flood Model study to understand the hydraulic behaviour of the Kosasthalaiyar River, Ennore Creek and their floodplains, to determine the flood paths along the proposed Kattupalli port expansion area is presented in Section 7.4 of Chapter 7 suggested that the existing open channel towards the western side and periphery of the port backup is recommended to be retained for

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
			<p>mitigation of flooding in this area. The de-silting of this canal is important to have a quick recession of flood water</p> <ul style="list-style-type: none"> • MIDPL will implement the canal strengthening activities • MIDPL RMP will not disturb the flow pattern of the Kosisttalaiyar River and Buckingham canal and will strengthen the bund • MIDPL has to be taken up activities in the field of Education, Community Health, Sustainable Livelihood Development and Rural Infrastructure Development to improve the quality of the life in the nearby villages • MIDPL promoting Sustainable Livelihood Development in the region through Livelihood restoration programmes under CSR activities • MIDPL is also committed to carry out comprehensive CSR programs in the areas of Education, Community Health, Sustainable Livelihood opportunities and Rural Infrastructure Development in the region. The aim is to walk with the communities, help people look ahead, make the right choices and secure

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
			a bright and beautiful future, together.
6.	Oornamedu Sea Fisherman Cooperative Society No.92, Ooranamedu, Vayalur Post, Ponneri Taluk, Tiruvallur District, Tamilnadu, India	<p>We all are permanent residents of Oornamedu village. Over the years, the people of this village has fishing has their profession. We use different methods for catching fishes, prawns. Many migratory birds visit seasonally and breed over the places around Oornamedu village.</p> <p>In our village, the fish market sales are high because of lesser price of fishes than available at the market. Domestic livestock were grazed on open land in the surrounding of the village. From cattle, Milk and Milk products will generate income for the livelihood. Vela maran (<i>Prosopis julifer</i>) which is abundant in nature has been collected for fire wood by local people.</p> <p>If a private company like Adani port acquires the land, our livelihood will be lost and our future generation will be affected by the impacts caused by the proposed project. During rainy Season, floods used to occur in this region where humans and animal life has been lost in the past.</p> <p>We request you to consider the above mentioned problems which will be faced by humans as well as environment while approving the proposed project.</p>	<ul style="list-style-type: none"> • The RMP area doesn't involve any Eari/Grassing Land/kullam etc. • The land classification of RMP area as per the VAO's certificates are Dry/Wet and land use is either Vacant/Agricultural land under the possession of both government and private ownership • No fishing grounds are reported in the proposed areas for revised master Plan development • Comprehensive Biodiversity assessment (Marine, Brackish Water and Fresh Water Ecosystems) study has been carried out in and around the study area including fishery, Impacts have been identified and appropriate mitigation/management measures has been presented in the EIA report. • Flood Model study to understand the hydraulic behaviour of the Kosasthalaiyar River, Ennore Creek and their floodplains, to determine the flood paths along the proposed Kattupalli port expansion area is presented in Section 7.4 of Chapter 7. Suggested that the

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
			<p>existing open channel towards the western side and periphery of the port backup is recommended to be retained for mitigation of flooding in this area. The de-silting of this canal is also proposed to have a quick recession of flood water</p> <ul style="list-style-type: none"> • MIDPL will implement the canal strengthening activities • MIDPL RMP will not disturb the flow pattern of the Kosistalaiyar River and Buckingham canal and will strengthen the bund • MIDPL promoting Sustainable Livelihood Development in the region through Livelihood restoration programmes under CSR activities • MIDPL is also committed to carry out comprehensive CSR programs in the areas of Education, Community Health, Sustainable Livelihood opportunities and Rural Infrastructure Development in the region. The aim is to walk with the communities, help people look ahead, make the right choices and secure a bright and beautiful future, together.
7.	Thirumalai Nagar Fisherman Panchayat Sabha, Pulicat (Post)-	The project site shown by Adani port project is the region formed between sea and river area.	<ul style="list-style-type: none"> • Present land use is Sea, Intertidal area,

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
	601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India	<p>The project site naturally comprised of sand dunes, <i>Spinifex literus</i>, mangrove forest, springs & brine (salt) pits, marsh lands. This place is a living habitat for birds. Protection of these above mentioned areas will help in conservation of Pulicat lake.</p> <p>There are hundreds of fisher folks & villages dependent on Pulicat lake and sea. The site shown for Adani port is very important for fishing and fishing reproductive cycle which is essential for us a fisherman. Under the Coastal Regulation Zone notification order 2011, coastal zone management plan has to be prepared for the project. The plan should clearly show the fish hatcheries and fish breeding grounds, but this information is not depicted or registered up to date. Since this information is not registered legally, permission should not be granted for his project.</p> <p>we fisher man would like to bring to your attention that because of Adani port plan, Pulicat lake and natural sand dunes located near the sea areas will be adversely affected. The project site which has been selected is very important for the fisherman living around the site, so we request you to relocate the project site.</p>	<p>Sandy area/beach, Abandon salt pans, and Land with/without Scrub and Sparse Vegetation (<i>Prosopis juliflora</i> /Casuarina/Eucalyptus).</p> <ul style="list-style-type: none"> Proposed activities are approved under the CRZ notification 2011/2019 or approved CZMP. The drainage pattern of Ennore Creek, Pulicat lake and Buckingham Canal were studied and presented in Section 2.4.9 of Chapter 2. Baseline Drainage Pattern of Study Area is presented in Section 3.6.1.1 of Chapter 3. Impact and mitigation measures proposed on Existing Drainage Pattern in Section 4.3.2.3 of Chapter 4. Drainage Pattern and Catchment Area Analysis of Port Area are discussed in Section 7.4.5.2 and 7.4.5.3 of Chapter 7. Comprehensive Biodiversity assessment (Marine, Brackish Water and Fresh Water Ecosystems) study has been carried out in and around the study area including fishery, Impacts have been identified and appropriate mitigation/management measures has been presented in
8.	Light house Nadukuppam, Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
9.	Arangan Kupam Fisherman Panchayat Sabha, Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
10.	Nakkaturavu Fisherman Village Panchayat Sabha Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
11.	Tamilnadu Fisherman Association No:245, Annai Theresa street, sathan kuppam, Pulicat -601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
12.	Tiruvallur Mavatham Parambariya Ikyaa Meeenvara Sangam Registration No: 396/2010, No: 1A, Kottai Street, Near Fly over, Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India Email: tmpims2010@gmail.com		
13.	Korai Kuppam Fisherman Panchayat Association Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
14.	Pulicat Area Fisherman Association, Kottai Street, Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
15.	Thangal Perumbulam Panchayat, Sattangkuppam Fisherman Panchayat Sabha, Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
16.	Light house Kupam Taluk/ 13 Fisherman Villages Association in Coastal Side , Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
17.	FMC-109, Pettaipalli Kuppam, Sea Fisherman Cooperative Society, Pettai Pallikuppam, Pulicat (post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
18.	Kunang Kuppam Fisherman Panchay Sabha, Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		<p>the EIA report.</p> <ul style="list-style-type: none"> • Patches of Mangroves are observed in Ennore creek, Kosisttalaiyar river (connecting Ennore creek and Pulicat lake), mouth of the Buckingham canal and Pulicat lake region of the study area. These mangroves are scattered and MIDPL has excluded these mangroves areas from the port activity and will also implement the mangrove conservation measures. Mangrove Management Plan has been prepared as part of Biodiversity Assessment and presented in EIA. • MIDPL RMP will not disturb the flow pattern of the Kosisttalaiyar River and Buckingham canal and will strengthen the bund • MIDPL promoting Sustainable Livelihood Development in the region through Livelihood restoration programmes under CSR activities • MIDPL is also committed to carry out comprehensive CSR programs in the areas of Education, Community Health, Sustainable Livelihood opportunities and Rural Infrastructure
19.	Vairavan Kuppam South, Dr. Ambedkar Adidravida Fisherman Sabha, Vairavan Kuppam, Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
20.	Vairavan Kuppam Village Mahasabha, Arani Amman Koyil Street, Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
21.	Vairavan Kuppam Fisherman Panchayat Sabha, Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
22.	Karimanal Kuppam fisherman Panchayat Sabha, Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
23.	Kalangerai Villakam (L.H. Kuppam), Adidravida Fisherman Village Mahasabha, Reg No: J.J.247, Light house, Pulicat-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		
24.	Sembasipalli Kuppam Village Panchayat Sabha, Pulicat (Post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India		

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
			Development in the region. The aim is to walk with the communities, help people look ahead, make the right choices and secure a bright and beautiful future, together.
Representations received in English Language			
1.	Pasiyavaram Kuppam Fisherman Panchayat Association Pulicat (post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India – dated on 06.08.2019	More than one lakh fisherfolk and farmers of the public-Ennore area are in deep distress on hearing that the EAC (Infra 2) and the Sub-Committee that visited our area has recommended for the granting of TOR for the development of the Katupalli Port that will destroy our life and livelihoods. We call your attention to the following:	<ul style="list-style-type: none"> • Present land use is Sea, Intertidal area, Sandy area/beach, Abandon salt pans, and Land with/without Scrub and Sparse Vegetation (<i>Prosopis juliflora</i> /<i>Casuarina</i>/<i>Eucalyptus</i>). • Additional ToR study were prescribed by the committee after the site visit viz. Three season data on coastal region as well as estuarine region, protection of general ecosystem of Kosastaliyar Estuary, Biodiversity of Estuary and Coastal Areas, Socio-Economic Study of the Surrounding villages, detailed study on drainage pattern within and outside port area, impact of proposed port on fragile barrier island of Pulicat Lake etc. All these components have been comprehensively studied, outcomes have been analyzed and presented in EIA Report. • Comprehensive
2.	Korai Kuppam Fisherman Panchayat Association Pulicat (post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India – dated on 06.08.2019	<ul style="list-style-type: none"> • The fishing villages of Goonankuppam, VairavanKuppam, sattankuppam, KoraiKuppam, Lighthouse Nadukuppam, KadalKanniyur, Kattupalli, Kalanji, Karungali, Arangankuppam, Thirumalai Nagar, sembaspalli kuppam, Edamani kuppam are all fully dependent on the near shore waters that this project wants to reclaim. 	
3.	Sathan Kuppam Fisherman Panchayat Association Pulicat (post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India – dated on 06.08.2019	<ul style="list-style-type: none"> • Most of our fishing areas are slotted to be destroyed by this project. Decline of fishing grounds will leave the entire fishing community in the lurch, with no alternate livelihoods. Further, any damage to Pulicat Lake will affect fisherfolk from more than 45 villages. 	
4.	Edamani Kuppam Fisherman Panchayat Association Pulicat (post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India – dated on 06.08.2019	<ul style="list-style-type: none"> • More than 80% of the project is proposed in areas where no industrial development has materialised so far 	
5.	Thiruvallur mavata parambariya ikya meenavara sangam registration No: 396/2010, No: 1A, Kottai street, Near fly over, Pulicat (post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India Email: tmpims2010@gmail.com - dated on 06.08.2019	<ul style="list-style-type: none"> • Due to the presence of two ports on the area, our coastline is already under severe stress of erosion. • The rate of erosion towards Pulicat Lake will increase significantly if another port is built on the Ennore coastline. There is a risk of sand bar separating Pulicat Lake and Bay of Bengal eroding, resulting in massive sea level rise that will swallow the islands on Pulicat Lake, where many 	
6.	Light house kuppam urachi/ 13 fisherman village association in coastal side ponneri vattam, Pulicat (post)-		

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
	601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India - dated on 06.08.2019	habitations are situated. In the absence of a long term housing plan, our safety is at risk.	Biodiversity assessment (Marine, Brackish Water and Fresh Water Ecosystems) study has been carried out in and around the study area including fishery, Impacts have been identified and appropriate mitigation/management measures has been presented in the EIA report. SDMRI
7.	Kattupalli Kuppam Fisherman Panchayat Association Kattupallikuppam, North Chennai Themal PP(S.O) 600120 Ponneri Taluk, Tiruvallur District, Tamilnadu, India - dated on 06.08.2019	<ul style="list-style-type: none"> The sand dunes in Kattupalli and Kalanji villages act as a buffer, protecting the areas and groundwater inland. Now, the port proposes to flatten many acres of sand dunes, exposing the habitations here to extreme affects of natural weather events like cyclones, tsunami etc. 	In the biodiversity study area four fishing village are assessed. They are Vairavankuppam, Koraikuppam, Kadalkannikuppam and Kattupalli, whereas Karungali, which is situated in between Kattupalli and Kadalkannikuppam was used by few fishermen from Kattur region for their fishing activities particularly in the Kosasthalaiyar river. These villages are situated from north to centre region of the study area
8.	Pulicat Area Fisherman Association Kottai street, Pulicat-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India - dated on 06.08.2019	<ul style="list-style-type: none"> Allowing the sea to move inland into Pulicat lake and into the groundwater will greatly affect inland fresh water aquifers that will lead to the collapse of freshwater resources in the district. 	
9.	Vairavan Kuppam Fisherman Panchayat Association Pulicat(post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India	<ul style="list-style-type: none"> Thousands of farming communities are located in the western side of the backwater, fully dependent on the fresh water resources for agriculture. Salinisation of ground water will lead to a collapse in the agrarian economy in the district. 	
10.	Kalanganrai villakam (L.H. Kuppam), Adidravida fisherman village mahasabha Reg No: J.J. 247, kalanganrai villakam, Pulicat -601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India - dated on 06.08.2019	<ul style="list-style-type: none"> Building of low-lying areas like the lagoon, salt pans, mudflats etc. will also alter the overall drainage of the area, making it incapable to handle the massive amounts of flood waters brought in by Araniyar and Kosasthalaiyar rivers. 	
11.	Karimanal Kuppam fisherman panchayat sabha Pulicat -601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India- dated on 06.08.2019	Despite raising these points to EAC Infra-2 and the Sub-Committee, who have noted these points as observations in the report submitted and subsequent meeting minutes, the EAC has recommended the project for TOR.	
12.	Light House Nadu Kuppam Fisherman Panchayat Association Pulicat (post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India - dated on 06.08.2019	The EAC has no jurisdiction to assess the impact or permit developmental activity that erases sand dunes, wetlands, lakes and intertidal areas. We fear that the EAC has succumbed to the pressure of the project proponent and is unable to expertise with independence.	<ul style="list-style-type: none"> The fishermen employ mostly FRP boats fixed with outboard engine. Nearly 269 motorized fibre boats are operated for fishing from these fishing villages
13.	Nakkaturavu fisherman village panchayat sabha Pulicat (post)-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India - dated on	We request the MoEFCC to- <ol style="list-style-type: none"> Reject the Recommendation of the EAC (Infra 2) regarding grant of TOR for this project Refrain from granting final TORs for 	<ul style="list-style-type: none"> No fishing grounds are reported in the proposed areas for revised master Plan

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
	06.08.2019		development
14.	Goonan Kuppam Fisherman Panchayat Association Pulicat (post)-601205, Ponneri Taluk, Tiruvallur istrict, Tamilnadu, India - dated on 06.08.2019	3. Recognize the environmental sensitivity of this area, and declare the Pulicat - Ennore coast coast and wetlands as a no development zone 4. Direct the project proponent to withdraw the application in the current site	<ul style="list-style-type: none"> Shoreline Change Prediction was carried out and presented in detail in 4.2.3.5 of Chapter 4. Numerical model studies on Shoreline Changes/ Shoreline Evolution Study were detailed in Section 4.2.1.3 or Chapter 4. Shoreline Management during port operation phase is detailed in Section 4.2.3.6 of Chapter 4. Details of Shoreline change Management Plan are given in Section 4.2.3.6 of Chapter 4. It is observed that, the tendency of erosion and deposition is decreasing, towards northern side while moving from Kattupalli Port towards Pulicat Creek The area where mouth of Pulicat Creek is located, the sand deposition is more in this particular stretch of coastline than the erosion The area just north of Pulicat Creek is more dynamic. The shoreline is more-or-less stable The model results with the proposed master plan and without any shoreline protection measures indicates shoreline erosion up to 1 km on the northern side of the
15.	Arangam Kuppam Fisherman Panchayat Association Pulicat (post)-601205, Ponneri Taluk, Truvallur District, Tamilnadu, India - dated on 06.08.2019		
16.	Tamilnadu Fishermen's Association No.245, Mother Theresa Street, Sattankuppam Village, Pazhaverkadu-601205, Ponneri Taluk, Tiruvallur District, Tamilnadu, India Cell: 9840692057 Email: mahendran151@gmail.com - dated on 06.08.2019		
17.	Sembasipalli Kuppam Fisherman Panchayat Association Pulicat (post)-601205, Pon`neri Taluk, Truvallur District, Tamilnadu, India - dated on 06.08.2019		
18.	Thirumalai Nagar Fisherman Panchayath Association Pulicat (post)-601205, Ponneri Taluk, Truvallur District, Tamilnadu, India -		

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
			<p>port with an erosion rate of 8m/year</p> <ul style="list-style-type: none"> • Shoreline Management Plans are being proposed • Following the implementation of beach fill and groyne field, the rate of erosion is reduced to 3.6 m/year • The erosion of extent is limited to 3km north of the proposed groyne field along with beach fill. Thereafter the coastline is stable and not subjected to any erosion. The Pulicat lake is further 7 km north from the erosion region hence, it will have no impact either from the proposed Master plan development or from the proposed shoreline protection measures (beach fill and groyne field). The groyne field will also help to keep the nourished material on the beach during extreme weather conditions such as tsunami and cyclones. • The drainage pattern of Ennore Creek, Pulicat lake and Buckingham Canal were studied and presented in Section 2.4.9 of Chapter 2. Baseline Drainage Pattern of Study Area is presented in Section 3.6.1.1 of Chapter 3. Impact and mitigation

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
			<p>measures proposed on Existing Drainage Pattern in Section 4.3.2.3 of Chapter 4.</p> <ul style="list-style-type: none"> • Drainage Pattern and Catchment Area Analysis of Port Area are discussed in Section 7.4.5.2 and 7.4.5.3 of Chapter 7 suggested that the existing open channel towards the western side and periphery of the port backup is recommended to be retained for mitigation of flooding in this area. The de-silting of this canal is also proposed to have a quick recession of flood water • MIDPL will implement the canal strengthening activities • MIDPL RMP will not disturb the flow pattern of the Kosisttalaiyar River and Buckingham canal and will strengthen the bund • Proposed activities are approved under the CRZ notification • MIDPL promoting Sustainable Livelihood Development in the region through Livelihood restoration programmes under CSR activities • MIDPL is also committed to carry out comprehensive CSR programs in the areas of Education, Community Health,

S. No	Name/Organization and Place of Speaker/Representation	Public View or Comments	Response of MIDPL
			Sustainable Livelihood opportunities and Rural Infrastructure Development in the region. The aim is to walk with the communities, help people look ahead, make the right choices and secure a bright and beautiful future, together.

APPENDIX F
BASELINE MONITORING RESULTS

Appendix F Baseline Monitoring Results

F.1 Soil Quality Monitoring Results

Soil quality monitoring results are given in Table F-1.

Table F-1: Soil Quality Monitoring Results

S.NO	PARAMETER	UNITS	Pre-Monsoon		Winter		Summer	
			Max	Min	Max	Min	Max	Min
1.	Texture	-						
	Clay	%	18	12	15	10	19	11
	Sand	%	68	56	70	59	69	57
	Silt	%	27	18	26	18.5	24	18
2.	pH		8.56	6.69	7.969	7.01	8.20	7.31
3.	EC	μMohs/Cm	310	29.72	298	48.6	328	110
4.	Exchangeable Sodium	mg/Kg	131	109	127	102	138	95.5
5.	Exchangeable Potassium	Kg/ha	220	199	214	193	239	186
6.	Total Nitrogen	Kg/ha	132	112	128	108	138	106
7.	Sodium absorption Ratio (SAR)	-	0.311	0.252	0.294	0.236	0.281	0.24
8.	Bulk density	gm/cc	1.22	1.16	1.27	1.19	1.31	1.14
9.	Cation exchange capacity	meq/100gm	1.63	1.51	2.57	1.46	1.65	1.54
10.	Permeability	Cm/s	0.0000258	0.0000198	0.000025	0.0000187	0.0000236	0.0000191
11.	Water Holding Capacity	%	59.6	28.6	54.09	25.4	48.5	27.5
12.	Porosity	%	45.2	32.1	48.1	35.4	45.6	33.1
13.	Cadmium as Cd	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
14.	Chromium as Cr	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
15.	Copper as Cu	mg/kg	7.71	1.98	3.2	2.1	8.6	3.9
16.	Manganese as Mn	mg/kg	24.3	11.6	3.03	2.11	3.16	2.39
17.	Lead as Pb	mg/kg	17.2	10.1	11.4	8.9	10.6	7.3
18.	Zinc as Zn	mg/kg	2.6	1.1	1.496	0.66	2.92	1.35
19.	Nickel as Ni	mg/kg	6.8	2.05	2.3	1.4	2.3	1.2

F.2 Surface Water Monitoring Results

Surface water quality monitoring results are given in **Table F-2**.

Table F-2: Surface Water Monitoring Results

S.N O	PARAMETERS	UNIT	PRE MONSOON		WINTER		SUMMER		SW QUALITY STANDAR DS AS PER IS: 2296- CLASS- C
			MAX	MIN	MAX	MIN	MAX	MIN	
Physical Parameters									
1	Colour	Hazen	15.6	10.1	16.2	12.6	14.8	11.6	300
2	Odour	-	Agreeable						-
3	Turbidity	NTU	50.5	4.5	49.6	5.1	41.9	4.56	-
4	pH	-	7.05	6.96	6.98	6.96	6.82	6.71	6.5 to 8.5
5	Temperature	°C	31.8	30.1	30.8	30.4	31.3	31.1	-
6	Electrical Conductivity	µmhos/cm	46820	8310	46249	8202	48256	8225	2250
7	Total Solids	mg/l	28213	5065	27853	4988	27922	4930	-
8	Total Dissolved Solids	mg/l	28091	5023	27731	4946	27904	4919	1500
9	Salinity	ppt	29.3	0.4	29	4.01	29.9	4.17	-
Chemical Parameters									
10	Total Alkalinity as CaCO ₃	mg/l	324	140	308	128	325	158	-
11	Total Hardness as CaCO ₃	mg/l	5600	2090	5538	2072	5507	2176	-
12	Calcium as Ca	mg/l	401	176	395	174	415	189	-
13	Magnesium as Mg	mg/l	1118	401	1106	398	1086	414	-
14	Chlorides as Cl	mg/l	16249	2251	16108	2225	16325	2310	600
15	Fluorides as F	mg/l	1.26	1.03	1.18	0.99	1.11	0.95	1.5
16	Nitrates as NO ₃	mg/l	4.66	4.08	4.02	3.75	4.29	3.98	50
17	Sulphates as SO ₄	mg/l	1775	774	1683	758	1758	778	400
18	Iron as Fe	mg/l	0.11	0.08	0.1	0.07	0.11	0.09	50
19	Free Residual Chlorine	mg/l	BDL (DL: 0.1)						-
20	Copper as Cu	mg/l	BDL (DL: 0.01)						1.5
21	Manganese as Mn	mg/l	BDL (DL: 0.01)						-
22	Sodium as Na	mg/l	8090	1010	8002	992	7925	948	-
23	Potassium as K	mg/l	267	57.4	254	55.6	272	57.2	-
24	Phenolic Compounds as C ₆ H ₅ OH	mg/l	BDL (DL: 0.005)						0.005
25	Total Nitrogen	mg/l	BDL (DL: 0.1)						-
26	Total Phosphorous	mg/l	BDL (DL: 1.54)						-
27	Free Ammonia as NH ₄	mg/l	BDL (DL: 0.1)						-

S.N O	PARAMETERS	UNIT	PRE MONSOON		WINTER		SUMMER		SW QUALITY STANDAR DS AS PER IS: 2296- CLASS- C
			MAX	MIN	MAX	MIN	MAX	MIN	
28	Anionic Detergents (as MBAS)	mg/l	BDL (DL: 0.001)						1.0
29	Zinc as Zn	mg/l	BDL (DL: 0.01)						15
30	Selenium as Se	mg/l	BDL (DL: 0.01)						0.05
31	Cadmium as Cd	mg/l	BDL (DL: 0.01)						0.01
32	Cyanide as CN	mg/l	BDL (DL: 0.01)						0.05
33	Lead as Pb	mg/l	BDL (DL: 0.01)						0.1
34	Mercury as Hg	mg/l	BDL (DL: 0.01)						-
35	Total Arsenic as As	mg/l	BDL (DL: 0.01)						0.2
36	Hexavalent Chromium as Cr6+	mg/l	BDL (DL: 0.01)						0.05
37	Dissolved Oxygen as DO	mg/l	7	6.3	6.8	6.5	6.7	6.6	4.0
38	Chemical Oxygen Demand as COD	mg/l	142	36.1	158	30.2	140	25.1	-
39	Biochemical Oxygen Demand at 27°C for 3days.	mg/l	9.5	8.6	10.4	7.1	9.51	6.25	3.0
Bacteriological Parameters									
40	Total Coliforms	MPN/100 ml	75	63	39	23	28	18	5000
41	Faecal Coliforms	MPN/100 ml	BDL						-

F.3 Groundwater Quality Monitoring

Groundwater quality monitoring results for the study period is given in **Table F-3**.

Table F-3: Groundwater Monitoring Results

S.NO	PARAMETERS	UNIT	PRE MONSOON		WINTER		SUMMER		IS 10500:2012 DRINKING WATER SPECIFICATIONS	
			MAX	MIN	MAX	MIN	MAX	MIN	AL	PL
Physical Parameters										
1	Colour	Hazen	1.64	1.21	1.61	1.19	1.48	1.06	5	15
2	Odour	-	Agreeable						Agreeable	Agreeable
3	Turbidity	NTU	BDL (DL: 0.01)						1	5
4	pH	-	7.94	7.02	7.88	7.11	7.79	7.26	6.5 to 8.5	No relaxation
5	Temperature	°C	31.6	30.8	31.4	30.9	31.9	31.6	-	-
6	Electrical Conductivity	µmhos/cm	1015	164	975	159	866	258	-	-
7	Total Solids	mg/l	611	106	583	102	510	170	-	-
8	Total Dissolved Solids	mg/l	540	101	515	98	489	158	500 Max	2000 Max
9	Salinity	ppt	0.71	0.04	0.66	0.03	0.76	0.35		
Chemical Parameters										
10	Total Alkalinity as CaCO ₃	mg/l	123	62.6	112	56.2	124	65.1	200	600
11	Total Hardness as CaCO ₃	mg/l	208	70.1	198	65.5	230	89.1	200	600
12	Calcium as Ca	mg/l	48.5	19.4	46.2	18.2	51.6	24.8	75	200
13	Magnesium as Mg	mg/l	21.2	5.25	20.4	4.88	24.5	6.59	30	100
14	Chlorides as Cl	mg/l	195	23.9	188	21.4	194	26.8	250	1000
15	Fluorides as F	mg/l	0.64	0.42	0.61	0.41	0.63	0.45	1	1.5
16	Nitrates as NO ₃	mg/l	4.13	1.89	3.72	1.78	4.26	2.24	45	No relaxation
17	Sulphates as SO ₄	mg/l	107	10.8	101	9.6	118	15.6	200	400
18	Iron as Fe	mg/l	0.21	0.04	0.19	0.03	0.16	0.06	1.0	No relaxation
19	Free Residual Chlorine	mg/l	BDL (DL: 0.1)						0.2	1
20	Copper as Cu	mg/l	BDL (DL: 0.01)						0.05	1.5
21	Manganese as Mn	mg/l	BDL (DL: 0.01)						0.1	0.3
22	Sodium as Na	mg/l	210	7.89	201	6.63	184	10.3	-	-
23	Potassium as K	mg/l	9.54	0.95	8.32	0.91	6.98	1.21	-	--
24	Phenolic Compounds as C ₆ H ₅ OH	mg/l	BDL (DL: 0.005)						0.001	0.002
25	Total Nitrogen	mg/l	BDL (DL: 0.1)						-	-
26	Total Phosphorous	mg/l	BDL (DL: 0.01)						-	-
27	Free Ammonia as NH ₄	mg/l	BDL (DL: 0.1)						0.5	
28	Anionic Detergents (as MBAS)	mg/l	BDL (DL: 0.001)						0.2	1
29	Zinc as Zn	mg/l	BDL (DL: 0.01)						5	15
30	Selenium as Se	mg/l	BDL (DL: 0.01)						0.01	No relaxation
31	Cadmium as Cd	mg/l	BDL (DL: 0.01)						0.003	No relaxation
32	Cyanide as CN	mg/l	BDL (DL: 0.01)						0.05	No relaxation

S.NO	PARAMETERS	UNIT	PRE MONSOON		WINTER		SUMMER		IS 10500:2012 DRINKING WATER SPECIFICATIONS	
			MAX	MIN	MAX	MIN	MAX	MIN	AL	PL
33	Lead as Pb	mg/l	BDL (DL: 0.01)						0.01	No relaxation
34	Mercury as Hg	mg/l	BDL (DL: 0.01)						0.001	No relaxation
35	Total Arsenic as As	mg/l	BDL (DL: 0.01)						0.01	0.05
36	Hexavalent Chromium as Cr6+	mg/l	BDL (DL: 0.02)						-	-
37	Dissolved Oxygen as DO	mg/l	6.9	6.1	6.7	6.2	6.8	6.4	-	-
38	Chemical Oxygen Demand as COD	mg/l	BDL (DL: 10.1)						-	-
39	Biochemical Oxygen Demand at 27°C for 3days.	mg/l	BDL (DL: 3.1)						-	-
Bacteriological Parameters										
40	Total Coliforms	MPN/100ml	7	BDL					Shall not be detectable in any 100 ml sample	
41	Faecal Coliforms	MPN/100ml	BDL						-	-

AL-Acceptable Limit

PL-Permissible Limit in the absence of Alternate source

F.4 Marine Water and Sediment Quality Monitoring Results

Marine Water Quality Monitoring Results are given from **Table F-4** to **Table F-32**.

Table F-4: Seasonal Variations in Water Physico-chemical parameters

Sl No.	Location Code	Temperature (°C)			Salinity (‰)			pH			Turbidity (NTU)			TSS (mg/l)		
		M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
1	MSL1	29.7	29.8	30.17	31	33	33.8	8.06	7.76	8.21	5.83	2.51	4.06	86.2	105.6	115.3
2	MSL1SS	29.3	29.3	30.08	31	34	33.6	8.1	7.92	8.26	6.52	3.43	4.48	106.8	112.2	118.6
3	MSL2	29.6	29.9	30.24	32	33	34.3	8.16	7.83	8.16	5.12	1.83	4.53	99	121.4	82.5
4	MSL2SS	29.3	29.2	30.11	32	34	33.9	8.22	8.03	8.18	6.24	2.82	4.78	122.5	126.4	89.9
5	MSL3	29.6	29.7	30.26	32	33	34.5	8.32	7.78	8.04	7.15	2.24	4.79	103.8	112.6	102.8
6	MSL3SS	29.4	29.3	30.13	32	33	34.3	8.38	7.95	8.07	7.94	3.78	4.86	132.6	108.4	104.7
7	MSL4	29.5	29.9	30.15	31	33	34.2	8.06	7.91	8.13	7.14	8.66	4.82	116.8	113.5	108.4
8	MSL4SS	29.2	29.4	30.05	32	34	34.1	8.14	8.13	8.15	8.23	9.08	5.33	130.5	116.5	110.6
9	MSL5	29.3	29.7	30.22	32	34	34.4	8.28	7.74	8.04	4.86	3.05	4.15	76.5	103.6	132.4
10	MSL5SS	29.0	29.2	30.19	32	35	34.3	8.32	7.96	8.07	5.24	5.11	4.57	94.6	110.1	130.6
11	MSL6	29.7	29.8	30.31	32	33	34.1	8.02	7.84	8.09	5.06	2.16	5.86	83.6	98.6	128.6
12	MSL6SS	29.3	29.5	30.14	32	34	33.9	8.1	8.05	8.11	6.15	4.72	4.36	94.6	101.7	133.2
13	MSL7	29.4	29.8	30.35	31	33	34.2	8.3	7.95	8.11	5.37	4.08	5.24	76.8	86.4	116.3
14	MSL7SS	29.1	29.4	30.22	32	34	34.1	8.28	8.12	8.18	5.19	5.79	6.1	102.4	98.5	116.9
15	MSL8	29.6	29.9	30.28	32	33	34.1	8.22	7.89	7.99	4.94	2.89	4.22	86.7	106.5	98.5
16	MSL8SS	29.1	29.4	30.11	32	34	34	8.28	8.17	8.06	6.38	4.04	4.59	94.2	110.3	101.5
17	MSL9	29.4	29.7	30.31	32	33	34.2	8.12	7.96	8.13	5.24	2.52	4.16	93.7	91.5	106.7
18	MSL9SS	29.0	29.5	30.2	32	34	34.3	8.1	8.05	8.18	7.24	5.1	4.34	105.8	86.4	109.4
19	ITL10	30.4	30.2	32.86	33	35	34.1	8.02	7.76	8.08	6.87	6.24	6.34	124.6	130.4	154.5
20	ITL10SS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	ITL11	30.5	30.1	32.56	33	34	34.1	8.06	7.89	8.14	5.44	3.45	5.48	115.3	120.7	128.61
22	ITL11SS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SI No.	Location Code	Temperature (°C)			Salinity (‰)			pH			Turbidity (NTU)			TSS (mg/l)		
		M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
23	BERTH 3	29.8	29.9	33.42	31	33	33.5	8.24	7.76	8.07	5.57	1.85	5.22	96.1	132.3	110.5
24	BERTH 3SS	29.4	29.5	33.12	32	34	33.4	8.3	7.86	8.11	6.83	3.47	6.12	113.4	164.8	113.4
25	CB-1	29.9	30.2	33.27	31	33	34	8.16	7.72	8.06	5.38	2.78	5.36	87.5	122.6	119.3
26	CB-1SS	29.5	29.6	33.04	32	33	33.8	8.24	7.94	8.02	6.26	3.46	6.43	108.4	154.5	126.7

M-Monsoon, PM- Post Monsoon, S-Summer.

Table F-5: Seasonal Variations in Water Nutrient parameters-1

SI No.	Location Code	Parameters (µmol/l)																							
		DO			BOD			NO2			NO3			NH4			TN			IP			TP		
		M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
1	MSL1	5.11	5.82	5.33	2	1.6	1.4	1.47	1.66	1.06	3.05	3.16	3.21	0.031	0.035	0.025	18.79	19.45	15.42	1.24	1.04	0.62	2.56	2.98	2.04
2	MSL1SS	4.89	5.94	5.21	2.3	1.4	1.5	1.54	1.76	1.12	3.29	3.34	3.32	0.034	0.036	0.029	19.06	19.89	15.67	1.25	1.15	0.68	2.87	3.06	2.07
3	MSL2	5.23	5.45	5.61	1.9	1.3	1.3	1.53	1.43	1.12	2.68	2.98	3.16	0.02	0.024	0.022	17.37	16.72	14.52	1.26	1.15	0.57	2.81	3.48	1.78
4	MSL2SS	5.07	5.37	5.44	2.1	1.5	1.5	1.61	1.53	1.18	2.84	3.06	3.25	0.026	0.027	0.031	17.53	17.14	14.74	1.28	1.22	0.63	2.96	3.52	1.85
5	MSL3	5.73	5.26	5.58	1.6	1.5	1.3	1.74	1.86	1.24	3.37	3.53	3.24	0.041	0.044	0.026	20.69	21.62	16.73	1.31	0.94	0.54	2.16	2.26	1.88
6	MSL3SS	5.51	5.62	5.42	1.7	1.7	1.4	1.86	2.06	1.28	3.64	3.83	3.33	0.044	0.047	0.029	20.88	22.32	16.94	1.35	0.99	0.58	2.24	2.31	1.93
7	MSL4	5.32	5.66	6.66	1.8	1.4	1.1	1.45	1.27	1.24	2.48	2.74	3.42	0.026	0.023	0.026	16.54	15.06	17.31	1.21	1.46	0.71	2.86	3.81	1.67
8	MSL4SS	5.01	5.21	6.58	2.1	1.5	1.3	1.53	1.35	1.31	2.69	2.83	3.46	0.028	0.024	0.029	16.87	15.27	17.55	1.25	1.45	0.73	2.94	3.92	1.74
9	MSL5	5.84	5.47	5.86	1.6	1.6	1.3	1.63	1.79	1.39	2.93	2.84	2.35	0.027	0.037	0.021	18.72	20.34	16.84	1.22	0.99	0.67	2.7	2.73	1.92
10	MSL5SS	5.76	5.4	5.63	1.6	1.8	1.5	1.72	1.92	1.46	3.06	3.02	2.43	0.029	0.038	0.028	19.22	21.82	17.32	1.26	1.12	0.71	2.84	2.89	1.95
11	MSL6	4.97	5.26	6.34	2.2	1.1	1.2	1.23	1.53	1.17	2.64	2.86	2.35	0.025	0.027	0.019	15.82	17.36	15.39	1.06	1.06	0.58	2.23	3.31	2.02
12	MSL6SS	4.77	5.17	6.1	2.4	1.3	1.4	1.38	1.64	1.24	2.83	2.97	2.39	0.026	0.029	0.022	16.46	18.05	15.84	1.21	1.14	0.62	2.49	3.45	2.08
13	MSL7	6.1	5.62	6.08	1.2	1.2	1.2	1.76	1.58	1.28	3.06	2.92	2.76	0.033	0.031	0.025	17.64	18.96	17.53	1.31	1.06	0.63	2.31	3.07	1.94
14	MSL7SS	5.82	5.32	5.87	1.6	1.5	1.3	1.54	1.66	1.34	3.25	3.06	2.98	0.037	0.038	0.031	18.42	19.05	17.69	1.37	1.22	0.67	2.52	3.18	1.99
15	MSL8	5.68	5.23	5.94	1.5	1.2	1.3	1.59	1.93	1.41	2.93	3.16	2.68	0.031	0.042	0.28	15.36	21.41	14.55	1.28	0.97	0.61	2.45	2.17	2.06
16	MSL8SS	5.43	5.19	5.86	1.7	1.4	1.5	1.66	2.1	1.46	3.18	3.66	2.79	0.033	0.045	0.34	16.73	22.34	14.89	1.3	1.06	0.62	2.56	2.06	2.1

SI No.	Location Code	Parameters (µmol/l)																							
		DO			BOD			NO2			NO3			NH4			TN			IP			TP		
		M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
17	MSL9	4.82	5.72	5.68	2.3	1.3	1.4	0.82	1.5	1.25	2.24	2.73	2.46	0.023	0.029	0.031	13.97	18.36	15.83	0.99	1.14	0.66	1.97	3.28	1.84
18	MSL9SS	4.76	5.61	5.54	2.4	1.6	1.7	1.12	1.59	1.31	2.67	2.92	2.52	0.024	0.031	0.035	14.64	18.49	16.12	1.04	1.17	0.7	2.21	3.35	1.93
19	ITL10	5.23	5.13	5.02	1.9	1.4	1.3	1.28	0.86	1.3	1.89	2.34	1.96	0.023	0.019	0.021	15.66	13.83	14.76	0.89	0.46	0.98	1.92	1.48	2.17
20	ITL10SS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	ITL11	5.52	5.19	5.22	1.5	2	1.5	1.1	1.45	1.06	1.87	1.75	2.2	0.024	0.021	0.016	14.68	14.89	13.33	1.06	1.02	0.52	2.39	2.04	1.43
22	ITL11SS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	BERTH 3	4.89	5.18	5.36	2.3	1.8	1.6	1.45	1.4	1.31	2.33	2.64	2.93	0.023	0.025	0.024	13.86	15.46	18.26	1.16	1.26	0.74	2.67	3.51	2.06
24	BERTH 3SS	4.52	4.83	5.22	2.5	2.2	1.9	1.69	1.56	1.37	2.51	2.83	3.06	0.028	0.026	0.028	14.52	16.37	18.64	1.21	1.3	0.82	2.84	3.72	2.12
25	CB-1	5.06	5.28	5.28	2	1.7	1.8	1.22	1.31	1.35	2.16	2.34	2.76	0.024	0.022	0.026	14.37	14.87	17.95	1.2	1.31	0.81	2.74	3.54	2.11
26	CB-1SS	4.76	4.98	5.14	2.4	1.9	2.2	1.34	1.46	1.43	2.38	2.59	2.95	0.027	0.024	0.03	15.07	15.04	18.25	1.24	1.33	0.86	2.92	3.65	2.16

Table F-6: Seasonal Variations in Water Nutrient parameters-2

SI No.	Location Code	Parameters (µmol/l)						Parameters (µg/l)					
		SiO3			POC			PHC					
		M	PM	S	M	PM	S	M	PM	S			
1	MSL1	36.59	37.92	31.06	86	116	114	BDL	BDL	BDL			
2	MSL1SS	37.17	38.34	33.55	95	120	117	BDL	BDL	BDL			
3	MSL2	37.23	35.78	24.89	114	126	111	BDL	BDL	BDL			
4	MSL2SS	38.15	36.05	26.52	117	129	114	BDL	BDL	BDL			
5	MSL3	38.33	40.75	33.44	116	132	116	BDL	BDL	BDL			
6	MSL3SS	39.46	42.56	35.83	122	135	119	BDL	BDL	BDL			
7	MSL4	34.58	34.37	31.64	108	130	117	BDL	BDL	BDL			
8	MSL4SS	35.29	34.51	32.08	113	135	119	BDL	BDL	BDL			
9	MSL5	37.45	38.56	30.58	113	122	115	BDL	BDL	BDL			
10	MSL5SS	38.07	39.64	32.61	118	126	119	BDL	BDL	BDL			
11	MSL6	32.54	36.1	33.1	98	120	117	BDL	BDL	BDL			

SI No.	Location Code	Parameters (µmol/l)			Parameters (µg/l)					
		SiO3			POC			PHC		
		M	PM	S	M	PM	S	M	PM	S
12	MSL6SS	33.72	36.43	34.55	104	124	120	BDL	BDL	BDL
13	MSL7	39.87	37.12	34.06	122	129	115	BDL	BDL	BDL
14	MSL7SS	40.26	37.52	34.27	128	133	118	BDL	BDL	BDL
15	MSL8	37.06	40.76	33.37	115	118	118	BDL	BDL	BDL
16	MSL8SS	38.55	41.76	33.85	119	121	120	BDL	BDL	BDL
17	MSL9	33.46	36.12	32.68	70	124	110	BDL	BDL	BDL
18	MSL9SS	34.52	36.52	34.05	84	128	115	BDL	BDL	BDL
19	ITL10	31.2	37.35	41.35	96	110	112	BDL	BDL	BDL
20	ITL10SS	0	0	0	0	0	0	0	0	0
21	ITL11	40.23	33.45	38.42	116	102	107	BDL	BDL	BDL
22	ITL11SS	0	0	0	0	0	0	0	0	0
23	BERTH 3	33.62	35.28	31.61	110	132	113	BDL	BDL	BDL
24	BERTH 3SS	34.64	35.46	32.48	116	136	117	BDL	BDL	BDL
25	CB-1	32.96	33.59	32.82	105	133	118	BDL	BDL	BDL
26	CB-1SS	34.03	33.32	33.51	109	138	121	BDL	BDL	BDL

Table F-7: Seasonal Variations in Water Heavy Metals - 1

SI No.	Location Code	Parameters (µg/l)														
		Cd			Cu			Fe			Pb			Zn		
		M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
1	MSL1	0.92	1.08	0.82	10.5	9.06	9.13	16.89	14.37	12.36	1.24	0.26	1.68	14.59	16.49	15.26
2	MSL1SS	1.02	1.23	1.03	11.6	10.5	9.48	17.45	15.72	12.75	1.46	0.28	2.07	14.76	16.88	15.88
3	MSL2	0.83	1.2	0.75	12.2	11.3	7.83	15.34	16.88	11.45	1.56	0.56	1.89	13.94	15.79	14.18
4	MSL2SS	0.86	1.81	0.83	12.6	11.7	8.42	16.05	17.19	11.68	1.73	0.55	2.15	14.33	16.34	15.22
5	MSL3	0.93	1.38	1.13	12.8	8.46	8.33	14.41	13.82	13.29	1.15	1.16	2.17	15.21	17.23	17.36
6	MSL3SS	0.98	1.49	1.18	13.2	9.13	8.69	14.62	14.62	13.88	1.27	1.19	2.44	15.66	18.06	17.95

SI No.	Location Code	Parameters (µg/l)														
		Cd			Cu			Fe			Pb			Zn		
		M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
7	MSL4	1.03	1.08	0.94	11.8	10.3	7.59	15.72	15.43	14.23	1.83	1.44	2.83	14.86	16.82	19.36
8	MSL4SS	1.15	1.23	1.06	12.1	10.7	8.34	16.37	16.07	14.86	1.95	1.63	3.05	15.17	17.94	19.71
9	MSL5	0.84	1.2	1.34	11.9	7.26	9.52	13.35	14.62	12.41	1.04	0.68	1.36	14.06	17.46	14.44
10	MSL5SS	0.86	1.41	1.4	12.3	8.27	9.79	14.43	15.4	12.66	1.16	0.81	1.55	14.49	17.83	15.26
11	MSL6	0.92	1.18	0.93	10.1	7.85	8.36	15.22	15.93	11.78	1.89	0.97	1.86	14.73	17.37	18.06
12	MSL6SS	0.98	1.39	1.01	10.6	8.26	8.84	15.58	16.27	12.05	2.04	1.04	2.17	15.06	18.37	18.48
13	MSL7	0.74	0.43	0.68	11.3	10.3	9.43	15.44	13.63	12.25	1.42	1.27	3.06	13.52	17.42	16.5
14	MSL7SS	0.79	0.82	0.76	12.1	10.8	9.85	16.35	14.41	12.56	1.51	1.31	3.27	13.77	17.65	16.82
15	MSL8	0.86	1.19	1.15	10.8	9.43	11.2	13.01	15.25	13.77	1.17	3.12	2.53	14.83	18.09	17.83
16	MSL8SS	0.96	1.59	1.25	11.1	9.98	11.4	14.83	15.44	13.95	1.21	3.07	2.79	15.17	18.53	18.05
17	MSL9	0.74	1.22	1.07	11.2	12.1	9.43	14.06	16.19	12.56	0.89	1.25	2.84	14.05	17.23	15.86
18	MSL9SS	0.83	1.54	1.12	12.1	12.3	9.87	14.15	16.93	12.81	1.08	1.46	2.96	14.44	17.65	16.61
19	ITL10	0.61	0.72	8.37	9.06	2.54	14.5	13.69	6.26	2.24	1.95	13.26	12.13	12.57	0.52	0.09
20	ITL10SS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	ITL11	2.06	1.76	8.36	8.46	2.01	15.1	11.26	9.17	0.44	1.22	10.45	16.86	12.39	1.34	0.14
22	ITL11SS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	BERTH 3	1.03	1.47	11.73	11.3	0.65	15.3	15.83	10.89	1.34	1.13	13.96	14.76	17.35	1.86	0.16
24	BERTH 3SS	1.14	1.89	12.03	12.5	0.69	15.8	16.52	11.46	1.48	1.33	14.23	15.12	18.16	2.21	0.2
25	CB-1	1.05	1.51	11.43	11.6	0.68	15.6	15.07	10.76	1.28	1.21	14.05	15.08	18.33	2.41	0.15
26	CB-1SS	1.18	1.69	11.81	12.3	0.74	16	15.56	11.03	1.36	1.38	14.22	15.43	18.56	2.56	0.19

Table F-8: Seasonal Variations in Water Heavy Metals - 2

SI No.	Location Code	Parameters (µg/l)											
		Hg			Ni			Mn			Cr		
		M	PM	S	M	PM	S	M	PM	S	M	PM	S
1	MSL1	0.14	0.12	0.25	1.26	1.24	1.43	26.52	21.59	24.57	2.11	1.68	2.16
2	MSL1SS	0.16	0.14	0.28	1.29	1.27	1.49	27.22	22.34	25.08	2.14	1.82	2.43
3	MSL2	0.11	0.14	0.28	1.2	1.25	1.33	28.56	21.48	23.46	1.89	1.76	1.89
4	MSL2SS	0.15	0.19	0.31	1.24	1.28	1.38	28.93	22.47	23.88	1.93	1.96	1.94
5	MSL3	0.16	0.17	0.19	1.33	1.29	1.5	31.33	23.95	26.22	2.06	2.24	2.53
6	MSL3SS	0.19	0.21	0.23	1.37	1.31	1.58	32.56	24.34	27.14	2.35	2.51	2.68
7	MSL4	0.18	0.16	0.27	1.21	1.27	1.32	33.28	24.08	25.82	2.37	2.06	1.94
8	MSL4SS	0.21	0.19	0.31	1.24	1.36	1.41	34.64	24.64	26.45	2.46	2.36	2.11
9	MSL5	0.15	0.11	0.3	1.16	1.16	1.45	28.55	23.78	26.72	2.16	1.96	2.53
10	MSL5SS	0.17	0.14	0.33	1.18	1.24	1.5	29.06	24.52	27.36	2.2	2.15	2.67
11	MSL6	0.11	0.13	0.19	1.14	1.21	1.57	27.94	23.67	28.03	1.86	2.04	2.77
12	MSL6SS	0.15	0.17	0.22	1.18	1.27	1.63	28.32	24.67	28.46	1.94	2.34	2.86
13	MSL7	0.12	0.15	0.25	1.24	1.26	1.32	27.58	21.93	23.59	2.05	1.96	2.34
14	MSL7SS	0.14	0.16	0.28	1.27	1.36	1.37	28.85	22.56	24.16	2.17	2.13	2.48
15	MSL8	0.12	0.17	0.18	1.25	1.12	1.52	30.34	20.94	25.69	1.95	1.64	2.16
16	MSL8SS	0.16	0.19	0.24	1.29	1.14	1.58	31.29	21.15	25.87	2.04	1.97	2.28
17	MSL9	0.11	0.14	0.23	1.28	1.17	1.42	28.5	24.56	26.19	2.13	1.84	2.43
18	MSL9SS	0.14	0.15	0.26	1.31	1.23	1.49	28.87	25.14	26.42	2.28	2.05	2.76
19	ITL10	0.11	15.46	1.16	1.11	0.13	22.53	24.21	1.06	1.72	1.83	21.15	1.57
20	ITL10SS	0	0	0	0	0	0	0	0	0	0	0	0
21	ITL11	0.17	13.24	1.25	1.34	0.15	20.64	22.34	1.23	1.68	1.59	21.63	1.33
22	ITL11SS	0	0	0	0	0	0	0	0	0	0	0	0
23	BERTH 3	0.18	18.06	1.22	1.29	0.21	28.36	25.79	1.51	2.47	2.73	27.15	2.72
24	BERTH 3SS	0.21	18.37	1.29	1.36	0.25	29.31	26.83	1.62	2.54	2.84	27.56	2.85
25	CB-1	0.17	17.86	1.3	1.3	0.18	27.92	25.34	1.54	2.51	2.53	26.92	2.76

26	CB-1SS	0.24	18.56	1.34	1.41	0.22	28.55	26.25	1.67	2.59	2.61	27.34	2.91
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Table F-9: Seasonal Variations in Sediment Heavy Metals - 1

SI No.	Location Code	Parameters (µg/l)														
		Cd			Cu			Fe			Pb			Zn		
		M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
1	MSL1	10.53	7.66	8.14	24.6	22.6	24.6	1650	1810	1780	6.58	5.34	6.35	18.21	27.63	24.35
2	MSL2	8.54	8.18	6.69	20.6	25.6	19.8	1840	1760	1690	6.23	6.52	7.06	22.43	24.14	20.81
3	MSL3	9.64	7.86	8.12	23.5	28.5	22.9	1720	1940	1810	5.73	6.32	6.74	20.19	29.18	25.08
4	MSL4	7.89	10.05	7.64	25.9	27.6	25.6	1580	1870	1780	6.49	6.67	7.16	19.45	29.56	27.06
5	MSL5	9.62	8.24	7.34	21.5	27.2	24.8	1640	1850	1870	5.33	5.57	6.49	24.56	23.39	21.36
6	MSL6	10.22	7.96	8.06	23	24.9	23.2	1490	1910	1830	4.59	4.29	5.98	23.49	26.25	23.49
7	MSL7	8.76	8.44	7.68	22.9	21.3	20.6	1630	1610	1690	6.23	6.26	6.49	26.88	24.48	20.53
8	MSL8	9.45	9.26	8.55	27.9	20.5	24.6	1740	1830	1720	5.19	5.82	5.94	23.16	25.34	19.34
9	MSL9	8.06	8.47	8.34	26.6	22.8	21.9	1550	1950	1760	4.98	6.37	6.18	22.38	23.63	22.91
10	ITL10	6.24	6.45	7.64	17.3	18.4	18.3	1630	1650	1810	6.18	5.86	4.26	17.53	18.27	20.25
11	ITL11	8.07	7.33	7.12	16.4	19.7	18.2	1720	1620	1700	6.18	6.59	5.21	21.64	18.26	19.15
12	BERTH 3	9.56	9.48	9.31	27.2	28.2	26.2	1790	1810	1830	6.13	6.63	6.78	25.33	29.87	26.47
13	CB-1	9.13	10.23	9.76	27.6	28.4	26.5	1810	1860	1840	6.29	7.45	6.93	26.53	30.56	27.83

Table F-10: Seasonal Variations in Sediment Heavy Metals - 2

SI No.	Location Code	Parameters (µg/l)											
		Hg			Ni			Mn			Cr		
		M	PM	S	M	PM	S	M	PM	S	M	PM	S
1	MSL1	0.25	0.24	0.26	11.73	12.64	10.27	53.39	50.45	52.73	10.64	9.63	8.64
2	MSL2	0.21	0.27	0.24	10.26	9.14	8.94	55.49	47.25	49.06	8.38	10.54	9.73
3	MSL3	0.28	0.3	0.31	9.81	11.57	10.83	50.26	53.93	52.18	8.93	11.87	8.48
4	MSL4	0.24	0.32	0.29	9.45	8.93	8.76	62.72	55.54	64.58	10.68	11.29	9.33
5	MSL5	0.27	0.29	0.27	8.66	10.93	10.43	65.41	52.56	58.06	9.55	9.35	10.06
6	MSL6	0.24	0.28	0.24	9.35	7.69	9.56	58.05	43.52	49.81	9.46	10.36	9.51

SI No.	Location Code	Parameters (µg/l)											
		Hg			Ni			Mn			Cr		
		M	PM	S	M	PM	S	M	PM	S	M	PM	S
7	MSL7	0.26	0.24	0.3	8.51	10.11	8.94	53.28	44.18	55.43	10.16	11.79	8.87
8	MSL8	0.21	0.26	0.28	9.36	10.34	10.28	48.43	43.47	48.14	10.28	10.54	9.06
9	MSL9	0.24	0.25	0.23	8.42	8.51	9.47	55.96	50.66	54.82	10.55	11.59	10.13
10	ITL10	0.19	0.21	0.18	8.59	8.64	7.58	41.37	48.93	42.82	10.26	8.46	9.26
11	ITL11	0.22	0.16	0.2	8.53	8.06	8.22	40.13	45.66	43.26	10.68	10.07	8.06
12	BERTH 3	0.28	0.31	0.3	10.93	11.7	10.76	55.73	58.63	61.49	10.86	11.64	9.67
13	CB-1	0.31	0.35	0.32	10.06	10.34	11.23	53.15	56.44	57.62	10.43	11.13	10.16

Table F-11: Seasonal Variations in Biological Parameters

SI No.	Location Code	Chlorophyll-a			Phaeophytin (Phaeo-pigments)			Total biomass		
		M	PM	S	M	PM	S	M	PM	S
1	MSL1	1.12	1.97	2.18	0.65	1.06	1.15	18.93	25.64	26.03
2	MSL2	1.43	1.61	1.69	0.72	0.84	0.99	19.76	22.56	22.75
3	MSL3	1.62	2.3	2.28	0.85	1.26	1.24	20.85	31.54	31.51
4	MSL4	1.36	1.17	1.21	0.75	0.75	0.79	19.42	20.43	20.52
5	MSL5	1.53	2.04	2.11	0.76	1.17	1.2	20.04	27.48	27.56
6	MSL6	1.04	1.68	1.71	0.63	0.89	0.91	18.53	23.19	23.22
7	MSL7	1.83	1.94	1.99	0.94	1.04	1.11	22.63	25.41	25.52
8	MSL8	1.57	2.26	2.29	0.81	1.24	1.28	20.28	31.06	31.24
9	MSL9	0.84	1.73	1.77	0.56	0.95	0.98	17.81	23.67	23.71
10	ITL10	0.73	1.03	0.96	0.41	0.72	0.43	16.24	18.46	17.77
11	ITL11	0.64	0.98	0.81	0.46	0.7	0.66	16.49	18.22	18.15
12	BERTH 3	0.96	1.41	1.33	0.53	0.81	0.71	17.24	21.37	20.98
13	CB-1	0.93	1.26	1.21	0.54	0.76	0.71	17.76	20.78	20.69

Table F-12: Seasonal Variations in primary Productivity

SI No.	Location Code	Primary Productivity (mgC/m3/hr)		
		M	PM	S
1	MSL1	4.73	6.21	6.32
2	MSL2	4.93	5.73	5.82
3	MSL3	5.49	6.73	6.69
4	MSL4	4.86	5.13	5.24
5	MSL5	4.80	6.37	6.45
6	MSL6	4.67	5.9	5.93
7	MSL7	5.97	6.17	6.25
8	MSL8	5.37	6.77	6.82
9	MSL9	4.32	5.97	6.01
10	ITL10	4.02	4.95	4.31
11	ITL11	4.14	5.08	4.98
12	BERTH 3	4.60	5.52	5.39
13	CB-1	4.45	4.98	4.85

Table F-13: Seasonal Variations in water microbial populations (CFU/ml)

SI No.	Location Code		TVC in CFU/ml			TC in CFU/ml			FCLO in CFU/ml			ECLO in CFU/ml			VCLO in CFU/ml		
			M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
1	MSL1	10 ^{x3}	634	512	545	573	426	412	387	376	374	302	311	322	288	175	175
2	MSL2	10 ^{x3}	491	432	512	406	387	425	376	321	337	299	288	300	231	102	112
3	MSL3	10 ^{x3}	511	624	685	476	594	620	400	543	568	367	491	512	278	299	321
4	MSL4	10 ^{x3}	443	486	502	380	428	452	311	356	412	286	301	321	221	156	125
5	MSL5	10 ^{x3}	353	566	598	299	459	462	236	391	402	192	324	345	111	171	186
6	MSL6	10 ^{x3}	591	426	485	521	311	365	476	276	302	401	206	225	378	91	102
7	MSL7	10 ^{x3}	568	345	685	491	187	215	431	121	154	380	106	110	302	53	75
8	MSL8	10 ^{x3}	433	588	612	390	501	425	312	456	365	274	385	312	201	199	212

SI No.	Location Code		TVC in CFU/ml			TC in CFU/ml			FCLO in CFU/ml			ECLO in CFU/ml			VCLO in CFU/ml		
			M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
9	MSL9	10 ^{X3}	630	692	525	587	613	648	508	576	587	469	511	513	399	338	345
10	ITL10	10 ^{X3}	680	678	745	511	597	621	473	512	523	403	456	485	369	279	225
11	ITL11	10 ^{X3}	695	628	785	575	562	589	481	493	521	420	420	455	337	285	295
12	BERTH 3	10 ^{X3}	490	541	625	401	484	521	372	402	412	298	371	385	222	164	174
13	CB-1	10 ^{X3}	555	485	502	479	395	412	404	311	320	300	278	321	254	105	112

Table F-14: Seasonal Variations in water microbial populations (CFU/ml)

SI No.	Location Code		VPLO in CFU/ml			PALO in CFU/ml			SFLO in CFU/ml			SHLO in CFU/ml			SLO in CFU/ml		
			M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
1	MSL1	10 ^{X3}	211	213	255	183	278	298	123	101	112	99	85	52	54	46	4
2	MSL2	10 ^{X3}	186	173	185	115	212	175	84	77	85	62	53	75	30	21	26
3	MSL3	10 ^{X3}	223	356	345	189	421	435	124	162	165	102	96	41	55	54	45
4	MSL4	10 ^{X3}	187	201	221	132	274	285	93	100	121	65	82	35	21	57	32
5	MSL5	10 ^{X3}	78	210	221	54	287	295	41	103	112	26	73	41	10	44	41
6	MSL6	10 ^{X3}	312	115	145	288	163	175	198	113	110	106	55	69	75	17	25
7	MSL7	10 ^{X3}	277	120	125	200	76	52	154	39	45	91	58	35	62	20	22
8	MSL8	10 ^{X3}	172	271	276	99	307	296	71	123	145	43	83	45	18	47	22
9	MSL9	10 ^{X3}	335	401	412	265	479	435	190	274	275	122	138	132	78	74	45
10	ITL10	10 ^{X3}	300	356	385	259	402	385	191	203	225	125	176	125	93	93	32
11	ITL11	10 ^{X3}	284	284	295	221	381	325	151	211	247	101	151	121	80	85	41
12	BERTH 3	10 ^{X3}	178	216	241	102	298	224	77	99	121	35	74	52	20	46	45
13	CB-1	10 ^{X3}	173	173	186	98	209	175	67	78	89	43	57	63	11	33	25

Table F-15: Seasonal Variations in sediment microbial populations (CFU/ml)

SI No.	Location Code		TVC in CFU/ml			TC in CFU/ml			FCLO in CFU/ml			ECLO in CFU/ml			VCLO in CFU/ml		
			M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
1	MSL1	10 ^{x3}	657	640	685	585	566	575	480	520	523	416	426	415	360	189	175
2	MSL2	10 ^{x3}	662	553	612	548	487	512	476	444	485	354	354	335	241	117	112
3	MSL3	10 ^{x3}	646	641	696	589	603	611	532	559	560	472	491	521	387	274	321
4	MSL4	10 ^{x3}	576	668	632	510	589	596	436	565	596	368	437	425	277	207	125
5	MSL5	10 ^{x3}	375	576	623	296	496	532	226	435	475	186	354	365	134	194	186
6	MSL6	10 ^{x3}	617	513	531	578	454	385	504	316	325	446	266	275	354	96	102
7	MSL7	10 ^{x3}	581	363	410	508	194	210	425	171	178	358	139	152	262	51	75
8	MSL8	10 ^{x3}	551	603	632	500	586	598	465	474	491	398	405	423	326	202	212
9	MSL9	10 ^{x3}	651	713	785	607	621	645	542	582	596	485	534	547	374	353	345
10	ITL10	10 ^{x3}	717	715	765	662	672	598	604	624	474	566	581	511	424	368	225
11	ITL11	10 ^{x3}	724	648	695	640	588	614	545	533	425	460	490	499	376	296	295
12	BERTH 3	10 ^{x3}	640	543	596	560	476	521	487	436	475	423	387	358	352	177	174
13	CB-1	10 ^{x3}	597	631	641	510	563	578	456	517	521	372	441	485	248	126	112

Table F-16: Seasonal Variations in sediment microbial populations (CFU/ml)

SI No.	Location Code		VPLO in CFU/ml			PALO in CFU/ml			SFLO in CFU/ml			SHLO in CFU/ml			SLO in CFU/ml		
			M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
1	MSL1	10 ^{x3}	272	287	211	207	355	369	101	113	125	76	96	52	61	58	66
2	MSL2	10 ^{x3}	186	186	231	124	241	374	104	87	88	70	55	85	33	26	35
3	MSL3	10 ^{x3}	315	366	285	268	431	456	169	192	199	105	126	147	54	66	74
4	MSL4	10 ^{x3}	190	284	198	154	328	415	97	125	145	58	97	32	24	64	66
5	MSL5	10 ^{x3}	102	209	521	80	297	325	62	121	135	34	88	99	10	48	58
6	MSL6	10 ^{x3}	296	132	75	180	185	198	138	128	128	67	62	74	25	32	33
7	MSL7	10 ^{x3}	184	139	56	135	98	102	78	43	45	56	29	35	30	34	74

SI No.	Location Code		VPLO in CFU/ml			PALO in CFU/ml			SFLO in CFU/ml			SHLO in CFU/ml			SLO in CFU/ml		
			M	PM	S	M	PM	S	M	PM	S	M	PM	S	M	PM	S
8	MSL8	10 ^{X3}	275	339	198	178	377	378	142	156	185	69	124	74	18	78	85
9	MSL9	10 ^{X3}	438	413	425	379	499	514	254	282	198	160	151	165	74	93	102
10	ITL10	10 ^{X3}	397	423	400	315	516	439	260	288	299	189	194	85	60	101	108
11	ITL11	10 ^{X3}	295	295	299	236	403	417	187	224	278	110	174	187	49	91	99
12	BERTH 3	10 ^{X3}	270	225	102	150	300	311	78	105	109	46	82	99	16	55	74
13	CB-1	10 ^{X3}	166	217	174	132	324	354	90	86	98	52	63	75	27	38	45

Table F-17: Variation in Phytoplankton Density during Monsoon Season

S.No.	Species	NOV-21, Parameter-Cells/L													
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1	
	Diatoms														
1	<i>Asterionella</i> sp.	0	100	0	200	0	100	100	0	0	0	200	0	0	
2	<i>Bacillaria</i> sp.	100	100	0	0	0	0	100	0	0	0	0	0	0	
3	<i>Bacteriastrium delicatulum</i>	0	0	0	0	100	0	0	0	0	0	0	0	0	
4	<i>Bacteriastrium comosum</i>	0	0	0	200	0	0	100	200	0	0	0	0	0	
5	<i>Bacteriastrium hyalinum</i>	100	100	200	300	0	0	200	300	0	0	100	100	200	
6	<i>Chaetoceros affinis</i>	500	500	800	600	300	200	700	600	100	500	200	400	600	
7	<i>Chaetoceros brevis</i>	800	1100	800	700	1200	300	400	500	100	200	200	200	500	
8	<i>Chaetoceros coarctatus</i>	400	800	400	700	900	300	900	600	500	400	700	100	700	
9	<i>Chaetoceros</i> sp.	800	1300	1300	1300	1500	900	1300	900	400	400	400	500	900	
10	<i>Coscinodiscus centralis</i>	0	0	100	200	0	100	200	300	0	0	200	100	200	
11	<i>Coscinodiscus gigas</i>	0	100	0	0	100	0	0	0	0	0	200	0	0	

S.No.	Species	NOV-21, Parameter-Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
12	<i>Coscinodiscus granii</i>	0	0	100	0	0	200	200	0	0	100	100	100	0
13	<i>Coscinodiscus sp.</i>	200	200	100	100	0	100	200	100	0	300	0	200	0
14	<i>Cyclotella sp.</i>	0	100	0	0	0	0	0	0	0	0	0	300	0
15	<i>Cylindrotheca closterium</i>	0	0	100	0	0	0	0	0	0	100	200	0	0
16	<i>Ditylum brightwellii</i>	300	100	400	300	100	300	100	200	200	200	400	200	400
17	<i>Ditylum sp.</i>	200	500	300	200	100	100	500	100	400	500	0	100	300
18	<i>Eucampia sp.</i>	0	100	0	0	0	0	100	0	0	0	0	0	0
19	<i>Fragilaria sp.</i>	0	0	0	0	0	0	100	0	0	0	0	0	0
20	<i>Hemidiscus hardmanianus</i>	100	200	400	100	200	0	0	300	100	100	100	200	200
21	<i>Lauderia sp.</i>	0	0	100	100	0	0	0	100	0	0	0	0	0
22	<i>Navicula sp.</i>	0	0	200	0	0	0	200	0	0	0	100	0	0
23	<i>Nitzschia sp.</i>	0	0	100	100	0	100	0	300	300	0	0	400	0
24	<i>Odontella sinensis</i>	300	400	200	100	400	300	700	400	900	300	300	600	100
25	<i>Planktoniella sol</i>	0	0	0	0	0	0	300	0	0	0	0	0	0
26	<i>Pleurosigma elongatum</i>	0	0	0	0	200	300	400	0	300	0	0	0	0
27	<i>Pleurosigma sp.</i>	100	300	300	100	100	200	300	200	300	200	200	400	0
28	<i>Rhizosolenia alata</i>	0	0	0	0	200	0	200	0	0	0	0	0	0
29	<i>Rhizosolenia castracanei</i>	500	300	500	100	300	600	1100	400	400	300	300	800	300
30	<i>Rhizosolenia sp.</i>	200	100	200	300	700	400	500	500	300	100	100	100	200
31	<i>Rhizosolenia stolterfothii</i>	300	700	300	200	500	300	400	100	200	100	0	0	100
32	<i>Skeletonema sp.</i>	0	200	200	200	400	200	500	300	500	100	200	200	0

S.No.	Species	NOV-21, Parameter-Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
33	<i>Synedra</i> sp.	0	0	0	0	0	0	100	0	0	0	0	0	0
34	<i>Thalassionema nitzschioides</i>	200	300	500	200	300	200	300	500	100	0	0	100	0
35	<i>Thalassiosira subtilis</i>	0	0	200	200	0	0	0	200	200	0	0	0	0
36	<i>Thalassiothrix frauenfeldii</i>	700	500	300	0	400	300	300	500	100	200	0	200	100
37	<i>Triceratium favus</i>	0	0	0	0	0	0	0	300	0	0	0	0	0
38	<i>Triceratium</i> sp.	200	300	200	100	400	200	400	400	500	0	0	100	100
	Dinoflagellates													
39	<i>Ceratium azoricum</i>	100	300	500	200	300	0	1100	700	100	100	100	100	100
40	<i>Ceratium furca</i>	600	700	1500	800	1300	500	1600	1300	400	500	400	500	400
41	<i>Ceratium macroceros</i>	1300	900	800	600	1000	400	900	900	500	600	600	400	700
42	<i>Ceratium trichoceros</i>	900	1000	1200	1100	900	500	1700	2100	600	300	300	600	400
43	<i>Ceratocorys horrida</i>	0	100	0	100	0	0	200	0	0	0	0	0	0
44	<i>Dinophysis caudata</i>	200	100	400	200	200	100	400	600	200	0	0	0	0
45	<i>Gymnodinium</i> sp.	0	0	0	0	100	0	0	0	0	0	0	100	0
46	<i>Noctiluca</i> sp.	300	100	200	500	100	300	700	0	0	400	200	300	100
47	<i>Ornithocercus steinii</i>	100	300	300	100	100	200	300	200	0	100	100	0	200
48	<i>Prorocentrum maximum</i>	0	400	300	200	0	200	500	0	200	100	100	0	300
49	<i>Protoperidinium depressum</i>	700	900	1100	800	1200	1100	1100	1100	700	500	600	900	800
50	<i>Pyrophacus horologium</i>	100	200	0	200	600	100	200	0	100	0	100	200	0
51	<i>Pyrophacus</i>	400	300	200	100	500	100	400	200	300	200	400	200	100

S.No.	Species	NOV-21, Parameter-Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	<i>steinii</i>													
	Cyanophyceae (Blue-greens)													
52	<i>Oscillatoria</i> sp.	600	700	1600	800	500	400	1500	600	300	100	400	300	700
53	<i>Trichodesmium erythraeum</i>	500	500	1100	1100	400	700	800	400	200	500	500	500	500
	Chlorophyceae (Greens)													
54	<i>Volvox</i> sp.	300	500	700	1200	700	800	900	900	200	100	200	300	300

Table F-18: Variation in Phytoplankton Density during Post Monsoon Season

SI No.	Species	FEB-22, Parameter-Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Diatoms													
1	<i>Asterionella</i> sp.	0	0	100	0	0	0	0	0	0	0	0	0	0
2	<i>Bacillaria</i> sp.	0	0	0	0	0	0	0	100	0	0	0	0	0
3	<i>Bacteriastrium delicatulum</i>	0	0	0	200	0	0	0	0	0	0	0	0	0
4	<i>Bacteriastrium comosum</i>	0	0	0	0	0	0	0	200	0	0	0	0	0
5	<i>Bacteriastrium hyalinum</i>	0	100	300	100	0	0	0	300	200	200	0	0	200
6	<i>Chaetoceros affinis</i>	800	500	1100	400	500	300	800	900	500	600	500	600	400
7	<i>Chaetoceros brevis</i>	1200	1500	1600	700	1300	800	600	700	500	300	400	400	600
8	<i>Chaetoceros coarctatus</i>	900	800	600	400	900	600	800	800	800	500	700	500	500
9	<i>Chaetoceros</i> sp.	1100	1500	1800	600	1700	1600	1200	1600	1100	600	500	900	800
10	<i>Coscinodiscus centralis</i>	300	100	300	100	200	200	100	300	100	100	200	200	200
11	<i>Coscinodiscus gigas</i>	0	0	0	0	0	0	100	0	0	0	0	0	0
12	<i>Coscinodiscus granii</i>	0	0	200	0	0	100	100	0	0	200	100	300	100
13	<i>Coscinodiscus</i> sp.	400	200	500	100	300	300	200	400	200	200	0	100	100
14	<i>Cyclotella</i> sp.	0	100	100	0	0	0	0	0	0	0	0	100	0

SI No.	Species	FEB-22, Parameter-Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
15	<i>Cylindrotheca closterium</i>	0	0	0	0	0	0	0	0	0	100	100	0	0
16	<i>Ditylum brightwellii</i>	500	300	400	200	100	300	200	300	200	400	200	400	100
17	<i>Ditylum</i> sp.	200	100	500	100	0	100	600	500	700	100	100	200	100
18	<i>Eucampia</i> sp.	0	0	100	0	0	0	0	0	0	0	0	0	0
19	<i>Fragilaria</i> sp.	0	0	100	0	0	0	0	0	0	0	0	0	0
20	<i>Hemidiscus hardmanianus</i>	200	100	200	0	400	200	0	300	100	100	100	200	100
21	<i>Lauderia</i> sp.	0	0	0	0	300	0	0	200	100	0	0	0	0
22	<i>Navicula</i> sp.	0	0	100	0	0	0	0	200	0	0	0	0	0
23	<i>Nitzschia</i> sp.	200	100	300	100	0	100	0	400	300	0	0	300	100
24	<i>Odontella sinensis</i>	600	700	500	200	600	400	400	700	800	300	300	400	200
25	<i>Planktoniella sol</i>	0	100	100	0	0	100	200	100	0	0	0	0	0
26	<i>Pleurosigma elongatum</i>	0	0	200	0	300	300	100	0	100	0	0	0	0
27	<i>Pleurosigma</i> sp.	300	200	400	100	300	300	400	500	600	200	200	300	100
28	<i>Rhizosolenia alata</i>	0	0	0	0	0	0	200	0	0	0	0	0	0
29	<i>Rhizosolenia castracanei</i>	600	200	300	100	700	600	700	800	500	300	300	500	200
30	<i>Rhizosolenia</i> sp.	300	200	200	300	600	700	900	900	500	100	100	200	100
31	<i>Rhizosolenia stolterfothii</i>	700	400	500	200	400	500	600	500	200	100	100	100	100
32	<i>Skeletonema</i> sp.	300	300	500	300	300	400	400	500	200	100	300	100	0
33	<i>Synedra</i> sp.	200	0	0	0	0	0	0	0	0	0	0	0	0
34	<i>Thalassionema nitzschioides</i>	300	200	500	100	0	200	300	300	200	0	0	100	0
35	<i>Thalassiosira subtilis</i>	0	0	100	0	0	0	0	300	300	0	0	0	0
36	<i>Thalassiothrix frauenfeldii</i>	300	200	600	0	300	300	400	500	300	100	100	100	300
37	<i>Triceratium favus</i>	0	0	0	0	100	0	0	0	0	0	0	0	0
38	<i>Triceratium</i> sp.	300	400	300	100	200	200	400	500	400	0	100	100	200
	Dinoflagellates													
39	<i>Ceratium azoricum</i>	300	200	1100	100	500	0	400	1100	200	300	200	100	100
40	<i>Ceratium furca</i>	1100	700	1900	900	1200	700	800	2100	500	600	500	400	400
41	<i>Ceratium macroceros</i>	700	500	1700	600	1100	500	700	1300	600	500	600	500	700

SI No.	Species	FEB-22, Parameter-Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
42	<i>Ceratium trichoceros</i>	900	700	2100	700	1200	300	900	1900	400	600	500	300	300
43	<i>Ceratocorys horrida</i>	0	0	0	0	0	0	0	200	0	0	100	0	0
44	<i>Dinophysis caudata</i>	300	100	800	100	500	200	100	500	100	0	0	0	0
45	<i>Gymnodinium sp.</i>	0	0	0	0	0	100	0	200	200	0	0	0	0
46	<i>Noctiluca sp.</i>	0	0	500	200	300	400	0	700	200	200	200	100	100
47	<i>Ornithocercus steinii</i>	200	100	100	100	0	300	200	400	200	100	100	200	100
48	<i>Prorocentrum maximum</i>	0	200	300	100	0	100	200	400	200	100	0	200	300
49	<i>Protoperdinium depressum</i>	700	500	1500	400	900	700	700	1700	900	700	800	900	1000
50	<i>Pyrophacus horologium</i>	0	0	200	0	300	0	100	300	0	0	0	0	0
51	<i>Pyrophacus steinii</i>	400	100	500	0	200	100	300	600	200	100	100	200	200
Cyanophyceae (Blue greens)														
52	<i>Oscillatoria sp.</i>	1200	800	3200	600	600	500	1100	3100	700	400	500	700	800
53	<i>Trichodesmium erythraeum</i>	700	700	4400	900	1300	800	600	3600	800	600	700	700	500
Chlorophyceae (Greens)														
54	<i>Volvox sp.</i>	600	600	1500	300	1100	400	400	1200	600	0	0	700	700

Table F-19: Variation in Phytoplankton Density during Summer Season

SI No.	Species	APRIL- 22, Parameter-Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
Diatoms														
1	<i>Asterionella sp.</i>	0	0	100	0	0	100	0	100	0	0	0	0	0
2	<i>Bacillaria sp.</i>	0	100	100	0	0	100	0	0	0	0	100	0	0
3	<i>Bacteriastrium delicatulum</i>	0	0	100	0	0	0	0	0	100	0	0	0	0
4	<i>Bacteriastrium comosum</i>	0	0	0	0	0	0	100	100	0	0	100	0	0
5	<i>Bacteriastrium hyalinum</i>	0	0	200	100	0	0	0	400	300	0	0	0	300
6	<i>Chaetoceros affinis</i>	900	600	1100	400	800	200	900	800	600	400	300	500	400
7	<i>Chaetoceros brevis</i>	1000	1600	1600	600	300	700	500	800	600	200	500	300	500

SI No.	Species	APRIL- 22, Parameter-Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
8	<i>Chaetoceros coarctatus</i>	1000	900	700	400	800	500	900	100	500	400	500	400	600
9	<i>Chaetoceros</i> sp.	1300	1600	1700	700	1400	1800	1500	1800	1300	900	900	900	700
10	<i>Coscinodiscus centralis</i>	400	0	200	0	300	100	100	200	0	0	0	0	200
11	<i>Coscinodiscus gigas</i>	0	0	100	0	0	0	100	0	0	100	0	0	0
12	<i>Coscinodiscus granii</i>	0	0	100	0	0	100	0	100	0	200	0	0	100
13	<i>Coscinodiscus</i> sp.	600	300	300	0	400	500	300	600	300	200	100	100	100
14	<i>Cyclotella</i> sp.	0	0	0	0	100	0	0	100	0	0	0	100	0
15	<i>Cylindrotheca closterium</i>	0	0	0	0	0	0	0	0	0	100	0	0	0
16	<i>Ditylum brightwellii</i>	600	500	200	100	200	200	300	200	100	400	100	400	0
17	<i>Ditylum</i> sp.	300	200	400	300	200	0	500	400	600	100	100	300	100
18	<i>Eucampia</i> sp.	0	0	200	100	0	0	0	0	0	0	0	0	0
19	<i>Fragilaria</i> sp.	0	0	200	0	100	0	0	0	100	0	0	0	0
20	<i>Hemidiscus hardmanianus</i>	300	200	100	100	300	200	100	400	200	100	200	300	100
21	<i>Lauderia</i> sp.	0	0	0	0	200	0	0	300	0	0	0	0	0
22	<i>Navicula</i> sp.	0	100	100	0	0	0	0	100	0	0	100	0	0
23	<i>Nitzschia</i> sp.	300	200	400	100	0	200	0	200	200	0	0	300	100
24	<i>Odontella sinensis</i>	400	900	600	100	500	200	200	900	600	300	200	400	200
25	<i>Planktoniella sol</i>	0	0	100	0	0	0	100	200	0	0	0	0	0
26	<i>Pleurosigma elongatum</i>	0	0	300	0	400	200	0	0	300	0	0	0	0
27	<i>Pleurosigma</i> sp.	400	100	600	100	400	400	600	700	500	200	100	300	100
28	<i>Rhizosolenia alata</i>	0	0	0	0	0	200	300	0	0	0	0	0	0
29	<i>Rhizosolenia castracanei</i>	800	100	500	100	800	400	600	1000	400	200	200	500	200
30	<i>Rhizosolenia</i> sp.	500	300	400	200	900	900	1100	1100	600	100	100	200	100
31	<i>Rhizosolenia stolterfothii</i>	500	200	400	100	300	400	300	300	300	0	100	100	0
32	<i>Skeletonema</i> sp.	400	100	300	200	400	300	300	300	300	100	300	200	0
33	<i>Synedra</i> sp.	100	0	0	0	100	0	0	0	0	0	0	0	0
34	<i>Thalassionema nitzschioides</i>	600	300	400	200	100	400	400	400	300	0	0	200	0
35	<i>Thalassiosira subtilis</i>	0	0	200	0	0	0	0	300	300	0	0	0	0

SI No.	Species	APRIL- 22, Parameter-Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
36	<i>Thalassiothrix frauenfeldii</i>	200	100	400	100	400	500	300	600	400	200	200	100	300
37	<i>Triceratium favus</i>	0	0	100	0	0	0	100	0	0	0	0	0	0
38	<i>Triceratium sp.</i>	400	100	500	200	300	300	300	600	300	0	100	200	200
Dinoflagellates														
39	<i>Ceratium azoricum</i>	300	300	900	100	400	100	500	900	200	200	300	100	200
40	<i>Ceratium furca</i>	1000	500	2100	600	1100	500	700	1900	600	500	300	400	300
41	<i>Ceratium macroceros</i>	800	700	1500	900	1200	600	800	1400	400	300	600	500	800
42	<i>Ceratium trichoceros</i>	600	500	2200	800	1400	500	1100	2200	500	700	600	300	300
43	<i>Ceratocorys horrida</i>	0	100	0	0	0	0	0	100	0	0	100	0	0
44	<i>Dinophysis caudata</i>	400	300	800	0	400	100	100	700	100	0	0	0	0
45	<i>Gymnodinium sp.</i>	0	0	0	0	0	0	100	100	0	0	0	0	0
46	<i>Noctiluca sp.</i>	100	0	300	100	200	400	100	400	200	0	0	300	200
47	<i>Ornithocercus steinii</i>	100	200	300	100	0	300	100	500	200	100	100	200	0
48	<i>Prorocentrum maximum</i>	0	100	500	0	100	200	200	600	300	300	0	200	400
49	<i>Protoperidinium depressum</i>	800	600	1600	500	1100	700	500	1900	900	800	900	900	800
50	<i>Pyrophacus horologium</i>	0	0	300	0	200	0	100	300	0	0	0	0	0
51	<i>Pyrophacus steinii</i>	400	0	500	0	300	100	400	700	100	200	100	200	100
Cyanophyceae (Blue-greens)														
52	<i>Oscillatoria sp.</i>	1000	1300	3100	800	700	600	1300	3200	900	300	600	600	900
53	<i>Trichodesmium erythraeum</i>	800	800	4700	1000	1500	700	800	3100	900	400	500	600	700
Chlorophyceae (Greens)														
54	<i>Volvox sp.</i>	500	700	1700	400	1300	500	600	1400	500	0	100	600	500

Table F-20: Diversity indices for Phytoplankton

SI No.	Location Code	Shannon diversity (H')			Margalef richness (d)			Pielous's evenness (J')		
		M	PM	S	M	PM	S	M	PM	S
1	MSL1	3.183	2.51	3.315	6.255	4.146	5.982	0.9269	0.9511	0.9565
2	MSL2	3.35	1.55	3.103	7.346	2.056	6.22	0.921	0.963	0.8954
3	MSL3	3.319	2.474	3.286	7.11	4.091	7.752	0.9125	0.9376	0.8582
4	MSL4	3.277	2.02	3.031	7.424	2.919	6.149	0.9009	0.9713	0.9
5	MSL5	3.224	2.476	3.302	6.479	4.235	6.631	0.9143	0.9654	0.9215
6	MSL6	3.292	2.262	3.328	7.007	3.53	7.062	0.9335	0.9435	0.9287
7	MSL7	3.483	2.369	3.335	7.895	4.024	7.18	0.9205	0.9881	0.9169
8	MSL8	3.292	2.499	3.362	6.598	4.465	7.435	0.9258	0.9228	0.8885
9	MSL9	3.255	2.303	3.393	6.558	3.693	6.985	0.9479	0.9606	0.9469
10	ITL10	3.176	1.946	3.075	6.465	3.083	5.933	0.9433	1	0.9331
11	ITL11	3.252	1.332	3.094	6.808	1.864	6.528	0.9471	0.961	0.9096
12	BERTH 3	3.274	1.609	3.263	6.979	2.485	6.42	0.9363	1	0.9501
13	CB-1	3.071	0.6931	3.083	5.709	1.443	5.929	0.9318	1	0.9252

Table F-21: Zooplankton Density during Monsoon Season

SI No.	Species	NOV-21, Parameter – Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Appendicularia													
1	<i>Oikopleura sp.</i>	0	100	0	0	0	0	100	0	0	0	0	0	0
	Spirotrichea													
2	<i>Tintinnopsis sp.</i>	0	100	0	0	0	0	100	100	0	0	0	0	0
3	<i>Tintinnopsis nordqvisti</i>	0	0	0	100	0	0	0	0	0	0	0	0	0
4	<i>Favella sp.</i>	100	100	0	0	0	0	100	0	0	0	0	0	0
5	<i>Favella serrata</i>	0	0	0	100	0	0	0	0	0	0	0	0	0
6	<i>Dictyocysta sp.</i>	0	0	100	0	0	0	100	0	0	0	0	0	0

SI No.	Species	NOV-21, Parameter – Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Bivalvia													
7	<i>Bivalve veliger</i>	0	0	100	0	100	0	100	100	0	0	0	0	0
8	Copepod nauplii	0	300	200	200	200	200	200	200	100	100	0	100	100
9	Barnacle nauplii	0	0	100	0	100	0	0	0	0	0	0	0	0
10	Shrimp larvae	100	200	200	100	100	0	100	100	100	0	0	100	0
	Gastropoda													
11	Gastropod veliger	0	100	0	0	100	0	0	0	0	0	0	0	0
	Maxillopoda													
12	<i>Acrocalanus gracilis</i>	100	100	200	100	100	100	200	200	100	0	0	0	100
13	<i>Acrocalanus longicornis</i>	100	100	100	0	0	100	100	0	0	0	0	0	0
14	<i>Acrocalanus gibber</i>	0	0	100	100	100	0	100	100	100	0	0	0	0
15	<i>Candacia catula</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
16	<i>Centropages furcatus</i>	0	0	0	0	200	0	0	0	100	0	0	0	0
17	<i>Centropages sp.</i>	100	100	300	200	100	100	300	300	100	100	100	100	100
18	Cirripede nauplius	0	100	100	0	0	0	100	100	0	0	0	0	0
19	Barnacle Molt	0	0	0	100	0	0	0	0	0	0	0	0	0
20	<i>Tortanus sp.</i>	0	100	0	0	0	0	0	0	0	0	0	0	0
	Monogononta													
21	<i>Brachionus sp.</i>	0	0	100	0	100	0	0	0	0	0	0	0	0
	Ophiuroidea													
22	Ophiopluteus larva	0	100	0	0	0	0	100	100	0	0	0	0	0
	Polychaeta													
23	Polychaete larvae	0	0	100	0	0	0	100	0	0	0	0	0	0
	Pisces													
24	Fish eggs	0	100	0	0	100	0	200	0	0	0	0	0	0
25	Fish Larvae	0	0	0	100	0	0	0	0	0	0	0	0	0
	Hexanauplia													
26	<i>Macrosetella gracilis</i>	100	200	100	100	100	100	100	200	100	0	100	0	0

SI No.	Species	NOV-21, Parameter – Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
27	Paracalanus sp.	0	0	200	100	0	100	200	100	100	0	100	100	0
28	Temora sp.	100	0	0	0	0	0	100	0	0	0	0	0	0
29	Acartia danae	0	100	100	100	100	100	0	100	0	0	0	0	0
30	Acartia erythraea	0	0	0	0	100	0	100	0	0	0	0	0	0
31	Acartia spinicauda	0	0	100	0	0	0	0	0	0	0	0	0	0
	Globothalamea													
32	Globigerina sp.	0	0	0	0	100	0	0	0	0	0	0	0	0
	Sagittoidea													
33	Sagitta sp.	0	100	100	0	0	0	100	100	0	0	0	0	0
	Branchiopoda													
34	Penilia sp.	0	100	0	0	0	0	100	100	0	0	0	0	0

Table F-22: Zooplankton Density during Post Monsoon Season

SI No.	Species	FEB-22, Parameter – Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Appendicularia													
1	Oikopleura sp.	0	0	100	0	100	0	100	0	0	0	0	0	0
	Spirotrichea													
2	Tintinnopsis sp.	100	0	0	0	0	0	0	100	0	0	0	0	0
3	Tintinnopsis nordqvisti	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Favella sp.	0	0	0	100	0	0	0	0	0	0	0	0	0
5	Favella serrata	0	0	0	0	0	100	0	0	0	0	0	0	0
6	Dictyocysta sp.	0	0	0	0	0	0	100	0	0	0	0	0	0
	Bivalvia													
7	Bivalve veliger	100	0	0	0	0	0	100	100	0	0	0	0	0
8	Copepod nauplii	400	200	500	200	300	400	200	500	300	100	200	100	100
9	Barnacle nauplii	0	0	100	0	0	0	0	100	0	0	0	0	0

SI No.	Species	FEB-22, Parameter – Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
10	Shrimp larvae	0	0	200	100	100	200	100	100	100	100	0	100	0
	Gastropoda													
11	Gastropod veliger	100	0	0	0	100	0	0	0	100	0	0	0	0
	Maxillopoda													
12	Acrocalanus gracilis	200	100	200	200	200	200	100	300	200	100	100	0	0
13	Acrocalanus longicornis	100	0	100	0	0	100	0	0	0	0	0	100	0
14	Acrocalanus gibber	200	0	100	100	100	100	100	100	100	0	0	0	0
15	Candacia catula	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Centropages furcatus	0	0	0	0	100	100	0	0	100	0	0	0	0
17	Centropages sp.	300	200	300	200	200	100	100	300	200	100	100	100	100
18	Cirripede nauplius	200	0	100	0	0	0	0	100	0	100	0	0	0
19	Barnacle Molt	100	0	0	0	0	0	0	0	0	0	0	0	0
20	Tortanus sp.	0	0	100	0	0	0	0	0	0	0	0	0	0
	Monogononta													
21	Brachionus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ophiuroidea													
22	Ophiopluteus larva	0	0	0	0	0	0	0	100	0	0	0	0	0
	Polychaeta													
23	Polychaete larvae	0	0	200	0	0	0	0	0	0	0	0	0	0
	Pisces													
24	Fish eggs	100	0	0	0	0	0	0	0	0	0	0	0	0
25	Fish Larvae	0	0	0	100	0	0	0	0	0	0	0	0	0
	Hexanauplia													
26	Macrosetella gracilis	100	100	200	0	100	200	100	100	100	100	100	0	0
27	Paracalanus sp.	0	0	0	0	100	0	0	100	100	100	0	100	0
28	Temora sp.	200	0	0	0	0	0	100	0	0	0	0	0	0
29	Acartia danae	100	100	100	100	100	100	0	100	100	0	0	0	0
30	Acartia erythroaea	0	0	0	0	0	0	0	0	0	0	0	0	0

SI No.	Species	FEB-22, Parameter – Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
31	<i>Acartia spinicauda</i>	0	0	0	0	0	100	0	0	0	0	0	0	0
	Globothalamea													
32	<i>Globigerina sp.</i>	0	0	100	0	0	0	0	0	0	0	0	0	0
	Sagittoidea													
33	<i>Saggita sp.</i>	0	0	0	0	0	0	0	100	0	0	0	0	0
	Branchiopoda													
34	<i>Penilia sp.</i>	0	0	0	0	0	0	0	100	0	0	0	0	0

Table F-23: Zooplankton Density during Summer Season

SI No.	Species	April-22, Parameter - Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Appendicularia													
1	<i>Oikopleura sp.</i>	100	0	100	0	200	0	100	0	100	0	0	0	0
	Spirotrichea													
2	<i>Tintinnopsis sp.</i>	100	0	100	0	0	0	0	100	0	0	0	0	0
3	<i>Tintinnopsis nordqvisti</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
4	<i>Favella sp.</i>	100	0	0	100	0	100	0	0	0	0	0	0	0
5	<i>Favella serrata</i>	0	0	0	0	0	100	0	0	0	0	0	0	0
6	<i>Dictyocysta sp.</i>	0	100	0	0	0	0	100	0	0	0	0	0	0
	Bivalvia													
7	<i>Bivalve veliger</i>	100	0	0	0	100	0	100	0	0	0	0	0	100
8	Copepod nauplii	400	200	500	300	400	500	300	600	400	100	300	100	100
9	Barnacle nauplii	0	100	200	0	0	0	100	0	0	0	0	0	100
10	Shrimp larvae	200	0	300	200	100	200	100	200	100	0	0	200	0
	Gastropoda													
11	Gastropod veliger	0	0	100	100	100	0	0	0	100	0	0	100	0
	Maxillopoda													

SI No.	Species	April-22, Parameter - Cells/L													
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1	
12	<i>Acrocalanus gracilis</i>	200	100	300	100	100	100	100	200	100	100	200	0	0	
13	<i>Acrocalanus longicornis</i>	200	0	200	0	0	200	100	0	0	0	0	200	0	
14	<i>Acrocalanus gibber</i>	100	0	0	200	200	200	100	200	0	0	0	0	0	
15	<i>Candacia catula</i>	0	0	0	0	100	0	0	0	0	0	0	0	0	
16	<i>Centropages furcatus</i>	0	100	100	0	100	100	0	0	100	0	0	0	100	
17	<i>Centropages sp.</i>	400	100	200	100	100	100	200	300	200	100	200	100	100	
18	Cirripede nauplius	300	100	200	0	0	100	0	200	0	0	0	0	0	
19	Barnacle Molt	100	0	0	0	100	0	0	100	0	0	0	0	0	
20	<i>Tortanus sp.</i>	0	0	100	0	0	0	0	0	100	0	0	0	0	
	Monogononta														
21	<i>Brachionus sp.</i>	0	0	0	100	0	0	0	0	0	0	0	0	0	
	Ophiuroidea														
22	<i>Ophiopluteus larva</i>	0	0	0	0	0	0	0	100	0	0	0	0	0	
	Polychaeta														
23	Polychaete larvae	0	0	0	0	0	0	100	0	100	0	0	0	0	
	Pisces														
24	Fish eggs	100	0	0	0	0	0	0	0	0	0	0	0	0	
25	Fish Larvae	0	0	0	100	0	0	0	0	0	0	0	0	0	
	Hexanauplia														
26	<i>Macrosetella gracilis</i>	100	100	100	100	100	200	100	200	200	100	0	0	0	
27	<i>Paracalanus sp.</i>	0	100	0	0	100	100	100	100	100	200	0	100	0	
28	<i>Temora sp.</i>	100	0	0	0	0	0	100	0	0	0	0	100	0	
29	<i>Acartia danae</i>	200	100	100	100	100	200	0	100	200	0	0	0	100	
30	<i>Acartia erythraea</i>	100	0	0	0	0	0	0	100	0	0	0	0	0	
31	<i>Acartia spinicauda</i>	0	0	0	0	0	100	0	0	0	0	0	0	0	
	Globothalamea														
32	<i>Globigerina sp.</i>	0	0	100	0	0	0	0	0	0	0	0	0	0	
	Sagittoidea														

SI No.	Species	April-22, Parameter - Cells/L												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
33	<i>Sagitta</i> sp.	0	0	0	0	0	0	0	100	0	0	0	0	0
	Branchiopoda													
34	<i>Penilia</i> sp.	0	0	0	0	0	0	0	100	0	0	0	0	0

Table F-24: Zooplankton Diversity Indices

SI No.	Location Code	Shannon diversity (H')			Margalef richness (d)			Pielous's evenss (J')		
		M	PM	S	M	PM	S	M	PM	S
1	MSL1	1.946	3.307	2.68	3.083	5.989	4.752	1	0.9542	0.9459
2	MSL2	2.756	3.221	2.272	5.255	6.861	3.753	0.9726	0.9061	0.9867
3	MSL3	2.751	3.282	2.548	5.103	7.362	4.248	0.971	0.8674	0.941
4	MSL4	2.441	3.168	2.303	4.168	6.717	3.693	0.9823	0.9142	0.9606
5	MSL5	2.67	3.242	2.507	4.941	5.856	4.415	0.986	0.9354	0.9498
6	MSL6	1.906	3.349	2.484	2.885	7.083	4.146	0.9796	0.9347	0.9413
7	MSL7	2.968	3.37	2.558	6.068	6.807	4.588	0.975	0.9403	0.9692
8	MSL8	2.552	3.399	2.519	4.415	7.205	4.248	0.967	0.9036	0.9301
9	MSL9	2.079	3.435	2.351	3.366	7.375	3.806	1	0.9443	0.9462
10	ITL10	0.6931	3.209	1.561	1.443	6.603	2.232	1	0.9345	0.9697
11	ITL11	1.099	3.16	1.079	1.82	6.413	1.028	1	0.9291	0.9821
12	BERTH 3	1.386	3.3	1.889	2.164	6.968	2.731	1	0.9359	0.9708
13	CB-1	1.099	3.175	1.792	1.82	6.732	2.791	1	0.9162	1

Table F-25: Macrobenthos Population during Monsoon Season

SI No.	Species	NOV-21, Parameter – Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Polychaetes													
1	<i>Capitella capitata</i>	1	1	0	1	2	0	0	1	1	1	1	1	0
2	<i>Capitella sp.1</i>	1	1	1	0	0	1	0	0	0	1	0	0	1
3	<i>Capitella sp.2</i>	2	2	1	2	2	0	3	0	1	2	1	1	0
4	<i>Notomastus aberrans</i>	1	1	0	2	0	2	2	0	0	1	0	0	0
5	<i>Notomastus sp.</i>	2	1	0	1	1	1	0	2	0	1	1	1	1
6	<i>Cirratilidae sp.</i>	1	0	0	1	0	1	0	0	1	0	0	0	0
7	<i>Cirratulus chrysoderma</i>	2	1	0	0	2	0	2	1	0	4	0	1	2
8	<i>Cirratulus sp.</i>	0	1	0	1	0	1	0	2	1	2	0	1	1
9	<i>Cossura coasta</i>	0	2	1	1	1	0	0	1	0	2	0	0	0
10	<i>Cossura sp.1</i>	1	1	1		0	0	0	0	1	1	0	1	0
11	<i>Cossura sp.2</i>	1	0	0	1	0	0	0	1	0	0	0	1	0
12	<i>Eunice sp.</i>	0	2	0	2	2	1	0	0	1	2	0	1	0
13	<i>Glycera sp.</i>	1	1	1	1	1	1	1	2	0	1	2	0	0
14	<i>Lumbrineris sp.</i>	1	1	2	1	0	0	2	0	1	0	0	1	1
15	<i>Lumbrineris aberans</i>	2	2	1	2	0	2	0	2	1	1	0	1	1
16	<i>Nephtys sp.</i>	1	0	0	0	1	0	3	1	0	0	1	0	1
17	<i>Nereis capensis</i>	3	1	0	1	0	1	0	0	1	1	1	1	0
18	<i>Nereis sp.</i>	1	0	2	2	1	1	2	2	0	1	0	1	0
19	<i>Ancistrosyllis sp.</i>	1	1	0	3	0	1	1	0	1	0	0	0	1
20	<i>Arabella mutans</i>	2	1	1	1	0	0	2	0	0	3	0	1	2
21	<i>Diopatra sp.</i>	2	2	1	2	1	0	1	1	1	0	0	0	3
22	<i>Onuphis sp.</i>	2	1	2	1	0	0	0	0	2	1	0	0	1
23	<i>Armandia sp.</i>	3	2	3	4	0	5	1	0	1	2	1	1	0
24	<i>Orbinia sp.</i>	2	3	1	5	1	2	1	1	0	1	1	2	1
25	<i>Polydora sp.</i>	2	1	2	0	1	0	2	1	0	1	1	0	1

SI No.	Species	NOV-21, Parameter – Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
26	<i>Prionospio pinnata</i>	7	2	5	3	0	2	4	1	2	1	2	2	2
27	<i>Prionospio sp.</i>	5	4	8	2	2	4	1	2	3	2	0	1	1
28	<i>Scololepis sp.</i>	2	2	0	1	2	3	1	0	1	0	1	1	1
29	<i>Scololepis squamata</i>	2	1	0	0	1	1	2	1	1	1	1	1	0
30	<i>Spiophanes sp.</i>	2	1	2	1	2	2	0	0	2	1	1	2	0
31	<i>Sternapsis sp.</i>	1	2	1	0	2	0	1	2	2	0	2	1	1
32	<i>Syllis sp.</i>	1	0	1	0	1	0	0	0	1	0	1	0	1
33	Unknown sp.	1	1	3	2	0	1	0	1	2	1	1	1	1
	Gastropods													
34	<i>Architectonica sp.</i>	1	0	1	0	0	1	0	0	2	0	1	1	1
35	<i>Epitonium sp.</i>	1	0	2	1	1	2	0	1	0	1	0	0	1
36	<i>Epitonium scalare</i>	0	1	0	1	0	0	1	2	1	1	2	2	1
37	<i>Marginella sp.</i>	1	0	2	0	1	0	0	1	0	1	0	1	1
38	<i>Bullia sp.</i>	3	5	1	1	0	2	0	0	1	0	1	0	1
39	<i>Bullia belangari</i>	0	0	0	0	0	1	2	1	2	1	2	1	3
40	<i>Oliva sp.</i>	1	0	0	1	0	0	1	1	0	1	1	1	2
41	<i>Turbonilla sp.</i>	1	2	1	1	2	1	1	0	0	0	0	1	1
42	<i>Duplicaria Duplicata</i>	2	0	0	0	1	0	0	1	1	1	1	0	1
43	<i>Turritella attenuata</i>	1	1	1	1	2	1	1	1	2	1	2	1	2
44	<i>Turris sp.</i>	2	2	1	1	1	1	0	0	0	2	1	2	1
45	<i>Turritella sp.</i>	0	0	0	0	0	0	1	0	0	1	0	1	0
46	<i>Turritella duplicata</i>	1	1	2	1	1	1	1	1	1	1	1	2	1
47	<i>Umbonium vestiarium</i>	0	0	0	0	0	1	1	0	0	0	0	0	0
48	Unknown sp.	1	1	1	1	1	0	2	0	1	2	1	2	3
	Bivalves													
49	<i>Anadara sp.</i>	1	1	0	0	2	1	1	1	0	1	1	2	2
50	<i>Anadara veligers</i>	2	0	1	0	1	1	1	0	0	0	0	0	1
51	<i>Cardium sp.</i>	1	1	0	0	1	0	1	0	1	1	1	1	2

SI No.	Species	NOV-21, Parameter – Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
52	<i>Cardium veligers</i>	1	0	1	0	1	0	2	1	1	0	1	1	1
53	<i>Donex sp.</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
54	<i>Meretrix sp.</i>	5	2	2	0	5	2	5	2	2	2	3	4	3
55	<i>Marcia opima</i>	5	3	1	5	2	2	2	0	0	1	2	0	1
56	<i>Gafrarium sp.</i>	1	3	0	2	2	1	1	1	1	1	0	0	0
57	Unknown sp.	3	2	0	1	1	2	0	0	1	1	1	1	2
	Amphipods													
58	<i>Ampelisca sp.</i>	2	0	3	1	1	1	2	0	0	1	1	0	1
59	<i>Grandidierella sp.</i>	1	1	0	1	0	0	1	1	1	2	0	1	1
60	<i>Gammaropsis thompsoni</i>	2	1	1	2	2	0	0	2	0	0	1	1	0
61	<i>Gammarus sp.</i>	1	0	0	3	0	1	2	1	1	2	1	2	1
62	<i>Amphithoe sp.</i>	4	2	3	1	2	0	0	0	0	1	0	0	0
63	<i>Amphithoe ramondi</i>	2	0	0	1	1	0	3	0	2	0	0	1	1
64	<i>Urothoe sp.1</i>	1	1	2	2	0	2	0	0	0	5	1	2	0
65	<i>Urothoe sp.2</i>	6	1	1	1	3	1	1	1	1	1	1	1	1
66	Unknown sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
	Isopods													
67	<i>Eurydice sp.</i>	2	2	1	1	1	0	0	1	1	1	1	1	1
68	<i>Eurydice sp.2</i>	2	1	1	0	0	1	2	0	1	1	0	0	0
69	<i>Angeliara sp.</i>	2	3	0	0	2	0	3	1	0	3	1	2	0
70	<i>Anthura sp.</i>	1	1	1	1	1	1	0	0	0	0	0	1	1
71	<i>Cymodoce sp.</i>	1	1	0	1	1	0	0	1	1	1	1	0	0
72	Unknown sp.	3	2	1	0	0	1	0	0	0	1	0	1	1
	Others													
73	<i>Cumacea sp.</i>	0	0	1	1	2	0	1	0	1	0	0	0	1
74	<i>Penaeus sp.</i>	2	4	1	0	0	1	0	1	2	3	1	3	0
75	<i>Portunus sp.</i>	1	1	0	1	1	0	2	0	1	1	0	2	1
76	<i>Tanaids sp.</i>	0	0	1	1	0	0	1	1	0	2	0	1	2

SI No.	Species	NOV-21, Parameter – Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
77	<i>Branchiostoma sp.</i>	1	1	0	0	1	1	1	0	1	1	2	0	1
78	Unknown sp.	1	2	2	1	0	0	0	0	1	0	0	1	0

Table F-26: Macrobenthos Population during Post-Monsoon Season

SI No.	Species	Feb-22, Parameter – Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Polychaetes													
1	<i>Capitella capitata</i>	1	2	0	1	2	1	0	1	2	0	1	0	0
2	<i>Capitella sp.1</i>	1				0	1	0	0	0	0	0	0	1
3	<i>Capitella sp.2</i>	2	0	3	2	3	2	3	0	1	3	1	2	0
4	<i>Notomastus aberrans</i>	0	0	0	0	0	2	2	0	0	1	0	1	0
5	<i>Notomastus sp.</i>	1	1	0	0	1	1	0	2	0	1	1	2	1
6	<i>Cirratilidae sp.</i>	0	0	0	0	0	1	1	0	0	0	0	0	0
7	<i>Cirratulus chrysoderma</i>	2	1	0	0	2	0	2	2	0	4	0	0	2
8	<i>Cirratulus sp.</i>	0	1	0	0	0	1	0	0	1	2	0	1	1
9	<i>Cossura coasta</i>	2	2	1	1	1	0	0	0	2	2	0	0	0
10	<i>Cossura sp.1</i>	1	1	2	0	0	0	0	0	0	1	0	1	0
11	<i>Cossura sp.2</i>	0	0	0	0	0	0	0	0	0	0	0	1	0
12	<i>Eunice sp.</i>	0	0	0	0	2	2	0	0	1	0	0	1	0
13	<i>Glycera sp.</i>	2	2	3	0	1	0	1	2	0	1	2	0	0
14	<i>Lumbrineris sp.</i>	2	1	2	0	0	0	2	0	1	0	0	1	1
15	<i>Lumbrineris aberans</i>	0	2	1	4	0	2	0	2	2	0	0	2	1
16	<i>Nephtys sp.</i>	0	0	0	0	0	0	3	1	0	0	1	0	1
17	<i>Nereis capensis</i>	1	1	0	1	0	1	0	0	1	1	1	0	0
18	<i>Nereis sp.</i>	1	0	2	0	0	1	0	2	0	1	0	1	0
19	<i>Ancistrosyllis sp.</i>	1	0	0	5	0	1	0	0	0	0	0	0	1
20	<i>Arabella mutans</i>	2	0	1	1	0	0	2	0	0	3	0	1	0

SI No.	Species	Feb-22, Parameter – Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
21	<i>Diopatra sp.</i>	2	1	1	2	3	1	1	1	0	0	1	2	1
22	<i>Onuphis sp.</i>	0	1	2	1	1	0	0	0	2	1	0	0	1
23	<i>Armandia sp.</i>	3	4	3	4	0	5	2	0	1	2	1	1	0
24	<i>Orbinia sp.</i>	2	3	1	5	1	2	1	2	0	1	1	2	1
25	<i>Polydora sp.</i>	2	1	2	0	1	0	2	2	0	0	1	1	1
26	<i>Prionospio pinnata</i>	7	2	5	3	1	4	5	6	2	0	2	2	2
27	<i>Prionospio sp.</i>	8	6	10	2	3	5	0	5	4	2	3	1	1
28	<i>Scololepis sp.</i>	2	0	0	1	2	3	0	2	1	0	1	1	1
29	<i>Scololepis squamata</i>	2	0	0	0	1	0	0	0	1	0	0	1	0
30	<i>Spiophanes sp.</i>	2	1	2	0	2	3	0	0	2	1	1	2	0
31	<i>Sternapsis sp.</i>	1	2	1	0	0	0	1	2	3	0	2	1	1
32	<i>Syllis sp.</i>	1	0	1	0	0	0	0	0	1	0	1	0	1
33	Unknown sp.	1	1	3	2	0	0	0	1	3	1	1	1	1
	Gastropods													
34	<i>Architectonica sp.</i>	1	0	1	0	0	1	0	0	2	0	0	0	1
35	<i>Epitonium sp.</i>	1	0	2	1	1	2	0	1	0	1	1	0	1
36	<i>Epitonium scalare</i>	0	1	0	1	0	1	1	2	1	2	2	1	1
37	<i>Marginella sp.</i>	1	0	0	1	1	0	0	1	0	1	0	1	1
38	<i>Bullia sp.</i>	3	5	1	2	2	2	0	0	1	2	1	2	1
39	<i>Bullia belangari</i>	0	0	0	1	0	1	0	1	2	1	2	1	3
40	<i>Oliva sp.</i>	0	0	0	1	0	0	0	1	0	1	1	1	2
41	<i>Turbonilla sp.</i>	1	2	2	1	2	1	1	3	2	0	0	1	1
42	<i>Duplicaria Duplicate</i>	2	0	0	0	1	0	0	2	1	0	1	1	1
43	<i>Turritella attenuata</i>	1	1	2	1	2	1	2	1	2	1	2	1	2
44	<i>Turris sp.</i>	2	2	3	2	1	2	0	0	0	2	1	2	1
45	<i>Turritella sp.</i>	0	0	0	0	0	0	1	0	0	1	0	1	0
46	<i>Turritella duplicate</i>	2	1	2	1	1	1	1	1	1	1	0	0	1
47	<i>Umbonium vestiarium</i>	0	0	0	0	0	0	0	0	0	0	0	0	0

SI No.	Species	Feb-22, Parameter – Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
48	Unknown sp.	1	3	1	1	1	0	4	5	4	2	2	3	4
	Bivalves													
49	<i>Anadara sp.</i>	1	0	0	1	0	0	0	1	0	1	1	1	2
50	<i>Anadara veligers</i>	0	0	1	1	0	0	0	1	0	0	0	0	0
51	<i>Cardium sp.</i>	1	0	0	1	0	0	0	1	0	1	1	1	2
52	<i>Cardium veligers</i>	0	0	0	1	0	0	0	0	0	1	1	0	2
53	<i>Donex sp.</i>	0	1	0	1	0	1	0	1	0	1	0	0	0
54	<i>Meretrix sp.</i>	1	0	0	1	2	0	0	1	0	1	0	2	0
55	<i>Marcia opima</i>	5	3	0	0	2	5	4	2	3	1	2	1	2
56	<i>Gafrarium sp.</i>	1	1	0	0	1	0	1	0	0	1	1	0	0
57	Unknown sp.	1	2	0	0	2	0	0	0	1	0	0	1	0
	Amphipods													
58	<i>Ampelisca sp.</i>	0	1	3	0	0	1	2	0	0	1	0	0	1
59	<i>Grandidierella sp.</i>	0	0	0	0	0	0	1	1	0	2	0	0	0
60	<i>Gammaropsis thompsoni</i>	2	1	1	0	2	1	0	1	0	0	0	0	0
61	<i>Gammarus sp.</i>	1	0	0	1	0	1	2	2	2	2	1	2	1
62	<i>Amphithoe sp.</i>	4	2	3	3	2	2	0	0	0	5	0	0	0
63	<i>Amphithoe ramondi</i>	2	0	0	1	0	0	1	0	0	1	0	1	1
64	<i>Urothoe sp.1</i>	1	0	1	2	1	1	0	0	0	0	1	0	0
65	<i>Urothoe sp.2</i>	6	2	3	3	2	1	3	3	5	1	2	1	1
66	Unknown sp.	0	2	0	0	0	0	0	0	1	0	0	0	0
	Isopods													
67	<i>Eurydice sp.</i>	1	2	0	0	1	0	0	2	1	1	1	1	1
68	<i>Eurydice sp.2</i>	1	1	0	0	2	1	1	2	0	0	0	0	0
69	<i>Angeliara sp.</i>	4	3	0	3	2	0	3	4	0	5	0	2	0
70	<i>Anthura sp.</i>	0	1	2	4	0	1	0	2	0	0	0	1	1
71	<i>Cymodoce sp.</i>	0	1	0	1	0	0	0	0	2	1	1	0	1
72	Unknown sp.	2	2	1	0	0	1	0	1	0	0	0	1	1

SI No.	Species	Feb-22, Parameter – Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Others													
73	<i>Cumacea</i> sp.	2	0	1	2	0	0	1	0	2	0	0	0	1
74	<i>Penaeus</i> sp.	0	0	1	0	0	0	0	0	0	2	1	1	0
75	<i>Portunus</i> sp.	1	0	1	1	0	0	1	0	2	3	2	0	1
76	<i>Tanaids</i> sp.	3	0	1	0	1	0	0	0	0	2	1	1	0
77	<i>Branchiostoma</i> sp.	1	1	0	0	2	1	1	0	1	2	0	0	1
78	Unknown sp.	1	3	2	0	2	1	0	0	0	1	2	1	0

Table F-27: Macrobenthos Population during Summer Season

SI No.	Species	April-22, Parameter - Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Polychaetes													
1	<i>Capitella capitata</i>	1	3	0	1	2	1	0	1	2	0	1	0	0
2	<i>Capitella</i> sp.1	1	0	0	0	0	1	0	0	0	0	0	0	1
3	<i>Capitella</i> sp.2	3	0	3	3	3	3	4	0	1	3	1	2	0
4	<i>Notomastus aberrans</i>	0	0	0	0	0	3	3	0	0	1	0	1	0
5	<i>Notomastus</i> sp.	1	1	0	0	1	1	0	3	0	1	1	2	1
6	<i>Cirratidae</i> sp.	0	0	0	0	0	1	1	0	0	0	0	0	0
7	<i>Cirratulus chrysoderma</i>	3	1	0	0	2	0	3	3	0	4	1	0	2
8	<i>Cirratulus</i> sp.	0	1	0	0	0	1	0	0	1	2	0	1	1
9	<i>Cossura coasta</i>	3	3	1	1	1	0	0	0	2	2	1	0	0
10	<i>Cossura</i> sp.1	1	1	3	0	0	0	0	0	0	1	0	1	0
11	<i>Cossura</i> sp.2	0	0	0	0	0	0	0	0	0	0	0	1	0
12	<i>Eunice</i> sp.	0	0	0	0	2	3	0	0	1	0	1	1	0
13	<i>Glycera</i> sp.	3	3	4	0	1	0	1	3	0	1	3	0	0
14	<i>Lumbrineris</i> sp.	3	1	3	0	0	0	3	0	1	0	0	1	1
15	<i>Lumbrineris aberans</i>	0	3	1	6	0	3	0	3	2	0	1	2	1
16	<i>Nephtys</i> sp.	0	0	0	0	0	0	4	1	0	0	1	0	1

SI No.	Species	April-22, Parameter - Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
17	<i>Nereis capensis</i>	1	0	0	0	0	1	0	0	1	1	1	0	0
18	<i>Nereis</i> sp.	1	0	3	0	0	1	0	3	0	1	0	1	0
19	<i>Ancistrosyllis</i> sp.	1	0	0	5	0	1	0	0	0	0	0	0	1
20	<i>Arabella mutans</i>	3	0	1	1	0	0	3	0	0	3	0	1	0
21	<i>Diopatra</i> sp.	2	1	1	3	3	1	1	1	0	0	1	2	1
22	<i>Onuphis</i> sp.	0	1	3	1	1	0	0	0	2	0	0	0	1
23	<i>Arandia</i> sp.	4	5	4	6	0	7	3	0	1	2	1	1	0
24	<i>Orbinia</i> sp.	3	4	1	7	1	3	1	3	0	1	1	2	1
25	<i>Polydora</i> sp.	3	1	3	0	1	0	3	3	0	1	1	1	1
26	<i>Prionospio pinnata</i>	2	3	7	4	1	6	7	8	2	0	3	2	2
27	<i>Prionospio</i> sp.	5	8	9	2	3	5	0	3	2	2	3	2	0
28	<i>Scololepis</i> sp.	3	0	0	1	2	4	0	3	1	0	1	1	1
29	<i>Scololepis squamata</i>	3	0	0	0	1	0	0	0	1	0	0	1	0
30	<i>Spiophanes</i> sp.	2	1	3	0	2	4	0	0	2	1	1	2	0
31	<i>Sternapsis</i> sp.	1	3	0	0	0	0	1	2	3	0	3	1	1
32	<i>Syllis</i> sp.	1	0	1	0	0	0	0	0	1	0	1	0	1
33	Unknown sp.	0	1	4	3	0	0	1	1	3	1	1	1	1
	Gastropods													
34	<i>Architectonica</i> sp.	1	0	1	0	0	1	0	0	2	0	0	0	1
35	<i>Epitonium</i> sp.	0	0	3	1	1	3	0	0	0	1	1	0	1
36	<i>Epitonium scalare</i>	0	1	0	1	0	1	1	3	1	2	3	1	1
37	<i>Marginella</i> sp.	1	0	0	1	0	0	0	1	0	1	0	1	1
38	<i>Bullia</i> sp.	3	7	1	3	2	3	0	0	1	2	1	2	1
39	<i>Bullia belangari</i>	0	0	0	1	0	1	0	0	2	1	3	0	3
40	<i>Oliva</i> sp.	0	0	0	1	0	0	0	1	0	1	0	1	2
41	<i>Turbonilla</i> sp.	1	3	3	1	2	1	1	4	2	0	0	1	1
42	<i>Duplicaria Duplicate</i>	2	0	0	0	0	0	0	3	1	0	1	0	1
43	<i>Turritella attenuata</i>	0	1	3	1	1	1	3	0	2	1	3	1	2

SI No.	Species	April-22, Parameter - Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
44	<i>Turris</i> sp.	3	3	0	3	1	3	0	0	0	2	1	2	1
45	<i>Turritella</i> sp.	0	0	0	0	0	0	1	0	0	1	0	1	0
46	<i>Turritella duplicate</i>	3	1	3	1	1	1	0	1	1	1	0	0	1
47	<i>Umbonium vestiarium</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
48	Unknown sp.	0	2	1	1	1	0	6	7	4	2	2	2	4
	Bivalves													
49	<i>Anadara</i> sp.	1	0	0	1	0	0	0	1	0	1	1	1	2
50	<i>Anadara veligers</i>	0	0	1	1	0	0	0	1	0	0	0	0	0
51	<i>Cardium</i> sp.	2	0	0	1	0	0	0	1	0	1	1	1	2
52	<i>Cardium veligers</i>	0	0	0	1	0	0	0	0	0	1	1	0	2
53	<i>Donex</i> sp.	0	1	0	1	0	1	0	1	0	1	0	4	0
54	<i>Meretrix</i> sp.	2	0	0	0	0	1	1	0	0	1	0	1	0
55	<i>Marcia opima</i>	7	2	0	0	3	7	5	3	3	2	3	2	2
56	<i>Gafrarium</i> sp.	1	0	0	0	1	0	1	0	0	1	1	0	4
57	Unknown sp.	1	3	0	0	2	1	0	0	1	1	0	1	0
	Amphipods													
58	<i>Ampelisca</i> sp.	0	1	4	0	0	1	3	0	0	1	0	0	1
59	<i>Grandidierella</i> sp.	0	0	0	0	0	0	1	1	0	2	0	0	0
60	<i>Gammaropsis thompsoni</i>	3	1	1	0	2	1	0	1	0	0	0	0	0
61	<i>Gammarus</i> sp.	1	0	0	1	0	1	3	3	2	2	1	2	1
62	<i>Amphithoe</i> sp.	6	3	4	4	2	3	0	0	0	2	0	0	0
63	<i>Amphithoe ramondi</i>	3	0	0	1	0	0	1	0	0	1	0	1	1
64	<i>Urothoe</i> sp.1	1	0	1	3	1	1	0	0	0	0	1	0	0
65	<i>Urothoe</i> sp.2	5	3	4	2	2	1	4	4	2	1	3	1	1
66	Unknown sp.	0	3	0	0	0	0	0	0	1	0	0	0	0
	Isopods													
67	<i>Eurydice</i> sp.	1	3	0	0	1	0	0	3	1	1	1	1	2
68	<i>Eurydice</i> sp.2	1	1	0	0	2	1	1	3	0	0	0	0	0

SI No.	Species	April-22, Parameter - Nos/M2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
69	<i>Angeliara</i> sp.	6	4	0	4	2	0	3	5	0	2	0	2	0
70	<i>Anthura</i> sp.	0	1	3	5	0	1	0	3	0	0	0	1	2
71	<i>Cymodoce</i> sp.	0	1	0	1	0	0	0	0	2	1	1	0	1
72	Unknown sp.	3	1	1	0	0	1	0	0	0	0	0	1	1
	Others													
73	<i>Cumacea</i> sp.	3	0	1	3	0	0	1	0	2	0	0	0	1
74	<i>Penaeus</i> sp.	0	0	1	0	0	0	0	0	0	2	1	1	0
75	<i>Portunus</i> sp.	1	1	1	0	0	0	1	0	2	2	1	0	1
76	<i>Tanaids</i> sp.	4	0	1	0	1	0	0	0	0	1	0	1	0
77	<i>Branchiostoma</i> sp.	1	2	0	0	2	1	1	0	1	0	0	0	1
78	Unknown sp.	1	4	3	2	2	1	0	0	0	1	3	1	0

Table F-28: Macrobenthos Diversity indices

SI No.	Location Code	Shannon diversity (H')			Margalef richness (d)			Pielous's evenss (J')		
		M	PM	S	M	PM	S	M	PM	S
1	MSL1	4.02	3.79	3.766	11.53	10.62	4.752	0.9561	0.9457	0.9531
2	MSL2	3.897	3.629	3.545	9.813	9.16	3.753	0.968	0.959	0.9424
3	MSL3	3.632	3.48	3.424	8.875	8.106	4.248	0.9486	0.9434	0.9412
4	MSL4	3.797	3.534	3.443	9.294	8.667	3.693	0.961	0.9516	0.9334
5	MSL5	3.728	3.562	3.502	9.001	8.584	4.415	0.9738	0.9793	0.9772
6	MSL6	3.633	3.528	3.491	9.447	9.381	4.146	0.9659	0.9499	0.9282
7	MSL7	3.683	3.318	3.279	7.603	7.367	4.588	0.9676	0.9574	0.9377
8	MSL8	3.609	3.502	3.373	8.801	7.537	4.248	0.9851	0.9559	0.9488
9	MSL9	3.763	3.482	3.52	8.562	8.723	3.806	0.9829	0.9642	0.975
10	ITL10	3.899	3.721	3.799	10.79	11.26	2.232	0.9687	0.9613	0.9761
11	ITL11	3.675	3.62	3.598	9.823	9.896	1.028	0.9831	0.9814	0.9626
12	BERTH 3	3.865	3.785	3.769	11.24	11.06	2.731	0.9781	0.9831	0.9789

13	CB-1	3.842	3.74	3.717	11.04	10.82	2.791	0.9772	0.9768	0.971
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Table F-29: Meiofauna Population during Monsoon Season

SI No.	Species	NOV-21, Parameter - nos/10cm2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Nematodes													
1	<i>Sabatieria</i> sp.	2	3	1	3	1	0	2	2	1	6	1	3	0
2	<i>Desmoscolex</i> sp.	1	1	1	1	0	2	1	1	3	2	3	1	2
3	<i>Desmodora</i> sp.	1	4	0	2	2	1	1	1	1	1	1	0	1
4	<i>Epsilonema</i> sp.	0	3	1	3	3	1	0	1	0	1	0	0	0
5	<i>Tricoma</i> sp.	1	1	1	1	2	0	1	2	1	2	1	2	0
6	<i>Microaimus</i> sp.	1	2		0	1	0	1		0	2	0	0	0
7	<i>Viscosia</i> sp.	0	0	0	1	0	3	0	0	2	0	1	1	0
8	<i>Haplaomus</i> sp.	1	0	2	0	1	0	2	0	0	1	0	0	0
9	<i>Halalaimus filum</i>	5	6	1	3	4	3	0	2	1	0	0	1	2
10	<i>Astomonema jenneri</i>	4	6	5	0	3	1	8	2	3	4	2	1	1
11	<i>Astomonema</i> sp.1	3	7	4	2	2	2	4	1	1	9	2	0	1
12	<i>Astomonema</i> sp.	7	9	5	4	6	4	5	1	0	6	1	3	2
13	<i>Mesacanthion</i> sp.	1	2	2	1	0	1	0	0	3	0	1	0	0
14	<i>Thoracostomopsis</i> sp.	1	4	3	0	1	0	2	0	2	2	2	0	0
15	<i>Daptonema</i> sp.1	2	2	0	1	1	0	3	1	2	2	1	0	1
16	<i>Daptonema</i> sp.2	1	1	1	2	0	2	1	0	1	0	0	1	0
17	<i>Theristus</i> sp.	2	1	2	3	4	2	3	2	0	2	1	0	0
18	Unknown sp.	1	1	1	1	0	0	1	0	2	1	0	0	0
	Foraminifera													
1	<i>Ammonia beccarii</i>	3	3	3	6	2	1	4	3	2	2	1	2	2
2	<i>Ammonia</i> sp.1	2	3	1	0	1	0	2	1	1	2	0	1	1
3	<i>Ammonia</i> sp.2	4	5	2	3	2	3	5	2	2	2	1	2	1
4	<i>Ammonia tepida</i>	3	4	2	3	1	2	2	1	0	1	1	1	1
5	<i>Asterorotalia</i> sp.	0	1	0	0	0	0	0	1	1	2	0	0	0

SI No.	Species	NOV-21, Parameter - nos/10cm2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
6	<i>Bolivina abbreviata</i>	1	2	1	1	1	1	2	2	2	1	1	2	1
7	<i>Bolivina sp.1</i>	1	1	1	0	1	0	0	0	1	0	2	1	0
8	<i>Bolivina sp.2</i>	1	2	0	1	0	1	1	2	1	1	1	1	1
9	<i>Calcarina sp.1</i>	0	1	1	0	3	1	1	0	1	1	2	0	0
10	<i>Calcarina sp.2</i>	1	2	2	1	0	0	0	2	3	0	0	0	2
11	<i>Cyclammina cancellata</i>	1	1	3	4	2	1	2	0	0	0	1	1	1
12	<i>Cornoboides sp.</i>	2	1	0	2	1	0	1	1	0	1	0	0	0
13	<i>Cibicides lobatulus</i>	1	1	1	0	2	1	0	1	0	1	0	0	0
14	<i>Elphidium sp.</i>	3	2	0	3	0	1	2	1	2	0	2	0	0
15	<i>Elphidium crispum</i>	2	2	2	2	2	1	2	0	2	0	1	1	2
16	<i>Elphidium claticulatum</i>	0	0	0	0	0	0	1	0	0	0	0	0	0
17	<i>Quinqueloculina agglutinans</i>	1	3	0	1	1	1	2	1	0	1	1	0	2
18	<i>Quinqueloculina sp.</i>	1	1	1	0	2	1	1	0	1	0	0	1	0
19	<i>Triloculina sp.</i>	1	1	0	0	0	0	0	1	1	0	1	0	1
20	<i>Hauerina sp.</i>	2	2	1	1	1	1	2	1	2	1	1	0	0
21	<i>Lagena sp.</i>	1	1	0	0	1	2	1	0	0	1	0	0	0
22	<i>Nonion sp.</i>	2	0	1	0	0	0	0	2	0	2	0	1	0
23	<i>Rosalina bradyi</i>	2	2	0	1	2	1	2	1	0	1	1	1	0
24	<i>Rosalina globularis</i>	1	1	1	1	0	3	1	0	2	0	0	0	1
25	<i>Rotalia sp.</i>	1	0	1	1	1	1	1	1	1	0	2	0	1
28	<i>Spirillina lateseptata</i>	0	1	0	0	0	0	0	0	1	1	0	1	0
29	<i>Spirillina limbata</i>	2	2	2	1	1	1	1	0	0	0	1	0	1
30	<i>Spiroloculina sp.</i>	1	0	0	0	0	0	0	2	1	1	2	0	0
31	<i>Sorites sp.</i>	2	1	1	1	1	0	1	0	1	0	1	1	1
33	Unknown sp.	1	2	1	1	1	2	1	3	2	1	0	0	0
	Cumaceans													
1	<i>Nannastacus sp.</i>	3	2	1	3	1	2	3	2	0	1	0	1	0
2	<i>Gynodiastylis sp.1</i>	1	0	0	2	0	0	0	1	1	0	1	0	0

SI No.	Species	NOV-21, Parameter - nos/10cm2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
3	<i>Gynodiastylis</i> sp.2	1	1	0	0	1	1	3	3	0	1	1	1	1
4	<i>Campylaspis</i> minor	2	2	1	2	0	0	2	0	1	1	1	1	0
5	<i>Picrocuma</i> sp.	0	0	0	1	0	1	1	2	0	0	0	0	0
6	Unknown sp.	1	1	0	0	1	0	4	0	1	0	1	0	1
	Harpacticoides													
1	<i>Microsetella</i> rosea	1	1	0	1	1	0	2	1	1	1	0	0	0
2	<i>Microsetella</i> gracilis	2	1	2	3	0	2	0	0	1	2	1	0	0
3	<i>Canulla</i> sp.	0	0	0	0	1	1	1	1	1	1	0	2	1
4	<i>Cylindropsyllus</i> sp.	2	2	1	1	0	2	1	1	2	0	0	1	0
5	<i>Macrosetella</i> sp.	3	2	1	3	0	0	0	0	1	3	1	1	
6	<i>Laophonte</i> thoracica	3	3	0	2	1	1	2	2	0	0	0	0	1
7	<i>Laophonte</i> sp.	1	1	1	2	0	5	2	1	1	2	2	2	0
8	<i>Euterpina</i> sp.	2	2	0	0	2	0	1	2	0	1	0	1	0
9	Unknown sp.	2	2	0	2	0	2	2	0	1	0	1	0	0
	Ostrocodes													
	<i>Cypridina</i> sp.1	0	0	1	0	1	4	2	0	0	1	0	0	1
1	<i>Cypridina</i> sp.2	2	0	0	2	0	2	1	2	1	1	1	1	0
2	<i>Parastenocypris</i> sp.	0	1	0	1	0	1	2	1	0	0	1	0	2
3	<i>Stenocypris</i> major	1	0	1	0	1	0	1	0	2	1	0	0	0
4	<i>Strandesia</i> sp.	2	1	0	1	1	1	2	0	0	0	2	1	1
5	Unknown sp.	0	0	1	1	1	0	1	1	1	1	1	0	0
	Others													
1	<i>Polychaete</i> larvae	1	1	0	2	0	2	3	1	0	0	1	0	0
2	<i>Turbellarian</i> sp.	0	0	0	1	1	1	1	1	1	2	0	1	1
3	<i>Cephalodasys</i> sp.	1	1	1	1	1	4	2	0	2	1	0	0	0
4	<i>Oligochaetes</i>	0	0	1	1	0	1	0	0	0	0	1	1	1
5	Unknown sp.	0	0	0	0	1	1	0	1	1	1	1	0	0

Table F-30: Meiofauna Population during Post-Monsoon Season

SI No.	Species	Feb-22, Parameter - nos/10cm2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Nematodes													
1	<i>Sabatieria</i> sp.	4	3	0	3	1	0	2	5	0	6	0	3	0
2	<i>Desmoscolex</i> sp.	2	1	3	1	0	2	1	3	0	0	2	1	2
3	<i>Desmodora</i> sp.	1	0	0	0	0	1	1	0	1	1	2	0	1
4	<i>Epsilonema</i> sp.	0	0	0	0	0	1	0	1	0	0	0	0	0
5	<i>Tricoma</i> sp.	1	1	2	0	2	0	0	2	1	2	0	2	0
6	<i>Microaimus</i> sp.	1	1	0	0	0	0	1	0	0	2	1	0	0
7	<i>Viscosia</i> sp.	0	0	0	0	0	3	0	0	0	0	0	1	0
8	<i>Haplaomus</i> sp.	0	0	0	0	0	0	2	0	0	0	0	0	0
9	<i>Halalaimus filum</i>	5	6	1	5	4	3	1	2	3	0	1	1	2
10	<i>Astomonema jenneri</i>	7	6	8	0	5	0	7	2	3	6	5	2	1
11	<i>Astomonema</i> sp.1	7	9	12	2	4	2	4	5	9	11	4	2	1
12	<i>Astomonema</i> sp.	10	10	11	4	6	5	6	4	0	8	3	5	6
13	<i>Mesacanthion</i> sp.	0	2	0	1	0	0	0	1	0	0	1	2	0
14	<i>Thoracostomopsis</i> sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
15	<i>Daptonema</i> sp.1	0	0	0	0	1	0	0	1	1	0	0	0	1
16	<i>Daptonema</i> sp.2	1	1	0	2	0	2	0	0	0	0	0	0	0
17	<i>Theristus</i> sp.	2	1	2	3	4	2	5	2	0	2	1	0	0
18	Unknown sp.	1	1	1	1	0	0	1	0	1	1	1	0	0
	Foraminifera													
1	<i>Ammonia beccarii</i>	3	4	5	6	2	1	5	3	1	2	1	4	2
2	<i>Ammonia</i> sp.1	2	2	1	0	2	0	2	4	0	2	0	2	1
3	<i>Ammonia</i> sp.2	4	5	6	5	2	3	4	2	2	3	4	2	1
4	<i>Ammonia tepida</i>	3	4	2	3	3	2	2	1	0	2	2	2	1
5	<i>Asterorotalia</i> sp.	0	0	0	0	0	0	0	1	1	2	0	0	0
6	<i>Bolivina abbreviata</i>	1	0	0	1	0	1	2	2	2	2	1	2	1

SI No.	Species	Feb-22, Parameter - nos/10cm2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
7	<i>Bolivina</i> sp.1	1	1	1	1	1	1	0	0	1	1	2	1	0
8	<i>Bolivina</i> sp.2	1	0	0	1	0	1	1	0	1	1	0	1	1
9	<i>Calcarina</i> sp.1	0	0	0	0	0	1	0	0	1	1	0	0	0
10	<i>Calcarina</i> sp.2	1	1	3	1	0	0	0	2	3	0	0	0	2
11	<i>Cyclammina cancellata</i>	1	1	3	0	2	1	2	0	0	1	0	0	1
12	<i>Cornoboides</i> sp.	2	0	0	0	0	0	1	1	0	2	0	0	0
13	<i>Cibicides lobatulus</i>	0	1	1	0	2	1	0	1	0	0	0	0	0
14	<i>Eliphidium</i> sp.	3	2	0	3	0	1	2	3	2	0	2	0	0
15	<i>Eliphidium crispum</i>	2	2	3	2	0	1	2	0	2	3	2	1	2
16	<i>Elphidium claticulatum</i>	0	0	0	0	0	0	1	0	0	0	0	0	0
17	<i>Quinqueloculina agglutinans</i>	1	0	0	1	1	1	0	0	0	0	0	0	0
18	<i>Quinqueloculina</i> sp.	1	1	0	0	1	1	2	1	1	0	0	0	0
19	<i>Triloculina</i> sp.	1	1	0	0	0	0	0	1	1	0	0	0	0
20	<i>Hauerina</i> sp.	2	2	0	1	0	1	2	1	2	1	1	0	0
21	<i>Lagena</i> sp.	1	1	0	0	1	1	2	0	0	1	0	0	0
22	<i>Nonion</i> sp.	2	0	0	0	0	0	0	2	1	2	1	1	1
23	<i>Rosalina bradyi</i>	2	2	0	1	2	1	2	1	0	0	1	1	0
24	<i>Rosalina globularis</i>	1	1	0	1	0	0	1	1	2	0	0	0	0
25	<i>Rotalia</i> sp.	1	0	0	1	0	1	1	1	1	0	0	0	0
28	<i>Spirillina lateseptata</i>	0	0	0	0	0	0	0	0	1	0	0	1	0
29	<i>Spirillina limbata</i>	2	2	2	1	0	0	1	0	0	0	0	2	0
30	<i>Spiroloculina</i> sp.	1	0	0	0	0	0	1	0	1	0	1	0	0
31	<i>Sorites</i> sp.	2	1	0	1	1	0	1	0	1	0	1	0	1
33	Unknown sp.	1	2	1	1	1	2	1	3	2	1	0	0	0
	Cumaceans													
1	<i>Nannastacus</i> sp.	3	2	1	2	1	2	5	4	0	1	0	1	0
2	<i>Gynodiastylis</i> sp.1		0	0	3	0	0	0	0	1	0	0	0	0
3	<i>Gynodiastylis</i> sp.2	1	0	0	0	0	1	5	0	0	1	0	0	1

SI No.	Species	Feb-22, Parameter - nos/10cm2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
4	<i>Campylaspis minor</i>	2	2	1	0	0	0	1	0	0	1	1	1	0
5	<i>Picrocuma</i> sp.	0	0	0	0	0	0	1	2	0	0	0	0	0
6	Unknown sp.	1	0	0	1	0	0	4	0	1	0	1	0	0
	Harpacticoides													
1	<i>Microsetella rosea</i>	1	1	2	1	1	0	1	0	0	0	0	0	0
2	<i>Microsetella gracilis</i>	2	0	2	0	0	2	1	0	1	0	1	0	0
3	<i>Canulla</i> sp.	0	0	0	0	0	0	1	0	1	0	0	2	1
4	<i>Cylindropsyllus</i> sp.	2	2	5	1	0	0	1	1	2	0	0	1	0
5	<i>Macrosetella</i> sp.	3	2	1	3	0	0	0	0	1	2	3	1	
6	<i>Laophonte thoracica</i>	3	3	0	2	3	1	3	2	0	0	0	0	1
7	<i>Laophonte</i> sp.	1	1	4	2	0	5	2	1	0	1	1	2	0
8	<i>Euterpina</i> sp.	2	2	0	0	2	0	1	2	0	1	0	1	0
9	Unknown sp.	2	2	0	1	0	2	2	0	1	0	1	0	0
	Ostrocodes													
	<i>Cypridina</i> sp.1		0	0	0	1	4	0	0	0	1	0	1	0
1	<i>Cypridina</i> sp.2	2	0	0	2	0	2	0	2	1	1	1	1	0
2	<i>Parastenocypris</i> sp.	0	0	0	0	0	1	0	1	0	1	0	0	0
3	<i>Stenocypris major</i>	1	0	1	0	0	0	0	0	0	1	0	0	0
4	<i>Strandesia</i> sp.	1	1	0	1	0	0	2	0	0	0	0	0	0
5	Unknown sp.	1	0	1	1	1	0	2	1	0	0	1	0	0
	Others													
1	<i>Polychaete larvae</i>	2	3	0	2	0	1	0	2	3	1	1	0	0
2	<i>Turbellarian</i> sp.	0	1	0	2	0	1	1	1	1	1	2	0	0
3	<i>Cephalodasys</i> sp.	0	1	0	2	1	1	2	1	2	0	0	0	0
4	<i>Olichochaetes</i>	0	0	0	0	0	1	0	0	0	0	0	0	0
5	Unknown sp.	0	0	0	0	1	1	0	1	1	1	1	0	0

Table F-31: Meiofauna Population during Post-Monsoon Season

SI No.	Species	April-22, Parameter - nos/10cm2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
	Nematodes													
1	<i>Sabatieria</i> sp.	6	4	0	4	1	0	2	7	0	5	0	3	0
2	<i>Desmoscolex</i> sp.	3	1	4	1	0	3	1	4	0	0	2	1	2
3	<i>Desmodora</i> sp.	1	0	0	0	0	1	1	0	0	1	2	0	1
4	<i>Epsilonema</i> sp.	0	0	0	0	0	1	0	1	0	0	0	0	0
5	<i>Tricoma</i> sp.	1	1	3	0	3	0	0	3	1	2	0	2	0
6	<i>Microaimus</i> sp.	1	1	0	0	0	0	1	0	0	2	1	0	0
7	<i>Viscosia</i> sp.	0	0	0	0	0	4	0	0	0	0	0	1	0
8	<i>Haplaomus</i> sp.	0	0	0	0	0	0	2	0	1	0	0	0	0
9	<i>Halalaimus filum</i>	7	7	1	6	6	4	1	3	2	0	1	1	2
10	<i>Astomonema jenneri</i>	8	7	11	0	7	0	8	3	4	5	5	2	1
11	<i>Astomonema</i> sp.1	5	11	17	2	6	3	5	7	6	10	4	2	1
12	<i>Astomonema</i> sp.	10	12	15	5	8	7	7	6	0	7	3	5	5
13	<i>Mesacanthion</i> sp.	0	2	0	1	0	0	0	1	0	0	1	0	0
14	<i>Thoracostomopsis</i> sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
15	<i>Daptonema</i> sp.1	0	0	0	0	1	0	0	1	1	0	0	1	1
16	<i>Daptonema</i> sp.2	1	1	0	2	0	3	0	0	0	0	0	0	0
17	<i>Theristus</i> sp.	3	1	3	4	6	3	6	3	0	2	1	1	0
18	Unknown sp.	1	1	1	1	0	0	1	0	1	1	1	0	0
	Foraminifera													
1	<i>Ammonia beccarii</i>	4	5	2	7	3	1	6	4	1	2	1	2	2
2	<i>Ammonia</i> sp.1	3	2	1	0	3	0	2	3	0	2	0	2	1
3	<i>Ammonia</i> sp.2	6	6	8	6	3	4	5	3	2	3	4	2	1
4	<i>Ammonia tepida</i>	4	2	3	4	4	3	2	1	0	2	2	0	1
5	<i>Asterorotalia</i> sp.	1	0	0	0	0	0	0	1	1	2	0	0	0
6	<i>Bolivina abbreviata</i>	1	0	0	1	0	1	2	3	2	2	1	2	1

SI No.	Species	April-22, Parameter - nos/10cm2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
7	<i>Bolivina</i> sp.1	0	1	1	1	1	1	0	0	1	1	2	1	0
8	<i>Bolivina</i> sp.2	1	0	0	1	0	1	1	0	1	1	0	0	1
9	<i>Calcarina</i> sp.1	0	1	0	1	0	1	0	0	1	1	0	0	0
10	<i>Calcarina</i> sp.2	1	1	4	1	0	0	0	3	4	0	0	0	3
11	<i>Cyclammina cancellata</i>	1	1	2	0	2	1	2	0	0	0	0	0	1
12	<i>Cornoboides</i> sp.	3	0	0	0	0	0	1	1	0	2	0	0	0
13	<i>Cibicides lobatulus</i>	1	1	1	0	3	1	0	2	0	0	0	0	0
14	<i>Eliphidium</i> sp.	2	0	0	1	0	1	3	4	2	0	2	0	0
15	<i>Eliphidium crispum</i>	0	2	3	2	0	1	2	0	1	3	2	1	2
16	<i>Elphidium claticulatum</i>	0	0	0	0	0	0	1	0	0	0	0	0	0
17	<i>Quinqueloculina agglutinans</i>	1	0	0	1	1	1	0	0	0	0	0	0	3
18	<i>Quinqueloculina</i> sp.	0	1	0	0	1	1	2	1	1	1	0	1	0
19	<i>Triloculina</i> sp.	1	0	0	2	0	0	0	1	1	0	0	0	0
20	<i>Hauerina</i> sp.	3	0	0	1	0	1	2	1	2	1	1	1	0
21	<i>Lagena</i> sp.	0	0	0	0	1	1	2	0	0	1	0	0	0
22	<i>Nonion</i> sp.	3	0	0	0	0	0	0	2	1	2	1	1	1
23	<i>Rosalina bradyi</i>	2	2	0	1	2	1	2	1	0	0	1	1	0
24	<i>Rosalina globularis</i>	1	1	0	1	0	0	1	1	2	0	0	0	0
25	<i>Rotalia</i> sp.	1	0	0	0	0	1	1	0	1	0	0	0	0
28	<i>Spirillina lateseptata</i>	0	0	0	0	1	0	0	0	1	0	0	1	0
29	<i>Spirillina limbata</i>	3	2	3	1	0	0	1	0	0	0	0	2	0
30	<i>Spiroloculina</i> sp.	1	0	0	0	0	0	1	0	2	0	1	0	0
31	<i>Sorites</i> sp.	2	1	0	1	2	0	1	1	3	0	1	0	1
33	Unknown sp.	2	0	0	1	0	2	1	1	2	1	0	0	0
	Cumaceans													
1	<i>Nannastacus</i> sp.	2	0	1	2	1	3	3	2	0	1	0	1	0
2	<i>Gynodiastylis</i> sp.1	0	0	0	4	0	0	0	0	1	0	0	0	0
3	<i>Gynodiastylis</i> sp.2	1	0	1	0	0	1	6	0	0	1	0	0	1

SI No.	Species	April-22, Parameter - nos/10cm2												
		MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSL-7	MSL-8	MSL-9	ITL-1	ITL-2	Berth-3	CB-1
4	<i>Campylaspis minor</i>	3	2	1	0	0	0	1	0	0	1	1	1	0
5	<i>Picrocuma</i> sp.	0	0	0	0	0	0	1	3	0	0	0	0	0
6	Unknown sp.	1	0	0	1	0	0	5	0	1	0	1	0	0
	Harpacticoides													
1	<i>Microsetella rosea</i>	0	1	2	1	1	0	0	0	0	0	0	0	0
2	<i>Microsetella gracilis</i>	2	0	1	0	0	1	1	0	1	2	1	0	0
3	<i>Canulla</i> sp.	0	0	0	0	0	0	1	0	1	0	0	2	1
4	<i>Cylindropsyllus</i> sp.	3	2	2	1	0	0	1	1	2	0	0	1	0
5	<i>Macrosetella</i> sp.	2	2	1	4	0	0	0	0	1	2	3	1	0
6	<i>Laophonte thoracica</i>	4	1	0	2	4	1	4	3	0	0	0	0	1
7	<i>Laophonte</i> sp.	0	1	6	2	0	7	2	1	0	1	1	2	0
8	<i>Euterpina</i> sp.	3	2	0	0	3	0	1	3	0	1	0	1	0
9	Unknown sp.	1	2	0	1	0	3	2	0	1	0	1	0	0
	Ostrocodes													
	<i>Cypridina</i> sp.1	0	0	0	0	1	6	0	0	0	1	0	1	0
1	<i>Cypridina</i> sp.2	3	0	0	2	0	3	0	3	1	1	1	1	0
2	<i>Parastenocypris</i> sp.	0	0	0	0	0	1	0	1	0	1	0	0	0
3	<i>Stenocypris major</i>	1	0	1	0	0	0	0	0	0	1	0	0	0
4	<i>Strandesia</i> sp.	1	1	0	1	0	0	2	0	0	0	0	0	0
5	Unknown sp.	1	0	1	1	1	0	2	1	0	0	1	0	0
	Others													
1	<i>Polychaete larvae</i>	3	4	0	2	0	1	0	3	4	1	1	0	0
2	<i>Turbellarian</i> sp.	0	1	0	2	0	1	1	1	1	1	2	0	0
3	<i>Cephalodasys</i> sp.	0	1	0	2	1	1	2	1	2	0	0	0	0
4	<i>Olichochaetes</i>	0	0	0	0	0	1	0	0	0	0	0	0	0
5	Unknown sp.	0	0	0	0	1	1	0	1	1	1	1	0	0

Table F-32: Meiobenthos Diversity indices

SI No.	Location Code	Shannon diversity (H')			Margalef richness (d)			Pielous's evenss (J')		
		M	PM	S	M	PM	S	M	PM	S
1	MSL1	3.934	3.747	3.656	12.6	11.19	10.13	0.9609	0.9394	0.9345
2	MSL2	3.834	3.499	3.273	11.81	9.317	8.288	0.9442	0.9246	0.8934
3	MSL3	3.62	2.981	2.849	10.12	6.061	5.863	0.9566	0.8946	0.8549
4	MSL4	3.783	3.534	3.498	11.01	9.154	9.157	0.9622	0.9515	0.936
5	MSL5	3.691	3.177	3.106	10.65	6.867	6.427	0.9587	0.9436	0.9225
6	MSL6	3.725	3.552	3.45	10.67	9.48	9.028	0.9623	0.9565	0.929
7	MSL7	3.871	3.682	3.62	11.87	10.34	9.98	0.9574	0.9462	0.935
8	MSL8	3.748	3.583	3.527	10.66	9.356	8.962	0.9789	0.9586	0.9436
9	MSL9	3.805	3.449	3.489	11.22	9.137	9.103	0.9776	0.9414	0.9524
10	ITL10	3.625	3.303	3.383	10.58	8.444	8.722	0.9363	0.9079	0.9234
11	ITL11	3.742	3.333	3.333	10.88	8.022	8.022	0.983	0.9532	0.9532
12	BERTH 3	3.445	3.269	3.314	8.72	7.413	7.792	0.977	0.9612	0.965
13	CB-1	3.379	2.864	2.933	8.189	5.824	5.955	0.984	0.9406	0.9488

F.5 Ambient Air Quality Monitoring

Ambient Air Quality Monitoring Data for the study area is given in **Table F-33** to **Table F-36**.

Table F-33: Ambient Air Quality Monitoring Data for PM₁₀

Name of the location	Pre-Monsoon		Winter		Summer		NAAQ Standard for PM ₁₀
	µg/m ³						
	Max	Min	Max	Min	Max	Min	
Attipattu	72.8	44.2	70.2	42.5	68.3	53.3	100
Kattupalli	54	36	52	31	52	34	100
Kalanji	52	34	53	33	56	36	100
Karungalikuppam	57.4	37.2	60.2	36.3	62	51.6	100
Neidavayal	76.9	43.2	71.2	42.2	70.5	58.9	100
Uranambedu	79.6	41.6	71.5	44.2	69.6	53.6	100
Kattur	60.4	36.9	60.5	32.6	64.6	52	100

Table F-34: Ambient Air Quality Monitoring Data for PM_{2.5}

Name of the location	Pre-Monsoon		Winter		Summer		NAAQ Standard for PM _{2.5}
	µg/m ³						
	Max	Min	Max	Min	Max	Min	
Attipattu	41.6	16.5	38.6	16.2	36.9	21.5	60
Kattupalli	22	12	23	10	22	12	60
Kalanji	23	12	24	10	24	12	60
Karungalikuppam	29.1	15.2	28.9	16.5	29.9	20.3	60
Neidavayal	37.8	16.8	34.5	15.6	32.5	15.9	60
Uranambedu	38.1	15.4	33.6	17.5	30.6	20.9	60
Kattur	33.5	15.4	31.2	16.9	30.6	20.6	60

Table F-35: Ambient Air Quality Monitoring Data for SO₂

Name of the location	Pre-Monsoon		Winter		Summer		NAAQ Standard for SO ₂
	µg/m ³						
	Max	Min	Max	Min	Max	Min	
Attipattu	9.7	5.6	10	6.1	10.8	6	80
Kattupalli	6.5	3.8	6.8	4.2	6.8	4	80
Kalanji	6	3.8	6.6	3.9	6.7	3.8	80
Karungalikuppam	8.9	5.9	10	6	9.6	6	80
Neidavayal	9.5	6.2	10.2	6	11.5	6	80
Uranambedu	9.9	6.1	11.2	7	11.5	6.3	80
Kattur	9.8	6.1	10.5	7	11.9	7.9	80

Table F-36: Ambient Air Quality Monitoring Data for NO₂

Name of the location	Pre-Monsoon		Winter		Summer		NAAQ Standard for NO ₂
	µg/m ³						
	Max	Min	Max	Min	Max	Min	
Attipattu	18.9	11.3	18.9	12	17.6	11.2	80
Kattupalli	15.7	11	16.3	10.3	16.4	11.2	80
Kalanji	15.5	10.3	16.5	10	16.5	11	80
Karungalikuppam	17.6	12.3	17.6	11.6	16.6	12.5	80
Neidavayal	18.4	13.7	18.2	13.6	18.5	13.2	80
Uranambedu	18.6	11.1	18	10.2	17.4	11.2	80
Kattur	18.9	11.2	18.2	10.2	19.6	9.6	80

F.6 Noise Quality Monitoring

Ambient Noise Quality Monitoring Data for the study area is given in **Table F-37**.

Table F-37: Ambient Noise Quality Monitoring Data for Day and night Equivalent

Location Code	Locations	Day Equivalent (L _d)				Night Equivalent (L _n)			
		W	S	PM	CPCB Standard dB(A)	W	S	PM	CPCB Standard dB(A)
N1	Attipattu (I)	65.63	66.66	63.80	75	55.80	56.85	53.93	70
N2	Kattupalli (I)	53.09	52.13	52.29	75	42.40	40.87	41.35	70
N3	Kalanji (I)	52.09	52.22	52.86	75	42.81	40.28	41.65	70
N4	Karungalikuppam (R)	52.50	53.77	50.33	55	43.70	44.78	41.84	45
N5	Neidavayal (R)	54.33	53.42	52.47	55	44.95	46.08	43.21	45
N6	Uranambedu (I)	64.77	65.89	62.90	75	56.44	57.61	55.01	70
N7	Kattur (R)	53.31	54.41	51.53	55	44.73	45.82	42.76	45

W-Winter

S-Summer

PM-Pre-Monsoon

F.8 Checklist of Flora present in the Core and Buffer Area

Sl. No.	Botanical Name	Family	Local	IUCN Status	Core	Buffer	Native/Cultivated
			Status				
Trees							
1	<i>Acacia auriculiformis</i>	Fabaceae	C	LC	*	*	Cultivated
2	<i>Acacia leucophloea</i> (Roxb.) Willd.	Fabaceae	C	LC		*	Cultivated
3	<i>Acacia nilotica</i> (L.) Delile.	Fabaceae	C	LC		*	Native
4	<i>Ailanthus excelsa</i> Roxb.	Simaroubaceae	C	LC		*	Native
5	<i>Alangium salviifolium</i> (L.f.) Wangerin.	Cornaceae	C	LC		*	Native
6	<i>Albizia amara</i> (Roxb.) B.Boivin.	Leguminosae	C	LC	*	*	Cultivated
7	<i>Alstonia scholaris</i> (L.) R. Br.	Apocynaceae	C	LC	*	*	Cultivated
8	<i>Anacardium occidentale</i> L.	Anacardiaceae	C	LC	*	*	Cultivated
9	<i>Annona squamosa</i> L.	Annonaceae	C	LC		*	Cultivated
10	<i>Artocarpus heterophyllus</i> Lam.	Moraceae	C	LC		*	Cultivated
11	<i>Azadirachta indica</i> A.Juss.	Meliaceae	C	LC	*	*	Cultivated
12	<i>Barringtonia acutangula</i> (L.) Gaertn.	Lecythidaceae	C	LC		*	Native
13	<i>Bauhinia purpurea</i> L.	Fabaceae	C	LC	*		Cultivated
14	<i>Bauhinia racemosa</i> Lam.	Fabaceae	C	LC		*	Cultivated
15	<i>Bombax ceiba</i> L.	Bombacaceae	C	LC		*	Cultivated
16	<i>Borassus flabellifer</i> L.	Arecaceae	C	LC	*	*	Cultivated
17	<i>Butea monosperma</i> (Lam.) Taub.	Fabaceae	C	LC		*	Native
18	<i>Calophyllum inophyllum</i> L.	Clusiaceae	C	LC	*	*	Native
19	<i>Cassia fistula</i> L.	Fabaceae	C	LC	*	*	Cultivated
20	<i>Cassia roxburghii</i>	Fabaceae	C	LC	*	*	Cultivated
21	<i>Cassia siamea</i> Lam.	Fabaceae	C	LC		*	Cultivated
22	<i>Cassine glauca</i> (Rottb.) Kuntze	Celastraceae	C	LC		*	Cultivated
23	<i>Casuarina equisetifolia</i> L.	Casuarinaceae	C	LC	*	*	Cultivated
24	<i>Ceiba pentandra</i> (L.) Gaertn	Malvaceae	C	LC		*	Cultivated
25	<i>Citrus sinensis</i> (L.) Osbeck	Rutaceae	C	LC		*	Cultivated

Sl. No.	Botanical Name	Family	Local	IUCN	Core	Buffer	Native/Cultivated
			Status	Status			
26	<i>Cocos nucifera</i> L.	Arecaceae	C	LC	*	*	Cultivated
27	<i>Cordia dichotoma</i> G.Forst.	Boraginaceae	C	LC		*	Native
28	<i>Dalbergia sissoo</i> DC.	Fabaceae	C	LC		*	Cultivated
29	<i>Dichrostachys cinerea</i> (L.) Wight & Arn.	Fabaceae	C	LC	*	*	Native
30	<i>Eucalyptus globulus</i> Labill.	Myrtaceae	C	LC	*	*	Cultivated
31	<i>Excoecaria agallocha</i> L.	Euphorbiaceae	C	LC	*	*	Native
32	<i>Ficus benghalensis</i> L.	Moraceae	C	LC	*	*	Cultivated
33	<i>Ficus hispida</i> L.f.	Moraceae	C	LC		*	Native
34	<i>Ficus mollis</i> Vahl	Moraceae	C	LC		*	Native
35	<i>Ficus religiosa</i> L.	Moraceae	C	LC	*	*	Cultivated
36	<i>Flacourtia indica</i> (Burm.f.) Merr.	Salicaceae	C	LC		*	Native
37	<i>Holoptelea integrifolia</i> Planch.	Ulmaceae	C	LC		*	Native
38	<i>Ixora parviflora</i> Lam.	Rubiaceae	C	LC		*	Native
39	<i>Jatropha curcas</i> L.	Euphorbiaceae	C	LC		*	Native
40	<i>Lannea coromandelica</i> (Houtt.) Merr.	Anacardiaceae	C	LC	*	*	Native
41	<i>Lepisanthes tetraphylla</i> Radlk.	Sapindaceae	C	LC	*	*	Native
42	<i>Leucaena leucocephala</i> (Lam.) de Wit	Leguminosae	C	LC	*	*	Cultivated
43	<i>Limonia acidissima</i> Groff	Rutaceae	C	LC		*	Cultivated
44	<i>Mangifera indica</i> L.	Anacardiaceae	C	LC	*	*	Cultivated
45	<i>Maytenus emarginata</i> (Ruiz & Pav.) Loes.	Celastraceae	C	LC		*	Native
46	<i>Millingtonia hortensis</i> L.f.	Bignoniaceae	C	LC		*	Cultivated
47	<i>Morinda pubescens</i>	Rubiaceae	C		*		Native
48	<i>Moringa oleifera</i> Lam.	Moringaceae	C	LC		*	Cultivated
49	<i>Ochna obtusata</i> DC	Ochnaceae	C	LC	*	*	Native
50	<i>Peltophorum pterocarpum</i> (DC.) K.Heyne	Fabaceae	C	LC	*	*	Cultivated
51	<i>Phoenix pusilla</i> Gaertn	Arecaceae	C	LC	*	*	Cultivated
52	<i>Phoenix sylvestris</i> (L.) Roxb.	Arecaceae	C	LC	*	*	Cultivated

Sl. No.	Botanical Name	Family	Local	IUCN	Core	Buffer	Native/Cultivated
			Status	Status			
53	Phyllanthus emblica L.	Phyllanthaceae	C	LC		*	Cultivated
54	Pithecellobium dulce (Roxb.) Benth.	Fabaceae	C	LC		*	Native
55	Plumeria rubra L.	Apocynaceae	C	LC		*	Cultivated
56	Pongamia pinnata (L.) Pierre	Fabaceae	C	LC	*	*	Cultivated
57	Prosopis chilensis (Molina) Stuntz	Fabaceae	C	LC	*	*	Cultivated
58	Psidium guajava L.	Myrtaceae	C	LC		*	Cultivated
59	Samanea saman	Mimosaceae	C	LC	*	*	Cultivated
60	Sapindus emarginatus Vahl	Sapindaceae	C	LC		*	Cultivated
61	Semecarpus anacardium L.f.	Anacardiaceae	C	LC		*	Native
62	Senna siamea (Lam.) H.S.Irwin & Barneby	Fabaceae	C	LC		*	Cultivated
63	Spathodea campanulata	Bignoniaceae	C	LC	*	*	Cultivated
64	Syzygium cumini (L.) Skeels	Myrtaceae	C	LC	*	*	Native
65	Tamarindus indica L.	Fabaceae	C	LC		*	Cultivated
66	Tectona grandis L.f.	Lamiaceae	C	LC		*	Cultivated
67	Terminalia arjuna (Roxb. ex DC.) Wight & Arn.	Combretaceae	C	LC		*	Cultivated
68	Terminalia catappa L.	Combretaceae	C	LC	*	*	Cultivated
69	Thespesia populnea (L.) Sol. ex Corrêa	Malvaceae	C	LC	*	*	Cultivated
70	Wrightia tinctoria R.Br.	Apocynaceae	C	LC	*	*	Native
71	Ziziphus jujuba Mill.	Rhamnaceae	C	LC		*	Native
72	Ziziphus nummularia (Burm. f.) Wight & Walk.-Arn.	Rhamnaceae	C	LC		*	Native
Shrubs							
73	Abutilon indicum (L.) Sweet	Malvaceae	C	LC		*	Native
74	Acalypha ciliata	Euphorbiaceae	C	LC		*	Native
75	Azima tetraantha Lam.	Salvadoraceae	C	LC		*	Native
76	Caesalpinia bonduc (L.) Roxb.	Caesalpinaceae	C	LC		*	Native
77	Caesalpinia pulcherrima (L.) Sw.	Caesalpinaceae	C	LC	*	*	Cultivated
78	Calamus rotang L.	Arecaceae	C	NA	*	*	Native

Sl. No.	Botanical Name	Family	Local	IUCN	Core	Buffer	Native/Cultivated
			Status	Status			
79	Calotropis gigantea (L.) Dryand.	Apocynaceae	C	LC	*	*	Native
80	Calotropis procera (Aiton) Dryand.	Apocynaceae	C	LC		*	Native
81	Canna indica L.	Cannaceae	C	LC		*	Cultivated
82	Canthium coromandelicum (Burm.f.) Alston.	Rubiaceae	C	LC		*	Native
83	Carissa carandas L.	Apocynaceae	C	LC	*	*	Native
84	Catunaregam spinosa (Thunb.) Tirveng.	Rubiaceae	C	LC	*	*	Native
85	Chromolaena odorata (L.) R.M.King & H.Rob.	Compositae	C	LC		*	Native
86	Dodonaea viscosa Jacq.	Sapindaceae	C	LC	*	*	Native
87	Euphorbia caducifolia Haines	Euphorbiaceae	C	LC		*	Native
88	Euphorbia tirucalli L.	Euphorbiaceae	C	LC		*	Native
89	Gardenia gummifera L.f.	Rubiaceae	C	LC		*	Native
90	Getonia floribunda Roxb	Combretaceae	C	LC		*	Native
91	Grewia flavescens Juss.	Malvaceae	C	LC		*	Native
92	Grewia tenax (Forssk.) Fiori	Malvaceae	C	LC		*	Native
93	Gymnosporia emarginata (Willd.) Thwaites	Celastraceae	C	LC		*	Native
94	Hibiscus rosa-sinensis L.	Malvaceae	C	LC		*	Cultivated
95	Hyptis suaveolens (L.) Poit.	Lamiaceae	C	LC	*	*	Native
96	Ixora coccinea L.	Rubiaceae	C	LC		*	Cultivated
97	Jasminum roxburghianum Wall. ex C.B.Clarke	Oleaceae	C	LC	*	*	Native
98	Jatropha glandulifera Roxb.	Euphorbiaceae	C	LC		*	Native
99	Lantana camara L.	Verbenaceae	C	LC	*	*	Native
100	Leonotis nepetifolia (L.) R.Br.	Lamiaceae	C	LC		*	Native
101	Martynia annua L.	Martyniaceae	C	LC		*	Native
102	Melhania hamiltoniana Wall.	Malvaceae	C	LC		*	Native
103	Musa × paradisiaca L.	Musaceae	C	LC		*	Cultivated
104	Opuntia dillenii (Ker Gawl.) Haw.	Cactaceae	C	LC	*	*	Native
105	Pandanus fascicularis Lam.	Pandanaceae	C	LC	*	*	Native

Sl. No.	Botanical Name	Family	Local	IUCN	Core	Buffer	Native/Cultivated
			Status	Status			
106	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	C	LC		*	Native
107	<i>Ricinus communis</i> L.	Euphorbiaceae	C	LC	*	*	Cultivated
108	<i>Sarcostemma acidum</i> (Roxb.) Voigt	Apocynaceae	C	LC		*	Native
109	<i>Senna alata</i> (Linnaeus) Roxburgh	Fabaceae	C	LC	*	*	Native
110	<i>Senna auriculata</i> (L.) Roxb.	Fabaceae	C	LC	*	*	Native
111	<i>Senna occidentalis</i> (L.) Link	Fabaceae	C	LC	*	*	Native
112	<i>Solanum pubescens</i> Willd.	Solanaceae	C	LC		*	Native
113	<i>Solanum trilobatum</i> L.	Solanaceae	C	LC		*	Native
114	<i>Vitex negundo</i> L.	Lamiaceae	C	LC		*	Native
115	<i>Wodyetia bifurcata</i> A.K.Irvine	Arecaceae	C	CD	*	*	Cultivated
116	<i>Ziziphus oenopolia</i> (L.) Mill.	Rhamnaceae	C	LC	*	*	Native
Herbs							
117	<i>Acalypha indica</i> L.	Euphorbiaceae	C	LC	*	*	Native
118	<i>Achyranthes aspera</i> L.	Amaranthaceae	C	LC		*	Native
119	<i>Aerva lanata</i> (L.) Juss.	Amaranthaceae	C	LC		*	Native
120	<i>Ageratum conyzoides</i> (L.) L.	Compositae	C	LC	*	*	Native
121	<i>Aloe vera</i> (L.) Burm.f.	Asparagaceae	C	LC		*	Native
122	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	Amaranthaceae	C	LC		*	Native
123	<i>Amaranthus viridis</i> L.	Amaranthaceae	C	LC	*	*	Native
124	<i>Andrographis paniculata</i> (Burm.f.) Nees	Acanthaceae	C	LC		*	Native
125	<i>Apluda mutica</i> L.f.	Poaceae	C	LC		*	Native
126	<i>Argemone mexicana</i> L.	Papaveraceae	C	LC		*	Native
127	<i>Aristida fasciculata</i> Torr.	Poaceae	C	LC		*	Native
128	<i>Aristida hystrix</i> L.f.	Poaceae	C	LC		*	Native
129	<i>Asystasia gangetica</i>	Acanthaceae	C	LC	*	*	Native
130	<i>Bacopa monnieri</i> (L.) Wettst.	Plantaginaceae	C	LC		*	Native
131	<i>Barleria longifolia</i> L.	Acanthaceae	C	LC		*	Native

Sl. No.	Botanical Name	Family	Local	IUCN Status	Core	Buffer	Native/Cultivated
			Status				
132	Barleria prionitis L.	Acanthaceae	C	LC		*	Native
133	Blepharis maderaspatensis (L.) B.Heyne ex Roth	Acanthaceae	C	LC	*	*	Native
134	Boerhavia diffusa L.	Nyctaginaceae	C	LC		*	Native
135	Bracharia ramosa (L.) Stapf	Poaceae	C	LC		*	Native
136	Cassia uniflora Mill.	Fabaceae	C	LC		*	Native
137	Cassia obtusa Clos	Fabaceae	C	LC		*	Native
138	Catharanthus pusillus (Murray) G.Don	Apocynaceae	C	LC		*	Native
139	Catharanthus roseus (L.) G.Don	Apocynaceae	C	LC	*	*	Native
140	Celosia argentea L.	Amaranthaceae	C	LC		*	Native
141	Chloris barbata Sw.	Poaceae	C	LC		*	Native
142	Cleome gynandra L.	Cleomaceae	C	LC		*	Native
143	Cleome viscosa L.	Cleomaceae	C	LC		*	Native
144	Commelina benghalensis L.	Commelinaceae	C	LC	*	*	Native
145	Commelina longifolia Lam.	Commelinaceae	C	LC		*	Native
146	Corchorus aestuans L.	Malvaceae	C	LC		*	Native
147	Crotalaria juncea L.	Fabaceae	C	LC		*	Native
148	Croton bonplandianus Baill.	Euphorbiaceae	C	LC		*	Native
149	Cyanotis axillaris (L.) D.Don ex Sweet	Commelinaceae	C	LC		*	Native
150	Cyanotis tuberosa (Roxb.) Schult. & Schult.f.	Commelinaceae	C	LC		*	Native
151	Cymbopogon citratus (DC.) Stapf	Poaceae	C	LC		*	Native
152	Cyperus rotundus L.	Cyperaceae	C	LC	*	*	Native
153	Cyperus triceps (Rottb.) Endl.	Cyperaceae	C	LC		*	Native
154	Dactyloctenium aegyptium (L.) Beauv.	Poaceae	C	LC	*	*	Native
155	Datura stramonium L.	Solanaceae	C	LC	*	*	Native
156	Desmodium triflorum (L.) DC.	Fabaceae	C	LC		*	Native
157	Dipteracanthus prostratus (Poir.) Nees	Acanthaceae	C	LC		*	Native
158	Ecboium viride (Forssk.) Alston	Acanthaceae	C	LC		*	Native

Sl. No.	Botanical Name	Family	Local	IUCN Status	Core	Buffer	Native/Cultivated
			Status				
159	<i>Eclipta prostrata</i> (L.) L.	Compositae	C	LC	*	*	Native
160	<i>Eragrostis tenella</i> (L.) Beauv. & Schult.	Poaceae	C	LC		*	Native
161	<i>Eupatorium odoratum</i> L.	Compositae	C	LC		*	Native
162	<i>Euphorbia hirta</i> L.	Euphorbiaceae	C	LC		*	Native
163	<i>Evolvulus alsinoides</i> (L.) L	Convolvulaceae	C	LC		*	Native
164	<i>Fimbristylis cymosa</i> R.Br.	Cyperaceae	C	LC	*	*	Native
165	<i>Fimbristylis ferruginea</i> (L.) Vahl	Cyperaceae	C	LC	*	*	Native
166	<i>Glinus oppositifolius</i> (L.) DC.	Molluginaceae	C	LC		*	Native
167	<i>Gomphrena serrata</i> L.	Amaranthaceae	C	LC		*	Native
168	<i>Halosarcia indica</i> (Willd.) Paul G.Wilson	Amaranthaceae	C	LC	*	*	Native
169	<i>Heteropogon contortus</i> (L.) P.Beauv. ex Roem. & Schult.	Poaceae	C	LC	*	*	Native
170	<i>Hibiscus lobatus</i> (Murray) Kuntze	Malvaceae	C	LC		*	Native
171	<i>Hybanthus enneaspermus</i> (L.) F.Muell.	Violaceae	C	LC		*	Native
172	<i>Hydrophylax maritima</i> L.f.	Rubiaceae	C	LC		*	Native
173	<i>Hygrophila auriculata</i> (Schumach.) Heine	Acanthaceae	C	LC		*	Native
174	<i>Indigofera linnaei</i> Ali	Leguminosae	C	LC		*	Native
175	<i>Ipomoea pes-caprae</i> (L.) R. Br.	Convolvulaceae	C	LC		*	Native
176	<i>Justicia procumbens</i> L.	Acanthaceae	C	LC		*	Native
177	<i>Lagascea mollis</i> Cav.	Compositae	C	LC		*	Native
178	<i>Launaea sarmentosa</i> (Willd.) Sch.Bip. ex Kuntze	Compositae	C	LC		*	Native
179	<i>Leucas aspera</i> (Willd.) Link	Lamiaceae	C	LC		*	Native
180	<i>Ludwigia perennis</i> L.	Onagraceae	C	LC		*	Native
181	<i>Melhania incana</i> B.Heyne	Sterculiaceae	C	LC		*	Native
182	<i>Mimosa pudica</i> L.	Leguminosae	C	LC		*	Native
183	<i>Mollugo nudicaulis</i> Lam.	Molluginaceae	C	LC		*	Native
184	<i>Ocimum tenuifolium</i> L.	Lamiaceae	C	LC	*	*	Native
185	<i>Oldenlandia umbellata</i> L.	Rubiaceae	C	LC		*	Native

Sl. No.	Botanical Name	Family	Local	IUCN	Core	Buffer	Native/Cultivated
			Status	Status			
186	<i>Oxalis corniculata</i> L.	Oxalidaceae	C	LC		*	Native
187	<i>Parthenium hysterophorus</i> L.	Compositae	C	LC		*	Native
188	<i>Pavonia zeylanica</i> Cav.	Malvaceae	C	LC		*	Native
189	<i>Pedaliium murex</i> L.	Pedaliaceae	C	LC		*	Native
190	<i>Phyla nodiflora</i> (L.) Greene	Verbenaceae	C	LC		*	Native
191	<i>Phyllanthus amarus</i> Schumach. & Thonn.	Phyllanthaceae	C	LC		*	Native
192	<i>Portulaca oleracea</i> L.	Portulacaceae	C	LC	*	*	Native
193	<i>Rhynchosia capitata</i> (Roth) DC.	Leguminosae	C	LC		*	Native
194	<i>Ruellia tuberosa</i> L.	Acanthaceae	C	LC		*	Native
195	<i>Saccharum spontaneum</i> L.	Poaceae	C	LC		*	Native
196	<i>Sesuvium portulacastrum</i> (L.) L.	Aizoaceae	C	LC	*	*	Native
197	<i>Setaria pumila</i> (Poir.) Roem. & Schult	Poaceae	C	LC		*	Native
198	<i>Sida acuta</i> Burm.f.	Malvaceae	C	LC		*	Native
199	<i>Sida cordifolia</i> L.	Malvaceae	C	LC	*	*	Native
200	<i>Spinifex littoreus</i> (Burm.f.) Merr.	Poaceae	C	LC		*	Native
201	<i>Sporobolus virginicus</i> (L.) Kunth	Poaceae	C	LC		*	Native
202	<i>Suaeda maritima</i> (L.) Dumort.	Amaranthaceae	C	LC	*	*	Native
203	<i>Suaeda monoica</i> Forssk. ex J.F.Gmel	Amaranthaceae	C	LC	*	*	Native
204	<i>Tephrosia purpurea</i> (L.) Pers.	Fabaceae	C	LC		*	Native
205	<i>Tribulus terrestris</i> L.	Zygophyllaceae	C	LC		*	Native
206	<i>Tridax procumbens</i> (L.) L.	Compositae	C	LC		*	Native
207	<i>Typha angustata</i> Bory & Chaub	Typhaceae	C	LC		*	Native
208	<i>Urena lobata</i> L.	Malvaceae	C	LC	*	*	Native
209	<i>Vernonia cinerea</i> (L.) Less.	Compositae	C	LC	*	*	Native
210	<i>Waltheria indica</i> L.	Malvaceae	C	LC		*	Native
Climbers/Creepers							
211	<i>Abrus precatorius</i> L.	Fabaceae	C	LC	*	*	Native

Sl. No.	Botanical Name	Family	Local	IUCN	Core	Buffer	Native/Cultivated
			Status	Status			
212	<i>Aristolochia indica</i> L.	Aristolochiaceae	C	LC		*	Native
213	<i>Asparagus racemosus</i> Willd.	Asparagaceae	C	LC		*	Native
214	<i>Caesalpinia bonduc</i> (L.) Roxb.	Fabaceae	C	LC		*	Native
215	<i>Canavalia gladiata</i> (Jacq.) DC.	Fabaceae	C	LC	*	*	Native
216	<i>Capparis zeylanica</i> L.	Oleaceae	C	LC		*	Native
217	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	C	LC	*	*	Native
218	<i>Cissus quadrangularis</i> L.	Vitaceae	C	LC		*	Native
219	<i>Clitoria ternatea</i> L.	Fabaceae	C	LC	*	*	Native
220	<i>Cuscuta reflexa</i> Roxb.	Convolvulaceae	C	LC		*	Native
221	<i>Hemidesmus indicus</i> (L.) R. Br. ex Schult	Apocynaceae	C	LC		*	Native
222	<i>Ichnocarpus frutescens</i> (L.) W.T.Aiton	Apocynaceae	C	LC		*	Native
223	<i>Ipomoea pes-caprae</i> (L.) R. Br.	Convolvulaceae	C	LC	*	*	Native
224	<i>Jasminum angustifolium</i> (L.) Willd.	Cleaceae	C	LC		*	Native
225	<i>Mimosa rubicaulis</i> Lam.	Fabaceae	C	LC		*	Native
226	<i>Mucuna pruriens</i> (L.) DC.	Fabaceae	C	LC		*	Native
227	<i>Passiflora foetida</i> L.	Passifloraceae	C	LC		*	Native
228	<i>Pergularia daemia</i> (Forssk.) Chiov.	Apocynaceae	C	LC	*	*	Native
229	<i>Tinospora cordifolia</i> (Willd.) Miers.	Menispermaceae	C	LC	*	*	Native
Hydrophytes							
230	<i>Aponogeton natans</i> (L.) Engl. & K.Krause	Aponogetonaceae	C	LC		*	Native
231	<i>Azolla pinnata</i>	Salviniaceae	C	LC		*	Native
232	<i>Eichornia crassipes</i> Solms	Pontederiaceae	C	LC		*	Native
233	<i>Hydrilla</i> Rich.	Hydrocharitaceae	C	LC		*	Native
234	<i>Lemna minor</i> Hegelm.	Araceae	C	LC	*	*	Native
235	<i>Marsilea quadrifolia</i> L.	Marsileaceae	C	LC		*	Native
236	<i>Nelumbo nucifera</i> Gaertn.	Nelumbonaceae	R	DD		*	Native
237	<i>Nymphaea nouchali</i> Burm. f.	Nymphaeaceae	C	LC		*	Native

Sl. No.	Botanical Name	Family	Local	IUCN Status	Core	Buffer	Native/Cultivated
			Status				
238	Nymphoides hydrophylla (Lour.) Kuntze	Menyanthaceae	C	LC		*	Native
239	Ottelia alismoides (L.) Pers.	Hydrocharitaceae	C	LC		*	Native
240	Pistia L.	Araceae	C	LC		*	Native

IUCN- International Union for Conservation of Nature
LC – Least Concerned

F.9 Check list of Mammals recorded in the Study area (Core and Buffer area)

S.No.	Family/Scientific Name	Common Name	IUCN	IWPA Schedule	Core	Buffer
	Canidae					
1	Indian fox	Vulpes bengalensis	LC	II	+	+
	Herpestidae					
2	Common Indian Mongoose	Herpestes javanicus	LC	III	+	+
	Leporidae					
3	Black-naped Hare	Lepus nigricollis	LC	IV	+	+
	Muridae					
4	Indian mole rat	Bendicota bengalensis	LC	V	--	+
5	Little Indian Field mouse	Mus booduga	LC	V	+	+
6	House rat	Rattus rattus	LC	V	+	+
	Sciuridae					
7	Three striped palm squirrel	Funambulus palmarum	LC	V	+	+
	Pteropodidae					
8	Indian fruit bat	Pteropus giganteus	LC	IV	--	+
	Suidae					
9	Indian Wild Boar	Sus scrofa cristatus	LC	III	+	+
	Cervidae					
11	Sambar deer	Rusa unicolor	LC	III	+	--

F.10 Check list of Birds recorded in the Study area (Core and Buffer area)

SI No	Order/Family/Common name	Species name	IUCN	IWPA	Core	Buffer
	Pelecanidae					
1	Spot-billed pelican	Pelecanus philippensis	NT	IV	+	+
	Ardeidae					
2	Cattle Egret	Bubulcus ibis	LC	IV	+	+
3	Little Egret	Egretta garzetta	LC	IV	+	+
3	Grey Heron	Ardea cinerea	LC	IV	--	+
4	Indian Pond Heron	Ardeola greyii	LC	IV	+	+
5	Night heron	Nycticorax nycticorax	LC	IV	+	+
	Anseriformes:Anatidae					
6	Common Teal	Anas crecca	LC	IV	--	+
	Falconiformes:Accipitridae					
7	Black Kite	Milvus migrans	LC	IV	+	+
	Corvidae					
8	Shikra	Accipiter badius	LC	IV	--	+
	Rallidae					
9	Common coot	Pulica atra	LC	IV	--	+
10	Common Moorhen	Gallinula chloropus	LC	IV	--	+
	Columbiformes:Columbidae					
11	Rock pigeon	Columba livia	LC	IV	+	+
12	Spotted Dove	Streptopelia chinensis	LC	IV	--	+
	Psittaciformes:Psittacidae					
13	Rose ringed Parakeet	Psittacula krameri	LC	IV	+	+
	Cuculiformes:Cuculidae					
15	Asian Koel	Eudynamys scolopacea	LC	IV	+	+
	Strigiformes:Strigidae					
16	Spotted Owlet	Athene brama	LC	IV	--	+
	Upupiformes:Upupidae					

SI No	Order/Family/Common name	Species name	IUCN	IWPA	Core	Buffer
17	Common hoopoe	<i>Upupa epops</i>	LC	IV	--	+
	Apodiformes:Apodidae					
18	Asian Palm Swift	<i>Cypsiurus unicolor</i>	LC	IV	+	+
19	House Swift	<i>Apus affinis</i>	LC	IV	--	+
	Coraciiformes:Meropidae					
20	Small Green Bee-eater	<i>Merops orientalis</i>	LC	IV	+	+
	Coraciidae					
21	Indian Roller	<i>Coracias benghalensis</i>	LC	IV	+	+
	Passeriformes:Alaudidae					
22	Ashy crowned Sparrow Lark	<i>Eremopterix grisea</i>	LC	IV	--	+
	Dicruridae					
23	Black Drongo	<i>Dicrurus macrocercus</i>	LC	IV	--	+
	Cisticolidae					
24	Ashy prinia	<i>Prinia socialis</i>	LC	IV	+	+
	Sturnidae					
25	Common Myna	<i>Acridotheres tristis</i>	LC	IV	+	+
26	Asian pied starling	<i>Gracupica contra</i>	LC	IV	--	+
	Timaliidae					
27	Common Babbler	<i>Turdoides caudatus</i>	LC	IV	+	+
	Aegithinidae					
28	Common lora	<i>Aegithina tiphia</i>	LC	IV	--	+
	Cisticolidae					
29	Plain prinia	<i>Prinia inornata</i>	LC	IV	+	+
	Oriolidae					
30	Eurasian Golden Oriole	<i>Oriolus oriolus</i>	LC	IV	--	+
	Corvidae					
31	House crow	<i>Corvus splendens</i>	LC	IV	+	+
32	Rufous Treepie	<i>Dendrocitta vagabunda</i>	LC	IV	--	+
	Passeridae					
33	House Sparrow	<i>Passer domesticus</i>	LC	IV	+	+
	Estrildidae					
34	Scaly-breasted Munia	<i>Lonchura punctulata</i>	LC	IV	--	+
35	Indian Silverbill	<i>Lonchura malabarica</i>	LC	IV	--	+
	Nectariniidae					
36	Purple rumped Sun bird	<i>Nectarinia zeylonica</i>	LC	IV	+	+
	Motacillidae					
37	Paddy field Pipit	<i>Anthus rufulus</i>	LC	IV	--	+
38	Pied wagtail	<i>Motacilla madarasapatanensis</i>	LC	IV	--	+
	Pycnonotidae					
39	Red vented bulbul	<i>Pycnonotus cafer</i>	LC	IV	+	+
	Campephagidae					
40	Small Minivet	<i>Pericrocotus cinnamomeus</i>	LC	IV	--	+
	Phalacrocoracidae					
41	Little cormorant	<i>Microcarbo niger</i>	LC	IV	--	+
	Megalaimidae					
42	Coppersmith Barbet	<i>Megalaima haemacephala</i>	LC	IV	--	+
	Phasianidae					
43	Indian peafowl	<i>Pavo cristatus</i>	LC	I	--	+
	Jacaniidae					
44	Bronze winged Jacana	<i>Metopidius indicus</i>	LC	IV	--	+
	Accipitridae					
45	Brahminy Kite	<i>Haliastur indus</i>	LC	IV	--	+

SI No	Order/Family/Common name	Species name	IUCN	IWPA	Core	Buffer
	Ploceidae					
46	Baya Weaver	<i>Ploceus philippinus</i>	LC	IV	--	+
	Podicipedidae					
47	Little Grebe	<i>Tachybaptus ruficollis</i>	LC	IV	--	+
	Rallidae					
48	White Breasted Water Hen	<i>Amauornis phoenicurus</i>	LC	IV	--	+
	Ciconiidae					
49	Asian openbill	<i>Anastomus oscitans</i>	LC	IV	--	+
50	Painted stork	<i>Mycteria leucocephala</i>	NT	IV	--	+
	Alcedinidae					
51	White breasted kingfisher	<i>Halcyon smyrnensis</i>	LC	IV	+	+
52	Lesser pied kingfisher	<i>Ceryle rudis</i>	LC	IV	--	+
	Anhingidae					
53	Oriental Darter	<i>Anhinga melanogaster</i>	NT	IV	--	+
	Scolopacidae					
54	Eurasian Whimbrel	<i>Numenius phaeopus</i>	LC	IV	+	+
	Scolopacidae					
55	Red-necked phalarope	<i>Phalaropus lobatus</i>	LC	IV	--	+

F.11 Check list of Herpeto fauna recorded in the Study Area (Core and Buffer area)

SI No	Order/Family/Common name	Species name	IUCN	IWPA Schedule	Core	Buffer
	Squamata:Agamidae					
1	Common garden lizard	<i>Calotes versicolor</i>	LC	NL	--	+
2	Fan throated lizard	<i>Citana ponticeriana</i>	LC	NL		+
3	Common Indian cobra	<i>Naja naja</i>	LC	II	+	+
	Anura:Ranidae					
4	Paddy Field Frog	<i>Fejervarya limnocharis</i>	LC	IV	--	+
5	Common tree frog	<i>Polypedates maculatus</i>	LC	NL	+	+
6	Common Indian Toad	<i>Bufo melanostictus</i>	LC	NL	+	+
	Squamata: Viperidae					
7	Russell's Viper	<i>Daboia russelii</i>	LC	II	--	+
	Squamata: Elapidae					
8	Common Indian Krait	<i>Bungarus caeruleus</i>	LC	NL	--	+
	Squamata;Varanidae					
9	Indian Monitor Lizard	<i>Varanus bengalensis</i>	LC	I	--	+
	Squamata;Chamaeleonidae					
10	Indian Chameleon	<i>Chamaeleo zeylanicus</i>	LC	II	--	+
	Colubridae					
11	Indian rat snake	<i>Ptyas mucosa</i>	LC	II	+	+
	Scincidae					
12	Common skink	<i>Mabuya carinata</i>	LC	NL	+	+

IWPA – Indian Wildlife Protection Act 1972

LC – Least Concerned; Core Zone – Project site; Buffer Zone – 10 Km of the study area;

NL-Not listed, NT-Near Threatened

Note: Sign (-) Absent & (+) Present

APPENDIX G
NATIONAL AMBIENT AIR QUALITY
STANDARDS, NOVEMBER, 2009



भारत का राजपत्र

The Gazette of India

असाधारण
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PUBLISHED BY AUTHORITY

सं. 217]

नई दिल्ली, बुधवार, नवम्बर 18, 2009/कार्तिक 27, 1931

No. 217]

NEW DELHI, WEDNESDAY, NOVEMBER 18, 2009/KARTIKA 27, 1931

राष्ट्रीय परिवेशी वायु गुणवत्ता मानक

केन्द्रीय प्रदूषण नियंत्रण बोर्ड

अधिसूचना

नई दिल्ली, 18 नवम्बर, 2009

सं. बी-29016/20/90/पी.सी.आई.-L—वायु (प्रदूषण निवारण एवं नियंत्रण) अधिनियम, 1981 (1981 का 12) की धारा 16 की उपधारा (2) (एच) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए तथा अधिसूचना संख्या का.आ. 384(ई), दिनांक 11 अप्रैल, 1994 और का.आ. 935 (ई) दिनांक 14 अक्टूबर, 1998 के अधिक्रमण में केन्द्रीय प्रदूषण नियंत्रण बोर्ड इसके द्वारा तत्काल प्रभाव से राष्ट्रीय परिवेशी वायु गुणवत्ता मानक अधिसूचित करता है, जो इस प्रकार है:-

राष्ट्रीय परिवेशी वायु गुणवत्ता मानक

क्र. सं.	प्रदूषक	समय आघातित औसत	परिवेशी वायु में सान्द्रण		
			औद्योगिक, रिहायशी, ग्रामीण और अन्य क्षेत्र	पारिस्थितिकीय संवेदनशील क्षेत्र (केन्द्र सरकार द्वारा अधिसूचित)	प्रबोधन की पद्धति
(1)	(2)	(3)	(4)	(5)	(6)
1	सल्फर डाई आक्साइड (SO ₂), µg/m ³	वार्षिक* 24 घंटे**	50 80	20 80	-उन्नत वैस्ट और गार्डक -पराबैगनी परिदीप्ती
2	नाइट्रोजन डाई आक्साइड (NO ₂), µg/m ³	वार्षिक* 24 घंटे**	40 80	30 80	-उप्रांतरित जैकब और हॉचाइजर (सोडियम-आर्सनाईट) -रासायनिक संदीप्ति
3	विविक्त पदार्थ (10माइक्रान से कम आकार)या PM ₁₀ , µg/m ³	वार्षिक* 24 घंटे**	60 100	60 100	-हसतमक विश्लेषण -टैयम -बीटा तनुकरण पद्धति

4	विविक्त पदार्थ (2.5 माइक्रान से कम आकार या $PM_{2.5}$, $\mu g/m^3$)	वार्षिक* 24 घंटे**	40 60	40 60	-हवात्मक विश्लेषण -टोयम -बीटा तनुकरण पद्धति
5	ओजोन (O_3) $\mu g/m^3$	8 घंटे** 1 घंटा**	100 180	100 180	-पराबैगनी द्विप्तिकाल -रासायनिक संदीप्ति -रासायनिक पद्धति
6	सीसा (Pb) $\mu g/m^3$	वार्षिक* 24 घंटे**	0.50 1.0	0.50 1.0	ई.पी.एम. 2000 या समरूप फिल्टर पेपर का प्रयोग करके AAS/ICP पद्धति -टेफलॉन फिल्टर पेपर का प्रयोग करते हुए ED-XRF
7	कार्बन मोनोक्साइड (CO) mg/m^3	8 घंटे** 1 घंटा**	02 04	02 04	-अविपेक्षी अवरक्त (NDIR) स्पैक्ट्रम मापन
8	अमोनिया (NH_3) $\mu g/m^3$	वार्षिक* 24 घंटे**	100 400	100 400	-रासायनिक संदीप्ति -इण्डोफिनॉल ब्ल्यू पद्धति
9	बैन्जीन (C_6H_6) $\mu g/m^3$	वार्षिक*	05	05	- गैस क्रोमेटोग्राफी आधारित सतत विश्लेषक -अधिशोषण तथा निशोषण के बाद गैस क्रोमेटोग्राफी
10	बैन्जो (ए) पाईरीन (BaP) केवल विविक्त कण, ng/m^3	वार्षिक*	01	01	-विलायक निष्कर्षण के बाद HPLC/GC द्वारा विश्लेषण
11	आर्सेनिक (As) ng/m^3	वार्षिक*	06	06	-असंवितरक अवरक्त स्पैक्ट्रोमिती ई.पी.एम. 2000 या समरूप फिल्टर पेपर का प्रयोग करके ICP/AAS पद्धति
12	निकिल (Ni) ng/m^3	वार्षिक*	20	20	ई.पी.एम. 2000 या समरूप फिल्टर पेपर का प्रयोग करके ICP/AAS पद्धति

* वर्ष में एक समान अंतरालों पर सप्ताह में दो बार प्रति 24 घंटे तक किसी एक स्थान विशेष पर लिये गये न्यूनतम 104 मापों का वार्षिक अंकगणीतीय औसत ।

** वर्ष में 98 प्रतिशत समय पर 24 घंटे या 8 घंटे या 1 घंटा के मानीटर मापमान, जो लागू हों, अनुपालन किये जाएंगे । दो प्रतिशत समय पर यह मापमान अधिक हो सकता है, किन्तु क्रमिक दो मानीटर करने के दिनों पर नहीं ।

टिप्पणी:

1. जब कभी और जहां भी किसी अपने-अपने प्रवर्ग के लिये दो क्रमिक प्रबोधन दिनों पर मापित मूल्य, ऊपर विनिर्दिष्ट सीमा से अधिक हो तो इसे नियमित या निरंतर प्रबोधन तथा अतिरिक्त अन्वेषण करवाने के लिये पर्याप्त कारण समझा जायेगा ।

संत प्रसाद गौतम, अध्यक्ष

[विज्ञापन-III/4/184/09/असा.]

टिप्पणी: राष्ट्रीय परिवेशी वायु गुणवत्ता मानक संबंधी अधिसूचनाएँ, केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा भारत के राजपत्र आसाधरण में अधिसूचना संख्या का.आ. 384 (ई), दिनांक 11 अप्रैल, 1994 एवं का. आ. 935 (ई), दिनांक 14 अक्टूबर, 1998 द्वारा प्रकाशित की गयी थी ।

**NATIONAL AMBIENT AIR QUALITY STANDARDS
CENTRAL POLLUTION CONTROL BOARD
NOTIFICATION**

New Delhi, the 18th November, 2009

No. B-29016/20/90/PCI-L—In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No.14 of 1981), and in supersession of the Notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect, namely:-

NATIONAL AMBIENT AIR QUALITY STANDARDS

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO ₂), µg/m ³	Annual* 24 hours**	50 80	20 80	- Improved West and Gaeke - Ultraviolet fluorescence
2	Nitrogen Dioxide (NO ₂), µg/m ³	Annual* 24 hours**	40 80	30 80	- Modified Jacob & Hochheiser (Na-Arsenite) - Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM ₁₀ µg/m ³	Annual* 24 hours**	60 100	60 100	- Gravimetric - TOEM - Beta attenuation
4	Particulate Matter (size less than 2.5µm) or PM _{2.5} µg/m ³	Annual* 24 hours**	40 60	40 60	- Gravimetric - TOEM - Beta attenuation
5	Ozone (O ₃) µg/m ³	8 hours** 1 hour**	100 180	100 180	- UV photometric - Chemiluminescence - Chemical Method
6	Lead (Pb) µg/m ³	Annual* 24 hours**	0.50 1.0	0.50 1.0	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m ³	8 hours** 1 hour**	02 04	02 04	- Non Dispersive Infra Red (NDIR) spectroscopy
8	Ammonia (NH ₃) µg/m ³	Annual* 24 hours**	100 400	100 400	- Chemiluminescence - Indophenol blue method

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C ₆ H ₆) µg/m ³	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m ³	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m ³	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m ³	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note. — Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

SANT PRASAD GAUTAM, Chairman
[ADVT-III/4/184/09/Exty.]

Note: The notifications on National Ambient Air Quality Standards were published by the Central Pollution Control Board in the Gazette of India, Extraordinary vide notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998.

APPENDIX H
NATIONAL AMBIENT NOISE
STANDARDS

THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000

(The Principal Rules were published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.)

Whereas the increasing ambient noise levels in public places from various sources, inter-alia, industrial activity, construction activity, fire crackers, sound producing instruments, generator sets, loud speakers, public address systems, music systems, vehicular horns and other mechanical devices have deleterious effects on human health and the psychological well being of the people; it is considered necessary to regulate and control noise producing and generating sources with the objective of maintaining the ambient air quality standards in respect of noise;

Whereas a draft of Noise Pollution (Control and Regulation) Rules, 1999 was published under the notification of the Government of India in the Ministry of Environment and Forests vide number S.O. 528 (E), dated the 28th June, 1999 inviting objections and suggestions from all the persons likely to be affected thereby, before the expiry of the period of sixty days from the date on which the copies of the Gazette containing the said notification are made available to the public;

And whereas copies of the said Gazette were made available to the public on the 1st day of July, 1999;

And whereas the objections and suggestions received from the public in respect of the said draft rules have been duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by clause (ii) of sub-section (2) of section 3, sub-section (1) and clause (b) of sub-section (2) of section 6 and section 25 of the Environment (Protection) Act, 1986 (29 of 1986) read with rule 5 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following rules for the regulation and control of noise producing and generating sources, namely:-

The Noise Pollution (Regulation and Control) Rules, 2000

1. Short-title and commencement.-

- (1) These rules may be called the 'Noise Pollution (Regulation and Control) Rules, 2000.
- (2) They shall come into force on the date of their publication in the Official Gazette.

2. **Definitions-** In these rules, unless the context otherwise requires,-

- (a) "Act" means the Environment (Protection) Act, 1986 (29 of 1986);
- (b) "area / zone" means all areas which fall in either of the four categories given in the Schedule annexed to these rules;
- (c) "authority" means and includes any authority or officer authorized by the Central Government, or as the case may be, the State Government in accordance with the laws in force and includes a District Magistrate, Police Commissioner, or any other officer not below the rank of the Deputy Superintendent of Police designated for the maintenance of the ambient air quality standards in respect of noise under any law for the time being in force;
- (d) "court" means a governmental body consisting of one or more judges who sit to adjudicate disputes and administer justice and includes any court of law presided over by a judge, judges or a magistrate and acting as a tribunal in civil, taxation and criminal cases;
- (e) "educational institution" means a school, seminary, college, university, professional academies, training institutes or other educational establishment, not necessarily a chartered institution and includes not only buildings, but also all grounds necessary for the accomplishment of the full scope of educational instruction, including those things essential to mental, moral and physical development;
- (f) "hospital" means an institution for the reception and care of sick, wounded, infirm or aged persons, and includes government or private hospitals, nursing homes and clinics;
- (g) "person" shall include any company or association or body of individuals, whether incorporated or not;
- (h) "State Government" in relation to a Union territory means the Administrator thereof appointed under article 239 of the Constitution.
- (i) "public place" means any place to which the public have access, whether as of right or not, and includes auditorium, hotels, public waiting rooms, convention centres, public offices, shopping malls, cinema halls, educational institutions, libraries, open grounds and the like which are visited by general public; and
- (j) "night time" means the period between 10.00 p.m. and 6.00 a.m.

3. Ambient air quality standards in respect of noise for different areas/zones.-

(1) The ambient air quality standards in respect of noise for different areas / zones shall be such as specified in the Schedule annexed to these rules.

(2) The State Government shall categorize the areas into industrial, commercial, residential or silence areas / zones for the purpose of implementation of noise standards for different areas.

(3) The State Government shall take measures for abatement of noise including noise emanating from vehicular movements, blowing of horns, bursting of sound emitting firecrackers, use of loud speakers or public address system and sound producing instruments and ensure that the existing noise levels do not exceed the ambient air quality standards specified under these rules.

(4) All development authorities, local bodies and other concerned authorities while planning developmental activity or carrying out functions relating to town and country planning shall take into consideration all aspects of noise pollution as a parameter of quality of life to avoid noise menace and to achieve the objective of maintaining the ambient air quality standards in respect of noise.

(5) An area comprising not less than 100 metres around hospitals, educational institutions and courts may be declared as silence area / zone for the purpose of these rules.

4. Responsibility as to enforcement of noise pollution control measures.-

(1) The noise levels in any area / zone shall not exceed the ambient air quality standards in respect of noise as specified in the Schedule.

(2) The authority shall be responsible for the enforcement of noise pollution control measures and the due compliance of the ambient air quality standards in respect of noise.

(3) The respective State Pollution Control Boards or Pollution Control Committees in consultation with the Central Pollution Control Board shall collect, compile and publish technical and statistical data relating to noise pollution and measures devised for its effective prevention, control and abatement.

5. Restrictions on the use of loud speakers / public address system and sound producing instruments.-

(1) A loud speaker or a public address system shall not be used except after obtaining written permission from the authority.

(2) A loud speaker or a public address system or any sound producing instrument or a musical instrument or a sound amplifier shall not be used at night time except in closed premises for communication within, like auditoria, conference rooms, community halls, banquet halls or during a public emergency.

(3) Notwithstanding any thing contained in sub-rule (2), the State Government may subject to such terms and conditions as are necessary to reduce noise pollution, permit use of loud speakers or public address system and the like during night hours (between 10.00 p.m. to 12.00 midnight) on or during any cultural or religious festive occasion of a limited duration not exceeding fifteen days in all during a calendar year. The concerned State Government shall generally specify in advance, the number and particulars of the days on which such exemption would be operative.

(4) The noise level at the boundary of the public place, where loudspeaker or public address system or any other noise source is being used shall not exceed 10 dB (A) above the ambient noise standards for the area or 75 dB (A) whichever is lower;

(5) The peripheral noise level of a privately owned sound system or a sound producing instrument shall not, at the boundary of the private place, exceed by more than 5 dB (A) the ambient noise standards specified for the area in which it is used.

5A. Restrictions on the use of horns, sound emitting construction equipments and bursting of fire crackers:-

(1) No horn shall be used in silence zones or during night time in residential areas except during a public emergency.

(2) Sound emitting fire crackers shall not be burst in silence zone or during night time.

(3) Sound emitting construction equipments shall not be used or operated during night time in residential areas and silence zones.

6. Consequences of any violation in silence zone / area.-

Whoever, in any place covered under the silence zone / area commits any of the following offence, he shall be liable for penalty under the provisions of the Act:-

- (i) whoever, plays any music or uses any sound amplifiers,
- (ii) whoever, beats a drum or tom-tom or blows a horn either musical or pressure, or trumpet or beats or sounds any instrument, or
- (iii) whoever, exhibits any mimetic, musical or other performances of a nature to attract crowds.
- (iv) whoever, bursts sound emitting fire crackers; or
- (v) whoever, uses a loud speaker or a public address system.

7. Complaints to be made to the authority.-

(1) A person may, if the noise level exceeds the ambient noise standards by 10 dB (A) or more given in the corresponding columns against any area / zone or, if there is a violation of any provision of these rules regarding restrictions imposed during night time, make a complaint to the authority.

(2) The authority shall act on the complaint and take action against the violator in accordance with the provisions of these rules and any other law in force.

8 Power to prohibit etc. continuance of music sound or noise.-

(1) If the authority is satisfied from the report of an officer incharge of a police station or other information received by him including from the complainant that it is necessary to do so in order to prevent annoyance, disturbance, discomfort or injury or risk of annoyance, disturbance, discomfort or injury to the public or to any person who dwell or occupy property on the vicinity, he may, by a written order issue such directions as he may consider necessary to any person for preventing, prohibiting, controlling or regulating:-

- (a) the incidence or continuance in or upon any premises of-
 - (i) any vocal or instrumental music,
 - (ii) sounds caused by playing, beating, clashing, blowing or use in any manner whatsoever of any instrument including loudspeakers, public address systems, horn, construction

equipment, appliance or apparatus or contrivance which is capable of producing or re-producing sound, or

(iii) sound caused by bursting of sound emitting fire crackers, or,

(b) the carrying on in or upon, any premises of any trade, avocation or operation or process resulting in or attended with noise.

(2) The authority empowered under sub-rule (1) may, either on its own motion, or on the application of any person aggrieved by an order made under sub-rule (1), either rescind, modify or alter any such order:

Provided that before any such application is disposed of, the said authority shall afford to the applicant and to the original complainant, as the case may be, an opportunity of appearing before it either in person or by a person representing him and showing cause against the order and shall, if it rejects any such application either wholly or in part, record its reasons for such rejection.

SCHEDULE

(see rule 3(1) and 4(1))

Ambient Air Quality Standards in respect of Noise

Area Code	Category of Area / Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

- Note:-
1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
 2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
 3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority
 4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.

"A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq: It is an energy mean of the noise level over a specified period.

APPENDIX I
NOISE LIMIT FOR GENERATOR SETS

NOISE LIMIT FOR GENERATOR SETS RUN WITH DIESEL

(Noise Limit for Generator Sets run with Diesel were notified by Environment (Protection) second Amendment Rules vide GSR 371(E), dated 17th May 2002 at serial no.94 and its amendments vide GSR No 520(E) dated 1st July 2003; GSR 448(E), dated 12th July 2004; GSR 315(E) dated 16th May 2005; GSR 464(E) dated 7th August 2006; GSR 566(E) dated 29th August 2007 and GSR 752(E) dated 24th October 2008; G.S.R. 215 (E), dated 15th March, 2011 under the Environment (Protection) Act, 1986)

Noise Limit for Generator Sets run with Diesel

1. Noise limit for diesel generator sets (upto 1000 KVA) manufactured on or after the 1st January, 2005

The maximum permissible sound pressure level for new diesel generator (DG) sets with rated capacity upto 1000 KVA, manufactured on or after the 1st January, 2005 shall be 75 dB(A) at 1 metre from the enclosure surface.

The diesel generator sets should be provided with integral acoustic enclosure at the manufacturing stage itself.

The implementation of noise limit for these diesel generator sets shall be regulated as given in paragraph 3 below.

2. Noise limit for DG sets not covered by paragraph 1.

Noise limits for diesel generator sets not covered by paragraph 1, shall be as follows:-

2.1 Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the users end.

2.2 The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/acoustic treatment. Under such circumstances the performance may be checked for noise reduction upto actual ambient noise level, preferably, in the night time). The measurement for Insertion Loss may be done at different points at 0.5 m from the acoustic enclosure/ room, then averaged.

2.3 The DG set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).

2.4 These limits shall be regulated by the State Pollution Control Boards and the State Pollution Control Committees.

2.5 Guidelines for the manufacturers/ users of Diesel Generator sets shall be as under:-

01. The manufacturer shall offer to the user a standard acoustic enclosure of 25 dB (A) insertion loss and also a suitable exhaust muffler with insertion loss of 25 dB(A).
02. The user shall make efforts to bring down the noise levels due to the DG set, outside his premises, within the ambient noise requirements by proper citing and control measures.
03. Installation of DG set must be strictly in compliance with the recommendations of the DG set manufacturer.
04. A proper routine and preventive maintenance procedure for the DG set should be set and followed in consultation with the DG set manufacturer which would help prevent noise levels of the DG set from deteriorating with use.

3.0 Limits of Noise for DG Sets (upto 1000 KVA) Manufactured on or after the 1st January, 2005

3.1 Applicability

01. These rules apply to DG sets upto 1000 KVA rated output, manufactured or imported in India, on or after 1st January, 2005.
02. These rules shall not apply to –
 - a) DG sets manufactured or imported for the purpose of exports outside India; and
 - b) DG sets intended for the purpose of sample and not for sale in India.

3.2 Requirement of Certification

Every manufacturer or assembler or importer (hereinafter referred to as the "manufacturer") of DG set (hereinafter referred to as "product") to which these regulations apply must have valid certificates of Type Approval and also valid certificates of Conformity of Production for each year, for all the product models being manufactured or assembled or imported from 1st January, 2005 with the noise limit specified in paragraph 1.

3.3 Sale, import or use of DG sets not complying with the rules prohibited

No person shall sell, import or use of a product model, which is not having a valid Type Approval Certificate and Conformity of Production certificate.

3.4 Requirement of Conformance Labelling

- i) The manufacturer of the 'product' must affix a conformance label on the product meeting the following requirements:
 - (a) The label shall be durable and legible,
 - (b) The label shall be affixed on a part necessary for normal operation of the 'product' and not normally requiring replacement during the 'product' life.
- ii) The conformance label must contain the following information:
 - (a) Name & address of the manufacturer (if the address is described in the owner's manual, it may not be included in the label),
 - (b) Statement "this product conforms to the Environment (Protection) Rules, 1986",
 - (c) Noise limit viz. 75 dB(A) at 1 m
 - (d) Type Approval certificate number
 - (e) Date of manufacture of the product

3.5 Nodal Agency

- i) The Central Pollution Control Board shall be the nodal agency for implementation of these regulations.
- ii) In case of any dispute or difficulty in implementation of these regulations, the matter shall be referred to the nodal agency.
- iii) The nodal agency shall constitute a Committee to advise it on all matters; including the disputed matters, related to the implementation of these regulations.

3.6 Authorised agencies for certification

The following agencies are authorized to carry out such tests as they deem necessary for giving certificates for Type Approval and Conformity of Production testings of DG sets and to give such certificates:

- i) Automotive Research Association of India, Pune;
- ii) Naval Science & Technology Laboratory, Visakhapatnam;
- iii) Fluid Control Research Institute, Palghat;

- iv) National Aerospace Laboratory, Bangalore;
- v) International Centre for Automotive Technology, Manesar, Haryana; and
- vi) National Test House (Northern Region), Ghaziabad, Uttar Pradesh.

3.7 Compliance and Testing Procedure

The compliance and testing procedure shall be prepared and published by the Central Pollution Control Board, with the help of the certification agencies.

4.0 Exemption from the provisions of paragraph 1 and 3, for the products (diesel generator sets upto 30 KVA) purchased by the Ministry of Defence, Government of India.

The products manufactured in or imported into India till 30th April, 2007 for the purpose of supplying to the Ministry of Defence, shall be exempted from the regulations given in paragraphs 1 to 3 above, subject to the following conditions, namely:-

- i) The manufacturer shall manufacture or import the products only after getting purchase order from the Ministry of Defence and shall maintain the record of receipts, production / import, dispatch, etc., for inspection by the Central Pollution Control Board.
- ii) The special dispensation for noise norms shall be only for the mobile Defence vehicles which, with the present design / configuration, cannot carry the gensets with acoustic enclosures.
- iii) Director, Ministry of Defence shall ensure and maintain the serial number of all gensets for the Army and he shall also direct the manufacturers of these gensets to emboss on the engine and the main body of the gensets, the words "**For the use of Army only**".
- iv) The genset serial number shall be specially assigned by the Ministry of Defence with the request for proposal and contract purchase order and this information shall be forwarded to the Central Pollution Control Board for inspection as and when required.
- v) Registers shall be maintained at the manufacturers premises and in the Ministry of Defence to ensure that the number of gensets manufactured under special dispensation are not misused.
- vi) The gensets procured under this dispensation shall be operated in the remote areas and not in the cities.

- vii) This shall be a one-time exemption during which the Army shall remodel its vehicles to contain the new gensets and also obtain the necessary Type Approval of the gensets.

5.0 Exemption from the provisions of paragraph 1 and 3 for sixteen Diesel Generator sets of 45 KVA purchased by the Ministry of Defence, Government of India.

The 45 KVA DG sets manufactured in India for the purpose of their use in Mobile Decontamination System for use by the Ministry of Defence shall be exempted from the regulations given in paragraph 1 to 3 above subject to the following conditions, namely:-

- i) The special dispensation for the noise norms shall be only for the DG sets to be used in Mobile Decontamination System (MDS) by Army which, with the present design/configuration cannot carry the gensets with acoustic enclosures.
- ii) The Director, Ministry of Defence, shall ensure and maintain the serial numbers for sixteen gensets and he shall also direct the manufacturers of these generator sets to emboss on the engine and main body of the gensets, the words "For the use of Army only in Mobile Decontamination System (MDS)"
- iii) A register shall be maintained at the manufacturers premises and in the Ministry of Defence to ensure that only sixteen numbers of 45 KVA gensets are manufactured under special dispensation and are not misused elsewhere.

6.0 Transportation of Diesel Generator Sets (above 250 KVA)

- i) Diesel Generator set shall be transported after fulfilling the requirement of certification specified in paragraph 3.2 as a complete unit with acoustic enclosure, or dismantled, with relevant genset number specified on acoustic enclosure and silencer for reassembling at the site of its operation.
- ii) Compliance with the noise norms shall be monitored after reassembling the DG set at the location of the installation by the concerned State Pollution Control Board or, as the case may be, the Union Territory Pollution Control Committee.

APPENDIX J
IS 10500:2012 DRINKING WATER
STANDARDS

भारतीय मानक
पीने का पानी — विशिष्टि
(दूसरा पुनरीक्षण)

Indian Standard
DRINKING WATER — SPECIFICATION
(*Second Revision*)

ICS 13.060.20

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BHADUR SHAH ZAFAR MARG
NEW DELHI 110002

**AMENDMENT NO. 1 JUNE 2015
TO
IS 10500 : 2012 DRINKING WATER — SPECIFICATION**

(Second Revision)

[Page 2, Table 2, Sl No. xii), col 3] — Substitute '1.0' for '0.3'.

[Page 3, Table 3, Sl No. x), col 4] — Substitute 'No relaxation' for '0.05'.

(FAD 14)

Publication Unit, BIS, New Delhi, India

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Drinking Water Sectional Committee had been approved by the Food and Agriculture Division Council.

This standard was originally published in 1983. A report prepared by the World Health Organization in cooperation with the World Bank showed that in 1975, some 1 230 million people were without safe water supplies. These appalling facts were central to the United Nations decision to declare an International Drinking Water Supply and Sanitation decade, beginning in 1981. Further, the VI Five-Year Plan of India had made a special provision for availability of safe drinking water for the masses. Therefore, the standard was formulated with the objective of assessing the quality of water resources, and to check the effectiveness of water treatment and supply by the concerned authorities.

The first revision was undertaken to take into account the up-to-date information available about the nature and effect of various contaminants as also the new techniques for identifying and determining their concentration. Based on experience gained additional requirements for alkalinity; aluminium and boron were incorporated and the permissible limits for dissolved solids, nitrate and pesticides residues modified.

As per the eleventh five year plan document of India (2007-12), there are about 2.17 lakh quality affected habitations in the country with more than half affected with excess iron, followed by fluoride, salinity, nitrate and arsenic in that order. Further, approximately, 10 million cases of diarrhoea, more than 7.2 lakh typhoid cases and 1.5 lakh viral hepatitis cases occur every year a majority of which are contributed by unclean water supply and poor sanitation. The eleventh five year plan document of India (2007-2012) recognizes dealing with the issue of water quality as a major challenge and aims at addressing water quality problems in all quality affected habitations with emphasis on community participation and awareness campaigns as well as on top most priority to water quality surveillance and monitoring by setting up of water quality testing laboratories strengthened with qualified manpower, equipments and chemicals.

The second revision was undertaken to upgrade the requirements of the standard and align with the internationally available specifications on drinking water. In this revision assistance has been derived from the following:

- a) EU Directives relating to the quality of water intended for human consumption (80/778/EEC) and Council Directive 98/83/EC.
- b) USEPA standard — National Primary Drinking Water Standard. EPA 816-F-02-013 dated July, 2002.
- c) WHO Guidelines for Drinking Water Quality. 3rd Edition Vol. 1 Recommendations, 2008.
- d) Manual on Water Supply and Treatment, third edition — revised and updated May 1999, Ministry of Urban Development, New Delhi.

This standard specifies the acceptable limits and the permissible limits in the absence of alternate source. It is recommended that the acceptable limit is to be implemented as values in excess of those mentioned under 'Acceptable' render the water not suitable. Such a value may, however, be tolerated in the absence of an alternative source. However, if the value exceeds the limits indicated under 'permissible limit in the absence of alternate source' in col 4 of Tables 1 to 4, the sources will have to be rejected.

Pesticide residues limits and test methods given in Table 5 are based on consumption pattern, persistence and available manufacturing data. The limits have been specified based on WHO guidelines, wherever available. In cases where WHO guidelines are not available, the standards available from other countries have been examined and incorporated, taking in view the Indian conditions.

In this revision, additional requirements for ammonia, chloramines, barium, molybdenum, silver, sulphide, nickel, polychlorinated biphenyls and trihalomethanes have been incorporated while the requirements for colour, turbidity, total hardness, free residual chlorine, iron, magnesium, mineral oil, boron, cadmium, total arsenic, lead, polynuclear aromatic hydrocarbons, pesticides and bacteriological requirements have been modified.

In this revision, requirement and test method for virological examination have been included. Further, requirements and test methods for cryptosporidium and giardia have also been specified.

Routine surveillance of drinking water supplies should be carried out by the relevant authorities to understand the risk of specific pathogens and to define proper control procedures. The WHO Guidelines for Drinking Water Quality, 3rd Edition, Vol. 1 may be referred for specific recommendations on using a water safety approach incorporating risk identification. Precautions/Care should be taken to prevent contamination of drinking water from chlorine resistant parasites such as cryptosporidium species and giardia.

Indian Standard

DRINKING WATER — SPECIFICATION

(Second Revision)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for drinking water.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard the following definition shall apply.

3.1 Drinking Water — Drinking water is water intended for human consumption for drinking and cooking purposes from any source. It includes water (treated or untreated) supplied by any means for human consumption.

4 REQUIREMENTS

Drinking water shall comply with the requirements given in Tables 1 to 4. The analysis of pesticide residues given in Table 3 shall be conducted by a recognized laboratory using internationally established test method meeting the residue limits as given in Table 5.

Drinking water shall also comply with bacteriological requirements (*see 4.1*), virological requirements (*see 4.2*) and biological requirements (*see 4.3*).

4.1 Bacteriological Requirements

4.1.1 Water in Distribution System

Ideally, all samples taken from the distribution system including consumers' premises, should be free from coliform organisms and the following bacteriological quality of drinking water collected in the distribution system, as given in Table 6 is, therefore specified when tested in accordance with IS 1622.

4.2 Virological Requirements

4.2.1 Ideally, all samples taken from the distribution

Table 1 Organoleptic and Physical Parameters

(Foreword and Clause 4)

SI No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to Part of IS 3025	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Colour, Hazen units, <i>Max</i>	5	15	Part 4	Extended to 15 only, if toxic substances are not suspected in absence of alternate sources
ii)	Odour	Agreeable	Agreeable	Part 5	a) Test cold and when heated b) Test at several dilutions
iii)	pH value	6.5-8.5	No relaxation	Part 11	—
iv)	Taste	Agreeable	Agreeable	Parts 7 and 8	Test to be conducted only after safety has been established
v)	Turbidity, NTU, <i>Max</i>	1	5	Part 10	—
vi)	Total dissolved solids, mg/l, <i>Max</i>	500	2 000	Part 16	—

NOTE — It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

Table 2 General Parameters Concerning Substances Undesirable in Excessive Amounts
(Foreword and Clause 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Aluminium (as Al), mg/l, <i>Max</i>	0.03	0.2	IS 3025 (Part 55)	—
ii)	Ammonia (as total ammonia-N), mg/l, <i>Max</i>	0.5	No relaxation	IS 3025 (Part 34)	—
iii)	Anionic detergents (as MBAS) mg/l, <i>Max</i>	0.2	1.0	Annex K of IS 13428	—
iv)	Barium (as Ba), mg/l, <i>Max</i>	0.7	No relaxation	Annex F of IS 13428* or IS 15302	—
v)	Boron (as B), mg/l, <i>Max</i>	0.5	1.0	IS 3025 (Part 57)	—
vi)	Calcium (as Ca), mg/l, <i>Max</i>	75	200	IS 3025 (Part 40)	—
vii)	Chloramines (as Cl ₂), mg/l, <i>Max</i>	4.0	No relaxation	IS 3025 (Part 26)* or APHA 4500-Cl G	—
viii)	Chloride (as Cl), mg/l, <i>Max</i>	250	1 000	IS 3025 (Part 32)	—
ix)	Copper (as Cu), mg/l, <i>Max</i>	0.05	1.5	IS 3025 (Part 42)	—
x)	Fluoride (as F) mg/l, <i>Max</i>	1.0	1.5	IS 3025 (Part 60)	—
xi)	Free residual chlorine, mg/l, <i>Min</i>	0.2	1	IS 3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l
xii)	Iron (as Fe), mg/l, <i>Max</i>	0.3	No relaxation	IS 3025 (Part 53)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xiii)	Magnesium (as Mg), mg/l, <i>Max</i>	30	100	IS 3025 (Part 46)	—
xiv)	Manganese (as Mn), mg/l, <i>Max</i>	0.1	0.3	IS 3025 (Part 59)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xv)	Mineral oil, mg/l, <i>Max</i>	0.5	No relaxation	Clause 6 of IS 3025 (Part 39) Infrared partition method	—
xvi)	Nitrate (as NO ₃), mg/l, <i>Max</i>	45	No relaxation	IS 3025 (Part 34)	—
xvii)	Phenolic compounds (as C ₆ H ₅ OH), mg/l, <i>Max</i>	0.001	0.002	IS 3025 (Part 43)	—
xviii)	Selenium (as Se), mg/l, <i>Max</i>	0.01	No relaxation	IS 3025 (Part 56) or IS 15303*	—
xix)	Silver (as Ag), mg/l, <i>Max</i>	0.1	No relaxation	Annex J of IS 13428	—
xx)	Sulphate (as SO ₄) mg/l, <i>Max</i>	200	400	IS 3025 (Part 24)	May be extended to 400 provided that Magnesium does not exceed 30
xxi)	Sulphide (as H ₂ S), mg/l, <i>Max</i>	0.05	No relaxation	IS 3025 (Part 29)	—
xxii)	Total alkalinity as calcium carbonate, mg/l, <i>Max</i>	200	600	IS 3025 (Part 23)	—
xxiii)	Total hardness (as CaCO ₃), mg/l, <i>Max</i>	200	600	IS 3025 (Part 21)	—
xxiv)	Zinc (as Zn), mg/l, <i>Max</i>	5	15	IS 3025 (Part 49)	—

NOTES

1 In case of dispute, the method indicated by '*' shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

Table 3 Parameters Concerning Toxic Substances
(Foreword and Clause 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Cadmium (as Cd), mg/l, <i>Max</i>	0.003	No relaxation	IS 3025 (Part 41)	—
ii)	Cyanide (as CN), mg/l, <i>Max</i>	0.05	No relaxation	IS 3025 (Part 27)	—
iii)	Lead (as Pb), mg/l, <i>Max</i>	0.01	No relaxation	IS 3025 (Part 47)	—
iv)	Mercury (as Hg), mg/l, <i>Max</i>	0.001	No relaxation	IS 3025 (Part 48)/ Mercury analyser	—
v)	Molybdenum (as Mo), mg/l, <i>Max</i>	0.07	No relaxation	IS 3025 (Part 2)	—
vi)	Nickel (as Ni), mg/l, <i>Max</i>	0.02	No relaxation	IS 3025 (Part 54)	—
vii)	Pesticides, µg/l, <i>Max</i>	See Table 5	No relaxation	See Table 5	—
viii)	Polychlorinated biphenyls, mg/l, <i>Max</i>	0.000 5	No relaxation	ASTM 5175*	—
ix)	Polynuclear aromatic hydrocarbons (as PAH), mg/l, <i>Max</i>	0.000 1	No relaxation	APHA 6440	or APHA 6630 —
x)	Total arsenic (as As), mg/l, <i>Max</i>	0.01	0.05	IS 3025 (Part 37)	—
xi)	Total chromium (as Cr), mg/l, <i>Max</i>	0.05	No relaxation	IS 3025 (Part 52)	—
xii)	Trihalomethanes:				
a)	Bromoform, mg/l, <i>Max</i>	0.1	No relaxation	ASTM D 3973-85* or APHA 6232	—
b)	Dibromochloromethane, mg/l, <i>Max</i>	0.1	No relaxation	ASTM D 3973-85* or APHA 6232	—
c)	Bromodichloromethane, mg/l, <i>Max</i>	0.06	No relaxation	ASTM D 3973-85* or APHA 6232	—
d)	Chloroform, mg/l, <i>Max</i>	0.2	No relaxation	ASTM D 3973-85* or APHA 6232	—

NOTES

1 In case of dispute, the method indicated by '*' shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

Table 4 Parameters Concerning Radioactive Substances
(Foreword and Clause 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to Part of IS 14194	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Radioactive materials:				
a)	Alpha emitters Bq/l, <i>Max</i>	0.1	No relaxation	Part 2	—
b)	Beta emitters Bq/l, <i>Max</i>	1.0	No relaxation	Part 1	—

NOTE — It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

Table 5 Pesticide Residues Limits and Test Method
(Foreword and Table 3)

Sl No.	Pesticide	Limit µg/l	Method of Test, Ref to	
			USEPA (4)	AOAC/ ISO (5)
(1)	(2)	(3)	(4)	(5)
i)	Alachlor	20	525.2, 507	—
ii)	Atrazine	2	525.2, 8141 A	—
iii)	Aldrin/ Dieldrin	0.03	508	—
iv)	Alpha HCH	0.01	508	—
v)	Beta HCH	0.04	508	—
vi)	Butachlor	125	525.2, 8141 A	—
vii)	Chlorpyrifos	30	525.2, 8141 A	—
viii)	Delta HCH	0.04	508	—
ix)	2,4- Dichlorophenoxyacetic acid	30	515.1	—
x)	DDT (<i>o, p</i> and <i>p, p</i> – Isomers of DDT, DDE and DDD)	1	508	AOAC 990.06
xi)	Endosulfan (alpha, beta, and sulphate)	0.4	508	AOAC 990.06
xii)	Ethion	3	1657 A	—
xiii)	Gamma — HCH (Lindane)	2	508	AOAC 990.06
xiv)	Isoproturon	9	532	—
xv)	Malathion	190	8141 A	—
xvi)	Methyl parathion	0.3	8141 A	ISO 10695
xvii)	Monocrotophos	1	8141 A	—
xviii)	Phorate	2	8141 A	—

NOTE — Test methods are for guidance and reference for testing laboratory. In case of two methods, USEPA method shall be the reference method.

Table 6 Bacteriological Quality of Drinking Water¹⁾
(Clause 4.1.1)

Sl No.	Organisms	Requirements
(1)	(2)	(3)
i)	<i>All water intended for drinking:</i>	
a)	<i>E. coli</i> or thermotolerant coliform bacteria ^{2), 3)}	Shall not be detectable in any 100 ml sample
ii)	<i>Treated water entering the distribution system:</i>	
a)	<i>E. coli</i> or thermotolerant coliform bacteria ²⁾	Shall not be detectable in any 100 ml sample
b)	Total coliform bacteria	Shall not be detectable in any 100 ml sample
iii)	<i>Treated water in the distribution system:</i>	
a)	<i>E. coli</i> or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml sample
b)	Total coliform bacteria	Shall not be detectable in any 100 ml sample

¹⁾Immediate investigative action shall be taken if either *E.coli* or total coliform bacteria are detected. The minimum action in the case of total coliform bacteria is repeat sampling; if these bacteria are detected in the repeat sample, the cause shall be determined by immediate further investigation.

²⁾Although, *E. coli* is the more precise indicator of faecal pollution, the count of thermotolerant coliform bacteria is an acceptable alternative. If necessary, proper confirmatory tests shall be carried out. Total coliform bacteria are not acceptable indicators of the sanitary quality of rural water supplies, particularly in tropical areas where many bacteria of no sanitary significance occur in almost all untreated supplies.

³⁾It is recognized that, in the great majority of rural water supplies in developing countries, faecal contamination is widespread. Under these conditions, the national surveillance agency should set medium-term targets for progressive improvement of water supplies.

system including consumers' premises, should be free from virus.

4.2.2 None of the generally accepted sewage treatment methods yield virus-free effluent. Although a number of investigators have found activated sludge treatment to be superior to trickling filters from this point of view, it seems possible that chemical precipitation methods will prove to be the most effective.

4.2.3 Virus can be isolated from raw water and from springs, enterovirus, reovirus, and adenovirus have been found in water, the first named being the most resistant to chlorination. If enterovirus are absent from chlorinated water, it can be assumed that the water is safe to drink. Some uncertainty still remains about the virus of infectious hepatitis, since it has not so far been isolated but in view of the morphology and resistance of enterovirus it is likely that, if they have been inactivated hepatitis virus will have been inactivated also.

4.2.4 An exponential relationship exists between the rate of virus inactivation and the redox potential. A redox potential of 650 mV (measured between platinum and calomel electrodes) will cause almost instantaneous inactivation of even high concentrations of virus. Such a potential can be obtained with even a low concentration of free chlorine, but only with an extremely high concentration of combined chlorine. This oxidative inactivation may be achieved with a number of other oxidants also, for example, iodine, ozone and potassium permanganate, but the effect of the oxidants will always be counteracted, if reducing components, which are mainly organic, are present. As a consequence, the sensitivity of virus towards disinfectants will depend on the *milieu* just as much as on the particular disinfectant used.

4.2.5 Viruses are generally resistant to disinfectants as well as get protected on account of presence of particulate and organic matter in water. Because the difference between the resistance of coliform organisms and of virus to disinfection by oxidants increases with increasing concentration of reducing components, for example, organic matter, it cannot be assumed that the absence of available coliform organisms implies freedom from active virus under circumstances where a free chlorine residual cannot be maintained. Sedimentation and slow sand filtration in themselves may contribute to the removal of virus from water.

4.2.6 In practice, >0.5 mg/l of free chlorine for 1 h is sufficient to inactivate virus, even in water that was originally polluted provided the water is free from particulates and organic matter.

4.2.7 MS2 phage are indicator of viral contamination in drinking water. MS2 phage shall be absent in 1 litre of water when tested in accordance with USEPA method 1602. If MS2 phage are detected in the drinking water, virological examination shall be done by the Polymerase Chain Reaction (PCR) method for virological examination as given in Annex B. USEPA method in Manual of Method for Virology Chapter 16, June 2001 shall be the alternate method. If viruses are detected, the cause shall be determined by immediate further investigation.

4.3 Biological Requirements

4.3.1 Ideally, all samples taken including consumers premises should be free from biological organisms. Biological examination is of value in determining the causes of objectionable tastes and odours in water and controlling remedial treatments, in helping to interpret the results of various chemical analysis, and in explaining the causes of clogging in distribution pipes and filters. In some instances, it may be of use in demonstrating that water from one source has been mixed with that from another.

4.3.2 The biological qualities of water are of greater importance when the supply has not undergone the conventional flocculation and filtration processes, since increased growth of methane-utilizing bacteria on biological slimes in pipes may then be expected, and the development of bryozoal growths such as *Plumatella* may cause operational difficulties.

4.3.3 Some of the animalcules found in water mains may be free-living in the water, but others such as *Dreissena* and *Asellus* are more or less firmly attached to the inside of the mains. Although these animalcules are not themselves pathogenic, they may harbour pathogenic organisms or virus in their intestines, thus protecting these pathogens from destruction by chlorine.

4.3.4 Chlorination, at the dosages normally employed in waterworks, is ineffective against certain parasites, including amoebic cysts; they can be excluded only by effective filtration or by higher chlorine doses than can be tolerated without subsequent dechlorination. *Amoebiasis* can be conveyed by water completely free from enteric bacteria; microscopic examination after concentration is, therefore, the only safe method of identification.

4.3.5 Strict precautions against back-syphonage and cross-connections are required, if amoebic cysts are found in a distribution system containing tested water.

4.3.6 The *cercariae of schistosomiasis* can be detected by similar microscopic examination, but there is, in

any case, no evidence to suggest that this disease is normally spread through piped water supplies.

4.3.7 The cyclops vector of the embryos of *Dracunculus medinensis* which causes dracontiasis or Guinea-worm disease can be found in open wells in a number of tropical areas. They are identifiable by microscopic examination. Such well supplies are frequently used untreated, but the parasite can be relatively easily excluded by simple physical improvements in the form of curbs, drainage, and apron surrounds and other measures which prevent physical contact with the water source.

4.3.8 Cryptosporidium shall be absent in 10 liter of water when tested in accordance with USEPA method 1622 or USEPA method 1623* or ISO 15553 : 2006.

4.3.9 Giardia shall be absent in 10 liter of water when tested in accordance with USEPA method 1623* or ISO 15553 : 2006.

4.3.10 The drinking water shall be free from microscopic organisms such as algae, zooplanktons, flagellates, parasites and toxin producing organisms. An illustrative (and not exhaustive) list is given in Annex C for guidance.

NOTE — In case of dispute, the method indicated by '*' in **4.3.8** and **4.3.9** shall be referee method.

5 SAMPLING

Representative samples of water shall be drawn as prescribed in IS 1622 and IS 3025 (Part 1).

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	Title	IS No.	Title
1622 : 1981	Methods of sampling and microbiological examination of water (<i>first revision</i>)	(Part 41) : 1992	Cadmium (<i>first revision</i>)
3025	Methods of sampling and test (physical and chemical) for water and waste water:	(Part 42) : 1992	Copper (<i>first revision</i>)
(Part 1) : 1987	Sampling (<i>first revision</i>)	(Part 43) : 1992	Phenols (<i>first revision</i>)
(Part 2) : 2002	Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy	(Part 46) : 1994	Magnesium
(Part 4) : 1983	Colour (<i>first revision</i>)	(Part 47) : 1994	Lead
(Part 5) : 1983	Odour (<i>first revision</i>)	(Part 48) : 1994	Mercury
(Part 7) : 1984	Taste threshold (<i>first revision</i>)	(Part 49) : 1994	Zinc
(Part 8) : 1984	Tasting rate (<i>first revision</i>)	(Part 52) : 2003	Chromium
(Part 10) : 1984	Turbidity (<i>first revision</i>)	(Part 53) : 2003	Iron
(Part 11) : 1983	pH value (<i>first revision</i>)	(Part 54) : 2003	Nickel
(Part 16) : 1984	Filterable residue (total dissolved solids) (<i>first revision</i>)	(Part 55) : 2003	Aluminium
(Part 21) : 1983	Total hardness (<i>first revision</i>)	(Part 56) : 2003	Selenium
(Part 23) : 1983	Alkalinity (<i>first revision</i>)	(Part 57) : 2005	Boron
(Part 24) : 1986	Sulphates (<i>first revision</i>)	(Part 59) : 2006	Manganese
(Part 26) : 1986	Chlorine residual (<i>first revision</i>)	(Part 60) : 2008	Fluoride
(Part 27) : 1986	Cyanide (<i>first revision</i>)	13428 : 2003	Packaged natural mineral water — Specification (<i>first revision</i>)
(Part 29) : 1986	Sulphide (<i>first revision</i>)	14194	Radionuclides in environmental samples — Method of estimation:
(Part 32) : 1988	Chloride (<i>first revision</i>)	(Part 1) : 1994	Gross beta activity measurement
(Part 34) : 1988	Nitrogen (<i>first revision</i>)	(Part 2) : 1994	Gross alpha activity measurement
(Part 37) : 1988	Arsenic (<i>first revision</i>)	15302 : 2002	Determination of aluminium and barium in water by direct nitrous oxide-acetylene flame atomic absorption spectrometry
(Part 39) : 1989	Oil and grease	15303 : 2002	Determination of antimony, iron and selenium in water by electrothermal atomic absorption spectrometry
(Part 40) : 1991	Calcium		

ANNEX B

(Clause 4.2.7)

POLYMERASE CHAIN REACTION (PCR) METHOD

B-1 GENERAL

The method involves the concentration of viruses from 100 litre of drinking water to 1 ml by membrane filter technique. The concentrate is subjected to amplification using polymerase chain reaction (PCR) and primers based on highly conserved regions of viral genomes. This method can detect as low as 10 genome copies. Stringent precautions are needed to avoid contamination with amplified DNA products leading to false positive reactions. Detection of hepatitis A virus (HAV) RNA and enterovirus (EV) RNA is considered as an indication of presence of viruses in water. Steps involved include concentration of water, RNA extraction, complementary DNA (cDNA) synthesis and PCR.

B-2 CONCENTRATION OF DRINKING WATER

B-2.1 Apparatus

B-2.1.1 Pressure Pump

B-2.1.2 Membrane Filter Assembly with 144 mm Diameter with Tripod Stand

B-2.1.3 Pressure Vessel (50 litre capacity) with Pressure Gauge

B-2.1.4 Inter-connecting Pressure Tubes

B-2.2 Reagents

Autoclaved double distilled water shall be used for the preparation of reagents/buffers in this study.

B-2.2.1 Aluminium Chloride

B-2.2.2 HCl/NaOH Urea (Extra Pure)

B-2.2.3 Disodium Hydrogen Phosphate ($\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$) — 0.2 M, filter sterilized.

B-2.2.4 Sodium Dihydrogen Phosphate ($\text{NaH}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$) — 0.2 M, filter sterilized.

B-2.2.5 Citric Acid — 0.1 M, filter sterilized.

B-2.2.6 L-Arginine — 0.5 M, filter sterilized.

B-2.2.7 Urea-Arginine Phosphate Buffer (U-APB) — Mix 4.5 g of urea with 2 ml of 0.2 M NaH_2PO_4 and 2 ml of 0.5 M L - Arginine and make up the volume to 50 ml with sterile distilled water. The pH of the eluent shall be 9.0.

B-2.2.8 Magnesium Chloride (MgCl_2) — 1 M.

B-2.2.9 McII Vaines Buffer (pH 5.0) — Mix 9.7 ml of

0.1 M citric acid with 10.3 ml of 0.2 M $\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$ under sterile conditions.

B-2.3 Procedure

Filter 100 litre of drinking water sample through membrane filter assembly using either positively charged membrane of 144 mm diameter or 0.22 micron diameter pore size nitrocellulose membrane. For positively charged membrane the test water pH need not be adjusted. But for the 0.22 micron nitrocellulose membrane adjust the pH to 3.5 after adding the aluminium chloride as a coagulant to a final concentration of 0.000 5 M.

At lower pH pass the water through the membrane. The flow rate shall be 40 litre/h approximately. After the completion of the filtration, elute the adsorbed particles using 100 ml of urea-arginine phosphate buffer (U-APB). Precipitate the suspended particles using 1 ml of magnesium chloride (1 M). Dissolve the resultant precipitate centrifuged out of the sample in 800-1.0 ml of McII vaines buffer. The processed sample can be stored at refrigerator until required.

B-3 RNA EXTRACTION

B-3.1 Apparatus

B-3.1.1 Cooling Centrifuge

B-3.1.2 Deep Freezer (-20°C)

B-3.1.3 Vortex Mixer

B-3.1.4 Pipette Man

B-3.2 Reagents

B-3.2.1 Cetyl Trimethyl Ammonium Bromide (CTAB) Buffer

CTAB	:	1 percent
Sodium Dodecyl Sulphate (SDS)	:	1 percent
EDTA	:	20 mM
Sodium Chloride	:	1 M

B-3.2.2 Phenol, Chloroform and Isoamylalcohol in the ratio of 25:24:1 (PCI)

B-3.2.3 Ethanol

B-3.2.4 TE Buffer (pH 8.0)

Tris base	:	1 M
EDTA	:	0.5 M

B-3.2.5 Sodium Acetate — 3 M.

B-3.3 Procedure

Treat 300 µl of concentrated water sample with equal volume of CTAB and 1/10th volume of PCI. Vortex and centrifuge at 5 000 × g for 30 min at 4°C. Add 1/10th volume of 3 M sodium acetate and double the volume of cold ethanol to the aqueous layer. Keep the mixture at either at –20°C for overnight or in liquid nitrogen for 2-5 min. Centrifuge at 10 000 × g, for 30 min at 4°C. Discard the supernatant and air dry the pellet and dissolve it in 20 µl TE buffer.

B-4 COMPLEMENTARY DNA (c DNA) SYNTHESIS**B-4.1 Apparatus****B-4.1.1 PCR Machine****B-4.1.2 Deep Freezer (–20°C)****B-4.2 Reagents****B-4.2.1 cDNA Synthesis Kit****B-4.3 Procedure**

Suspend the extracted RNA in 20 µl of cDNA reaction mixture, which consists of 4 µl of 5X reverse transcriptase reaction buffer [250 mM TRIS–HCl (pH 8.5), 40 mM KCl, 150 mM MgCl₂, 5 mM dithiothreitol (DTT)], 0.5 µl of 10 mM deoxynucleotide phosphate (dNTP), 2 µl of hexa nucleotide mixture, 1 µl of 25 U of Maloney Murine Leukaemia Virus (M-MuLV) reverse transcriptase, 0.5 µl of 20 U of human placental RNase inhibitor. Heat the reaction mixture to 95°C for 5 min and rapidly chill on ice, this is followed by the addition of 1 µl (25 U/µl) of M-MuLV reverse transcriptase. Incubate the reaction mixture as given by the manufacturer of the kit and quickly chill the reaction tube on ice.

B-5 PCR AMPLIFICATION**B-5.1 Apparatus****B-5.1.1 PCR Machine****B-5.1.2 Deep Freezer (–20°C)****B-5.1.3 Micropipette****B-5.2 Reagents****B-5.2.1 Primers for EV and HAV**

EV sense primer, 5' — TCC TCC GGC CCC
TGA ATG CG — 3'
antisense primer, 5' — ATT GTC ACC
ATA AGC AGC CA — 3'
HAV sense primer, 5' — GTTTT GCTCC
TCTTT ATCAT GCTAT G-3'

antisense primer, 5' — GGAAA TGTCT
CAGGT ACTTT CTTTG-3'

B-5.2.2 PCR Master Mix**B-5.2.3 Mineral Oil****B-5.3 Procedure****B-5.3.1 PCR Amplification for Hepatitis A Virus (HAV)**

In 5 µl of cDNA, add 95 µl of a PCR Master Mix (10 mM TRIS–HCl (pH 8.3), 50 mM KCl, 2.5 mM MgCl₂, 0.01 percent gelatin (1× PCR buffer), 200 µM of each dNTP, 1.5 U of *Thermus aquaticus* polymerase). Add 25 pico moles of sense and antisense oligonucleotide primers of HAV and overlay with mineral oil. Appropriate positive and negative controls shall be included with each run. Set the following reaction at thermo cycler:

Denaturation at 94°C for 2 min	} 35 cycles
Denaturation for 1.0 min at 94°C	
Annealing for 1.0 min at 57°C	
Extension for 1.3 min at 72°C	
Final extension at 72°C for 7 min.	

B-5.3.2 PCR Amplification for Enterovirus (EV)

In 5 µl of cDNA, add 95 µl of a PCR Master Mix (10 mM TRIS–HCl (pH 8.3), 50 mM KCl, 2.5 mM MgCl₂, 0.01 percent gelatin (1X PCR buffer), 200 µM of each dNTP, 1.5 U of *Thermus aquaticus* polymerase). Add 25 pico moles of sense and antisense oligonucleotide primers of EV and overlay with mineral oil. Appropriate positive and negative controls shall be included with each run. Set the following reaction at thermo cycler:

Denaturation at 94°C for 2 min	} 35 cycles
Denaturation for 1.0 min at 94°C	
Annealing for 1.0 min at 42°C	
Extension for 2.0 min at 72°C	
Final extension at 72°C for 7 min.	

B-6 AGAROSE GEL ELECTROPHORESIS**B-6.1 Apparatus****B-6.1.1 Micropipette****B-6.1.2 Electrophoresis Apparatus****B-6.1.3 Gel Documentation System****B-6.2 Reagents****B-6.2.1 Running Buffer — 50X TAE buffer**

Tris base/Tris buffer : 121.00 g

Glacial acetic acid : 28.55 ml
 0.5 M EDTA : 50 .00 ml
 Distilled water : 300.45 ml
 (autoclaved)

Make the final volume upto 1 000 ml with deionised distilled water, sterilize and store at 4°C. The final concentration for the preparation of agarose gel and to run the gel shall be 1X.

B-6.2.2 Tracking Dye — 6X bromophenol blue.

B-6.2.3 Ethidium Bromide — 0.5 µg/ml.

B-6.3 Procedure

Run the PCR amplified product of EV and HAV on 1.5 percent agarose gel using 1X TAE buffer. Load 10 µl of amplified product after mixing it with 1 µl 10X loading dye. Run the molecular weight marker along with the samples. Run the electrophoresis at 100 V for 30 min. Stain the gel with ethidium bromide (0.5 µl/ml) for 20 min. Wash it with distilled water and view under UV transilluminator and photograph the gel to analyse the band pattern. EV gives the band as 155 base pair and the HAV gives band as 225 base pair.

ANNEX C (Clause 4.3.10)

ILLUSTRATIVE LIST OF MICROSCOPIC ORGANISMS PRESENT IN WATER

Sl No.	Classification of Microscopic Organism	Group and Name of the Organism	Habitat	Effect of the Organisms and Significance
(1)	(2)	(3)	(4)	(5)
i)	Algae	a) Chlorophyceae:		
		1) <i>Species of</i> Coelastrum, Gomphospherium, Micractinium, Mougeotia, Oocystis, Euastrum, Scenedesmus, Actinastrum, Gonium, Eudorina Pandorina, Pediastrum, Zygnema, Chlamydomonas, Careteria, Chlorella, Chroococcus, Spirogyra, Tetraedron, Chlorogonium, Stigeoclonium	Polluted water, impounded sources	Impart colouration
		2) <i>Species of</i> Pandorina, Volvox, Gomphospherium, Staurastrum, Hydrodictyon, Nitella	Polluted waters	Produce taste and odour
		3) <i>Species of</i> Rhizoclonium, Cladotrix, Ankistrodesmus, Ulothrix, Micrasterias, Chromulina	Clean water	Indicate clean condition
		4) <i>Species of</i> Chlorella, Tribonema, Clostrium, Spirogyra, Palmella	Polluted waters, impounded sources	Clog filters and create impounded difficulties
		b) Cyanophyceae:		
		1) <i>Species of</i> Anacystis and Cylandrospermum	Polluted waters	Cause water bloom and impart colour
		2) <i>Species of</i> Anabena, Phormidium, Lyngbya, Arthrospira, Oscillatoria	Polluted waters	Impart colour
		3) <i>Species of</i> Anabena, Anacystis, Aphanizomenon	Polluted waters, impounded sources	Produce taste and odour
		4) <i>Species of</i> Anacystis, Anabena, Coelospherium, Cleotrichina, Aphanizomenon	Polluted waters	Toxin producing
		5) <i>Species of</i> Anacystis, Rivularia, Oscillatoria, Anabena	Polluted waters	Clog filters

<i>Sl No.</i>	<i>Classification of Microscopic Organism</i>	<i>Group and Name of the Organism</i>	<i>Habitat</i>	<i>Effect of the Organisms and Significance</i>
(1)	(2)	(3)	(4)	(5)
		6) <i>Species of Rivularia</i>	Calcareous waters and also rocks	Bores rocks and calcareous strata and causes matted growth
		7) <i>Species of Lemanea</i>	Agmenellum, Microcoleus, Clean waters	Indicators of purification
		c) Diatoms (Bacillareophyceae):		
		1) <i>Species of Stauroneis</i>	Fragillaria, Stephanodiscus, —	Cause discoloration
		2) <i>Species of Asterionella</i>	Tabellaria	Hill streams high altitude, torrential and temperate waters
		3) <i>Species of Synedra</i>	and Fragillavia	Polluted waters
		4) <i>Species of Nitzchia</i>	Gomphonema	Moderately polluted waters
		5) <i>Species of Cymbela</i>	Synedra, Melosira, Rivers and streams impounded sources	Clog filters and cause operational difficulties
		6) <i>Species of Pinnularia</i>	Surinella, Clean waters	Indicators of purification
		d) Xanthophyceae:		
		<i>Species of Botryococcus</i>	Hill streams, high altitude and temperate waters	Produces coloration
ii)	Zooplankton	a) Protozoa:		
		1) Amoeba, Giardia, Lamblia, Arcella, Diffugia, Actinophrys	Polluted waters	Pollution indicators
		2) Endamoeba, Histolytica	Sewage and activated sludge	Parasitic and pathogenic
		b) Ciliates:		
		Paramoecium, Vorticella, Carchesium, Stentor, Colpidium, Coleps, Euplotes, Colopoda, Bodo	Highly polluted waters, sewage and activated sludge	Bacteria eaters
		c) Crustacea:		
		1) Bosmina, Daphnia	Stagnant polluted waters	Indicators of pollution
		2) Cyclops	Step wells in tropical climate	Carrier host of guinea worm
iii)	Rotifers	a) Rotifers:		
		Anurea, Rotaria, Philodina	Polluted and Algae laden waters	Feed on algae
		b) Flagellates:		
		1) Ceratium, Glenodinium, Dinobryon	Peridinium	Rocky strata, iron bearing and acidic waters
		2) Euglena, Phacus	Polluted waters	Impart colour

<i>Sl No.</i>	<i>Classification of Microscopic Organism</i>	<i>Group and Name of the Organism</i>	<i>Habitat</i>	<i>Effect of the Organisms and Significance</i>
(1)	(2)	(3)	(4)	(5)
iv)	Miscellaneous Organisms	a) Sponges, Hydra	Fresh water	Clog filters and affect purification systems
		b) Tubifex, Eristalls, Chironomids	Highly polluted waters, sewage and activated sludge and bottom deposits	Clog filters and render water unaesthetic
		c) Plumatella	Polluted waters	Produces biological slimes and causes filter operational difficulties
		c) Dreissena, Asellus	Polluted waters	Harbour pathogenic organisms

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APPENDIX K
ISI-IS2296-1982 STANDARDS
FOR USE BASED CLASSIFICATION OF
SURFACE WATER

Tolerance and Classification

As per ISI-IS: 2296-1982, the tolerance limits of parameters are specified as per classified use of water (Table 1,2,3,4,5 below) depending on various uses of water. The following classifications have been adopted in India.

Class of Water

Classification	Type of use
Class A	Drinking water source without conventional treatment but after disinfection
Class B	Outdoor bathing
Class C	Drinking water source with conventional treatment followed by disinfection.
Class D	Fish culture and wild life propagation
Class E	Irrigation, industrial cooling or controlled waste disposal

TOLERANCE LIMITS

TABLE-1: TOLERANCE LIMITS FOR INLAND SURFACE WATERS, CLASS – A

S. No.	Characteristic	Tolerance
(1)	(2)	(3)
(i)	pH	6.5 to 8.5
(ii)	Dissolved Oxygen, mg/l,	6.0
(iii)	Bio-chemical Oxygen Demand	2.0
(iv)	Total Coliform Organisms, MPN/100 ml, Max	50
(v)	Colour, Hazen units, Max	10
(vi)	Odour	unobjectionable
(vii)	Taste	Agreeable taste
(viii)	Total Dissolved Solids, mg/l, Max	500
(ix)	Total Hardness (as CaCO ₃), mg/l, Max	300
(x)	Calcium Hardness (as CaCO ₃), mg/l, Max	200
(xi)	Magnesium (as CaCO ₃), mg/l, Max	100
(xii)	Copper (as Cu), mg/l, Max	1.5
(xiii)	Iron (as Fe), mg/l, Max	0.3
(xiv)	Manganese (as Mn), mg/l, Max	0.5
(xv)	Chlorides (as Cl), mg/l, Max	250
(xvi)	Sulphate (as SO ₄), mg/l, Max	400
(xvii)	Nitrates (as NO ₂), mg/l, Max	20
(xviii)	Fluorides (as F,) mg/l, Max	1.5
(xix)	Phenolic compounds (as C ₆ H ₅ OH), mg/l, Max	0.002
(xx)	Mercury (as Hg), mg/l, Max	0.001
(xxi)	Cadmium (as Cd), mg/l, Max	0.01
(xxii)	Selenium (as Se), mg/l, Max	0.01
(xxiii)	Arsenic (as As), mg/l, Max	0.05
(xxiv)	Cyanides (as CN), mg/l, Max	0.05
(xxv)	Lead (as Pb), mg/l, Max	0.1
(xxvi)	Zinc (as Zn), mg/l, Max	15
(xxvii)	Chromium (as Cr ⁶⁺), mg/l, Max	0.05
(xxviii)	Anionic detergents, (as MBAS), mg/l, Max .	0.2
(xxix)	Poly-nuclear aromatic hydrocarbons (PAH),	0.2
(xxx)	Mineral oil, mg/l, Max	0.01
(xxxi)	Barium (as Ba), mg/l, Max	1.0
(xxxii)	Silver (as Ag), mg/l Max	0.05
(xxxiii)	Pesticides	Absent
(xxxiv)	Alpha emitters, µc/ml, Max	10 ⁻⁹
(xxxv)	Beta emitters, µc/ml, Max	10 ⁻⁸

TABLE- 2: TOLERANCE LIMITS FOR INLAND SURFACE WATERS, CLASS – B

S.	Characteristic	Tolerance Limit
(1)	(2)	(3)
(i)	pH Value	6.5 to 8.5
(ii)	Dissolved Oxygen, mg/l, Max	5.0
(iii)	Biochemical Oxygen Demand (5 days at 20 °C), Max	3.0
(iv)	Total Coliform Organisms, MPN/100 ml, Max	500
(v)	Fluorides (as F) <mg/l, Max	1.5
(vi)	Colour, Hazen units, Max	300
(vii)	Cyanides (as CN), mg/l, Max	0.05
(viii)	Arsenic (as As), mg/l, Max	0.2
(ix)	Phenolic Compounds (as C ₆ H ₅ OH) mg/l, Max	0.005
(x)	Chromium (as Cr ⁶⁺), mg/l, Max	1.0
(xi)	Anionic detergents (as MBAS), mg/l, Max	1.0
(xii)	Alpha emitters, µc/ml, Max	10 ⁻⁸

TABLE - 3: TOLERANCE LIMITS FOR INLAND SURFACE WATERS, CLASS – C

S.No.	Characteristic	Tolerance Limit
(1)	(2)	(3)
(i)	pH Value	6.5 to 8.5
(ii)	Dissolved Oxygen, mg/l Minimum	4.0
(iii)	Biochemical Oxygen Demand	3.0
(iv)	Total coliform organisms, MPN/100 ml, Max	5000
(v)	Colour, Hazen units, Max	300
(vi)	Fluorides (as F), mg/l, Max	1.5
(vii)	Cadmium (as Cd), mg/l, Max	0.01
(viii)	Chlorides (as Cl), mg/l, Max	600
(ix)	Chromium (as Cr ⁶⁺), mg/l, Max	0.05
(x)	Cyanides (as CN), mg/l, Max	0.05
(xi)	Total Dissolved Solids, mg/l, Max	1500
(xii)	Selenium (as Se), mg/l, Max	0.05
(xiii)	Sulphates (as SO ₄), mg/l, Max	400
(xiv)	Lead (as Pb), mg/l, Max	0.1
(xv)	Copper (as Cu), mg/l, Max	1.5
(xvi)	Arsenic (as As), mg/l, Max	0.2
(xvii)	Iron (as Fe), mg/l, Max	50
(xviii)	Phenolic compounds (as C ₆ H ₅ OH), mg/l, Max	0.005
(xix)	Zinc (as Zn), mg/l, Max	15
(xx)	Insecticides, mg/l, Max	Absent
(xxi)	Anionic detergents (as MBAS), mg/l, Max	1.0
(xxii)	Oils and grease, mg/l, Max	0.1
(xxiii)	Nitrates (as NO ₃), mg/l, Max	50
(xxiv)	Alpha emitters, µc/mg, Max	10 ⁻⁹
(xxv)	Beta emitters, µc/ml, Max	10 ⁻⁸

TABLE- 4: TEOLERANCE LIMITS FOR INLAND SURFACE WATERS, CALSS – D

S.No.	Characteristic	Tolerance Limit
(1)	(2)	(3)
(i)	pH value	6.5 to 8.5
(ii)	Dissolved Oxygen, mg/l, Min.	4.0
(iii)	Free Ammonia (as N), mg/l, Max.	1.2
(iv)	Electrical Conductance at 25 °C, μ S, Max	1000
(v)	Free Carbon Dioxide (as CO ₂),mg/1, Max	6.0
(vi)	Oils and Grease, mg/l, Max	0.1
(vii)	Alpha emitters, μ c/ml, Max	10 ⁻⁹
(viii)	Beta emitters, μ c/ml, Max	10 ⁻⁸

TABLE- 5: TOLERANCE LIMITS FOR INLAND SURFACE WATERS, CLASS – E

S.No.	Characteristic	Tolerance Limit
(1)	(2)	(3)
(i)	pH value	6.0 to 8.5
(ii)	Electrical Conductance at 25°C, µS, Max	2250
(iii)	Sodium Adsorption Ratio, Max	26
(iv)	Boron (as B), mg/l, Max	2.0
(v)	Total Dissolved Solids, (inorganic), mg/l, Max	2100
(vi)	Sulphates (as SO ₄), mg/l, Max	1000
(vii)	Chlorides (as Cl), Mg/l, Max	600
(viii)	Sodium Percentage, Max	60
(ix)	Alpha emitters, µc/ml, Max	10 ⁻⁹
(x)	Beta emitters, µc/ml, Max	10 ⁻⁸

APPENDIX L
PRIMARY WATER QUALITY
STANDARDS FOR COASTAL WATER
(SW-IV) FOR HARBOUR WATER

**Primary Water Quality Criteria for Class SW-IV Waters
(For Harbor waters)**

S.No	Parameter	Standards	Rationale/Remarks
1	pH range	6.0-9.0	To minimize corrosive and scaling effect
2	Dissolved oxygen	3.0mg/l or 40% saturation value whichever is higher	Considering the biodegradation of oil and inhibition tooxygen production through photosynthesis
3	Colour and odour	No visible colour or offensive odour	None from reactive chemicals which corrode paints/metallic surfaces
4	Floating materials,	10mg/l oil, grease and scum (including petroleum products)	Floating matter should be free from excessive living organisms which may clog or coat operative parts of marine vessels/equipment
5	Fecal coliform	500/100 ml (MPN)	Not exceeding 1000/100ml in 20% of samples in the year and in 3 consecutive samples in monsoon months
6	Biochemical oxygen demand (BOD) (3 days at 27°C)	5mg/l decomposable wastes	To maintain water reactively free from pollution caused by sewage and other

APPENDIX M
EMISSION LIMITS FOR NEW DIESEL
ENGINE MORE THAN 800 KW FOR
GENERATOR SET

7. **अनुपालन और परीक्षण प्रक्रिया-** (1) केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा यथा प्रकाशित अनुपालन और परीक्षण प्रक्रिया का अनुसरण किया जाएगा ।

(2) प्रमाणन के लिए प्राधिकृत अभिकरण उत्सर्जन की बाबत परीक्षण और प्रमाणन ब्यौरे वार्षिक रूप से केन्द्रीय प्रदूषण नियंत्रण बोर्ड को भेजेगा ।

8. **ईंधन विनिर्देश-** डीजल जेनसेटों को लागू वाणिज्यिक ईंधन के विनिर्देश वही होंगे जो, भारत सरकार की नीति के अनुसार समय समय पर उस क्षेत्र में जहां उत्पाद प्रचालित किया जाए, डीजल यानों के लिए लागू वाणिज्यिक उच्च गति डीजल को लागू हैं ।

9. **इंजन घटक या भाग पहचान-** उत्सर्जन क्रिया के लिए उत्तरदायी इंजन घटकों या भागों के सभी ब्यौरे अंग्रेजी भाषा में स्पष्टतः चिन्हित किए जाएंगे ।”।

[फा. सं. क्यू-15017/08/2012-सीपीडब्ल्यू]

डा. राशिद हसन, सलाहकार

टिप्पण : मूल नियम भारत के राजपत्र में सं. का.आ. 844(अ), तारीख 19 नवंबर, 1986 द्वारा प्रकाशित किए गए थे और उनके पश्चातवर्ती संशोधन का.आ. 433 (अ), तारीख 18 अप्रैल, 1987, सा.का.नि. 01(अ), तारीख 1 जनवरी, 2010, सा.का.नि. 61(अ), तारीख 5 फरवरी, 2010, सा.का.नि. 485(अ), तारीख 9 जून, 2010, सा.का.नि. 608(अ), तारीख 21 जुलाई 2010, सा.का.नि. 739(अ), तारीख 9 सितंबर, 2010, सा.का.नि. 809(अ), तारीख 4 अक्टूबर, 2010, सा.का.नि. 215(अ), तारीख 15 मार्च, 2011, सा.का.नि. 221(अ), तारीख 18 मार्च, 2011, सा.का.नि. 354(अ), तारीख 2 मई, 2011, सा.का.नि. 424(अ), तारीख 1 जून, 2011, सा.का.नि. 446(अ), तारीख 13 जून, 2011, सा.का.नि. 152(अ), तारीख 16 मार्च, 2012, सा.का.नि. 266(अ), तारीख 30 मार्च, 2012, सा.का.नि. 277(अ), तारीख 31 मार्च, 2012, सा.का.नि. 820(अ), तारीख 9 नवंबर, 2012, सा.का.नि. 820(अ), तारीख 18 मार्च, 2013, और सा.का.नि. 535 (अ), तारीख 7 अगस्त, 2013 द्वारा किए गए ।

MINISTRY OF ENVIRONMENT AND FORESTS

NOTIFICATION

New Delhi, the 11th December, 2013

G.S.R. 771(E). – In exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely:—

1. (1) These rules may be called the Environment (Protection) (Third Amendment) Rules, 2013.
- (2) They shall come into force on the date of their publication in the Official Gazette.
2. In the Environment (Protection) Rules, 1986, in Schedule I, for serial number 95 and entries relating thereto, the following serial number and entries shall be substituted, namely:-

“95. Emission limits for new diesel engine up to 800 kW for generator set (Genset) application.- The emission limits for new diesel engine upto 800 kW for generator set (hereinafter referred to as Genset) application shall be effective from 1st April, 2014 as specified in the Table below subject to the general conditions contained therein, namely:-

TABLE

Power Category	Emission Limits (g/kW-hr)			Smoke Limit (light absorption coefficient, m ⁻¹)
	NO _x +HC	CO	PM	
Upto 19 KW	≤ 7.5	≤ 3.5	≤ 0.3	≤ 0.7
More than 19 KW upto 75 KW	≤ 4.7	≤ 3.5	≤ 0.3	≤ 0.7
More than 75 KW upto 800 KW	≤ 4.0	≤ 3.5	≤ 0.2	≤ 0.7

Note:

1. The abbreviations used in the Table shall mean as under: NO_x – Oxides of Nitrogen; HC – Hydrocarbon; CO – Carbon Monoxide; and PM – Particulate Matter.
2. Smoke shall not exceed above value throughout the operating load points of the test cycle.
3. The testing shall be done as per D2 – 5 mode cycle of ISO: 8178- Part 4.
4. The above mentioned emission limits shall be applicable for Type Approval and Conformity of Production (COP) carried out by authorised agencies.
5. Every manufacturer, importer or, assembler (hereinafter referred to as manufacturer) of the diesel engine (hereinafter referred to as 'engine') for genset application manufactured or imported into India or, diesel genset (hereinafter referred to as 'product'), assembled or imported into India shall obtain Type Approval and comply with COP of their product(s) for the emission limits which shall be valid for the next COP year or, the date of implementation of the revised norms specified above, whichever earlier.
Explanation.- The term 'COP year' means the period from 1st April to 31st March.
6. Stack height (in metres), for genset shall be governed as per Central Pollution Control Board (CPCB) guidelines.

General Conditions

1. Applicability.- These conditions shall apply to all new engines for genset application and products manufactured, assembled or, imported into India, as the case may be :

Provided that these rules, shall not apply to, -

- (a) any engine or, product, assembled or manufactured or imported, as the case may be, for the purpose of export outside India, or;
- (b) any engine or product intended for the purpose of sample limited to four in number and to be exported back within three months, and not for sale in India.

2. Requirement of certification.- Every manufacturer of engine or product, as the case may be, shall have valid certificate(s) of Type Approval and COP for each COP year, for all engine models being manufactured or, for all engine or product models being imported, after the effective date for the emission limits, as specified above and the COP for the genset sold on or after 1st April, 2014 shall be effective and in force as per revised emission norms with effect from 1st April, 2015.

3. Sale, import or use of engine or product not complying with these rules.- No person shall sell, import or use an engine for genset application or, a product which is not having a valid Type Approval certificate and certificate of COP referred to in condition 2.

4. Requirement of conformance labeling.- (1) All the engines, individually or as part of the product shall be clearly engraved 'Genset Engine' on the cylinder block.

(2) the engine or the product shall be affixed with a conformance label meeting the following requirements, namely:-

- (a) the label shall be durable and legible;

- (b) the label shall be affixed on a part necessary for normal operation of the engine or the product and not normally requiring replacement during the life of the engine or the product.
- (3) The conformance label shall contain the following information, namely:-
- (a) name and address of the manufacturer of engine or product, as the case may be;
 - (b) statement that the engine or product conforms to the Environment (Protection) Rules, 1986;
 - (c) Type Approval certificate number;
 - (d) date of manufacture of engine and the product or in case of import, the date of import of the engine and the product; and
 - (e) rated speed and corresponding gross power in kW.

5. Nodal Agency.- (1) The Central Pollution Control Board shall be the nodal agency for implementation of these rules.

(2) In case of any dispute or difficulty in implementation of these rules, the matter shall be referred to the nodal agency.

(3) The nodal agency shall constitute a Committee to advise it on all matters, including the disputed matters, related to the implementation of these rules.

6. Authorised agencies for certification.- The following institutions are authorised to carry out such tests as they may deem necessary, for giving certificates of Type Approval and Conformity of Production tests for diesel engines or products and to give such certificates, namely:-

- (i) the Automotive Research Association of India, Pune (Maharashtra);
- (ii) the International Centre for Automotive Technology, Manesar (Haryana);
- (iii) the Indian Oil Corporation, Research and Development Centre, Faridabad (Haryana);
- (iv) the Indian Institute of Petroleum, Dehradun (Uttarakhand); and
- (v) the Vehicle Research Development Establishment, Ahmednagar (Maharashtra).

7. Compliance and testing procedure.- (1) The Compliance and Testing Procedure, as published by the Central Pollution Control Board shall be followed by all concerned.

(2) The authorised agencies for certification shall submit the testing and certification details in respect of the emission to the Central Pollution Control Board annually.

8. Fuel Specification.- The specification of commercial fuel applicable for diesel gensets shall be the same as applicable for commercial High Speed Diesel applicable for diesel vehicles in the area where product would be operated, from time to time, as per policy of Government of India.

9. Engine component or parts identification.- All the details of engine components or parts responsible for the emission performance shall be clearly marked in English language."

[F.No. Q-15017/08/2012-CPW]

Dr. RASHID HASAN, Advisor

Note: - The principal rules were published in the Gazette of India vide number S.O. 844 (E), dated the 19th November, 1986 and subsequently amended vide notification numbers S.O. 433 (E), dated the 18th April 1987; G.S.R. 01 (E), dated the 1st January, 2010; G.S.R. 61 (E), dated the 5th February, 2010; G.S.R. 485 (E), dated the 9th June, 2010; G.S.R. 608 (E), dated the 21st July, 2010; G.S.R. 739 (E), dated the 9th September, 2010; G.S.R. 809(E), dated, the 4th October, 2010, G.S.R. 215 (E), dated the 15th March, 2011; G.S.R. 221(E), dated the 18th March, 2011; G.S.R. 354 (E), dated the 2nd May, 2011; G.S.R. 424 (E), dated the 1st June, 2011; G.S.R. 446 (E), dated the 13th June, 2011; G.S.R. 152 (E), dated the 16th March, 2012; G.S.R. 266(E), dated the 30th March, 2012; G.S.R. 277 (E); dated the 31st March, 2012; G.S.R. 820(E), dated the 9th November, 2012; G.S.R. 176(E), dated the 18th March, 2013; and G.S.R. 535(E), dated the 7th August, 2013.

EMISSION STANDARDS FOR DIESEL ENGINES (ENGINE RATING MORE THAN 0.8 MW (800 KW) FOR POWER PLANT, GENERATOR SET APPLICATIONS AND OTHER REQUIREMENTS

(Emission Standards for Diesel Engines (Engine Rating more than 0.8 MW (800 KW) were notified by the Environment (Protection) Third Amendment Rules 2002, vide G.S.R. 489 (E), dated 9th July, 2002 at serial no. 96, under the Environment (Protection) Act, 1986.)

EMISSION STANDARDS FOR DIESEL ENGINES (ENGINE RATING MORE THAN 0.8 MW (800 KW)) FOR POWER PLANT, GENERATOR SET APPLICATIONS AND OTHER REQUIREMENTS

TABLE

Parameter	Area Category	Total engine rating of the plant (includes existing as well as new generator sets)	Generator sets commissioning date		
			Before 1.7.2003	Between 1.7.2003 and 1.7.2005	On or after 1.7.2005
NO _x (as NO ₂) (AT 15% O ₂) , dry basis, in ppmv	A	Upto 75 MW	1100	970	710
	B	Upto 150 MW			
	A	More then 75 MW	1100	710	360
	B	More then 150 MW			
NMHC (as C)(at 15% O ₂), mg/Nm ³	Both A and B		150	100	
PM (at 15% O ₂), mg/Nm ³	Diesel Fuels- HSD & LDO	Both A and B	75	75	
	Furnace Oils- LSHS & FO	Both A and B	150	100	
CO (at 15% O ₂), mg/Nm ³	Both A and B		150	150	
Sulphur Content in fuel	A		< 2%		
	B		< 4%		
Fuel specification	For A only	Up to 5MW	Only Diesel fuels (HSD, LDO) shall be used.		
Stack height (for generator sets commissioned after 1.7.2003)	Stack height shall be maximum of the following, in meter: (i) $14 Q^{0.3}$, Q= Total SO ₂ emission from the plant in kg/hr. (ii) Minimum 6 m. above the building where generator set is installed. (iii) 30 m.				

Note:

1. Acronyms used :

MW	:	Mega(10^6) Watt	FO	:	Furnace Oil
NO _x	:	Oxides of Nitrogen	HSD	:	High Speed Diesel
NO ₂	:	Nitrogen Dioxide	LDO	:	Light Diesel Oil
O ₂	:	Oxygen	LSHS	:	Low Sulphur Heavy Stock
NMHC	:	Non-Methane Hydrocarbon	kPa	:	Kilo Pascal
C	:	Carbon	mm	:	Milli (10^{-3}) metre
PM	:	Particulate Matter	kg/ hr	:	Kilo (10^3) gram per hour
CO	:	Carbon Monoxide	mg/Nm ³ :	:	milli (10^{-3}) gram per Normal meter cubic
SO ₂	:	Sulphur Dioxide			
ppmv	:	parts per million (10^6) by volume			

2. Area categories A and B are defined as follows:

Category A: Areas within the municipal limits of towns/cities having population more than 10 lakhs and also upto 5 km beyond the municipal limits of such towns/cities.

Category B: Areas not covered by category A.

3. The standards shall be regulated by the State Pollution Control Boards or Pollution Control Committees, as the case may be.
4. Individual units with engine ratings less than or equal to 800 KW are not covered by this notification.
5. Only following liquid fuels viz. High Speed Diesel, Light Diesel Oil, Low Sulphur Heavy Stock and Furnace Oil or liquid fuels with equivalent specifications shall be used in these power plants and generator sets.
6. For expansion project, stack height of new generator sets shall be as per total Sulphur Dioxide emission (including existing as well as additional load).
7. For multi engine plants, flues shall be grouped in cluster to get better plume rise and dispersion. Provision for any future expansion should be made in planning stage itself.
8. Particulate matter, Non- Methane Hydrocarbon and Carbon Monoxide results are to be normalized to 25° C, 1.01 kilo Pascal (760 mm of mercury) pressure and zero percent moisture (dry basis).
9. Measurement shall be performed at steady load conditions of more than 85% of the rated load.

10. Continuous monitoring of Oxides of Nitrogen shall be done by the plants whose total engine capacity is more than 50 Mega Watt. However, minimum once in six month monitoring for other parameters shall be adopted by the plants.

11. Following methods may be adopted for the measurement of emission parameters:-

Sl. No.	Emission Parameters	Measurement Methods
1.	Particulates	Gravimetric
2.	SO ₂	Barium Perchlorate - Thorin indicator method
3.	NO _x	Chemiluminescence, Non Dispersive infra Red, Non Dispersive Ultra-violet (for continuous measurement), Phenol disulphonic method
4.	CO	Non Dispersive Infra Red
5.	O ₂	Paramagnetic, Electrochemical sensor
6.	NMHC	Gas Chromatograph - Flame Ionisation Detector

APPENDIX N
ETP OUTLET AND STP STANDARDS

सा.का.नि. सं. 446(अ), तारीख 13 जून, 2011; सा.का.नि. सं. 152(अ), तारीख 16 मार्च, 2012; सा.का.नि. सं. 266(अ), तारीख 30 मार्च, 2012; सा.का.नि. सं. 277(अ), तारीख 31 मार्च, 2012; सा.का.नि. सं. 820(अ), तारीख 9 नवंबर, 2012; सा.का.नि. सं. 176(अ), तारीख 18 मार्च, 2013; सा.का.नि. सं. 535(अ), तारीख 7 अगस्त, 2013; सा.का.नि. सं. 771(अ), तारीख 11 दिसंबर, 2013; सा.का.नि. सं. 2(अ), तारीख 2 जनवरी, 2014; सा.का.नि. सं. 229(अ), तारीख 28 मार्च, 2014; सा.का.नि. सं. 232(अ), तारीख 31 मार्च, 2014; सा.का.नि. सं. 325(अ), तारीख 7 मई, 2014; सा.का.नि. सं. 612(अ), तारीख 25 अगस्त, 2014; सा.का.नि. सं. 789(अ), तारीख 11 नवंबर, 2014; और अंत में अधिमूचना का.आ. सं. 3305(अ), तारीख 7 दिसंबर, 2015 द्वारा संशोधन किए गए थे।

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 1st January, 2016

S.O. 4(E).—In exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely:—

1. **Short title and Commencement.**—(1) These rules may be called the Environment (Protection) Amendment Rules, 2015.
(2) They shall come into force on the date of their publication in the Official Gazette.
2. In the Environment (Protection) Rules, 1986, in Schedule-I,—
 - (a) the serial number 41 and the entries relating thereto, shall be omitted;
 - (b) for serial number 55 and the entries relating thereto, the following serial number and entries shall be substituted, namely:—

S. No.	Industry	Parameter	Standards		
(1)	(2)	(3)	(4)		
55.	Common Effluent Treatment Plants (CETP)				
	A. Inlet Quality Standards	For each Common Effluent Treatment Plant (CETP), the State Board will prescribe Inlet Quality Standards for General Parameters, Ammonical-Nitrogen and Heavy metals as per design of the Common Effluent Treatment Plant (CETP) and local needs & conditions.			
	B: Treated Effluent Quality Standards		Max. permissible values (in milligram/litre except for pH and Temperature)		
			Into inland surface water	On land for irrigation	Into sea
		General Parameters			
		pH	6 - 9	6 - 9	6 - 9
		Biological Oxygen Demand, BOD ₅ , 27 °C	30	100	100 *
		Chemical Oxygen Demand (COD)	250	250	250 *
Total Suspended Solids (TSS)	100	100	100		
Fixed Dissolved Solids (FDS)	2100*	2100*	NS*		

Specific parameters			
Temperature, °C	Shall not exceed more than 5°C above ambient water temperature	Shall not exceed more than 5°C above ambient water temperature	Shall not exceed more than 5°C above ambient water temperature
Oil & Grease	10	10	10
Ammonical -Nitrogen	50	NS*	50
Total Kjeldahl Nitrogen (TKN)	50	NS*	50
Nitrate- Nitrogen	10	NS*	50
Phosphates, as P	5	NS*	NS*
Chlorides	1000	1000	NS*
Sulphates, as SO ₄	1000	1000	NS*
Flouride	2	2	15
Sulphides, as S	2	2	5
Phenolic compounds (as C ₆ H ₅ OH)	1	1	5
Total Res. Chlorine	1	1	1
Zinc	5	15	15
Iron	3	3	3
Copper	3	3	3
Trivalent Chromium	2	2	2
Manganese	2	NS*	2
Nickel	3	NS*	3
Arsenic	0.2	NS*	0.2
Cyanide, as CN	0.2	NS*	0.2
Vanadium	0.2	NS*	0.2
Lead	0.1	NS*	0.1
Hexavalent Chromium	0.1	NS*	0.1
Selenium	0.05	NS*	0.05
Cadmium	0.05	NS*	0.05
Mercury	0.01	NS*	0.01
Bio-assay test	As per industry-specific standards	As per industry-specific standards	As per industry-specific standards

*NS-Not specified

Notes:

- *Discharge of treated effluent into sea shall be through proper marine outfall. The existing shore discharges shall be converted to marine-outfalls. In cases where the marine outfall provides a minimum initial dilution of 150 times at the point of discharge and a minimum dilution of 1500 times at a point 100 m away from discharge point, then, the State Board may relax the Chemical Oxygen Demand (COD) limit:

Provided that the maximum permissible value for Chemical Oxygen Demand (COD) in treated effluent shall be 500 milligram/litre.	
2. *Maximum permissible Fixed Dissolved Solids (FDS) contribution by constituent units of a Common Effluent Treatment Plant (CETP) shall be 1000 milligram/litre. In cases where Fixed Dissolved Solids (FDS) concentration in raw water used by the constituent units is already high (i.e. it is more than 1100 milligram/litre) then the maximum permissible value for Fixed Dissolved Solids (FDS) in treated effluent shall be accordingly modified by the State Board.	
3. In case of discharge of treated effluent on land for irrigation, the impact on soil and groundwater quality shall be monitored twice a year (pre- and post-monsoon) by Common Effluent Treatment Plants (CETP) management. For combined discharge of treated effluent and sewage on land for irrigation, the mixing ratio with sewage shall be prescribed by State Board.	
4. Specific parameters for some important sectors, selected from sector-specific standards	
Sector	Specific Parameters
Textile	Bio-assay test, Total Chromium, Sulphide, Phenolic compounds
Electroplating Industries	Oil & Grease, Ammonia-Nitrogen, Nickel, Hexavalent Chromium, Total Chromium, Copper, Zinc, Lead, Iron, Cadmium, Cyanide, Fluorides, Sulphides, Phosphates, Sulphates.
Tanneries	Sulphides, Total Chromium, Oil & Grease, Chlorides
Dye & Dye Intermediate	Oil & Grease, Phenolic compounds, Cadmium, Copper, Manganese, Lead, Mercury, Nickel, Zinc, Hexavalent Chromium, Total Chromium, Bio-assay test, Chlorides, Sulphates.
Organic chemicals manufacturing industry	Oil & Grease, Bio-assay test, Nitrates, Arsenic, Hexavalent Chromium, Total Chromium, Lead, Cyanide, Zinc, Mercury, Copper, Nickel, Phenolic compounds, Sulphides
Pharmaceutical industry	Oil & Grease, Bio-assay test, Mercury, Arsenic, Hexavalent Chromium, Lead, Cyanide, Phenolic compounds, Sulphides, Phosphates."

[F. No. Q-15017/18/2014-CPW]

Dr. RASHID HASAN, Advisor

Note- The principal rules were published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i) vide number S.O. 844(E), dated the 19th November, 1986 and subsequently amended vide the following notifications:—

S.O. 433(E), dated the 18th April 1987; G.S.R. 176(E) dated the 2nd April, 1996; G.S.R. 97(E), dated the 18th February, 2009; G.S.R. 149(E), dated the 4th March, 2009; G.S.R. 543(E), dated the 22nd July, 2009; G.S.R. 739(E), dated the 9th September, 2010; G.S.R. 809(E), dated the 4th October, 2010. G.S.R. 215(E), dated the 15th March, 2011; G.S.R. 221(E), dated the 18th March, 2011; G.S.R. 354(E), dated the 2nd May, 2011; G.S.R. 424(E), dated the 1st June, 2011; G.S.R. 446(E), dated the 13th June, 2011; G.S.R. 152(E), dated the 16th March, 2012; G.S.R. 266(E), dated the 30th March, 2012; and G.S.R. 277(E), dated the 31st March, 2012; and G.S.R. 820(E), dated the 9th November, 2012; G.S.R. 176(E), dated the 18th March, 2013; G.S.R. 535(E), dated the 7th August, 2013; G.S.R. 771(E), dated the 11th December, 2013; G.S.R. 2(E), dated the 2nd January, 2014; G.S.R. 229 (E), dated the 28th March, 2014; G.S.R. 232(E), dated the 31st March, 2014; G.S.R. 325(E), dated the 07th May, 2014, G.S.R. 612(E), dated the 25th August, 2014; G.S.R. 789(E), dated the 11th November, 2014 and lastly amended vide notification S.O. 3305(E), dated the 7th December, 2015.



भारत का राजपत्र The Gazette of India

असाधारण

EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (i)

PART II—Section 3—Sub-section (i)

प्राधिकार से प्रकाशित

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पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय

अधिसूचना

नई दिल्ली, 13 अक्टूबर, 2017

सा.का.नि. 1265(अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 6 और धारा 25 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, पर्यावरण (संरक्षण) नियम, 1986 का और संशोधन करने के लिए निम्नलिखित नियम बनाती है, अर्थात् :—

- संक्षिप्त नाम और प्रारम्भ :—(1) इन नियमों का संक्षिप्त नाम पर्यावरण (संरक्षण) संशोधन नियम, 2017 है।
(2) ये राजपत्र में उनके प्रकाशन की तारीख को प्रवृत्त होंगे।
- पर्यावरण (संरक्षण) नियम, 1986 की अनुसूची-1 में, क्रम संख्यांक 104 और उससे सम्बन्धित प्रविष्टियों के पश्चात्, निम्नलिखित क्रम संख्यांक और प्रविष्टियां अन्तःस्थापित की जाएगी, अर्थात् :—

क्र. सं.	उद्योग	मानदंड	मानक
1	2	3	4
		बहिर्जाव निस्सारण मानक (निपटान के सभी ढंगों को लागू)	
"105	मल उपचार संयंत्र (एसटीपी)		अवस्थान
			सांद्र का निम्नलिखित से अधिक न होना
		पीएच	(क) देश में कहीं भी (ख) 6.5-9.0
		जैव-रासायनिक ऑक्सीजन (बीओडी) मांग	महानगर* अरुणाचल प्रदेश, असम, मणिपुर, मेघालय, मिजोरम, नागालैण्ड, त्रिपुरा, सिक्किम, हिमाचल प्रदेश, उत्तराखंड, जम्मू-कश्मीर राज्यों और

			अंदमान और निकोबार द्वीप, दादरा और नागर हवेली, दमण और दीव और लक्षद्वीप के सिवाय, सभी राज्यों की राजधानी।	
			ऊपर उल्लिखित से भिन्न क्षेत्र/प्रदेश	30
		कुल निलंबित ठोस पदार्थ (टीएसएस)	महानगर* अरुणाचल प्रदेश, असम, मणिपुर, मेघालय, मिजोरम, नागालैण्ड, त्रिपुरा, सिक्किम, हिमाचल प्रदेश, उत्तराखंड, जम्मू-कश्मीर राज्यों और अंदमान और निकोबार द्वीप, दादरा और नागर हवेली, दमण और दीव और लक्षद्वीप के सिवाय, सभी राज्यों की राजधानी।	<50
			ऊपर उल्लिखित से भिन्न क्षेत्र/प्रदेश	<100
		फैकल कोलीफॉर्म (एफसी) (अतिसंभाव्य संख्या प्रति 100 मिलीलिटर एमपीएन/100 मिलीलिटर	देश में कहीं भी	<1000

*मुंबई, दिल्ली, कोलकाता, चेन्नई, बेंगलूरु, हैदराबाद, अहमदाबाद और पुणे महानगर हैं।

टिप्पण :

- (i) पीएच और फैकल कौलीफॉर्म के सिवाय, मिलीग्राम/लिटर में सभी मूल्य।
- (ii) ये, मानक जलाशयों में निस्सारण और भूमि निपटान/अनुप्रयोगों के लिए लागू होंगे।
- (iii) फैकल कौलीफॉर्म के लिए मानक औद्योगिक प्रयोजनों के लिए उपचारित बहिर्चाव के उपयोग के सम्बन्ध में लागू नहीं होंगे।
- (iv) ये मानक 1 जून, 2019 को या उसके पश्चात् कमीशन किए जाने वाले सभी मल उपचार संयंत्रों (एसटीपी) को लागू होंगे और पुराने/विद्यमान मल उपचार संयंत्र (एसटीपी) राजपत्र में इस अधिसूचना के प्रकाशन की तारीख से पांच वर्ष की अवधि के भीतर इन मानकों को प्राप्त करेंगे।
- (v) समुद्र में उपचारित बहिर्चाव के निस्सारण के मामले में, इसे उचित समुद्री मुहाने के माध्यम से किया जाएगा और विद्यमान तट निस्सारण को समुद्री मुहानों में संपरिवर्तित किया जाएगा और उन मामलों में, जहां समुद्री मुहाना निस्सारण के बिन्दु पर 150 गुणा न्यूनतम आरम्भिक तनुकरण और निस्सारण बिन्दु से दूर 100 मीटर के किसी बिन्दु पर 1500 गुणा न्यूनतम तनुकरण प्रदान करता है, तब विद्यमान सन्नियम साधारण निस्सारण मानकों में विनिर्दिष्ट किए गए अनुसार लागू होंगे।
- (vi) उपचारित बहिर्चाव का पुनःउपयोग/पुनःचक्रण तथा उन मामलों में, जहां उपचारित बहिर्चाव के भाग का पुनःउपयोग और पुनःचक्रण किया जाता है जिसमें मानवीय सम्पर्क की सम्भावना अन्तर्वलित है, ऊपर यथा विनिर्दिष्ट मानक लागू होंगे।
- (vii) केन्द्रीय प्रदूषण नियंत्रण बोर्ड/राज्य प्रदूषण नियंत्रण बोर्ड/प्रदूषण नियंत्रण समितियां, पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 5 के अधीन स्थानीय परिवेश को ध्यान में रखते हुए, अधिक कठोर सन्नियम जारी कर सकेगा/कर सकेगी।

[फा. सं. क्यू-15017/2/2008/-सीपीडब्ल्यू]

अरुण कुमार मेहता, अपर सचिव

टिप्पण : मूल नियम भारत के राजपत्र, असाधारण, भाग II, खंड 3, उप-खंड (i) में का.आ. सं. 844(अ), तारीख 19 नवम्बर, 1986 द्वारा प्रकाशित किए गए थे और तत्पश्चात् उनमें निम्नलिखित अधिसूचनाओं द्वारा संशोधन किए गए थे, अर्थात् :—
 का.आ. 433(अ), तारीख 18 अप्रैल, 1987; सा.का.नि. 176(अ), तारीख 2 अप्रैल, 1996; सा.का.नि. 97(अ), तारीख 18 फरवरी, 2009; सा.का.नि. 149(अ), तारीख 4 मार्च, 2009; सा.का.नि. 543(अ), तारीख 22 जुलाई, 2009; सा.का.नि. 739(अ), तारीख 9 सितम्बर, 2010; सा.का.नि. 809(अ), तारीख 4 अक्टूबर, 2010; सा.का.नि. 215(अ), तारीख 15 मार्च, 2011; सा.का.नि. 221(अ), तारीख 18 मार्च, 2011; सा.का.नि. 354(अ), तारीख 2 मई, 2011; सा.का.नि. 424(अ), तारीख 1 जून, 2011; सा.का.नि. 446(अ), तारीख 13 जून, 2011; सा.का.नि. 152(अ), तारीख 16 मार्च, 2012; सा.का.नि. 266(अ), तारीख 30 मार्च, 2012; सा.का.नि. 277(अ), तारीख 31 मार्च, 2012; सा.का.नि. 820(अ), तारीख 9 नवम्बर, 2012; सा.का.नि. 176(अ), तारीख 18 मार्च, 2013; सा.का.नि. 535(अ), तारीख 7 अगस्त, 2013; सा.का.नि. 771(अ), तारीख 11 दिसम्बर, 2013; सा.का.नि. 2(अ), तारीख 2 जनवरी, 2014; सा.का.नि. 229(अ), तारीख 28 मार्च, 2014; सा.का.नि. 232(अ), तारीख 31 मार्च, 2014; सा.का.नि. 325(अ), तारीख 7 मई, 2014; सा.का.नि. 612(अ), तारीख 25 अगस्त, 2014; सा.का.नि. 789(अ), तारीख 11 नवम्बर, 2014; का.आ. 3305(अ), तारीख 7 दिसम्बर, 2015; का.आ. 4(अ), तारीख 1 जनवरी, 2016; सा.का.नि. 35(अ), तारीख 14 जनवरी, 2016; सा.का.नि. 281(अ), तारीख 7 मार्च, 2016; सा.का.नि. 496(अ), तारीख 9 मई, 2016; सा.का.नि. 497(अ), तारीख 10 मई, 2016; सा.का.नि. 978(अ), तारीख 10 अक्टूबर, 2016; और अंतिम बार अधिसूचना संख्यांक सा.का.नि. 1016(अ), तारीख 28 अक्टूबर, 2016 द्वारा संशोधित किए गए थे।

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
NOTIFICATION

New Delhi, the 13th October, 2017

G.S.R. 1265(E).—In exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely:-

1. **Short title and commencement.**—(1) These rules may be called the Environment (Protection) Amendment Rules, 2017.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Environment (Protection) Rules, 1986, in Schedule – I, after serial number 104 and the entries relating thereto, the following serial number and entries shall be inserted, namely:—

Sl. No.	Industry	Parameters	Standards	
1	2	3	4	
		Effluent discharge standards (applicable to all mode of disposal)		
“105	Sewage Treatment Plants (STPs)		Location	Concentration not to exceed
			(a)	(b)
		pH	Anywhere in the country	6.5-9.0
		Bio-Chemical Oxygen Demand (BOD)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir, and Union territory of	20

		Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep	
		Areas/regions other than mentioned above	30
	Total Suspended Solids (TSS)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep	<50
		Areas/regions other than mentioned above	<100
	Fecal Coliform (FC) (Most Probable Number per 100 milliliter, MPN/100ml)	Anywhere in the country	<1000

*Metro Cities are Mumbai, Delhi, Kolkata, Chennai, Bengaluru, Hyderabad, Ahmedabad and Pune.

Note :

- (i) All values in mg/l except for pH and Fecal Coliform.
- (ii) These standards shall be applicable for discharge into water bodies as well as for land disposal/applications.
- (iii) The standards for Fecal Coliform shall not apply in respect of use of treated effluent for industrial purposes.
- (iv) These Standards shall apply to all STPs to be commissioned on or after the 1st June, 2019 and the old/existing STPs shall achieve these standards within a period of five years from date of publication of this notification in the Official Gazette.
- (v) In case of discharge of treated effluent into sea, it shall be through proper marine outfall and the existing shore discharge shall be converted to marine outfalls, and in cases where the marine outfall provides a minimum initial dilution of 150 times at the point of discharge and a minimum dilution of 1500 times at a point 100 meters away from discharge point, then, the existing norms shall apply as specified in the general discharge standards.
- (vi) Reuse/Recycling of treated effluent shall be encouraged and in cases where part of the treated effluent is reused and recycled involving possibility of human contact, standards as specified above shall apply.
- (vii) Central Pollution Control Board/State Pollution Control Boards/Pollution Control Committees may issue more stringent norms taking account to local condition under section 5 of the Environment (Protection) Act, 1986".

[F. No. Q-15017/2/2008-CPW]

ARUN KUMAR MEHTA, Addl. Secy.

Note : The principal rules were published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i) *vide* number S.O. 844 (E), dated the 19th November, 1986 and subsequently amended *vide* the following notifications, namely:—

S.O. 433 (E), dated the 18th April 1987; G.S.R. 176(E) dated the 2nd April, 1996; G.S.R. 97 (E), dated the 18th February, 2009; G.S.R. 149 (E), dated the 4th March , 2009; G.S.R. 543(E), dated the 22nd July,2009; G.S.R. 739 (E), dated the 9th September, 2010; G.S.R. 809(E), dated the 4th October, 2010, G.S.R.

215 (E), dated the 15th March, 2011; G.S.R. 221(E), dated the 18th March, 2011; G.S.R. 354 (E), dated the 2nd May, 2011; G.S.R. 424 (E), dated the 1st June, 2011; G.S.R. 446 (E), dated the 13th June, 2011; G.S.R. 152 (E), dated the 16th March, 2012; G.S.R. 266(E), dated the 30th March, 2012; and G.S.R. 277 (E), dated the 31st March, 2012; and G.S.R. 820(E), dated the 9th November, 2012; G.S.R. 176 (E), dated the 18th March, 2013; G.S.R. 535(E), dated the 7th August, 2013; G.S.R. 771(E), dated the 11th December, 2013; G.S.R. 2(E), dated the 2nd January, 2014; G.S.R. 229 (E), dated the 28th March, 2014; G.S.R. 232(E), dated the 31st March, 2014; G.S.R. 325(E), dated the 7th May, 2014; G.S.R. 612, (E), dated the 25th August 2014; G.S.R. 789(E), dated the 11th November 2014; S.O. 3305(E), dated the 7th December, 2015; S.O.4(E), dated the 1st January 2016; G.S.R. 35(E), dated the 14th January 2016; G.S.R. 281 (E), dated the 7th March, 2016; G.S.R. 496(E), dated the 9th May, 2016; G.S.R.497(E), dated the 10th May, 2016; G.S.R.978(E), dated the 10thOctober, 2016; and lastly amended vide notification G.S.R. 1016(E), dated the 28th October, 2016.

APPENDIX Q
NFPA CLASSIFICATION AND
HAZARDS DUE TO EXPOSURE OF
CARGO HANDLED

Appendix O NFPA Classification of Hazardous & Non-Hazardous Materials

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
1.	LNG	Boiling Point: -161.5 °C Flash Point: -187.8 °C Lower Explosion Limit: 5% (by volume, gas phase) Upper Explosion Limit: 15% (by volume, gas phase) Auto Ignition Temperature: 537 °C (gas phase)	2	4	0	Potential Acute Health Effects: Skin: Freezing or severe cryogenic burns Inhalation: CNS depression and Cardiac Sensitization.	Eye: Contact with product may cause frostbite. In case of frostbite or freeze burns, gently soak the eyes with cool to lukewarm water. DO NOT WASH THE EYES WITH HOT WATER (i.e. over 105oF). Open eyelids wide to allow liquid to evaporate. If the person cannot tolerate light, protect the eyes with a bandage or handkerchief. Do not introduce ointment into the eyes without medical advice. Seek immediate medical attention. Skin: Contact with product may cause frostbite. In case of frostbite or freeze burns, remove contaminated clothing and flush the affected area with cool to lukewarm water. Immediately place frozen area in a circulating warm water bath or in flowing warm water (100 to 105 oF). DO NOT USE HOT WATER (i.e. over 105oF) OR DRY HEAT. Seek immediate medical attention if blistering, tissue freezing, or frostbite has occurred. Under no circumstances should the frozen part be rubbed, either before or after warming. Inhalation (Breathing): Inhalation of large quantities of LNG vapors may cause central nervous system depression with nausea, headache, dizziness, vomiting, and incoordination. LNG and associated vapor is a simple asphyxiant and may cause loss of consciousness, serious injury, or death by displacing air, thereby resulting in insufficient oxygen to support life. Prompt medical attention is strongly recommended in all cases of inhalation overexposure. Rescue personnel should be equipped with a self-contained breathing apparatus. Remove inhalation victims to fresh air quickly. If inhalation victim is not breathing, ensure that their airways are open and administer

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>cardiopulmonary resuscitation (CPR). If necessary, have a trained person administer air or oxygen once breathing is restored. Seek immediate medical treatment.</p> <p>Ingestion (Swallowing): This material is a gas under atmospheric temperature and pressure conditions and ingestion is unlikely. Seek immediate medical attention if material is ingested.</p>
2.	Ethylene	Boiling Point: -103.77°C Melting Point: -169.15°C Flash Point: -136.6°C Lower Explosion Limit: 2.7% Upper Explosion Limit: 36% Auto Ignition Temperature: 450°C	2	4	2	<p>Potential acute health effects:</p> <p>Eye: Liquid can cause burns similar to frostbite;</p> <p>Inhalation: Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness;</p> <p>Skin: Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite;</p> <p>Ingestion: Can cause central nervous system (CNS) depression. Ingestion of liquid can cause burns similar to frostbite.</p>	<p>First aid measures:</p> <p>Eye: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs;</p> <p>Inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.</p> <p>Skin: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. In case of contact with liquid, warm frozen tissues slowly with lukewarm water and get medical attention. Do not rub affected area. Wash clothing before reuse. Clean shoes</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>thoroughly before reuse.</p> <p>Ingestion: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention. If necessary, call a poison center or physician. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. As this product rapidly becomes a gas when released, refer to the inhalation section.</p> <p>Firefighting measures: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so. Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. For incidents involving large quantities, thermally insulated undergarments and thick textile or leather gloves should be worn.</p>
3.	Propylene	Boiling Point: -47.7°C	2	4	1	Potential Acute Health Effects:	First Aid Measures:

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
	(Propene)	Flash Point: -107.8°C Lower Explosion Limit: 2.1% Upper Explosion Limit: 11% Auto Ignition Temperature: 460°C				<p>Inhalation: Simple asphyxiant. May cause suffocation by displacing the oxygen in the air. Exposure to oxygen deficient.</p> <p>Atmosphere (<19.5%) may cause dizziness, drowsiness, nausea, vomiting, excess salivation, diminished mental alertness, loss of consciousness and death. Exposure to atmospheres containing 8-10% or less oxygen will bring about unconsciousness without warning and so quickly that the individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death. May cause central nervous system depression with nausea, headache, dizziness, vomiting, and incoordination.</p> <p>Eyes and Skin: Contact with rapidly expanding gas near the point of release may cause frostbite.</p>	<p>Inhalation: Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.</p> <p>Skin: The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation has returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible. . Adverse effects not expected from this product.</p> <p>Eye: Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately. Get immediate medical attention.</p> <p>Ingestion: Ingestion is not considered a potential route of exposure.</p> <p>Firefighting Measures: Suitable extinguishing media: Carbon dioxide, Dry chemical, Water spray or fog. Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.</p>
4.	Propane	Boiling Point:-42.222°C	1	4	0	Potential Acute Health Effects:	First Aid measures:

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Flash Point: -104°C Lower Explosion Limit: 2.1% Upper Explosion Limit: 9.5% Auto Ignition Temperature: 467.778°C				Exposure to concentrations above 100% of the LEL such as 5% or 50,000 ppm may sensitize heart and cause irregular heartbeat. High concentrations may exclude oxygen and cause dizziness and suffocation. Contact with liquid or cold vapor may cause frostbite or freeze burn. Exposure to concentrations above 10% of the LEL may cause a general central nervous system (CNS) depression typical of anesthetic gases or intoxicants. Aliphatic hydrocarbon gases may build up in confined spaces and may cause dizziness, lightheadedness, headache, nausea and loss of coordination. Continued inhalation may result in narcosis, unconsciousness, and possibly lead to death.	<p>Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.</p> <p>Skin contact: Take off contaminated clothing and shoes immediately. Wash off immediately with soap and plenty of water. Seek medical advice if symptoms persist or develop.</p> <p>Eye contact: In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Seek medical attention.</p> <p>Ingestion: Ingestion is considered unlikely. If accidentally swallowed obtain immediate medical attention.</p> <p>Firefighting Measures: Keep people away from and upwind of spill/leak. Fire should not be extinguished unless flow of gas can be immediately stopped. If spill or leak has not ignited, determine if water spray may assist in dispersing gas or vapor to protect personnel attempting to stop leak. Use water to cool equipment, surfaces and containers exposed to fire and excessive heat. For large fire the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Isolate area, particularly around ends of storage vessels. Withdraw immediately in the event of a rising sound from a venting safety device. Large fires typically require specially trained personnel and equipment to isolate and extinguish the fire.</p>
5.	Butadiene	Boiling Point: -11 - 28 °C Flash Point: -76°C	2	4	2	<p>Potential Acute Health Effects: Skin: May cause skin irritation in susceptible persons. Contact with liquid</p>	<p>First Aid Measures: General advice: Move out of dangerous area. Show this material safety data sheet to the doctor in attendance.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Lower Explosion Limit: 2% Upper Explosion Limit: 12%				<p>or refrigerated gas can cause cold burns and frostbite.</p> <p>Eye: Contact with eyes may cause irritation.</p> <p>Sensitization: Did not cause sensitization on laboratory animals. Information refers to the main ingredient.</p>	<p>If inhaled: Consult a physician after significant exposure. If unconscious place in recovery position and seek medical advice.</p> <p>In case of skin contact: If skin irritation persists, call a physician. If on skin, rinse well with water. If on clothes, remove clothes.</p> <p>In case of eye contact: Immediately flush eye(s) with plenty of water. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.</p> <p>If swallowed: Keep respiratory tract clear. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.</p> <p>Firefighting measures: Special protective equipment for fire-fighters: Wear self-contained breathing apparatus for firefighting if necessary. Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers. Fire and explosion protection: Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.</p>
6.	Butane	Boiling Point: 78.4°C Melting Point: -123.1°C Flash Point: -60°C (Closed cup), -5°C	1	4	0	<p>Potential Acute Health Effects: Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact</p>	<p>First Aid measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		(Open Cup) Lower Explosion Limit(%): 1.8% Upper Explosion Limit(%): 10.1% Auto Ignition Temperature: 460°C				(irritant, permeator). Inflammation of the eye is characterized by redness, watering, and itching.	<p>medical attention.</p> <p>Skin: After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing. Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.</p> <p>Inhalation: Allow the victim to rest in a well-ventilated area. Seek immediate medical attention. Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.</p> <p>Ingestion: Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.</p> <p>Firefighting Measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.</p>
7.	LPG	Propane - Boiling range: -88°C to 0°C Butane - Boiling range: -43°C to 36°C	1	4	0	<p>Potential Acute Health Effects</p> <ul style="list-style-type: none"> Extremely flammable gas May cause cancer by inhalation if 1,3-butadiene is a component. May cause genetic defects by 	<p>Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. Emergency eye wash capability should be available in the vicinity of any potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Propane - Flash point: -156°C Butane - Flash point: <-60°C Propane - UEL:9.8% LEL:2% Butane - UEL:9.5% LEL:1.5% Propoane - Auto-ignition temperature: 450°C Butane - Auto-ignition temperature: 287°C				inhalation if 1,3-butadiene is a component. <ul style="list-style-type: none"> • May cause drowsiness or dizziness. • High concentration may sensitize heart to adrenaline. 	hands before eating, drinking, smoking, or using toilet facilities. Waterless hand cleaners are effective. Promptly remove contaminated clothing and laundry before reuse. Consider disposal of contaminated clothing rather than laundering to prevent the formation of flammable vapours which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves. <p>First Aid Measures:</p> <ul style="list-style-type: none"> • Remove to fresh air. If breathing is irregular or stopped, administer artificial respiration. Give oxygen. • If skin exposed to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). • Immediately flush eyes thoroughly with warm water for at least 15 minutes. Remove contact lenses. Rinse with water. Take victim immediately to hospital. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. • Seek medical attention. • Ingestion is considered unlikely. If swallowed, obtain medical attention. • This material may be a cardiac sensitizer; avoid the use of epinephrine. <p>Fire fighting Measures:</p> Allow the fire to burn under controlled conditions. Fire should not be extinguished unless flow of gas can be immediately stopped. Stop leak if you can do it without risk. Evacuate area. If a leak or spill has not ignited, use water spray to disperse the vapours and to protect personnel attempting to stop a leak. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Use water to cool equipment, surfaces and containers exposed to fire and excessive heat. For large fire the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure.
8.	Pentane	Boiling Point: 36.1°C	1	4	0	Potential Acute Health Effects:	First Aid Measures:

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Melting Point: -130°C Flash Point: -49°C Lower Explosion Limit: 1.5% Upper Explosion Limit: 7.8% Auto Ignition Temperature: 260°C				Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).	<p>Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.</p> <p>Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.</p> <p>Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.</p> <p>Ingestion: If swallowed, do NOT induce vomiting. Never give anything by mouth to an unconscious person. Aspiration hazard if swallowed- can enter lungs and cause damage. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
9.	Ethyl Mercaptan	Boiling Point: 35°C Freezing Point: -144°C Flash Point: -48.3°C Lower Explosion Limit: 2.8% Upper Explosion Limit: 18% Auto Ignition Temperature: 300°C	1	4	0	<p>Potential Acute Health Effects:</p> <p>Inhalation: Short Term Exposure: irritation, nausea, difficulty breathing, headache, symptoms of drunkenness, bluish skin color, convulsions, coma; Long Term Exposure: no information on significant adverse effects</p> <p>Skin: Short Term Exposure: irritation; Long Term Exposure: no information on significant adverse effects</p> <p>Eye: Short Term Exposure: irritation; Long Term Exposure: no information on significant adverse effects</p> <p>Ingestion: Short Term Exposure: sore throat, nausea, stomach pain; Long Term Exposure: no information on significant adverse effects</p>	<p>First Aid Measures:</p> <p>INHALATION: Remove from exposure immediately. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Get medical attention.</p> <p>SKIN: Remove contaminated clothing, jewelry, and shoes immediately. Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention, if needed.</p> <p>EYE: Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower lids, until no evidence of chemical remains. Get medical attention immediately.</p> <p>INGESTION: Never make an unconscious person vomit or drink fluids. Give sodium bicarbonate solution. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.</p> <p>Firefighting measures:</p> <p>Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
10.	Motor Spirit	Flash point: -42.7°C Auto Ignition temperature: 280°C Lower Flammability Limit: 1.4% (V) Upper Flammability Limit: 7.8% (V) Boiling point: 46.5-190°C	1	3	0	<p>Potential Acute Health Effects:</p> <ul style="list-style-type: none"> The swallowing of small amounts may cause nausea and diarrhoea; larger amounts may cause irritation and drowsiness with vomiting. Unlikely to cause irritation on single contact. Prolonged or repeated contact is likely to cause short-term irritation, de-fating of the skin and could result in dermatitis. Likely to cause short-term irritation with redness and stinging. High vapour concentrations can cause irritation to eyes and mucous membranes, and drowsiness leading to loss of consciousness. 	<p>Motor spirits are designed to be used in closed systems. Avoid sources of ignition when refuelling vehicles or working on fuel system components. Electrical continuity is required between vessels during product transfer.</p> <p>Drums should be stored on their sides on racks preferably under cover, out of direct sunlight, in well ventilated conditions. Other types of containers should be stored under cover out of direct sunlight, in well ventilated conditions. Care should be taken to avoid over-stacking.</p> <p>First Aid Measures:</p> <ul style="list-style-type: none"> Wash mouth out with water and give water to drink (milk if available) - get medical advice. Do Not Induce Vomiting because of the Danger of Aspiration. Wash skin as soon as possible with soap and water. Change contaminated clothing immediately and launders before reuse. Get medical advice if irritation persists. Wash out immediately with large amounts of water. If redness and/or irritation continues, get medical advice. If inhalation of vapour causes irritation or drowsiness remove to fresh air. Get medical advice if the symptoms continue. <p>Fire fighting Measures: FIRE EXTINGUISHING AGENTS: Dry powder, foam, carbon dioxide Do not use water jets, water fog should be left to experienced personnel Fires in confined space should be dealt with by trained personnel wearing approved breathing apparatus.</p>
11.	Propylene Oxide	Boiling Point: 34.23°C Melting Point: -112°C Flash Point: -37°C Lower Explosion Limit: 2.3%	3	4	2	<p>Potential Acute Health Effects: Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (irritant, permeator). Inflammation of the</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Upper Explosion Limit: 36% Auto Ignition Temperature: 449°C				eye is characterized by redness, watering, and itching.	<p>Skin: After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.</p> <p>Inhalation: Allow the victim to rest in a well-ventilated area. Seek immediate medical attention.</p> <p>Ingestion: Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, auto-ignition or explosion.</p>
12.	Hexane	Boiling Point: 68°C Melting Point: -95°C Flash Point: -22.5°C Lower Explosion Limit: 1.15% Upper Explosion Limit: 7.5%	1	3	0	<p>Potential Acute Health Effects: Hazardous in case of skin contact (permeator), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Get medical attention if irritation occurs. Skin: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops; Serious Skin Contact: Wash with a disinfectant soap and cover the</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Auto Ignition Temperature: 225°C					contaminated skin with an anti-bacterial cream. Seek medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear. Firefighting measures: Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.
13.	Naphtha	Flash point: -21.7°C (-7.1°F) Lower Flammability Limit: 1.2 %(V) Upper Flammability Limit: 6.9 %(V) Boiling point: 26.7-148.9°C (80.1-300°F) Auto Ignition temperature: 225°C (437°F)	1	3	0	Potential Acute Health Effects: <ul style="list-style-type: none"> • May cause slight irritation. Skin irritation leading to dermatitis may occur upon prolonged or repeated contact. Can be absorbed through skin. • Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. • Vapours or mists from this material can irritate the nose, throat, and lungs, and can cause signs and 	Evacuate personnel to safe areas. Ventilate the area. Remove all sources of ignition. Response and clean-up crews must be properly trained and must utilize proper protective equipment. Should not be released into the environment. Avoid subsoil penetration. If the product contaminates rivers and lakes or drains, inform respective authorities. Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations. First Aid Measures: <ul style="list-style-type: none"> • If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
						<p>symptoms of central nervous system depression, depending on the concentration and duration of exposure. Inhalation of high concentrations may cause central nervous system depression such as dizziness, drowsiness, headache, and similar narcotic symptoms, but no long-term effects.</p> <ul style="list-style-type: none"> Long-term exposure may cause effects to specific organs, such as to the liver, kidneys, blood, nervous system, and skin. Contains benzene, which can cause blood disease, including anemia and leukemia. Skin, Central nervous system, Liver, Kidney, Blood 	<p>attention immediately.</p> <ul style="list-style-type: none"> Immediately flush skin with plenty of water. Take off contaminated clothing and shoes. Seek medical advice if symptoms persist or develop. Remove contact lenses. In the case of contact with eyes, rinse immediately with plenty of water If swallowed Do NOT induce vomiting. Never give anything by mouth to an unconscious person. <p>Fire Fighting Measures: Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Do not use a solid water stream as it may scatter and spread fire. Specific hazards during fire fighting: SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon. LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.</p>
14.	Acetone	Boiling Point: 56.2°C Melting Point: -95.35°C Flash Point: -20°C Lower Explosion Limit: 2.6% Upper Explosion Limit: 12.8% Auto Ignition Temperature: 465°C	1	3	0	<p>Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention. Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear; Serious Inhalation:</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.</p> <p>Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.</p>
15.	Methyl Chloride/Chloro Methane	Boiling Point: -24.2°C Melting Point: -98°C Flash Point: -20°C Flammability (solid, gas): 10.7 - 17.4 vol % Auto Ignition Temperature: 632°C	2	4	1	<p>Potential Acute Health Effects: May cause damage to organs (lung, kidneys, liver, and central nervous system) through prolonged or repeated exposure.</p>	<p>First Aid Measures: Inhalation: Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician. Skin: For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation has returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible. Eye: Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately. Ingestion: Ingestion is not considered a potential route of</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>exposure.</p> <p>Firefighting measures: Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection. Special protective equipment for fire fighters: Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.).</p>
16.	Cyclohexane	Boiling Point: 80.7°C Melting Point: 6.47°C Flash Point: -18°C Lower Explosion Limit: 1.3% Upper Explosion Limit: 8.4% Auto Ignition Temperature: 245°C	1	3	0	<p>Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Get medical attention. Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.</p> <p>Ingestion: If swallowed, do NOT induce vomiting. Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Aspiration hazard if swallowed- can enter lungs and cause damage. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention. Get medical attention if symptoms appear.</p> <p>Firefighting measures: Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.</p>
17.	Benzene	Boiling Point: 80.1°C Melting Point: 5.5°C Flash Point: -11.1°C Lower Explosion Limit: 1.2% Upper Explosion Limit: 7.8% Auto Ignition Temperature: 497.78°C	2	3	0	<p>Potential Acute Health Effects: Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately. Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.</p> <p>Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.</p>
18.	Ethyl Acetate	Boiling Point: 77°C Melting Point: -83°C Flash Point: -4.4°C Lower Explosion Limit: 2.2% Upper Explosion Limit: 9% Auto Ignition Temperature: 426.67°C	1	3	0	<p>Potential Acute Health Effects: Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator), of eye contact (irritant).</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention. Skin: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie,</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							belt or waistband. Get medical attention if symptoms appear. Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.
19.	Acrylonitrile	Boiling Point: 77.3°C Melting Point: -82°C Flash Point: -1.1111°C Lower Explosion Limit: 3.1% Upper Explosion Limit: 17% Auto Ignition Temperature: 481.11°C	4	3	2	Potential Acute Health Effects: Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (permeator), of eye contact (irritant). Severe over-exposure can result in death.	First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention. Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention. Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie,

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>belt or waistband. Get medical attention immediately.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.</p>
20.	Acetonitrile	Boiling Point: 81.6°C Melting Point: -46°C Flash Point: 2°C Lower Explosion Limit: 4.4% Upper Explosion Limit: 16% Auto Ignition Temperature: 524°C	2	3	0	<p>Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Severe over-exposure can result in death.</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention. Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention. Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.</p>
21.	Methyl Methacrylate	Boiling Point: 100°C Melting Point: -48°C Flash Point: 13°C Lower Explosion Limit: 2.1% Upper Explosion Limit: 12.5% Auto Ignition Temperature: 421°C	2	3	2	<p>Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention. Skin: After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention. Inhalation: Allow the victim to rest in a well-ventilated area. Seek immediate medical attention; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention. Ingestion: Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing,</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							perform mouth-to-mouth resuscitation. Seek immediate medical attention. Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.
22.	Methacrylonitrile	Boiling Point: 90-92°C Melting Point: -35.8°C Flash Point: 12°C Lower Explosion Limit: 2.0% Upper Explosion Limit: 6.8%	3	3	0	Potential Acute Health Effects: Breathing difficulties. May cause allergic skin reaction. Inhalation of high vapour concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, light-headedness, chest pain, muscle pain or flushing	First Aid Measures: Eye: Immediate medical attention is required. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Skin: Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Immediate medical attention is required. Inhalation: Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Immediate medical attention is required. Ingestion: Call a physician immediately. Clean mouth with water. Firefighting measures: As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear
23.	Methanol (Methyl Alcohol)	Boiling Point: 64.5°C Melting Point: -97.8°C Flash Point: 12°C Lower Explosion Limit: 6% Upper Explosion Limit: 36.5%	1	3	0	Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Severe over-exposure can result in death.	First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention. Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient.

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Auto Ignition Temperature: 464°C					<p>Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.</p> <p>Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.</p> <p>Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.</p>
24.	Isopropyl Alcohol	Boiling Point: 82.5°C Melting Point: -88.5°C Flash Point: 12.778°C Lower Explosion Limit: 2%	1	3	0	<p>Potential Acute Health Effects: Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer, permeator).</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention. Skin: Wash with soap and water. Cover the irritated skin with an</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Upper Explosion Limit: 12.7% Auto Ignition Temperature: 399°C					<p>emollient. Get medical attention if irritation develops. Cold water may be used.</p> <p>Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.</p> <p>Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.</p> <p>Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.</p>
25.	Ethyl Alcohol (Ethanol)	Boiling Point: 78.5°C Melting Point: -114.1°C Flash Point: 12.78°C Lower Explosion Limit: 3.3% Upper Explosion Limit: 19% Auto Ignition Temperature: 363°C	2	3	0	<p>Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of ingestion.</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention. Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.</p> <p>Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.</p> <p>Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.</p>
26.	Ethylene di chloride	Boiling Point: 83.6°C Melting Point: -35.3°C Flash Point: 13°C Lower Explosion Limit: 6.2% Upper Explosion Limit: 16% Auto Ignition Temperature: 440°C	3	3	0	Highly flammable liquid and vapour, May form explosive mixtures with air, Toxic if inhaled, Causes serious eye irritation, Causes skin irritation, May cause respiratory irritation, May cause cancer.	<p>First Aid Measures: Eye: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention. Inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.</p> <p>Skin: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.</p> <p>Ingestion: Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.</p> <p>Firefighting measures: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
27.	Methyl Isobutyl Ketone	Boiling Point: 115.9°C Melting Point: -84°C Flash Point: 14°C Lower Explosion Limit: 1.4% Upper Explosion Limit: 7.5% Auto Ignition Temperature: 460°C	2	3	1	Potential Acute Health Effects: Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (irritant, permeator). Inflammation of the eye is characterized by redness, watering, and itching.	First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention. Skin: After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: Allow the victim to rest in a well-ventilated area. Seek immediate medical attention; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention. Ingestion: Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar,

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention. Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.
28.	Ethyl Benzene	Boiling Point: 136°C Melting Point: -94.9°C Flash Point: 21°C Lower Explosion Limit: 0.8%-1.6% Upper Explosion Limit: 6.7%-7% Auto Ignition Temperature: 432°C	2	3	0	Potential Acute Health Effects: Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).	First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention. Skin: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear. Firefighting measures:

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.
29.	N-Butyl Acetate	Boiling Point: 126.5°C Melting Point: -77.9°C Flash Point: 23.9°C Lower Explosion Limit: 1.7% Upper Explosion Limit: 7.6% Auto Ignition Temperature: 421°C	1	3	0	Potential Acute Health Effects: Very hazardous in case of ingestion. Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator).	<p>First Aid Measures:</p> <p>Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.</p> <p>Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.</p> <p>Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.</p> <p>Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.</p> <p>Firefighting measures:</p> <p>Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, auto ignition or explosion.</p>
30.	Isobutyl Alcohol (Iso Butanol)	Boiling Point: 108°C Melting Point: -108°C	1	3	0	Potential Acute Health Effects: Hazardous in case of skin contact	<p>First Aid Measures:</p> <p>Eye: Check for and remove any contact lenses. Immediately flush</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Flash Point: 28°C Lower Explosion Limit: 1.2% Upper Explosion Limit: 10.9% Auto Ignition Temperature: 415.56°C				(irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).	eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention. Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear. Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, auto ignition or explosion.
31.	N- Butyl Alcohol (N - Butanol)	Boiling Point: 117°C Melting Point: -89°C Flash Point: 28.9°C Lower Explosion Limit:	1	3	0	Potential Health Effects: Inhalation: Short Term Effects: May cause irritation. Additional effects may include nausea, shortness of breath,	First Aid Measures: Inhalation: Remove from exposure area to fresh air immediately. Perform artificial respiration if necessary. Keep person warm and at rest. Treat symptomatically and supportively. Get medical

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		1.45%(v) Upper Explosion Limit: 11.25%(v) Auto Ignition Temperature: 343°C				<p>headache, drowsiness and drunkenness. Long Term Effects: In addition to effects from short term exposure, hearing loss may occur.</p> <p>Skin Contact: Short Term Effects: May cause irritation. Long Term Effects: Same effects as short term exposure. Eye Contact: Short Term Effects: May cause irritation. Long Term Effects: In addition to effects from short term exposure, tearing, blurred vision and intolerance of the eyes to light may occur.</p> <p>Ingestion: Short Term Effects : May cause nausea, vomiting, diarrhea, stomach pain, drunkenness and visual disturbances. Long Term Effects: No information is available on significant adverse effects.</p>	<p>attention.</p> <p>Skin Contact: Remove contaminated clothing and shoes immediately . Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention immediately.</p> <p>Eye Contact: Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower lids, until no evidence of chemical remains (at least 15-20 minutes). Get medical attention immediately.</p> <p>Ingestion: If the person is conscious and not convulsing, induce emesis by giving syrup of ipecac followed by water. (If vomiting occurs keep the head below the hips to prevent aspiration). Repeat in 20 minutes if not effective initially. In patients with depressed respiration or if emesis is not produced, perform gastric lavage cautiously Treat symptomatically and supportively. Gastric lavage should be performed by qualified medical personnel, Get medical attention immediately.</p> <p>Firefighting Measures: EXTINGUSHING MEDIA : Dry chemical, carbon dioxide, water spray or alcohol - resistant foam. For larger fires, use water spray, fog or alcohol - resistant foam.</p>
32.	Epichlorohydrin	Boiling Point: 115°C Melting Point: -48°C Flash Point: 31°C Lower Explosion Limit: 3.8% Upper Explosion Limit: 21%	3	3	2	<p>Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation (lung irritant). Corrosive to skin and eyes on contact. Liquid or spray mist may produce tissue damage particularly on mucous</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention. Skin: If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible,</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Auto Ignition Temperature: 411°C				<p>membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death.</p>	<p>protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands: Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. If irritation persists, seek medical attention. Wash contaminated clothing before reusing; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.</p> <p>Inhalation: Allow the victim to rest in a well-ventilated area. Seek immediate medical attention; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.</p> <p>Ingestion: Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, auto ignition or explosion.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
33.	Styrene	Boiling Point: 145.2°C Melting Point: -30.6°C Flash Point: 31.1°C Lower Explosion Limit: 1.1% Upper Explosion Limit: 6.1% Auto Ignition Temperature: 490°C	2	3	2	<p>Potential Acute Health Effects: Very hazardous in case of eye contact (irritant). Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching.</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention. Skin: After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: Allow the victim to rest in a well-ventilated area. Seek immediate medical attention. Ingestion: Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, auto ignition or explosion.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
34.	O-Xylene	Boiling Point: 144.4°C Melting Point: -25°C Flash Point: 17°C Lower Explosion Limit: 0.9% Upper Explosion Limit: 6.7% Auto Ignition Temperature: 463°C	2	3	0	Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.	First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Get medical attention. Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention; Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention; Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband. Firefighting measures: Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
35.	High Speed Diesel	Boiling Point: 110 to 375 °C Melting Point: <-15°C Flash Point: >35°C Lower Explosion Limit:0.5% Upper Explosion Limit: 5% Auto Ignition Temperature: 230°C to 250°C	1	2	0	<p>Potential Acute Health Effects:</p> <p>Skin Contact: Skin-dryness, cracking, irritation eyes watering, stinging and inflammation</p> <p>Effects of Exposure / symptoms: excessive inhalation of vapours cause rapid breathing, excitability, staggering, headache, fatigue, nausea and vomiting, dizziness, drowsiness, narcosis convulsions, coma.</p>	<p>First Aid Measures:</p> <p>Eyes: Flush with water for 15 min.</p> <p>Skin: Wash with warm water & soap.</p> <p>Inhalation: Remove to fresh air. Consult a physician if irritation persists.</p> <p>Ingestion: Do not induce vomiting. Do not give liquids.</p> <p>Firefighting Measures:</p> <p>Extinguishing Media: Foam, Dry Chemical Powder, CO2</p> <p>Fire-Fighting Instructions: Small fires can be extinguished by hand held extinguishers. Major fires may require withdrawal and allowing the tank to burn. Fire fighters should wear self-breathing apparatus while fighting fire.</p>
36.	Cumene	Boiling Point: 152.4°C Melting Point: -96°C Flash Point: 36°C Lower Explosion Limit: 0.9% Upper Explosion Limit: 6.5% Auto Ignition Temperature: 424°C	2	3	1	<p>Potential Acute Health Effects:</p> <p>Very hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.</p>	<p>First Aid Measures:</p> <p>Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.</p> <p>Skin: After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing. Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.</p> <p>Inhalation: Allow the victim to rest in a well-ventilated area. Seek immediate medical attention. Serious Inhalation: Evacuate the</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.</p> <p>Ingestion: Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.</p> <p>Firefighting measures: Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.</p>
37.	Crude Oil	Boiling point: -54°F to 1000°F Upper Flammability Limit: 8% Lower flammability Limit: 1% Flash point: 20-90°F (38°) Auto Ignition Temperature: 450°F(Liquid), 800-1000°F(vapour)	2	3	0	<p>Potential Acute Health Effects:</p> <ul style="list-style-type: none"> • Vapours or mists can cause irritation of the nose, throat, and lungs, headache, dizziness, drowsiness, loss of coordination, fatigue, nausea and laboured breathing. • Exposure to hydrogen sulphide vapour above 200 ppm may cause irritation of mucous membranes, inflammation of the lungs, accumulation of fluid in the lungs, irregular heartbeats, and unconsciousness with convulsions or impaired breathing with suffocation. • May cause slight eye irritation. 	<p>Personal precautions: Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible.</p> <p>Environmental precautions: Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material.</p> <p>First Aid measures:</p> <ul style="list-style-type: none"> • Inhalation: Move to fresh air. Administer oxygen or artificial respiration if needed. Seek medical attention immediately. • Skin contact: Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Seek medical attention if irritation or skin thermal burns occur.

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
						<ul style="list-style-type: none"> Moderate skin irritation may occur upon short-term exposure. Absorption through the skin may occur and produce toxic effects. Ingestion May cause nausea, vomiting, diarrhoea, and restlessness. May cause headache, dizziness, drowsiness, loss of coordination, fatigue, nausea and laboured breathing. Inflammation and damage which in severe cases may be fatal. 	<ul style="list-style-type: none"> Eye contact: In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical attention immediately. Ingestion: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately. <p>Firefighting Measures:</p> <ul style="list-style-type: none"> Small Fires: Any extinguisher suitable for Class B fires, dry chemical, CO₂, water spray, fire fighting foam, or Halon. Large Fires: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers., Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.
38.	Aviation fuel	Flash Point: 38°C Auto ignition temperature: 210°C Boiling point/boiling range: 160°C - 300°C Lower explosion limit: 0.7 %(V) Upper explosion limit: 5 %(V)	1	2	0	<p>Potential Acute Health Effects:</p> <p>Skin: Contact with the skin causes irritation. Symptoms may include pain, itching, discoloration, swelling, and blistering.</p> <p>Ingestion: Because of its low viscosity, this material can directly enter the lungs, if swallowed, or if subsequently vomited. Once in the lungs it is very difficult to remove and can cause severe injury or death.</p> <p>Inhalation: Mists of this material may cause respiratory irritation. Symptoms of respiratory irritation may include coughing and difficulty breathing.</p>	<p>Firs Aid Measures:</p> <p>Eye: Remove contact lenses, if worn. Flush eyes with water.</p> <p>Skin: Wash skin with water immediately and remove contaminated clothing and shoes. Get medical attention if any symptoms develop. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.</p> <p>Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.</p> <p>Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration if breathing is difficult, give oxygen.</p> <p>Firefighting Measures:</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
						Breathing this material at concentrations above the recommended exposure limits may cause central nervous system effects.	Carbon dioxide (CO ₂), water spray, Dry chemical, Foam, Keep containers and surroundings cool with water spray., Do not use a solid water stream as it may scatter and spread fire., Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.
39.	Kerosene	Boiling Point: 149°C(300.2°F) Melting Point: Data Not available Flash Point: 38°C/100.4°F Lower Explosion Limit: 0.7% Upper Explosion Limit: 5-7% Auto Ignition Temperature: 210°C/410°F	1	2	0	<p>Potential Acute Health Effects:</p> <p>Eyes: Contact with liquid or vapor may cause mild irritation.</p> <p>Skin: May cause skin irritation with prolonged or repeated contact. Practically non-toxic if absorbed following acute (single) exposure. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.</p> <p>Ingestion: The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhoea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.</p>	<p>First Aid Measures:</p> <p>Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.</p> <p>Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.</p> <p>Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.</p> <p>Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.</p> <p>Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
						<p>Inhalation: Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.</p>	<p>Firefighting Measures: Extinguishers: Carbon dioxide (CO₂), Water spray, Dry chemical, Foam, Keep containers and surroundings cool with water spray., Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam.</p>
40.	Acetic Acid	Boiling Point: 118 °C Melting Point: 17 °C Flash Point: 39°C Explosion Limits: 4-19% (v) Auto Ignition Temperature: 485 °C	3	2	0	<p>Potential Acute Health Effects:: Skin corrosion/irritation: Causes severe skin burns and eye damage. Serious eye damage/irritation Inhalation: Irritation of the respiratory tract. Irritation of the nasal mucous membranes. Coughing. Exposure to High Concentrations: Corrosion of the upper respiratory tract. Ingestion: Risk of aspiration pneumonia. Burns to the gastric/intestinal mucosa. Possible oesophageal perforation. Blood in vomit. Diarrhoea. Shock. Change in the blood composition. Change in urine composition. Decreased renal function.</p>	<p>First Aid measures: Inhalation: Remove the victim into fresh air. Immediately consult a doctor, administration of corticoid spray. Skin contact: Wash immediately with lots of water (15 minutes)/shower. Do not apply (chemical) neutralizing agents. Remove clothing while washing. Do not remove clothing if it sticks to the skin. Cover wounds with sterile bandage. If burned surface > 10%: take victim to hospital. Eye contact: Rinse immediately with plenty of water for 15 minutes. Take victim to an ophthalmologist. Ingestion: Rinse mouth with water. Immediately after ingestion: give lots of water to drink. Give milk to drink. Do not induce vomiting. Do not give activated charcoal. Immediately consult a doctor/medical service.</p> <p>Fie fighting measures:</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.
41.	Acetic Anhydride	Boiling Point: 139.9°C Melting Point: -73.1°C Flash Point: 49°C Lower Explosion Limit: 2.7% Upper Explosion Limit: 10.3% Auto Ignition Temperature: 316°C	3	2	1	Potential Acute Health Effects: Extremely hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Very hazardous in case of skin contact (corrosive). Hazardous in case of skin contact (permeator). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.	First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately. Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately. Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately. Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>Firefighting measures: Flammable liquid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, auto ignition or explosion.</p>
42.	Non-edible Oil/Mentha Oil	Flash Point: 65°C	1	2	0	<p>Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention. Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention. Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.</p> <p>Firefighting measures: Small Fire: Use DRY chemical powder.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							Large Fire: Use water spray, fog or foam. Do not use water jet.
43.	Low Sulphur Heavy Stock (LSHS)/Furnace oil/Fuel Oil	Boiling Point: 185-500 °C Flash Point: 66°C Lower Flammability Limit: 1% Upper Flammability limit: 5% Auto Ignition Temperature: 263-407°C	2	2	0	Potential Acute Health Effects: Skin: Skin-dryness, cracking, irritation eyes watering, stinging and inflammation Effects of Exposure / symptoms: excessive inhalation of vapours cause rapid breathing, excitability, staggering, headache, fatigue, nausea and vomiting, dizziness, drowsiness, narcosis convulsions, coma.	Emergency treatment: Do not induce vomiting if ingested. Affected body parts should thoroughly be washed with water and soap. Wash eyes thoroughly with water, seek medical help. Firefighting Measures: Water Spray to Be Used to Cool Containers If exposed to fire.
44.	Carbon Black Feedstock (CBFS)	Boiling Point: 295 - 453 °C Melting Point: <4.5°C Flash Point: 66 °C	1	2	0	Potential Acute Health Effects: Inhalation: Short Term: irritation, difficulty breathing, headache, drowsiness, dizziness, loss of coordination, weakness, coma Long Term: irritation Skin: Short Term: irritation, sensitivity to sunlight Long Term: irritation, sensitivity to sunlight, lung cancer, skin cancer Eye: Short Term: irritation, sensitivity to sunlight Long Term: irritation, sensitivity to sunlight Ingestion: Short Term: irritation, nausea, vomiting, stomach pain, headache, drowsiness, dizziness, loss of coordination, coma Long Term: headache, drowsiness, dizziness, loss of coordination	First Aid Measures: <ul style="list-style-type: none"> • If adverse effects occur, move to uncontaminated area, give artificial respiration if not breathing • Wash skin with soap and water for at least 15 minutes • Flush eyes with plenty of water for at least 15 minutes • Do not induce vomiting • Get immediate medical attention Fire Fighting Measures: <ul style="list-style-type: none"> • Use regular dry chemical, carbon dioxide, regular foam, water spray to extinguish flames • Fire-fighters should wear full firefighting turn-out gear (bunker gear) • Flood with fine water spray • Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire.

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
45.	Aniline	Boiling Point: 184.1°C Melting Point: -6°C Flash Point: 70°C Lower Explosion Limit: 1.3% Upper Explosion Limit: 23% Auto Ignition Temperature: 615°C	3	2	0	<p>Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Severe overexposure can result in death.</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention. Finish by rinsing thoroughly with running water to avoid a possible infection. Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention. Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately. Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.</p> <p>Firefighting measures:</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.
46.	Methyl Ethyl Ketone Peroxide	Flash Point: 75°C	3	2	2	<p>Skin: Severe skin irritant causes redness, blistering, and edema.</p> <p>Eye: Eye contact causes severe corrosion and may cause blindness.</p> <p>Ingestion: Changes in structure or function of esophagus, nausea, or vomiting, and other gastrointestinal effects.</p> <p>Inhalation: Moderately toxic by inhalation.</p>	<p>First Aid Measures:</p> <p>Skin: Immediately remove any contaminated clothing. Wash contaminated area thoroughly with soap and copious amounts of water for at least 15 minutes. If irritation or adverse symptoms develop seek medical attention.</p> <p>Eyes: Remove any contact lenses at once. Flush eyes with water for at least 15 minutes. Ensure adequate flushing by separating the eyelids with fingers. If irritation or adverse symptoms develop seek medical attention.</p> <p>Ingestion: Contact a physician, hospital or Poison Control Center at once. DO NOT INDUCE VOMITING.</p> <p>Inhalation: Remove to fresh air, if coughing, breathing becomes labored, irritation develops or other symptoms develop, seek medical attention at once, even if symptoms develop several hours after the exposure.</p> <p>Firefighting measures:</p> <p>FIRE EXTINGUISHER MEDIA: Water from a safe distance preferably with a fog nozzle. In case of very small fires, other means such as carbon dioxide, foam or dry chemical extinguishers may be effective. Dry chemical combined with MEKP formulations may reignite. Light water additives may be particularly effective at extinguishing MEKP fires.</p> <p>SPECIAL FIRE FIGHTING PROCEDURES: Firemen should be equipped with protective clothing and SCBA's. In case of fire near storage area, cool the containers with water spray. If dry chemical is used to extinguish an MEKP fire, the extinguished area must be thoroughly wetted down with water to prevent re-ignition.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
47.	Ethyl Hexanol-2	Boiling Point: 184°C Melting Point: -76°C Flash Point: 77°C Lower Explosion Limit: 1.1% Upper Explosion Limit: 7.4% Auto Ignition Temperature: 270°C	2	1	0	H227: Combustible liquid. H332: Harmful if inhaled. H315: Causes skin irritation. H319: Causes serious eye irritation. H336: May cause drowsiness or dizziness.	First Aid Measures: Eye: Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention. Skin: Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention. Inhalation: Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Obtain medical attention. Ingestion: Clean mouth with water. Get medical attention. Most important symptoms/effects: Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting Firefighting measures: As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
48.	Vinyl Chloride	Boiling Point: -13°C Melting Point: -154°C Flash Point: 78°C Lower Explosion Limit: 3.6% Upper Explosion Limit: 33% Auto Ignition Temperature: 472°C	2	4	1	Potential Health Effects: Inhalation: SHORT TERM EXPOSURE: irritation, nausea, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, joint pain, loss of coordination, hearing loss, lung congestion LONG TERM EXPOSURE: impotence, bluish skin colour, blood disorders, liver damage, cancer Skin: SHORT TERM EXPOSURE:	First Aid Measures: Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. Skin: If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105- 115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention. Eye: Wash eyes immediately with large amounts of water, occasionally lifting upper and lower lids, until no evidence of

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
						irritation, blisters LONG TERM EXPOSURE: irritation, blisters Eye: SHORT TERM EXPOSURE: irritation, eye damage LONG TERM EXPOSURE: irritation, eye damage Ingestion: SHORT TERM EXPOSURE: frostbite LONG TERM EXPOSURE: cancer	chemical remains. Get medical attention immediately. Ingestion: If a large amount is swallowed, get medical attention. NOTE TO PHYSICIAN: For inhalation, consider oxygen. Firefighting measures: EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray. FIRE FIGHTING: Move container from fire area if it can be done without risk. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Stop leak if possible without personal risk. Let burn unless leak can be stopped immediately. For smaller tanks or cylinders, extinguish and isolate from other flammables. Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Evacuate if fire gets out of control or containers are directly exposed to fire. Evacuation radius: 500 meters (1/3 mile). Consider downwind evacuation if material is leaking.
49.	Phenol	Boiling Point: 182°C Melting Point: 42°C Flash Point: 79°C Lower Explosion Limit:	4	2	0	Potential Acute Health Effects: Very hazardous in case of skin contact (corrosive, irritant), of eye contact (irritant), of ingestion, of inhalation.	First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		1.7% Upper Explosion Limit: 8.6% Auto Ignition Temperature: 715°C				Hazardous in case of skin contact (sensitizer, permeator). The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.	<p>immediately.</p> <p>Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately. Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.</p> <p>Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately. Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.</p> <p>Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.</p> <p>Firefighting measures: SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.</p>
50.	Naphthalene	Boiling Point: 218°C	2	2	0	Potential Acute Health Effects:	First Aid Measures:

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Melting Point: 80.2°C Flash Point: 88°C Lower Explosion Limit: 0.9% Upper Explosion Limit: 5.9% Auto Ignition Temperature: 567°C				Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant, permeator). Severe over-exposure can result in death.	<p>Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.</p> <p>Skin: After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.</p> <p>Inhalation: Allow the victim to rest in a well-ventilated area. Seek immediate medical attention. Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.</p> <p>Ingestion: Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.</p> <p>Firefighting measures: Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
51.	Ethylene Glycol	Boiling Point: 197.6°C Melting Point: -13°C Flash Point: 111°C Lower Explosion Limit: 3.2% Auto Ignition Temperature: 398°C	1	1	0	<p>Potential Acute Health Effects: Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of inhalation. Severe over-exposure can result in death.</p>	<p>explosion.</p> <p>First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention if irritation occurs. Skin: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband. Serious Ingestion: Medical Conditions Aggravated by Exposure: Persons with pre-existing kidney, respiratory, eye, or neurological problems might be more sensitive to Ethylene Glycol. Notes to Physician: 1. Support vital functions, correct for dehydration and shock, and manage fluid balance. 2. The currently recommended medical management of Ethylene Glycol poisoning includes elimination of Ethylene Glycol and metabolites. Elimination of Ethylene Glycol may be achieved by the following methods: a. emptying the stomach by gastric lavage. It is useful if initiated within < 1 of ingestion. b. Correct metabolic acidosis with intravenous administration of sodium bicarbonate, adjusting the administration rate according to repeated and frequent measurement of acid/base status. c.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>Administer ethanol (orally or by IV (intravenously)) or fomepizole (4-methylpyrazole or Antizol)) therapy by IV as an antidote to inhibit the formation of toxic metabolites. d. If patients are diagnosed and treated early in the course with the above methods, haemodialysis may be avoided if fomepizole or ethanol therapy is effective and has corrected the metabolic acidosis, and no renal failure is present. However, once severe acidosis and renal failure occurred, however, haemodialysis is necessary. It is effective in removing Ethylene Glycol and toxic metabolites, and correcting metabolic acidosis.</p> <p>Firefighting measures: SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.</p>
52.	Mono Ethylene Glycol	Boiling Point: 197.6°C Melting Point: -13°C Flash Point: 111°C Lower Explosion Limit: 3.2% Upper Explosion Limit: 15.3% Auto Ignition Temperature: 398°C	1	1	0	<p>Potential Acute Health Effects: Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of inhalation. Severe over-exposure can result in death.</p>	<p>First Aid Measures: Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention if irritation occurs. Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>Firefighting measures: SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.</p>
53.	Toluene 2,4-diisocyanate	Boiling Point: 251°C Melting Point: 19.4°C Flash Point: 127°C Lower Explosion Limit: 0.9% Upper Explosion Limit: 9.5% Auto Ignition Temperature: 620°C	3	1	2	<p>Potential Acute Health Effects: Extremely hazardous in case of ingestion. Very hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). Slightly hazardous in case of skin contact (corrosive). Severe overexposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention. Skin: After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing. Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: Allow the victim to rest in a well-ventilated area. Seek immediate medical attention. Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention. Ingestion: Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar,</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.</p> <p>Firefighting measures: SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.</p>
54.	Diphenyl Methane D-Isocyanate	Boiling Point: 251°C Melting Point: 13°C Flash Point: 135°C Lower Explosion Limit: 0.9% Upper Explosion Limit: 9.5% Auto Ignition Temperature: 177°C	3	1	1	<p>Inhalation: TDI or MDI vapours, mist, or aerosols at concentrations above the TLV can irritate (burning sensation) the mucous membranes in the respiratory tract (nose, throat, lungs) causing runny nose, sore throat, coughing, chest discomfort, shortness of breath and reduced lung function (breathing obstruction).</p> <p>Skin: Isocyanates react with skin protein and moisture and can cause irritation which may include the following symptoms: reddening, swelling, rash, scaling or blistering. Cured material is difficult to remove.</p> <p>Eye: Liquid, aerosols or vapors are severely irritating and can cause pain, tearing, reddening and swelling. If left untreated, corneal damage can occur and injury is slow to heal. However, damage is usually reversible.</p> <p>Ingestion: Can result in irritation and corrosive action in the mouth, stomach tissues and digestive tract. Symptoms</p>	<p>First Aid Measures: Eyes: Flush with copious amounts of water, preferably lukewarm for at least 15 min. holding eyelids open all the time. Skin: Remove contaminated clothing and shoes immediately. Wash affected areas thoroughly with soap and water for atleast 15 min. Tincture of green soap and water is also effective in removing isocyanates. Wash contaminated clothing thoroughly before reuse. Inhalation: Move to an area free risk of further exposure. Administer oxygen or artificial respiration as needed. Obtain medical attention. Asthmatic type symptoms may develop and may be immediate or delayed up to several hours. Ingestion: Do not include vomiting. Give 1 to 2 cups of milk or water to drink. Do not give anything by mouth to an unconscious person.</p> <p>Firefighting measures: Extinguishing Media: Dry Chemical; Carbon Dioxide; Foam; Water spray for large fires. Fire Fighting Procedures: Full emergency equipment with self-contained breathing apparatus and full protective clothing (such as rubber gloves, boots, bands around legs, arms and waist) should be worn by fire fighters. No skin surface should be exposed. During a fire, TDI and MDI vapors and other irritating,</p>

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						can include sore throat, abdominal pain, nausea, vomiting and diarrhea.	highly toxic gases may generate by thermal decomposition or combustion. At temperatures greater than 350 F (177 C) TDI and MDI form carbodiimides with the release of CO2 which can cause pressure build-up in closed containers. Explosive rupture is possible. Therefore, use cold water spray to cool fire-exposed containers. Unusual Fire / Explosion Hazards: Caution: Reaction between water or foam and hot Toluene Diisocyanate (TDI) can be vigorous.
55.	Edible oil/Palm Oil/ Vegetable oil	Melting Point: 35°C Flash Point: 162°C Auto Ignition Temperature: 316°C	0	1	0	<p>Potential Acute Health Effects:</p> <p>Eyes: Redness, tearing, itching, burning, conjunctivitis</p> <p>Skin: Redness, Itching</p> <p>Ingestion: Irritation and burning sensations of mouth and throat, nausea, vomiting and abdominal pain</p> <p>Inhalation: Irritation of mucous membranes, coughing, wheezing, shortness of breath</p>	<ul style="list-style-type: none"> Use ventilation to keep airborne concentrations below exposure limits. Have approved eyewash facility, safety shower, and fire extinguishers readily available. Wear chemical splash goggles and chemical resistant clothing such as gloves and aprons. Wash hands thoroughly after handling material and before eating or drinking. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Contain spill with sand or absorbent material and place in sealed bag or container for disposal. Ventilate and wash spill area after pickup is complete. <p>First Aid measures:</p> <ul style="list-style-type: none"> Eyes: Immediately flush eyes with excess water for 15 minutes, lifting lower and upper eyelids occasionally. Skin: Flush skin with excess water for 15 minutes while removing contaminated clothing. Ingestion: Call Poison Control immediately. Rinse mouth with cold water. Give victim 1-2 cups of water or milk to drink. Induce vomiting immediately. Inhalation: Remove to fresh air. If not breathing, give artificial respiration.

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
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							<p>Firefighting measures: SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.</p>
56.	Paraffin	Melting Point: 47°C Flash Point: 199°C Auto Ignition Temperature: 245-340°C	0	1	0	<p>Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs. Skin: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.</p> <p>Firefighting measures: Small Fire: Use DRY chemical powder. Large Fire: Use water spray, fog or foam. Do not use water jet.</p>
57.	Bitumen	Boiling Point: <243°C Melting Point: 175-205°C Explosion Limits: ~ 2-7 % (v) Flash Point: 204°C Auto Ignition	2	1	0	<p>Potential Acute Health Effects : Routes of Entry: (Inhalation, Skin, Mucous Membranes, Eye Contact and Ingestion at Elevated Temperature Only.) Effects of Exposure / Symptoms: A Moderate Irritant.</p>	<p>Emergency Treatment: Remove Victim to Fresh Air, Contacted Body Part to Be Immediately Plunged Under Cold Running Water for Ten Minutes. Seek Medical Help Without Delay.</p> <p>Firefighting measures: Use Water Spray To Cool The Fire Exposed Container.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
		Temperature: 485°C					
58.	Sulphur	Boiling Point: 445 °C Melting Point: 113 to 120 °C Flash Point: 207°C Lower Explosion Limit: 35 gm/m ³ (dust); 4% for hydrogen sulphide Upper Explosion Limit: 1,400 gm/m ³ (dust); 44% for hydrogen sulphide Auto Ignition Temperature: 232°C	2	1	0	<p>Potential Acute Health Effects:</p> <p>Eyes: Contact with molten sulphur may cause serious burns and blindness. Sulphur vapour may cause eye irritation. Dust contact with eyes may cause mechanical irritation (abrasion), characterized by a scratchy discomfort. This may progress to burning and tearing, with burning of vision upon repeated or prolonged exposure. These symptoms are generally reversible once exposure is discontinued. Excessive exposure may cause more severe symptoms such as redness, pain sensitivity to light, and conjunctivitis. Some severe exposure cases have resulted in permanent damage. Exposure to approximately 8 ppm sulphur vapour has been shown to cause eye irritation.</p> <p>Skin: Prolonged contact with sulphur dust in a localized area may result in irritation, primarily from abrasive action. Molten sulphur may cause 1st, 2nd, or 3rd degree thermal burns.</p> <p>Ingestion: Ingestion of small amounts of solid sulphur should not cause significant health effects. Large doses can produce mucous membrane irritation, difficult</p>	<p>First Aid Measures:</p> <p>Eyes: In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.</p> <p>Skin: Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops. Thermal burns require immediate medical attention depending on the severity and the area of the body burned.</p> <p>Ingestion: DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.</p> <p>Inhalation: Remove person to fresh air. If person is not breathing provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.</p> <p>Firefighting Measures:</p> <p>Sulphur dust ignites easily in air. Grinding sulphur may produce an explosion hazard. Static discharge may ignite sulphur dust. Sulphur burns with a pale blue flame that may be difficult to see in daylight. Burning sulphur will flow and emits large quantities of sulphur dioxide (SO₂), a toxic, irritating, and suffocating gas that can cause severe lung damage and death.</p> <p>Extinguishing Media: For small Fires use any extinguisher</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
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						<p>swallowing, redness of the throat and tongue, stomach, and urinary disturbances. Vomiting, abdominal pain and diarrhoea may also occur. Long term ingestion of small amounts may have a laxative effect. Ingestion of very large amounts may cause sore throat, nausea, headache, and possibly unconsciousness in severe cases. May be converted into hydrogen sulphide in the intestine.</p> <p>Inhalation: Inhalation of low concentrations of dust should not cause significant health effects. Inhalation of large amounts of dust may cause inflammation of the nose and throat, resulting in secretions from the nose. Symptoms include sore throat, tightness of the chest, chest pain, light-headedness, and persistent cough with sputum.</p>	<p>suitable for Class B fires, dry chemical, CO2, water spray, firefighting foam, or Halon and for large fires use water spray, fog or firefighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.</p> <p>Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam.</p>
59.	Lube oil	Boiling point: >315°C Flash Point: 410°F (210°C)	0	1	0	<p>Potential Acute Health Effects:</p> <p>Eyes: May cause eye irritation, swelling, tearing, redness, and/or blurred vision.</p> <p>Skin: May cause irritation. Prolonged or repeated skin contact may cause skin sensitization, evidenced by rashes and hives.</p> <p>Ingestion: May cause irritation to the gastrointestinal tract. Lubricant oils are</p>	<p>First Aid measures:</p> <p>Eye: Immediately flush eyes with plenty of cool water for at least 15 minutes while holding the eyes open. If redness, burning, blurred vision, or swelling persists, CONSULT A PHYSICIAN.</p> <p>Skin: Remove product and immediately wash affected area with soap and water. Do not apply greases or ointments. Remove contaminated clothing. Wash clothing with soap and water before reuse.</p> <p>Ingestion: DO NOT INDUCE VOMITING. Never administer</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
						<p>generally no more than toxic if swallowed.</p> <p>Inhalation: May cause mild irritation to the nose and respiratory tract.</p>	<p>anything by mouth to an unconscious person. Rinse out mouth with water, then drink sips of water to remove taste from mouth. Seek immediate medical attention. Do not leave victim unattended. Vomiting may occur spontaneously. To prevent aspiration of swallowed product, lay victim on side with head lower than waist.</p> <p>Inhalation: Remove patient to fresh air. If patient continues to experience difficulty breathing.</p> <p>Firefighting Measures: Suitable Extinguishing Media: Water fog, carbon dioxide or dry chemical, aqueous foam. Fire Fighting Equipment and Procedures: Wear full protective clothing and self-contained breathing apparatus for firefighting. Isolate fuel supply from fire. Clear fire area of all non-emergency personnel. Use water spray to cool fire-exposed surfaces and containers.</p>
60.	Asphalt	Boiling Point: >400°C Melting Point: 30-130°C Explosion Limits: 0.9-7 % (v) Flash Point: >230°C	1	1	0	<p>Potential Acute Health Effects: Causes skin irritation. Causes eye irritation. Suspected of causing cancer. May release toxic hydrogen sulfide gas that could accumulate at toxic concentrations inside containers of heated asphalt.</p>	<p>Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wash hands and any contacted skin thoroughly after handling. Wear protective gloves of materials such as leather or thick rubber, and long sleeved clothing. Wear safety eye glasses with side shields, and if needed to prevent splattering onto face, wear face shield.</p> <p>First Aid measures: Remove from exposure, lie down. Take off all contaminated clothing immediately. When symptoms persist or in all cases of doubt seek medical advice. Never give anything by mouth to an unconscious person.</p> <p>Inhalation: Remove to fresh air. If breathing is irregular or</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
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							<p>stopped, administer artificial respiration. Seek medical attention immediately.</p> <p>Skin: Cool skin rapidly with cold water after contact with molten material. Take off all contaminated clothing immediately. Wash off with soap and water but do not attempt to remove asphalt that adheres to skin before obtaining medical assistance. Wash contaminated clothing before re-use. If symptoms persist, seek medical attention immediately.</p> <p>Eye: Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If eye irritation persists, seek medical attention.</p> <p>Ingestion: Do NOT induce vomiting. Seek medical attention immediately. Clean mouth with water and drink afterwards plenty of water. If a person vomits when lying on his back, place him in the recovery position.</p> <p>Firefighting measures: Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam.</p>
61.	Coal	Melting Point: 399°C Flash Point: >127C Auto Ignition Temperature: 1270–185 °C	1	1	0	<p>Potential Health Effects: The chronic stage involves massive pulmonary fibrosis that does impair pulmonary function and shorten life. Chronic Bronchitis (lung inflammation,</p>	<p>Respiratory Protection: Use with Adequate Ventilation. Recommended For Use In Enclosed or Semi-Enclosed Work Areas.</p> <p>Eye Protection: Splash Goggles or Shields With Safety Glasses</p> <p>Protective Gloves: Neoprene, PVC</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
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						coughing attacks, difficult breathing, etc.) and emphysema can result from excessive coal dust inhalation. Rheumatoid arthritis can be exacerbated by pneumonias leading to rapidly developing lung damage (Caplan's Syndrome).	<p>Other Protective Clothing or Equipment: Employee Must Wear Appropriate Impervious Clothing And Equipment To Prevent Repeated Or Prolonged Skin Contact With This Substance.</p> <p>Firefighting measures: Special Fire Fighting Procedures: Use Wash-down and Spread out Method. Unusual Fire and Explosion Hazards: Susceptible To Spontaneous Combustion. Highly Combustible and/or Explosive When in Dust or Powder Form.</p>
62.	Natural Gas (NG)	Boiling point: -161.5°C Freezing point: -182.6°C Flash Point: -306°F (-188°C) Lower & Upper Explosion Limit 4.8% - 15% (v) Auto Ignition Temperature: 1004°F (540°C)	1	4	0	<p>Potential Acute Health Effects: Inhalation: At high pressures and high concentrations, may cause cardiac sensitization. At high concentrations and in enclosed areas, may displace sufficient oxygen to cause dizziness, headache, lack of muscular coordination, diminished mental alertness, cyanosis, narcosis, dyspnea, or death by asphyxiation. Skin: Not toxic, non-irritating. At high pressure, gas may be injected under skin, causing pain, possible tissue damage or embolism. Contact with LNG may cause immediate, severe frostbite. Eye: Not toxic, non-irritating. Pressurized gas or an LNG splash may cause physical damage to unprotected eyes.</p>	<p>First Aid Measures:</p> <ul style="list-style-type: none"> • Eye: If physical damage occurs due to high-pressure gas release or an LNG splash, cover both eyes with loose, bulky, sterile dressing and obtain immediate medical treatment. • Skin: If gas is injected under skin, treat patient for shock and seek immediate medical treatment. If LNG has splashed skin, remove victim from contact, flush affected area with lukewarm water. Apply a loose, sterile, bulky dressing. Get immediate medical help. • Inhalation: Remove victim to fresh air quickly. Restore or support breathing as needed. Use mouth to- mouth resuscitation or CPR as needed if asphyxiation has occurred. If available, have a trained person administer oxygen. Seek medical help immediately. <p>Fire Fighting Measures: Fire Extinguishing Media: CO₂ & Dry Chemical Powder. Keep the container cool by spraying water if exposed to heat or flame.</p>
63.	Ammonia (NH ₃)	Lower Explosion Limit: 16 %(V)	3	1	0	<p>Potential Acute Health Effects:</p> <ul style="list-style-type: none"> • Severely corrosive to the eyes. 	Immediately contact emergency personnel. Keep unnecessary personnel away. Shut off gas supply if this can be done safely.

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		Upper Explosion Limit: 25 % (V) Boiling point: -28°C Auto Ignition temperature: 690°C (1274°F)				<p>Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.</p> <ul style="list-style-type: none"> Severely corrosive to the skin. Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite. Severely corrosive to the respiratory system. Ingestion is not a normal route of exposure for gases May cause target organ damage May cause damage to the following organs: lungs, upper respiratory tract, skin, eyes 	<p>Isolate area until gas has dispersed. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Immediately contact emergency Personnel. Stop leak if without risk.</p> <p>First Aid Measures:</p> <ul style="list-style-type: none"> Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately. In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately. Try to warm up the frozen tissues and seek medical attention. Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately. <p>Fire Fighting measures:</p> <p>Take care not to extinguish flames. If flames are accidentally extinguished, explosive re-ignition may occur. Allow fire to burn out. Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.</p>
64.	Diammonium Phosphate/	Melting Point : 155°C	2	0	0	Potential Acute Health Effects:	First Aid Measures:

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
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	Ammonium Phosphate dibasic	Flash Point: Non flammable				Very hazardous in case of eye contact (irritant). Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Inflammation of the eye is characterized by redness, watering, and itching.	<p>Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.</p> <p>Skin Contact: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention. Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.</p> <p>Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.</p> <p>Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.</p> <p>Firefighting Measures: Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing. Dike area to prevent runoff and contamination of water sources. Dispose of fire control water later.</p>
65.	Muriate of Potash (MOP)	Boiling Point: Sublimes at 1,500°C(2,732°F) Melting Point: 772 to 776°C(1423 to 1428°F)	1	0	0	<p>Potential Acute Health Effects: Eyes: May cause mild eye irritation including stinging, watering and redness. Skin: may cause mild irritation including redness and a burning sensation</p>	<p>First Aid measures: Eye: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention. Skin: Cleanse affected area(s) thoroughly by washing with mild</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
						<p>Inhalation: May cause upper respiratory tract irritation.</p> <p>Ingestion: Low to moderate degree of toxicity by ingestion</p>	<p>soap and water. If irritation or redness develops and persists, seek medical attention.</p> <p>Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.</p> <p>Ingestion (Swallowing): If large amounts are swallowed, seek emergency medical attention. If victim is drowsy or unconscious and vomiting, place on left side with the head down and do not give anything by mouth. If victim is conscious and alert and ingestion occurred within the last hour, vomiting should be induced for ingestion of large amounts (more than 5 ounces or a little more than ½ cup in an adult) preferably under direction from a physician or poison center. If possible, do not leave victim unattended and observe closely for adequacy of breathing.</p> <p>Fire Fighting Measures: Positive pressure, self-contained breathing apparatus is required for all firefighting activities involving hazardous materials. Full structural firefighting (bunker) gear is the minimum acceptable attire. The need for proximity, entry, flashover and/or special chemical protective clothing (see Section 8) needs to be determined for each incident by a competent firefighting safety professional. Water used for fire suppression and cooling may become contaminated. Discharge to sewer system(s) or the environment may be restricted, requiring containment and proper disposal of water.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
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66.	Soda Ash (Sodium Carbonate)	Boiling Point: Decomposes Melting Point: 851°C(1.564°F) Flash point: Non Flammable	2	0	1	<p>Potential Acute Health Effects: Eyes: May cause severe irritation Skin: Prolonged skin contact may cause skin irritation Inhalation: May cause nose, throat, and lung irritation Ingestion: Ingestion of large quantities may cause nausea, vomiting, diarrhea, abdominal cramps.</p>	<p>First Aid Measures: Eye contact: In case of eye contact, remove contact lens and rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes; If eye irritation persists, consult a specialist. Skin contact: Wash off with soap and water; If symptoms persist, call a physician. Inhalation: Move to fresh air; If symptoms persist, call a physician. Ingestion: Rinse mouth with water; Do NOT induce vomiting; if symptoms persist, call a physician or Poison Control Centre immediately.</p> <p>Firefighting Measures: Extinguishing media: Water, Foam, CO₂ or dry chemicals. Use the extinguishing media that is appropriate for the surrounding fire. Fire Fighting Equipment: Fire fighters should wear full protective equipment, including self-contained breathing apparatus.</p>
67.	Urea	Melting Point: 132.7°C (270.9°F) Flash point: Non Flammable	2	1	0	<p>Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.</p>	<p>First Aid Measures: Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention. Skin Contact: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention. In case of Serious Skin Contact, wash with a disinfectant soap and cover the contaminated skin with an anti-</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>bacterial cream. Seek medical attention.</p> <p>Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.</p> <p>Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.</p> <p>Firefighting Measures: SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.</p>
68.	Limestone	Boiling Point: 2850 °c Melting Point: 825° C Flash point: Non Flammable	1	0	0	<p>Potential Acute Health Effects:</p> <p>Eyes: May cause irritation.</p> <p>Skin: May cause mild irritation</p> <p>Inhalation: can cause mild irritation of the respiratory system</p> <p>Ingestion: Can cause mild irritation of gastrointestinal tract if swallowed.</p>	<p>First Aid Measures:</p> <p>Eyes: Immediately flush eyes with generous amounts of water or eye wash solution if water is unavailable. Pull back eyelid while flushing to ensure that all limestone dust has been washed out. Seek medical attention promptly if the initial flushing of the eyes does not remove the irritant. Do not rub eyes.</p> <p>Skin: Brush off or remove as much dry limestone as possible. Wash exposed area with large amounts of water. If burned seriously or if irritation persists, seek medical attention promptly.</p> <p>Inhalation: Move victim to fresh air. Seek medical attention. If breathing has stopped, give artificial respiration.</p> <p>Ingestion: Do not induce vomiting. Seek medical attention immediately. Never give anything by mouth unless instructed to do so by medical personnel.</p> <p>Firefighting Measures:</p> <p>Limestone is not combustible or flammable. This product is not</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							considered to be an explosion hazard, although reaction with incompatible materials, such as acids, may rupture containers. Use extinguishing media appropriate for surrounding fire. Keep personnel away from and upwind of fire. Avoid skin contact or inhalation of dust. Wear full fire-fighting turn-out gear (full Bunker gear), and respiratory protection (SCBA)
69.	Caustic Soda	Boiling Point: 1388°C Melting Point: 323°C Flash point: Non Flammable	3	0	1	<p>Potential Acute Health Effects: Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, of inhalation. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastrointestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately. Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately. Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately. Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.</p>
70.	Sulphuric Acid	Boiling Point: 5180F Melting Point: -310F Flash point: Non Flammable	3	0	2	<p>Potential Acute Health Effects</p> <p>Eyes: Causes severe eye irritation and burns. May cause irreversible eye injury.</p> <p>Skin: Causes severe skin irritation and burns. Continued contact can cause tissue necrosis.</p> <p>Ingestion: Harmful if swallowed. May cause permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the stomach, GI bleeding, edema of the glottis, necrosis and scarring, and sudden circulatory collapse</p> <p>Inhalation: May cause severe irritation of the respiratory tract and mucous membranes with sore throat, coughing, shortness of breath, and delayed lung edema. May be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. May affect cardiovascular system.</p>	<p>First Aid Measures:</p> <p>Eyes: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.</p> <p>Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately. In case of serious skin contact, wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream.</p> <p>Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.</p> <p>Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.</p> <p>Firefighting data: Material is non-flammable. Products of decomposition include fumes of oxides of sulfur. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas. Reacts with cyanides and sulfides</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							to form poisonous hydrogen cyanide and hydrogen sulfide respectively.
71.	Phosphoric acid	Boiling Point: 158 °C Melting Point: 21 °C Flash point: Non Flammable	3	0	0	<p>Potential Acute Health Effects :</p> <p>Eyes: Hazardous in case of eye contact. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes.</p> <p>Skin: Very hazardous in case of skin contact (irritant). Skin contact may produce burns.</p> <p>Ingestion: Very hazardous in case of ingestion.</p> <p>Inhalation: Slightly hazardous in case of inhalation (lung sensitizer)</p>	<p>Engineering Controls:</p> <ul style="list-style-type: none"> • Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective threshold limit value. • Ensure that eyewash stations and safety showers are proximal to the work-station location. <p>Personal Protection:</p> <ul style="list-style-type: none"> • Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots. • Personal Protection in Case of a Large Spill: • Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.
72.	Piperine	Boiling Point: Decomposes Melting Point: 130°C	2	1	0	<p>Potential Acute Health Effects:</p> <p>Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation (lung irritant).</p>	<p>First Aid Measures:</p> <p>Eye: Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.</p> <p>Skin: After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing. Serious Skin Contact: Wash with a disinfectant soap and cover the</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							<p>contaminated skin with an anti-bacterial cream. Seek immediate medical attention.</p> <p>Inhalation: Allow the victim to rest in a well-ventilated area. Seek immediate medical attention.</p> <p>Ingestion: Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.</p> <p>Firefighting measures: Small Fire: Use DRY chemical powder. Large Fire: Use water spray, fog or foam. Do not use water jet.</p>
73.	Chloroform	Boiling Point: 61°C Melting Point: -63.5°C Flash point: Non Flammable	2	0	0	<p>Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).</p>	<p>First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention. Skin: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention. Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
							collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention. Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.
74.	Hydrochloric Acid	Boiling Point: 50.5°C Melting Point: -46.2to-25.4°C Flash point: Non Flammable	3	0	1	Potential Acute Health Effects: Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, slightly hazardous in case of inhalation (lung sensitizer). Non-corrosive for lungs. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is	First Aid Measures: Eye: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately. Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately. Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately. Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult,

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
			H	F	R/I		
						characterized by itching, scaling, reddening, or, occasionally, blistering.	administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention. Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
75.	Iron ore	Melting Point: 1565°C (2849°F) Flash point: Non Flammable	1	0	0	<p>Potential Acute Health Effects:</p> <p>Skin: Dust may cause mechanical irritation.</p> <p>Eye Contact: Dust may cause mechanical irritation.</p> <p>Inhalation: Dust is irritating to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.</p> <p>Ingestion: May cause severe and permanent damage to the digestive tract. May cause liver damage. Causes severe pain, nausea, vomiting, diarrhoea and shock. May cause hemorrhaging of the digestive tract.</p>	<p>Emergency First Aid measures:</p> <p>Eyes: Immediately flush eye with water for at least 15 minutes. Get medical aid.</p> <p>Skin: Immediately flush skin with water for at least 15 minutes. Remove contaminated clothing. Get medical aid if irritation develops or persists. Wash clothes before reuse.</p> <p>Inhalation: Remove person to fresh air. If not breathing, give artificial respiration. Seek medical help if coughing and other symptoms do not subside.</p> <p>Ingestion: Do not induce vomiting. If conscious, have the victim drink 2-4 cups of milk or water. Get medical aid.</p> <p>Fire Fighting measures:</p> <p>Wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH approved and full protective gear. Irritating and highly toxic gases may be generated by thermal decomposition or combustion. Non-combustible, substance does not burn but may decompose upon heating to produce irritating, corrosive and/or toxic fumes.</p> <p>Extinguishing Media: Substance is non-combustible; use appropriate agent for surrounding fire.</p>

S. No.	Chemical	Properties	NFPA 704 Codes			Health Hazard	Precautionary Measures
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76.	Nitric acid	Boiling Point: 83 °C Melting Point: -42 °C Flash point: Non Flammable	3	0	1	<p>Potential Acute Health Effects :</p> <p>Eyes: Contact rapidly causes severe damage. Symptoms include eye burns, watering eyes. Permanent damage to cornea may result</p> <p>Skin: Severe and rapid corrosion from contact. Extent of damage depends on duration of contact. Symptoms include burning, itching, redness, inflammation and /or swelling of exposed tissues. Harmful if absorbed through skin.</p> <p>Ingestion: Severe and rapid corrosive burns of the mouth, gullet and gastrointestinal tract will result if swallowed. Symptoms include burning, choking, nausea, vomiting and severe pain.</p> <p>Inhalation: Inhalation of mists can cause corrosive action on mucous membranes. Symptoms include burning, choking, coughing, wheezing, laryngitis, shortness of breath, headache or nausea.</p>	<p>First Aid Measures:</p> <ul style="list-style-type: none"> • Cleanup personnel need personal protection from inhalation and skin/eye contact. • Evacuate and ventilate the area. • In case of accidental spill, Prevent spillage from entering drains. Cautiously add water to spill, taking care to avoid splashing and spattering. Neutralize diluted spill with soda ash or lime. Absorb neutralized spill with vermiculite or other inert absorbent material, then place in a suitable container for disposal. • Clean surfaces thoroughly with water to remove residual contamination. • Dispose of all waste or cleanup materials in accordance with local regulations. Containers, even when empty, will retain residue and vapours. <p>Firefighting measures:</p> <p>Extinguishing Media: Product is not flammable. Use appropriate media for adjacent fire. Use flooding quantities of water to cool containers, keep away from common metals.</p> <p>Special fire-fighting procedures: Wear self-contained, approved breathing apparatus and full protective clothing, including eye protection and boots. Material can react violently with water (spattering and misting) and react with metals to produce flammable hydrogen gas.</p>

H: Health

0: Material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material.

1: Material that on exposure would cause irritation but only minor residual injury.

2: Material that on intense or continued but not chronic exposure could cause temporary incapacitation or possible residual injury.

3: Material that on short exposure could cause serious temporary or residual injury.

4: Material that on very short exposure could cause death or major residual injury.

F: Flammability (Susceptibility of material to burning)

0: Will not burn.

1 : Must be preheated before ignition can occur

2 : Must be moderately heated or exposed to relatively high temperature environment before ignition can occur

3 : Can be ignited at almost all temperatures

4: Will rapidly or completely vapourize at atmospheric pressure and normal temperature or will rapidly disperse in air and burn easily.

R/I: Reactivity/Instability (Susceptibility of Material to release Energy either by themselves or in combination with other materials)

0: Normally stable; even under fire exposure conditions.

1: Normally stable except in combination with certain other materials or at elevated temperatures and pressures.

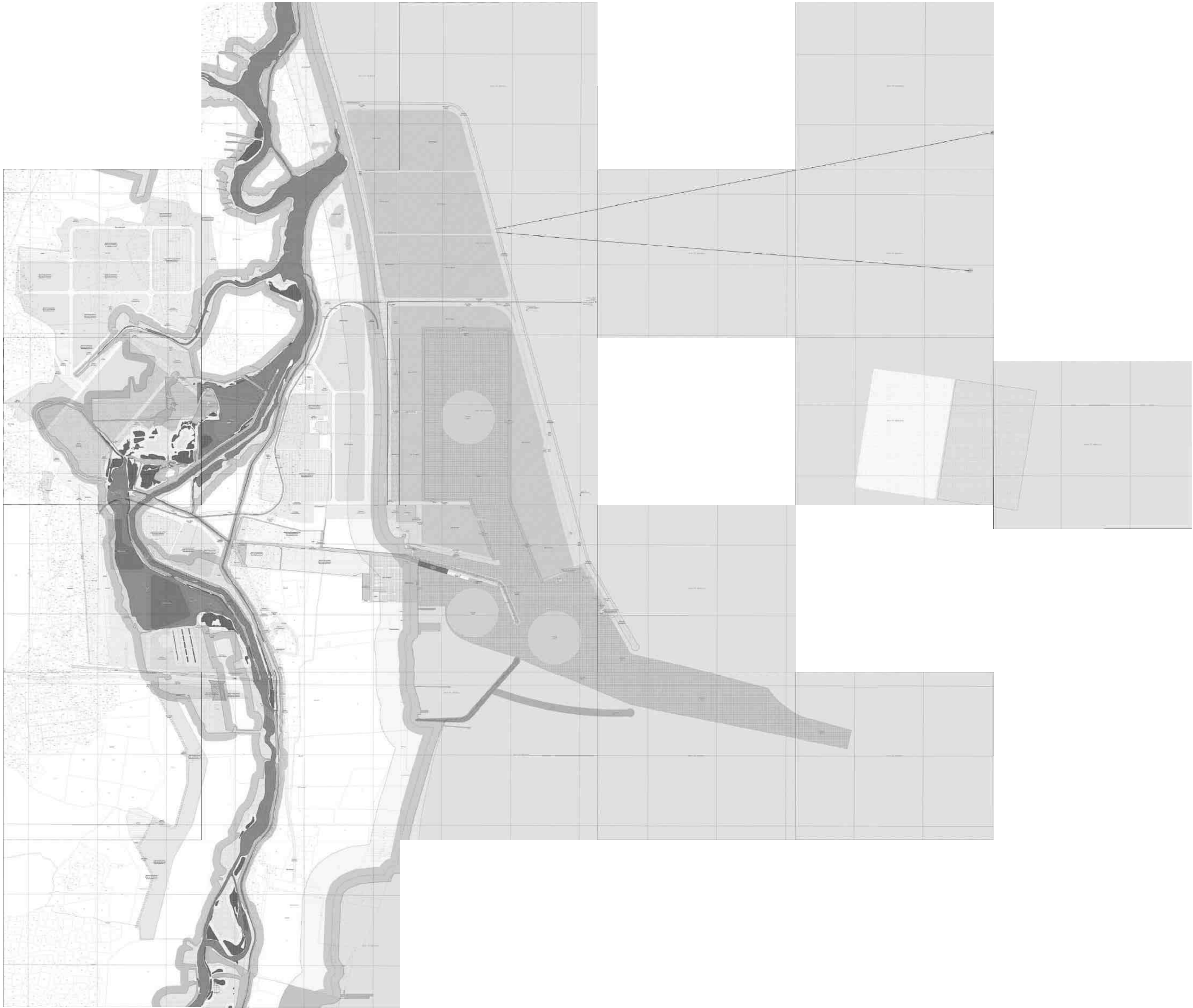
2: Normally unstable; readily undergoes violent chemical change at elevated temperature and pressures.

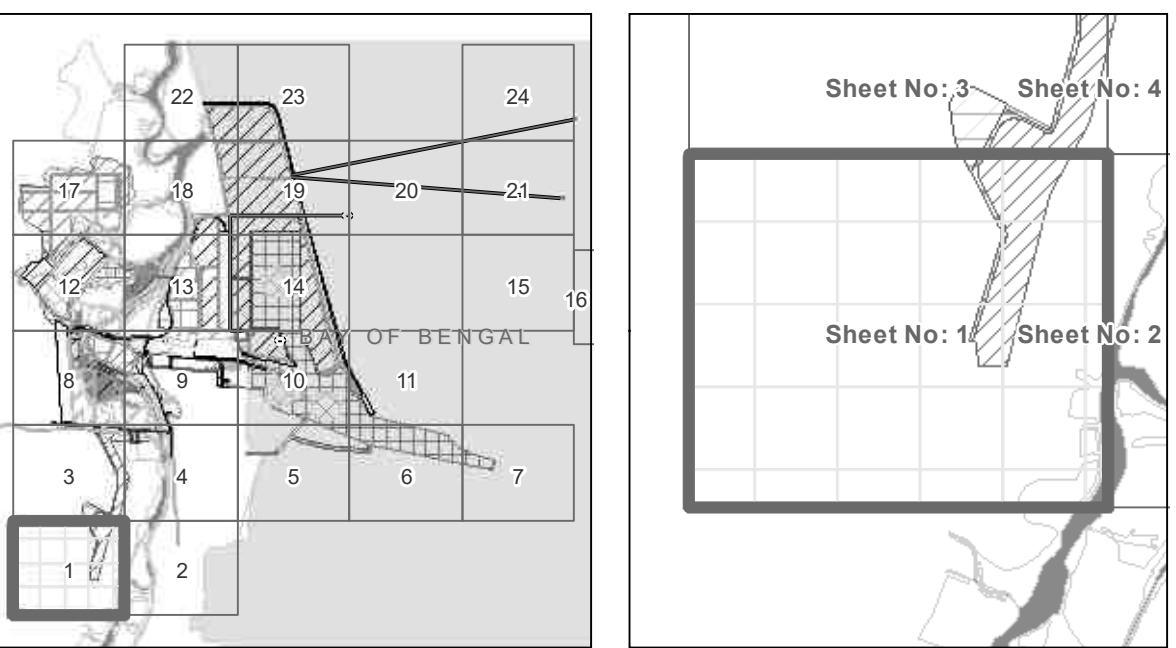
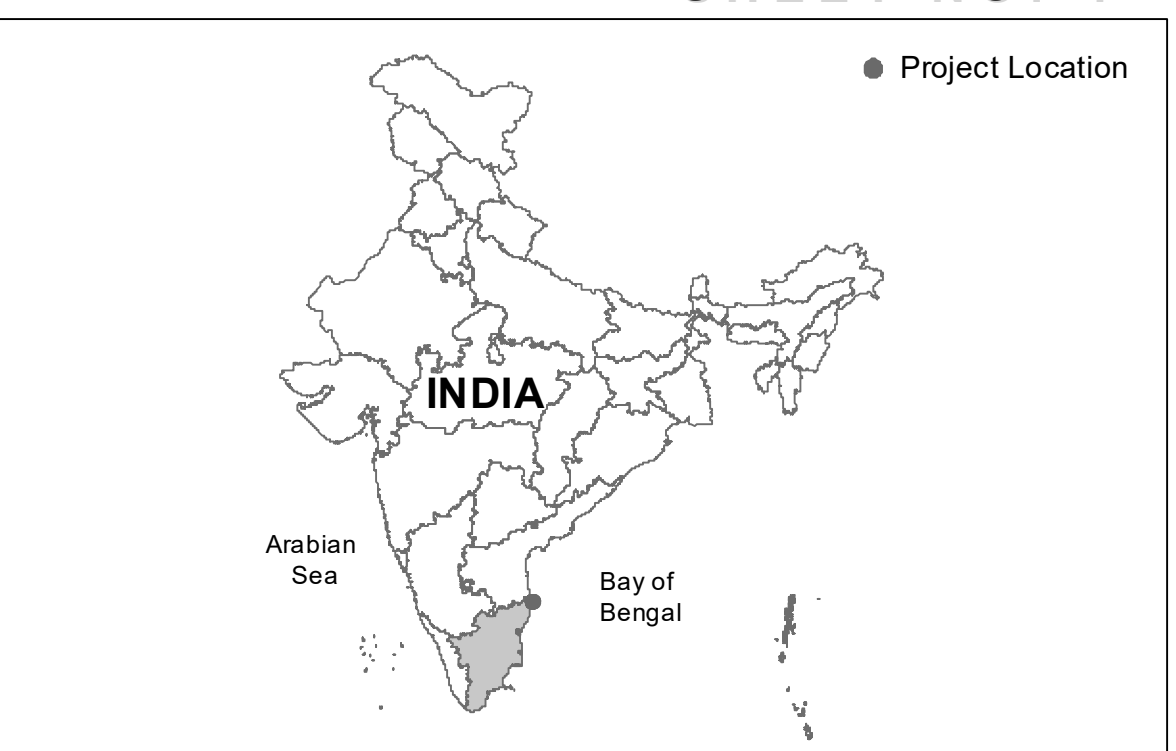
3: Can detonate or explode under a strong initiating force or after heating under confinement.

4: Readily detonates or explodes at normal temperatures and pressure.

ATTACHMENTS

ATTACHMENT 1
CRZ MAP





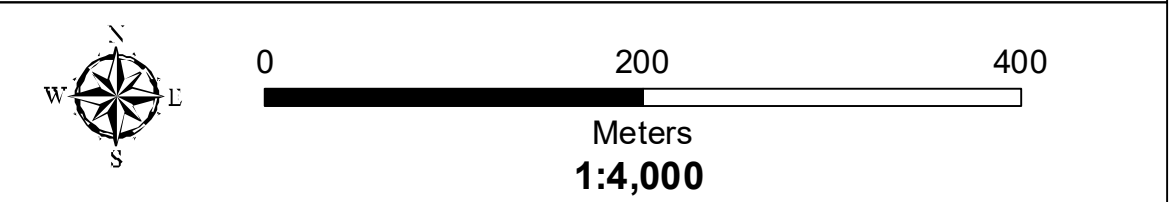
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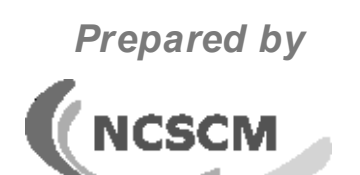
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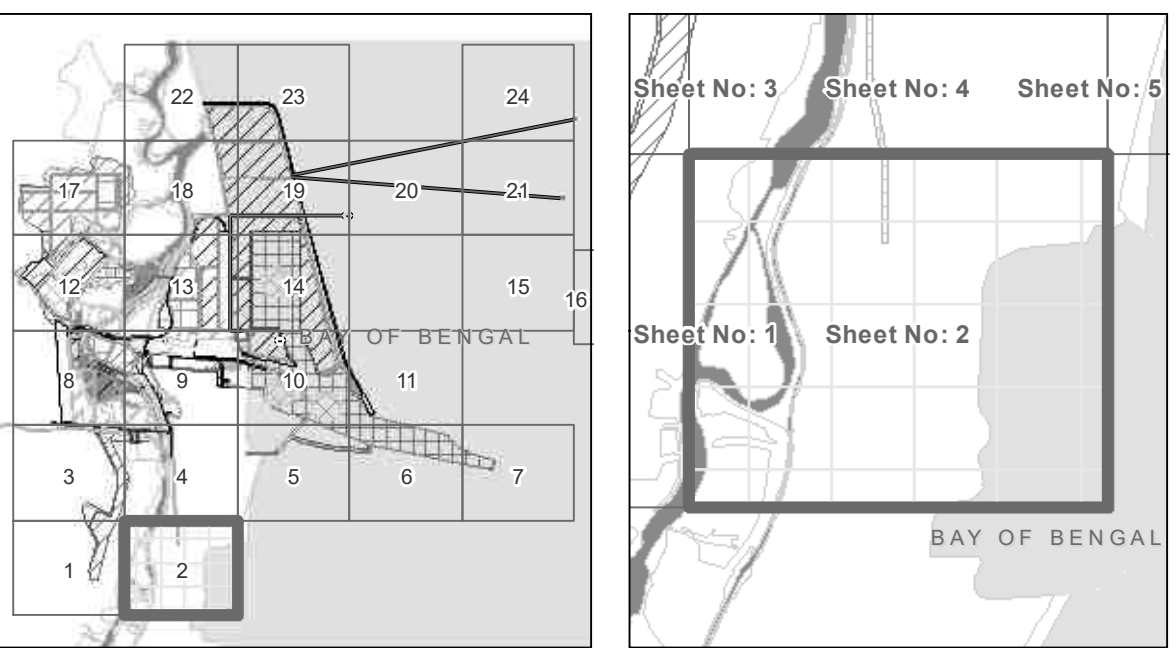
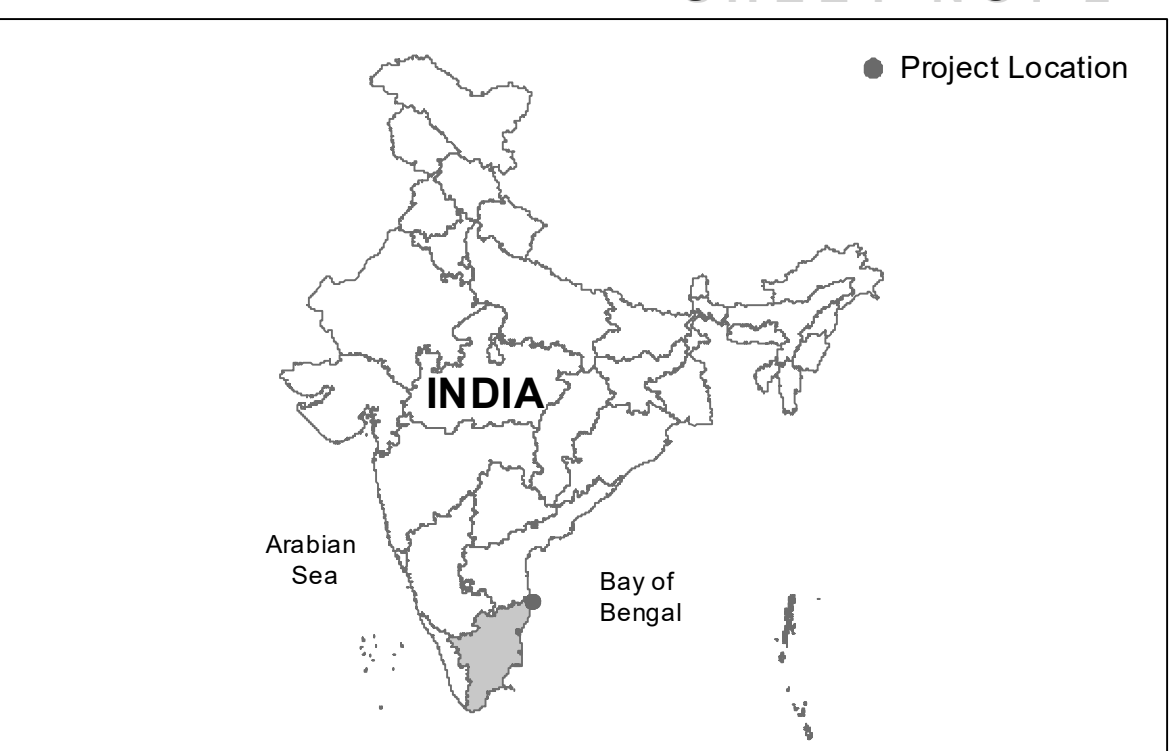
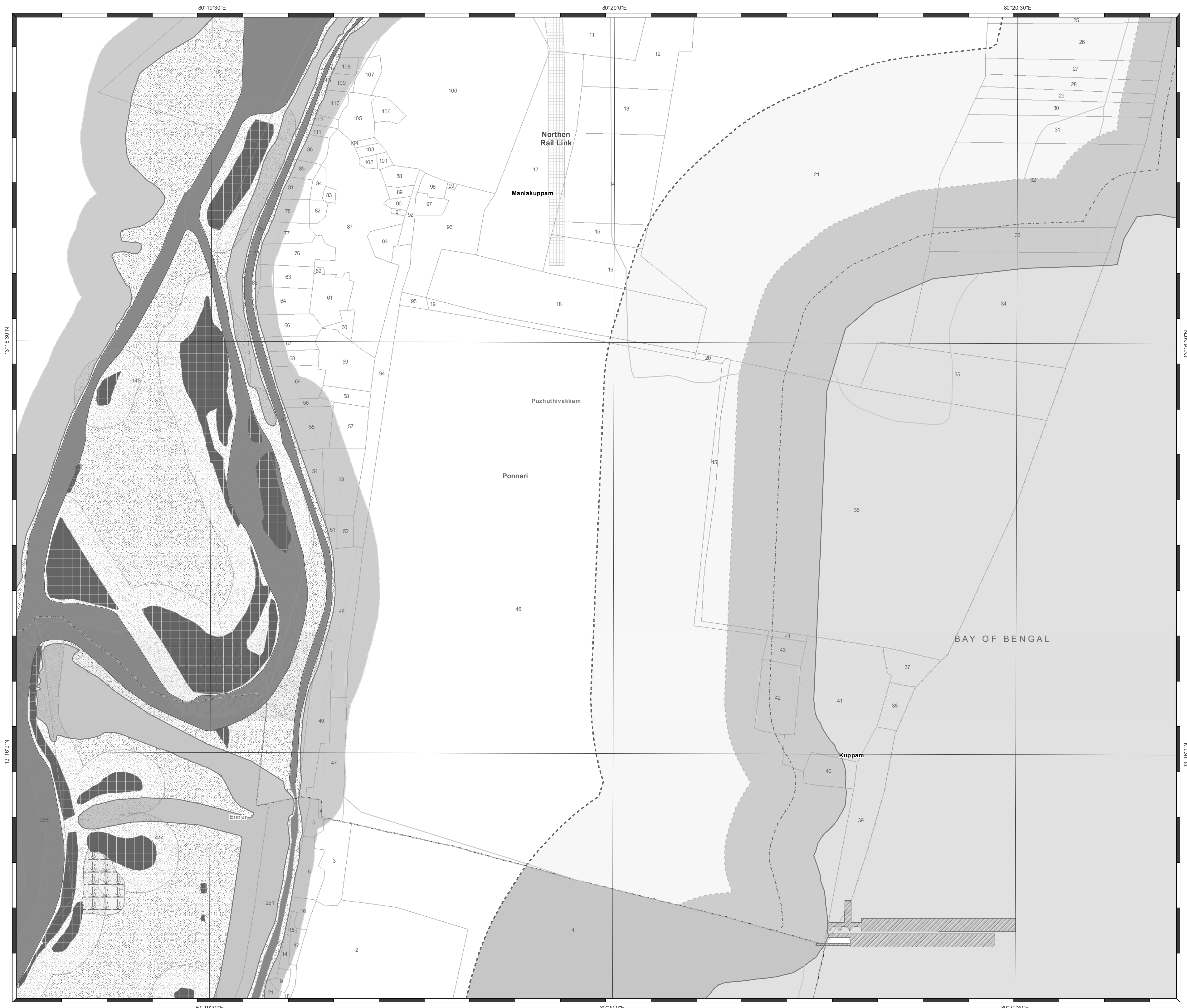


National Centre for Sustainable Coastal Management
(Ministry of Environment, Forest & Climate Change)
Chennai - 25

Prepared for
M/s. Adani Ports & SEZ Limited

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⊕ Proposed Combined Intake Point(CWDL & Port)	⊕ Proposed Combined Outfall Point(CWDL & Port)	— Proposed SPM Pipeline
▲ Intake - 100MLD Seawater Desalination Plant	▲ Intake 2 & Outfall 2 - 20 MMTPA LNG/LPG Processing Facility	▲ Intake 1 - 20 MMTPA LNG/LPG Processing Facility
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▨ Proposed 25 m Wide Road	▨ Proposed 50 m Wide Road	▨ Proposed 20 m Wide Road
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Figure 2: CRZ Map of the Proposed Project Site (For Details Refer Report No. NCSCM/GEO/CRZ/2022/00)



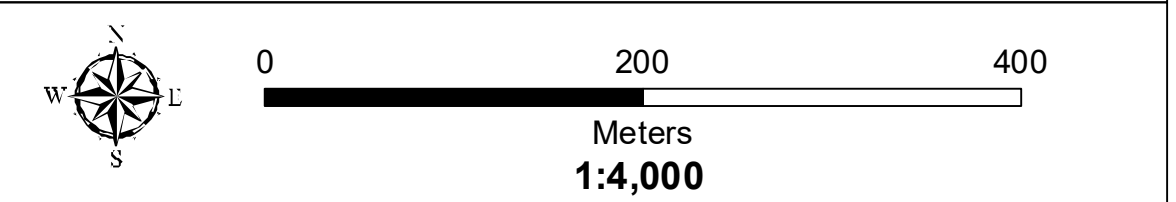
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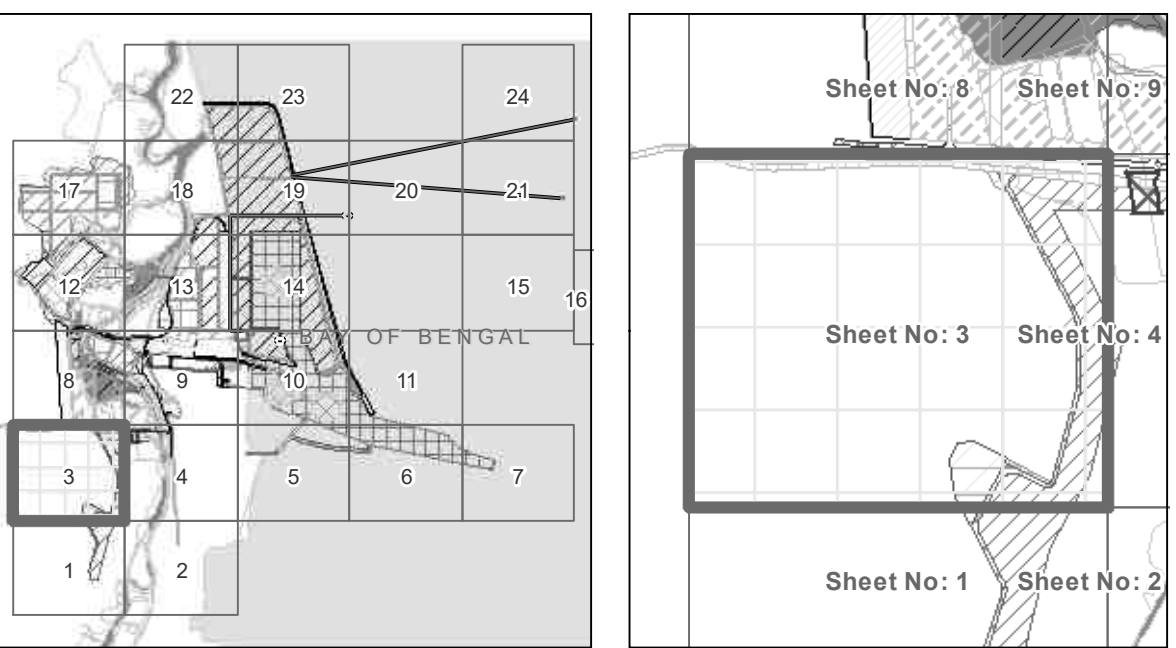
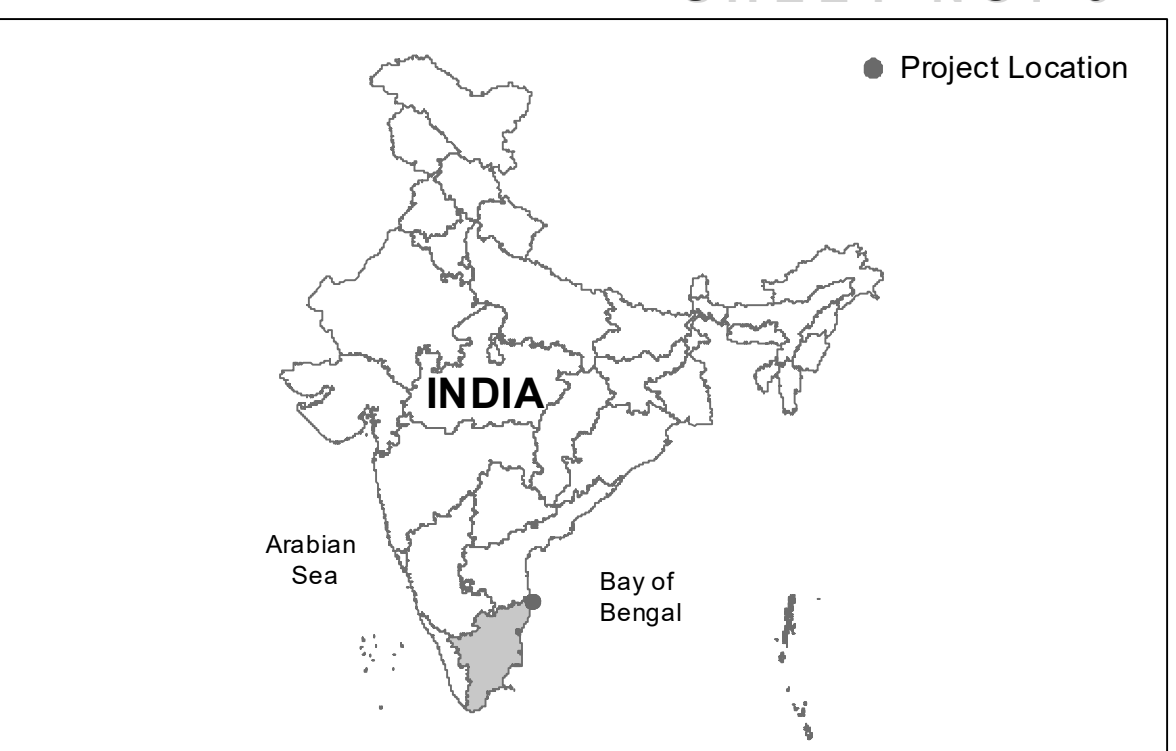
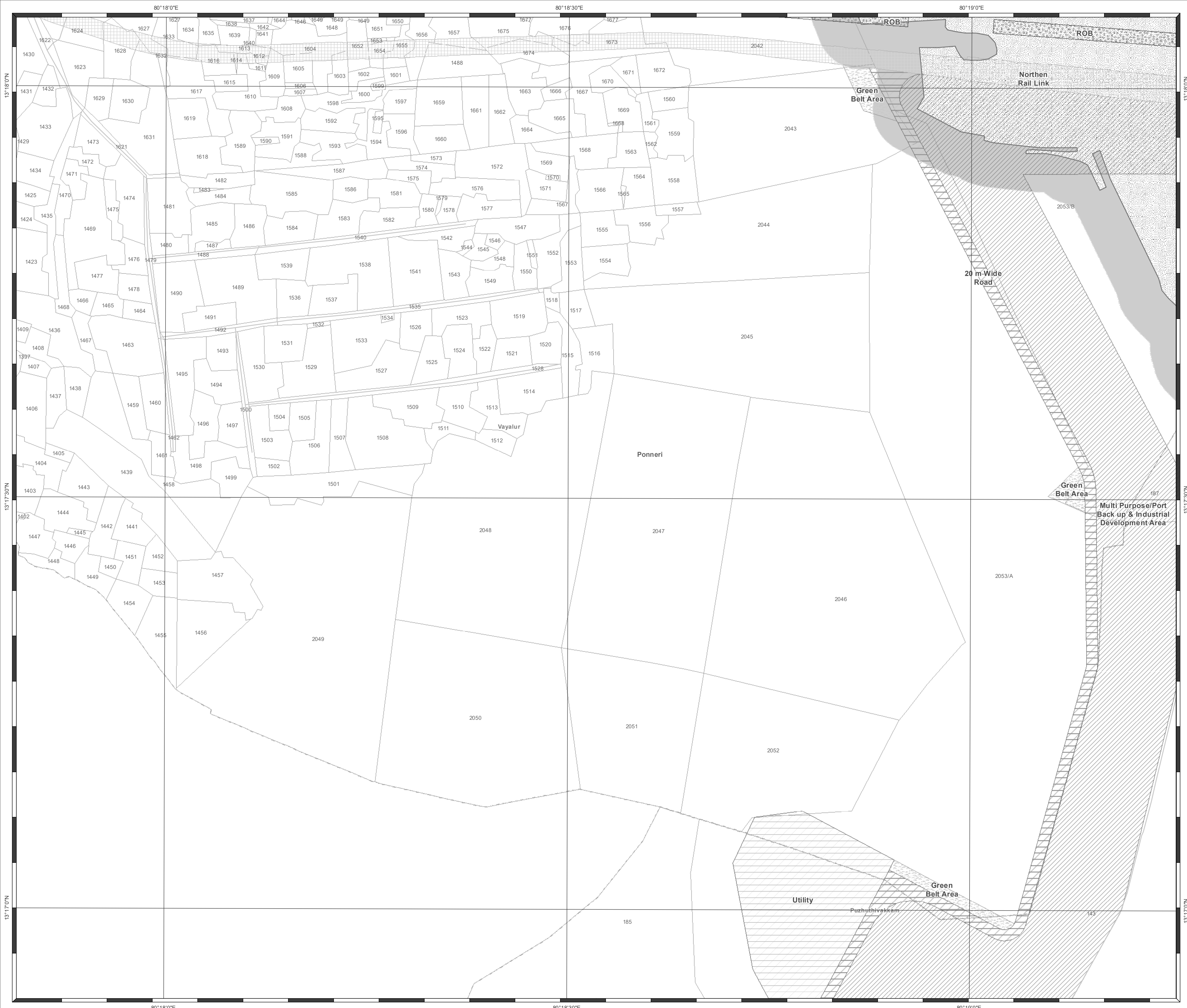
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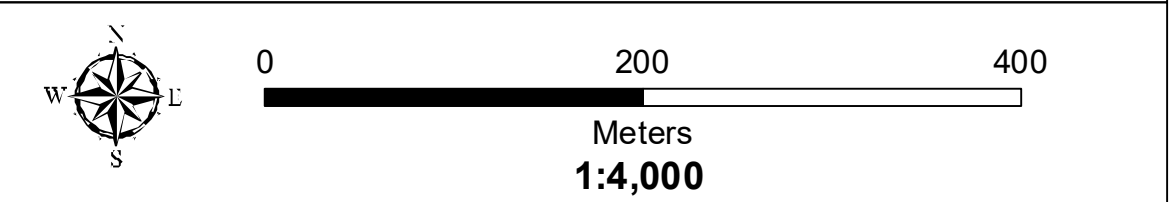
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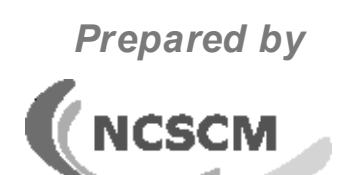
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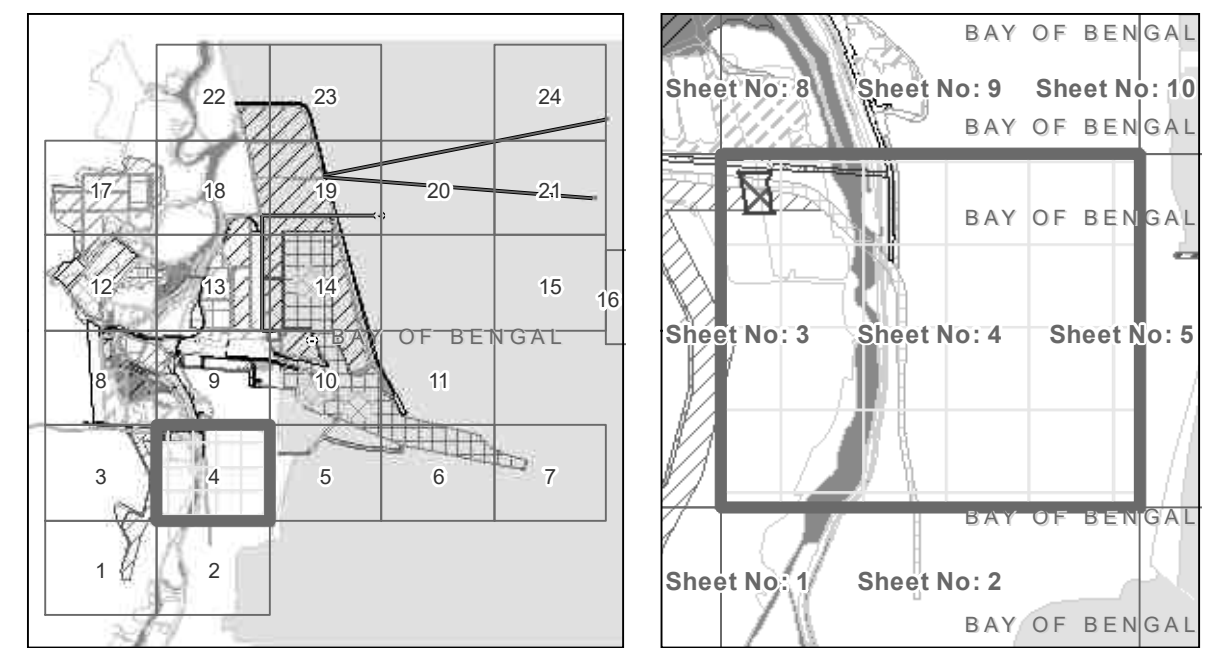
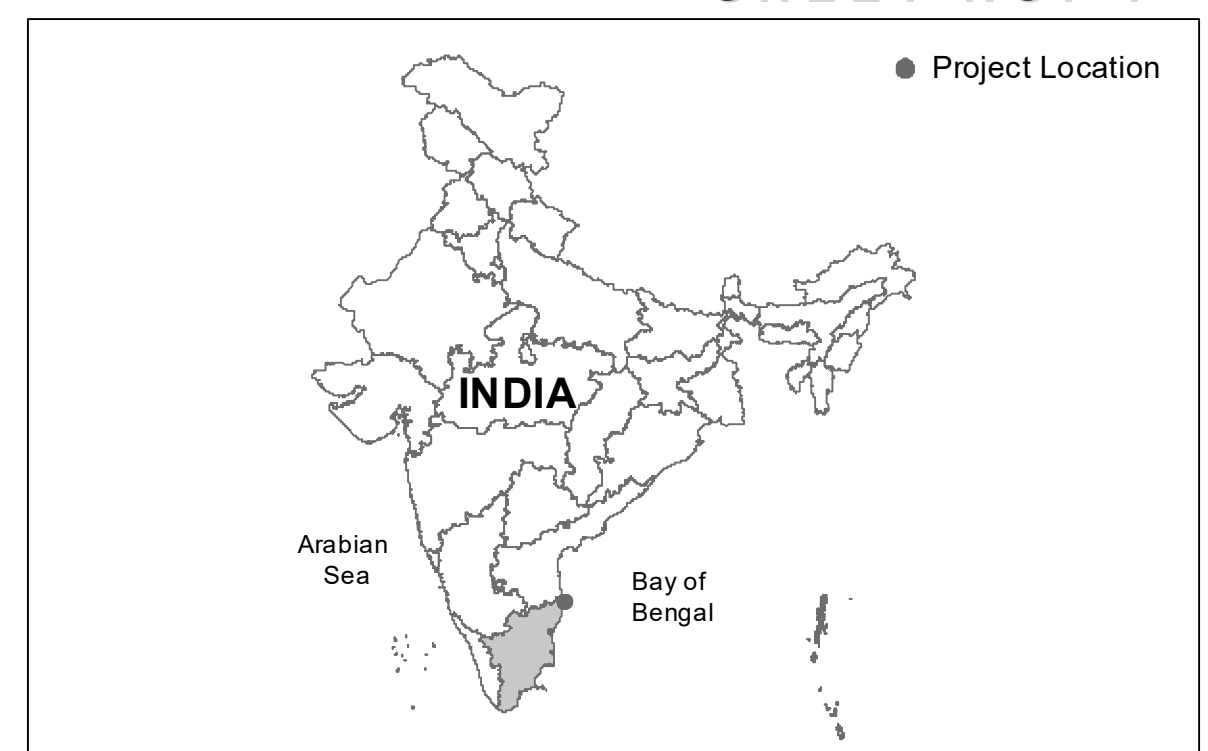
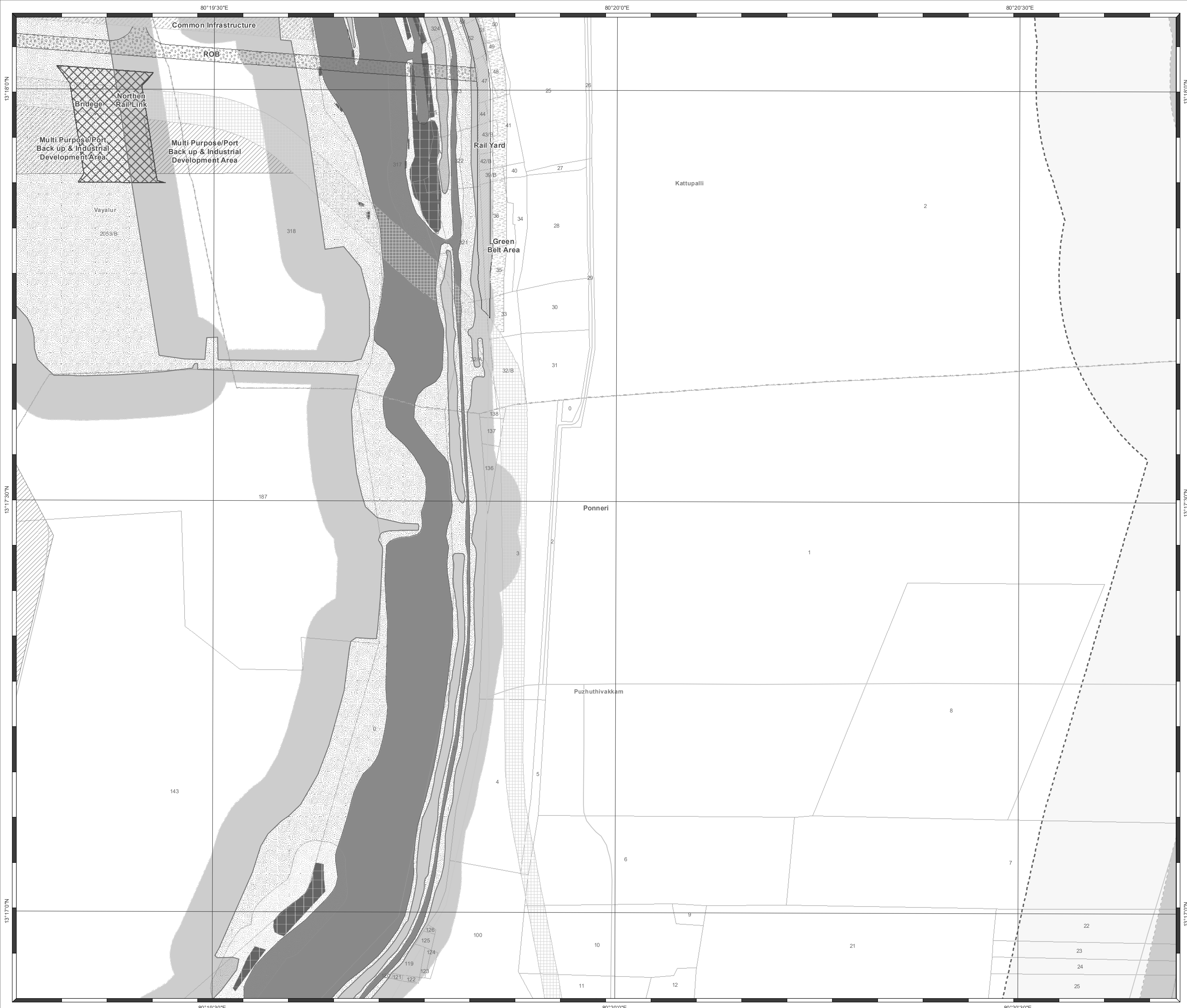


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Figure 2: CRZ Map of the Proposed Project Site (For Details Refer Report No. NCSCM/GEO/CRZ/2022/00)



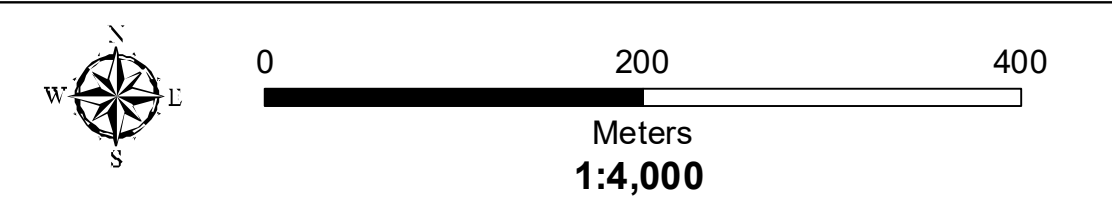
Mapped During: November, 2020 & January, 2021

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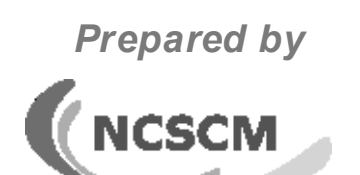
Prepared in accordance with the approved CZMP of Tamil Nadu State as per CRZ Notification, 2011

HTL, LTL AND CRZ FOR THE PROPOSED EXPANSION OF KATTUPALLI PORT, KATTUPALLI VILLAGE, PONNERI TALUK, TIRUVALLUR DISTRICT, TAMIL NADU.



Verified by _____ Approved by _____

REVISED FINAL DRAFT MAP



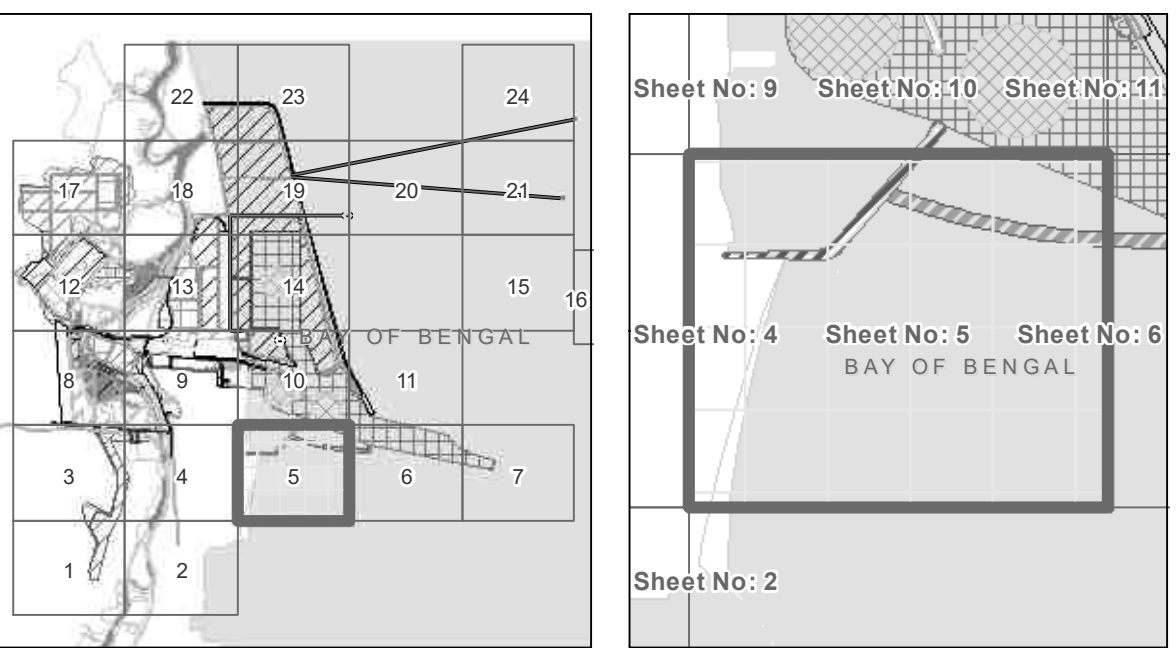
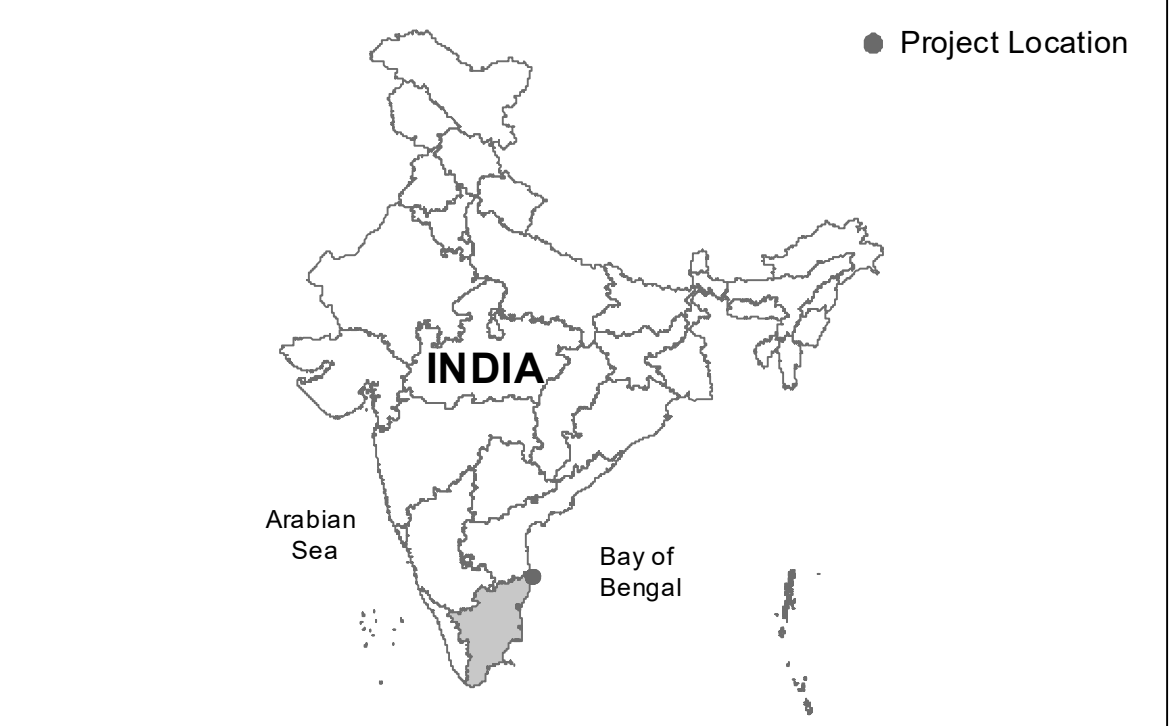
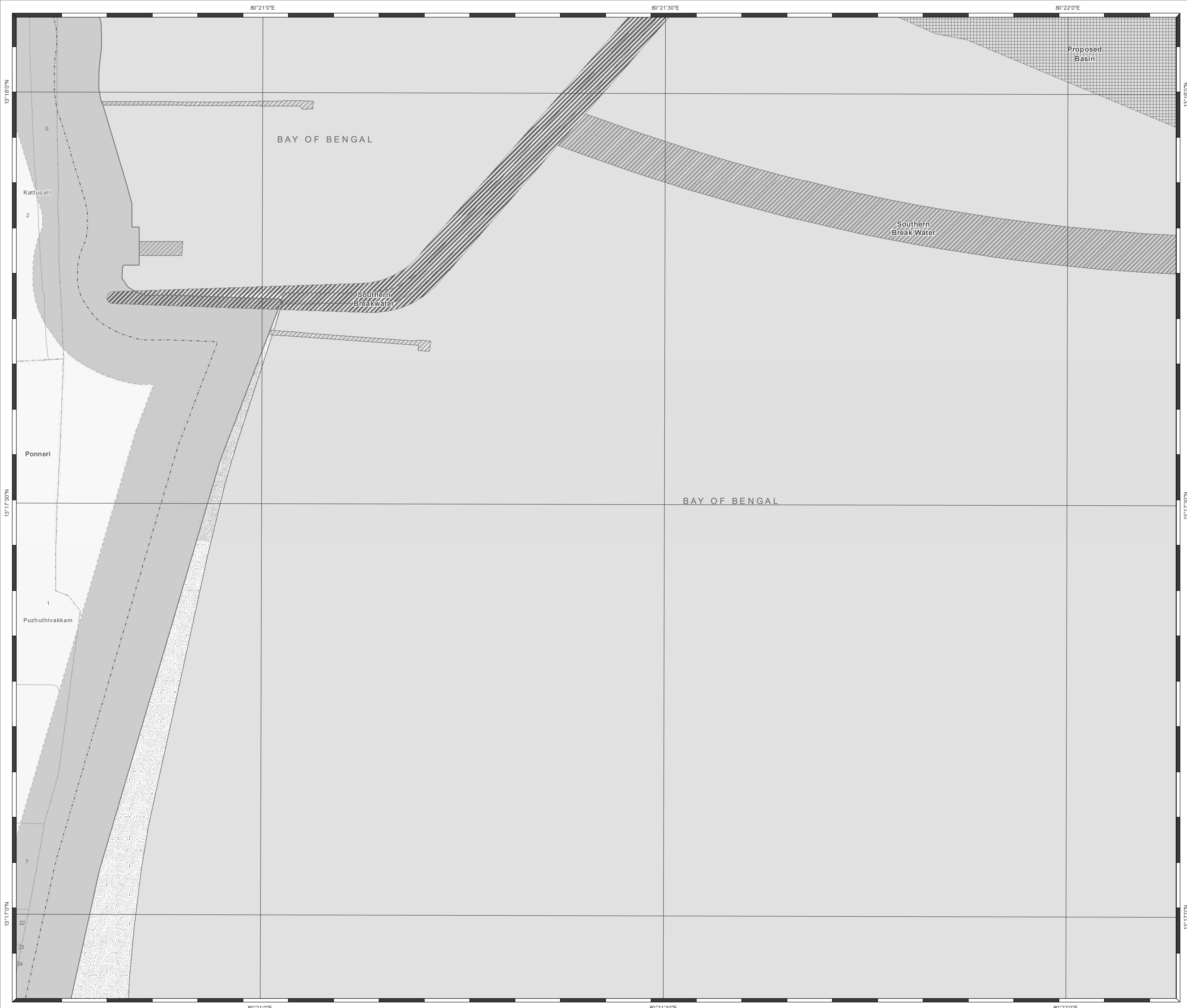
National Centre for Sustainable Coastal Management
(Ministry of Environment, Forest & Climate Change)
Chennai - 25

Prepared for
M/s. Adani Ports & SEZ Limited

Proposed/Existing Activities (As given by Project Proponent)

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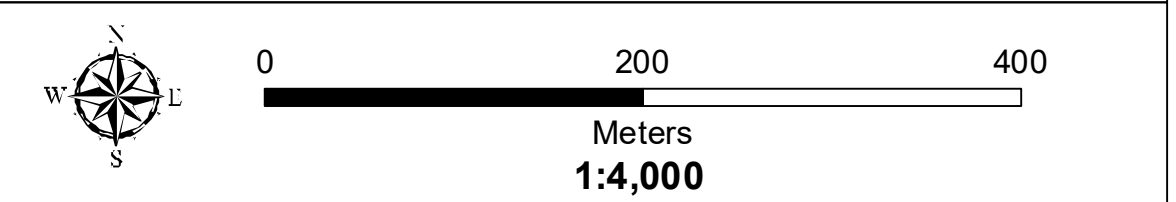
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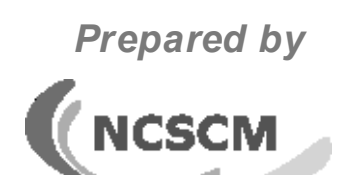
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REVISED FINAL DRAFT MAP

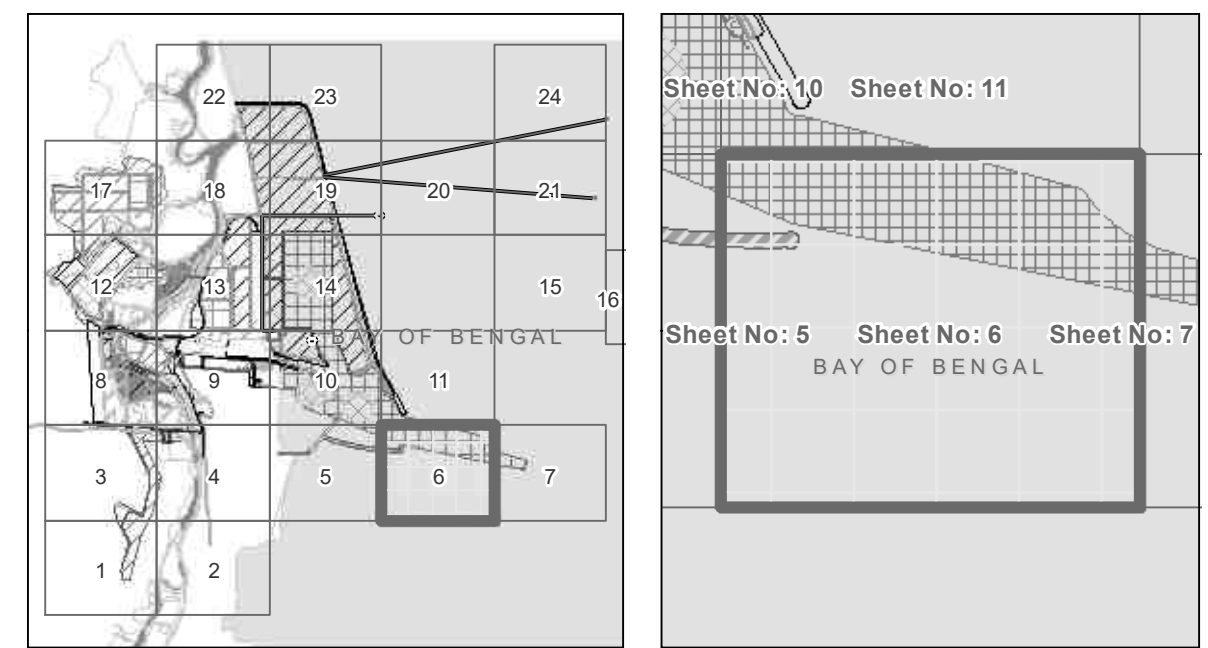
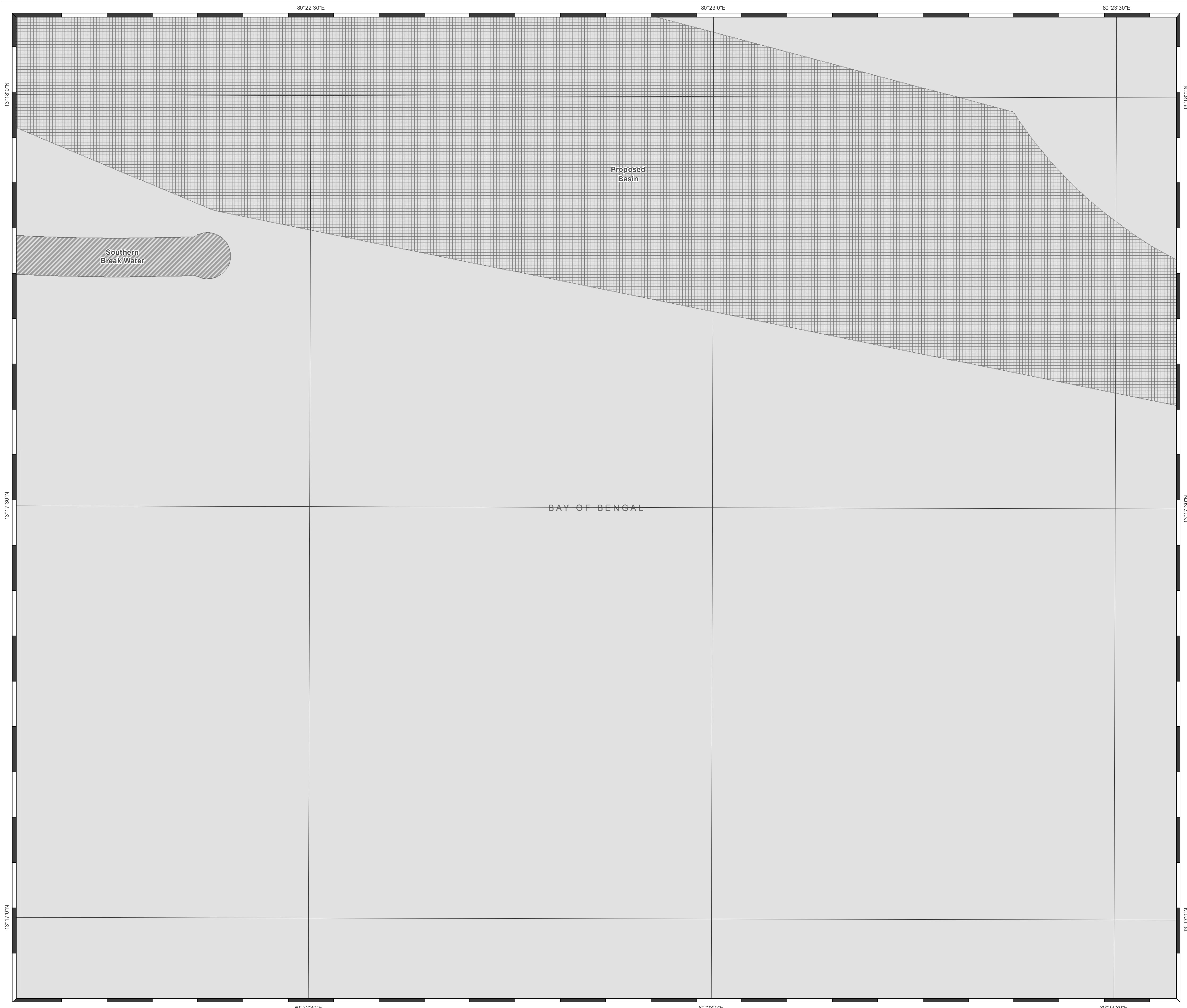


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Prepared for M/s. Adani Ports & SEZ Limited

Proposed/Existing Activities (As given by Project Proponent)					
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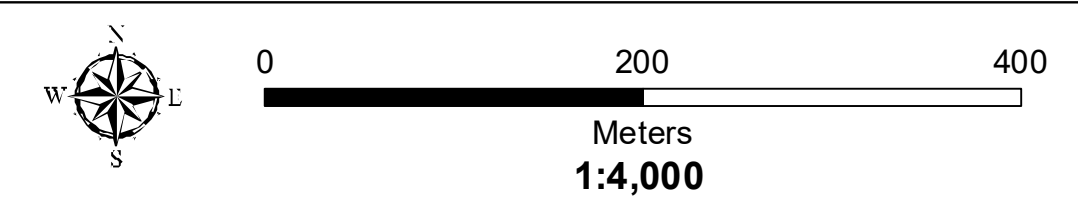
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Verified by

Approved by

REVISED FINAL DRAFT MAP

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National Centre for Sustainable Coastal Management
(Ministry of Environment, Forest & Climate Change)
Chennai - 25

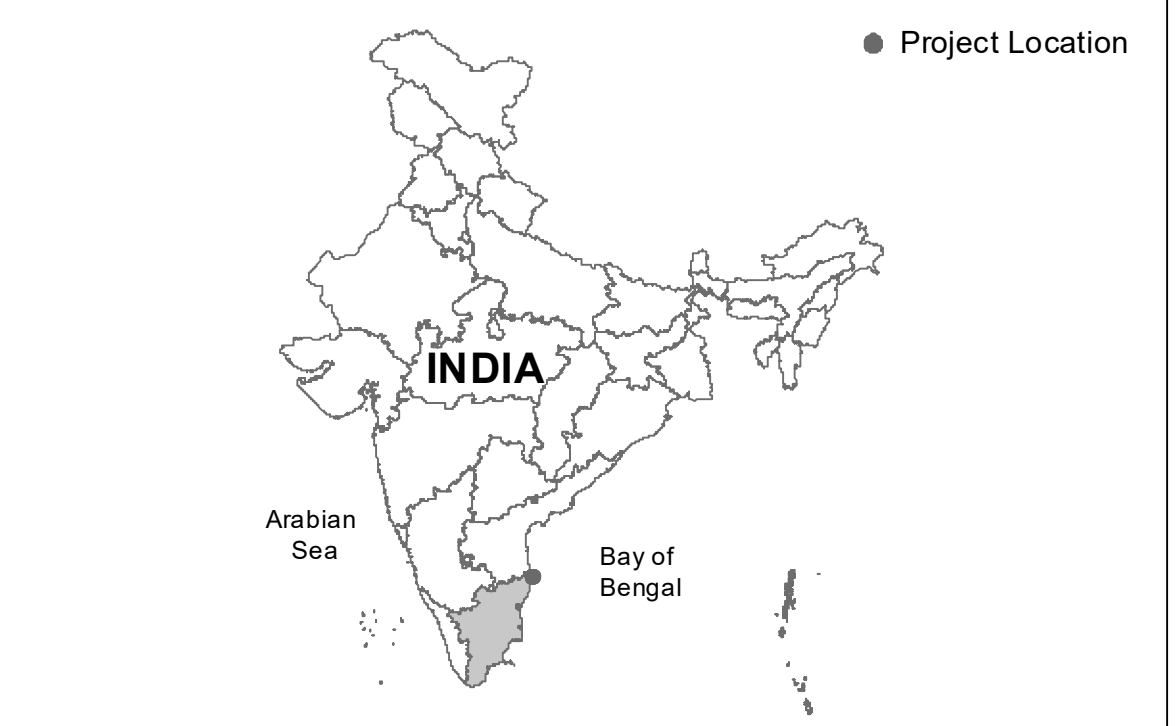
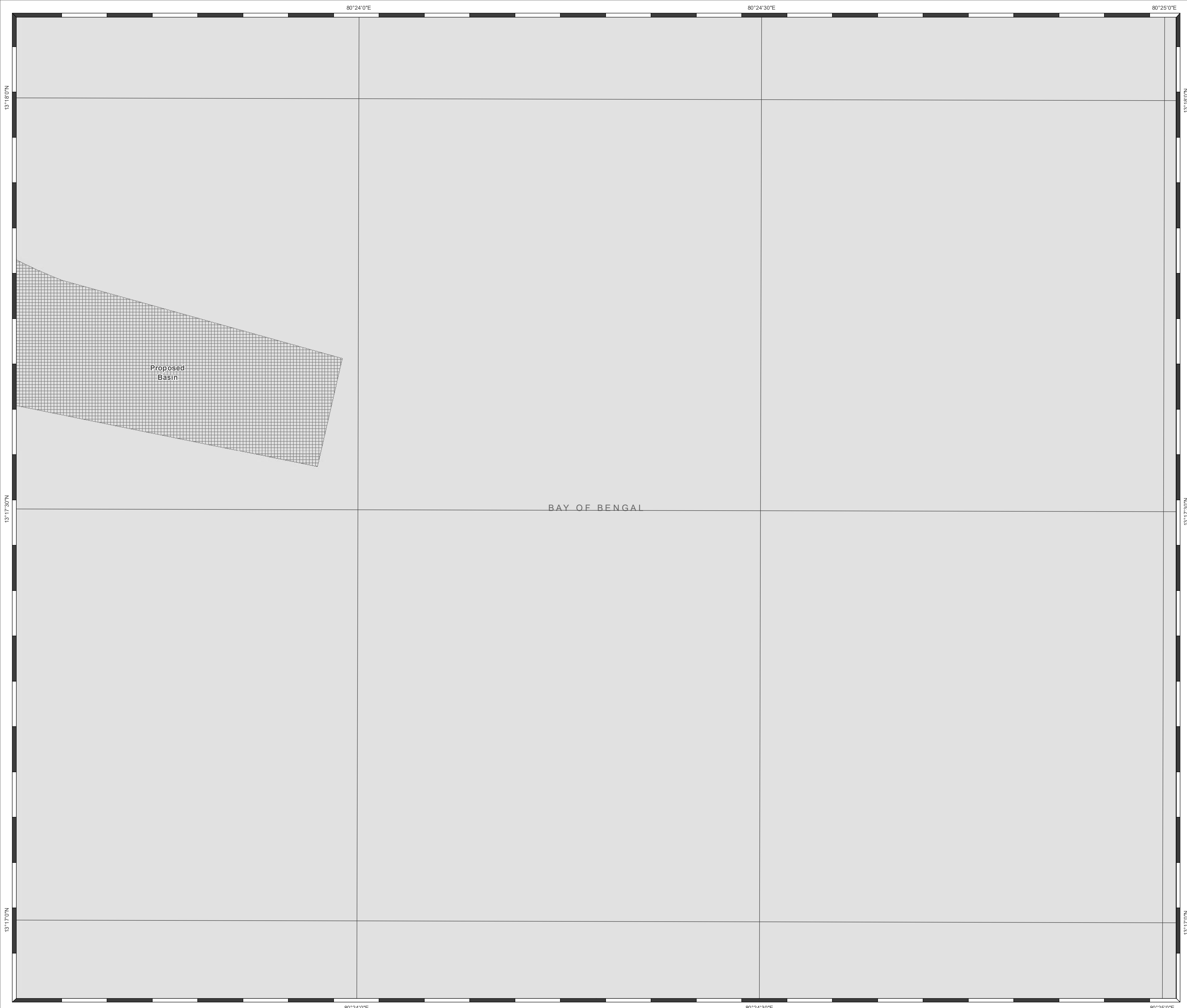
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M/s. Adani Ports & SEZ Limited

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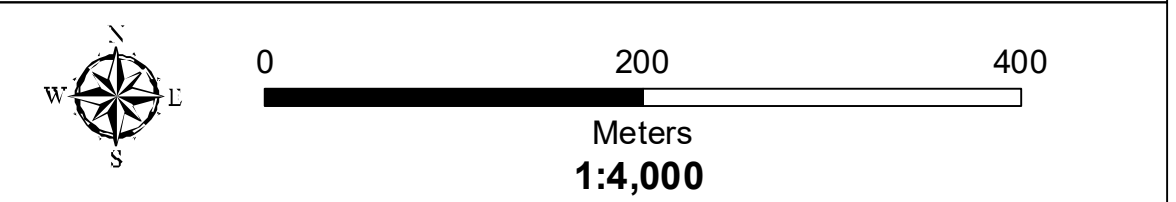
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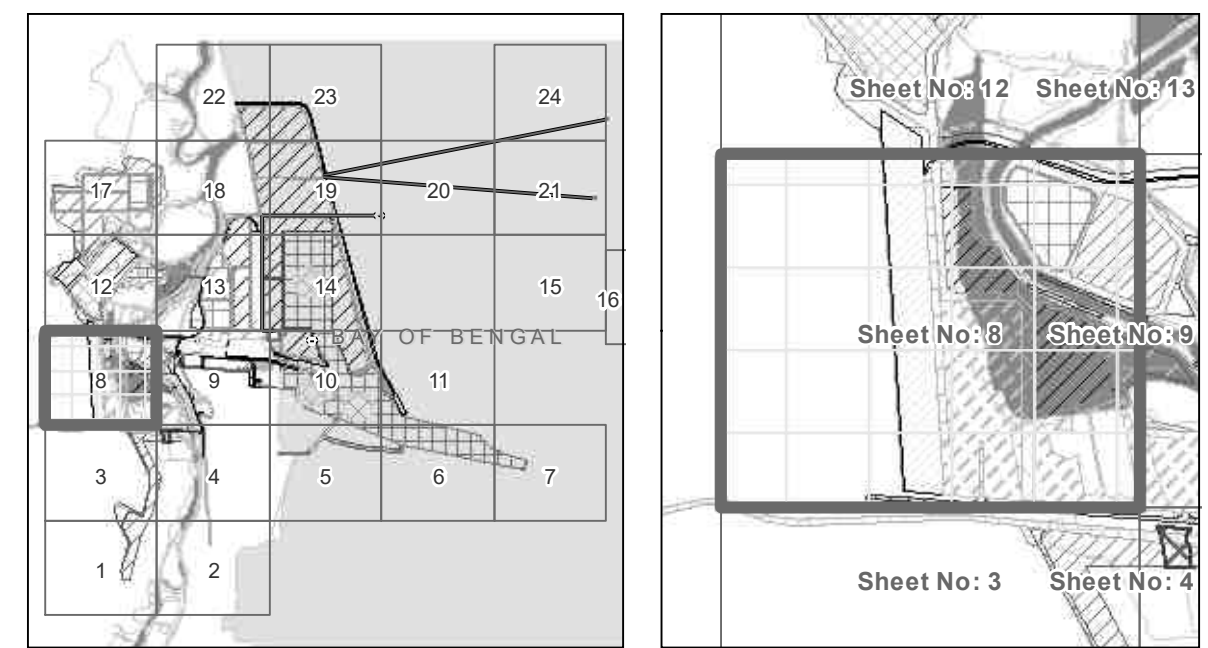
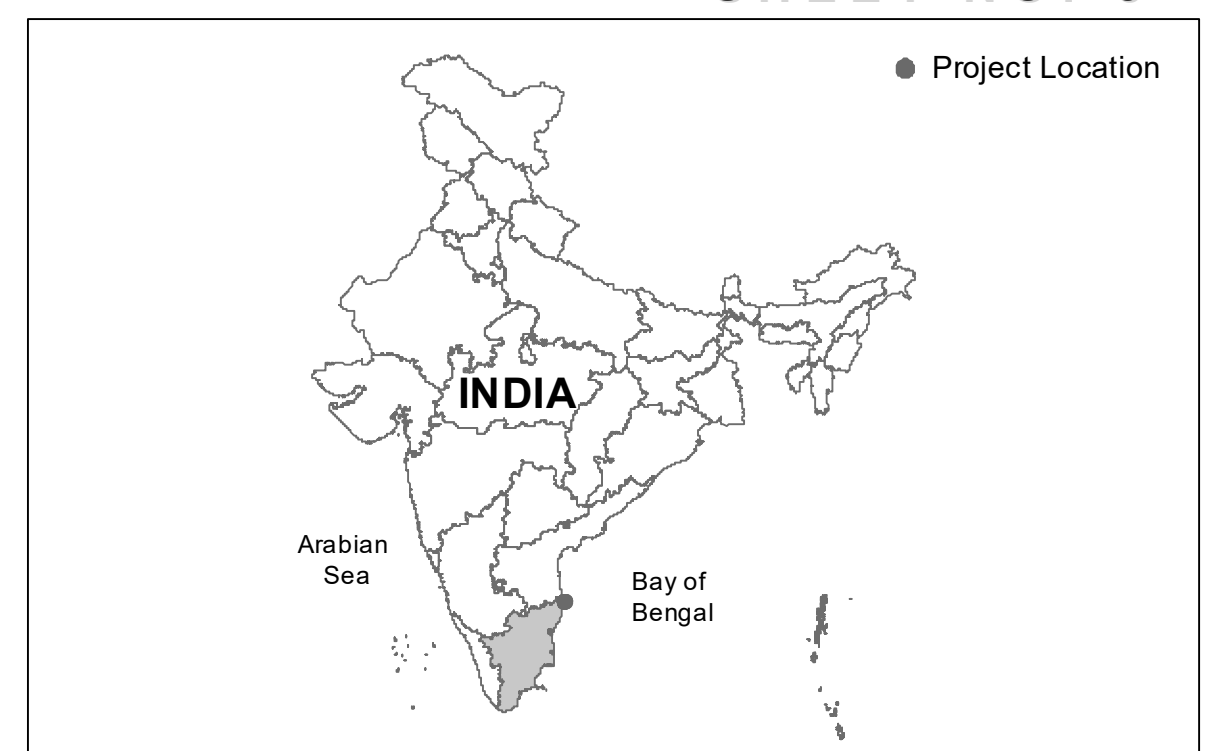
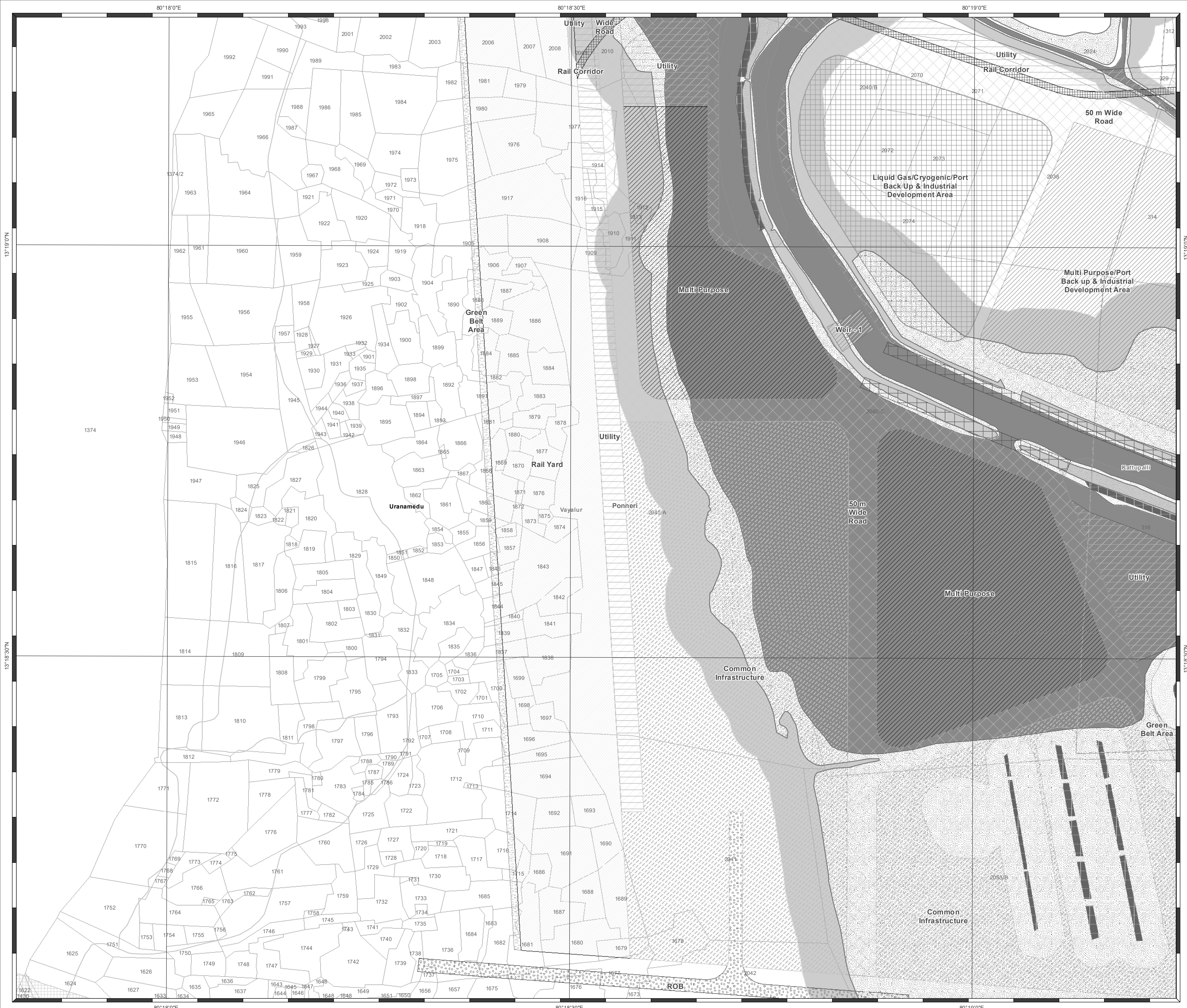
National Centre for Sustainable Coastal Management
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Chennai - 25

Prepared for

M/s. Adani Ports & SEZ Limited

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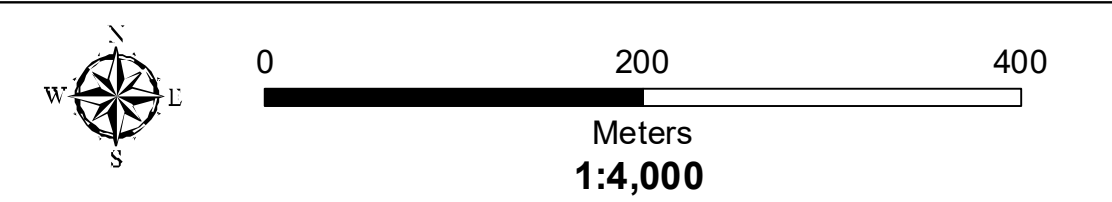


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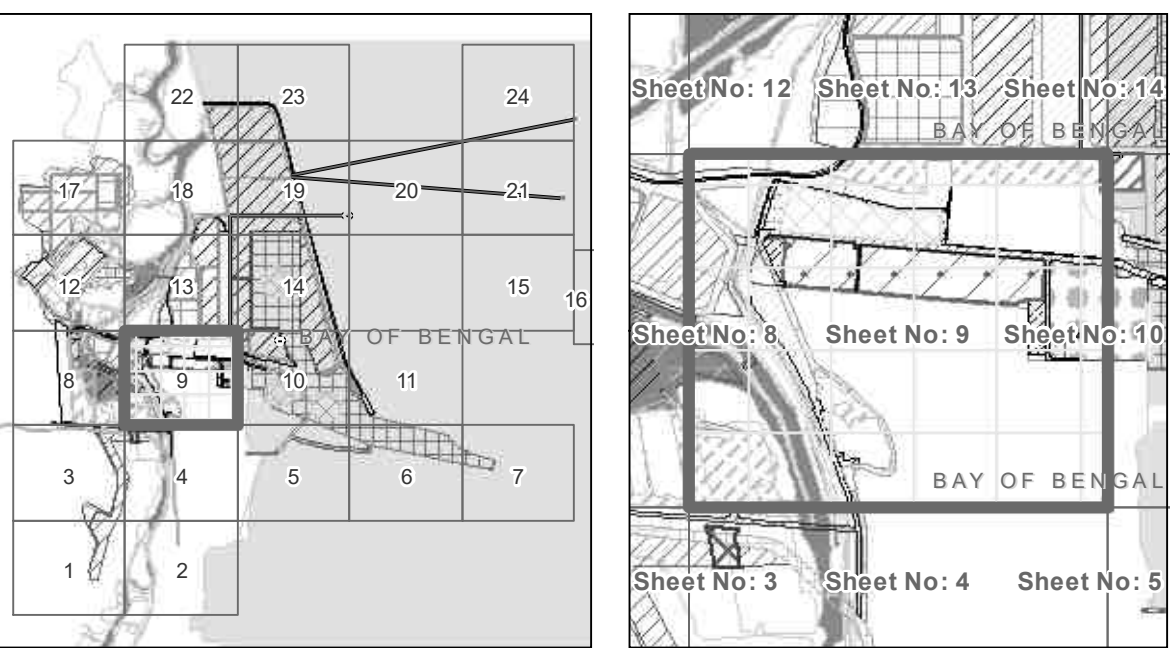
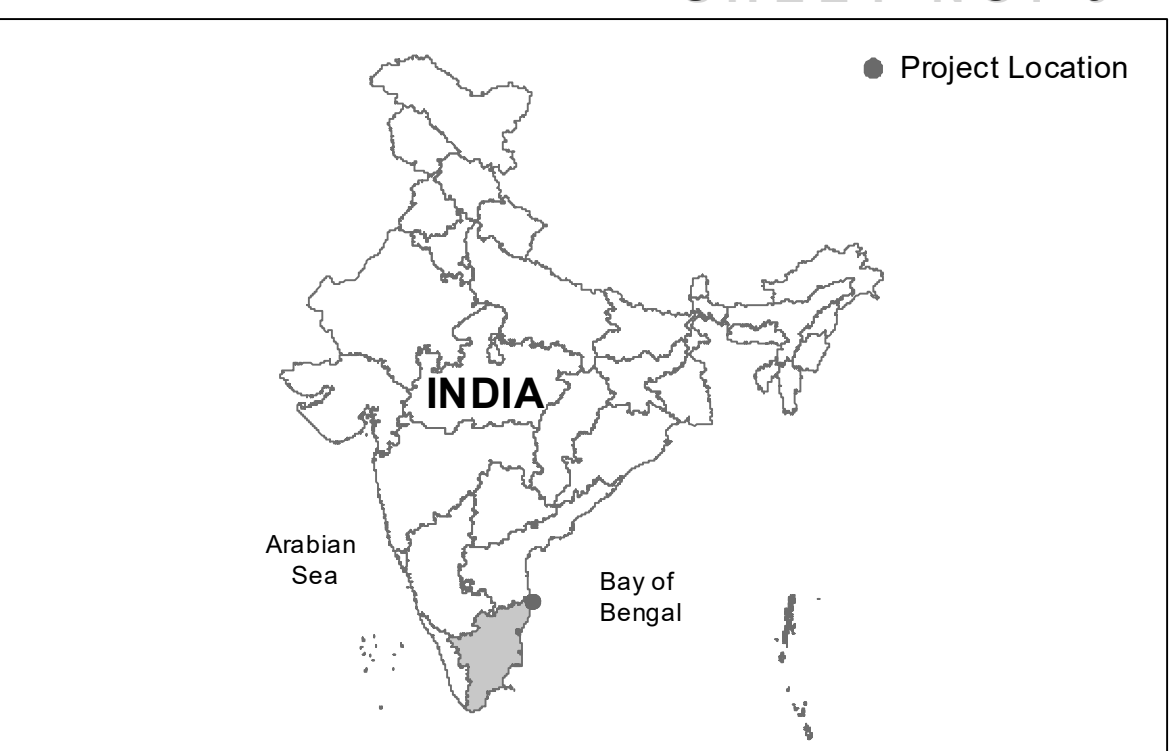
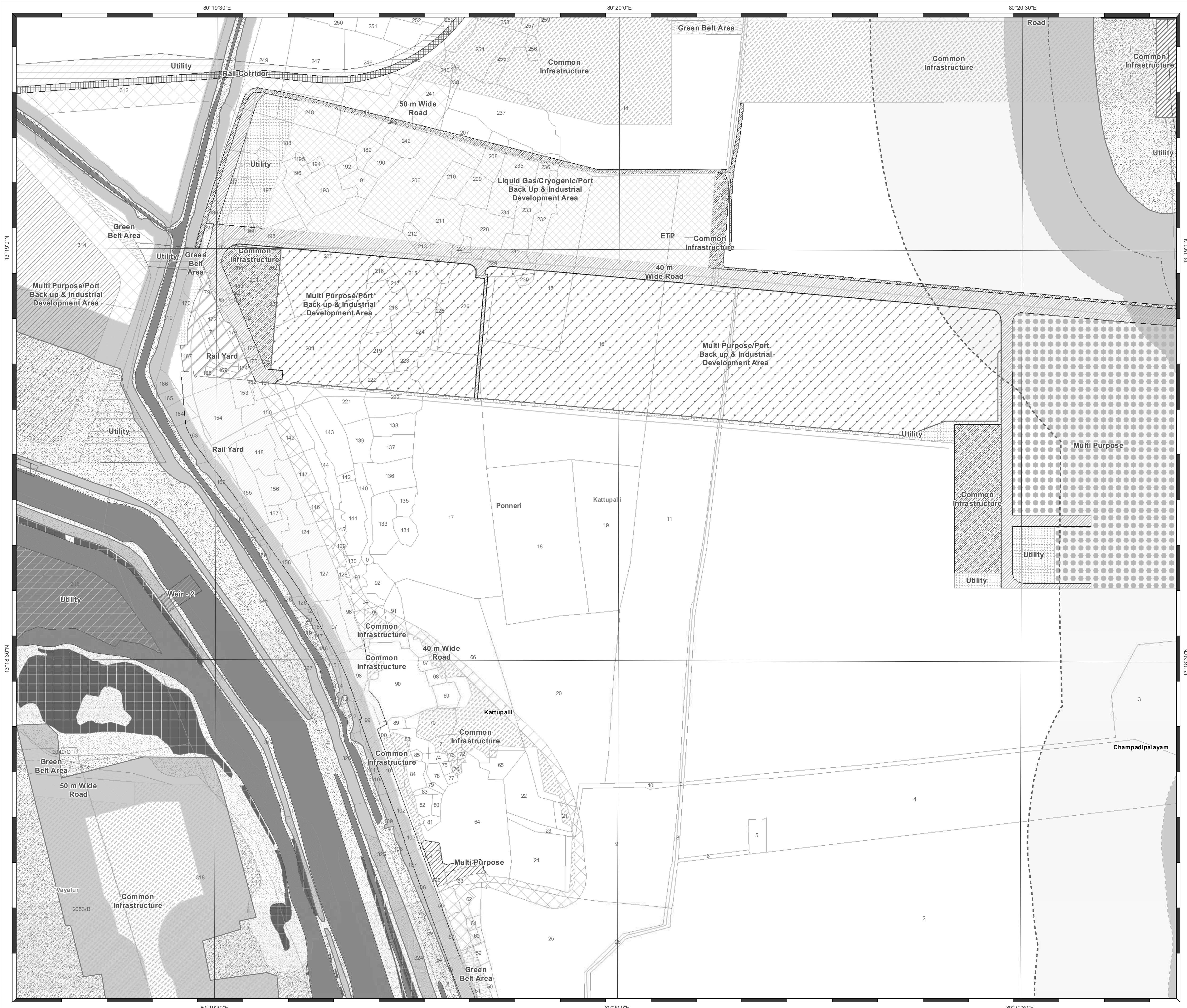


National Centre for Sustainable Coastal Management (Ministry of Environment, Forest & Climate Change) Chennai - 25

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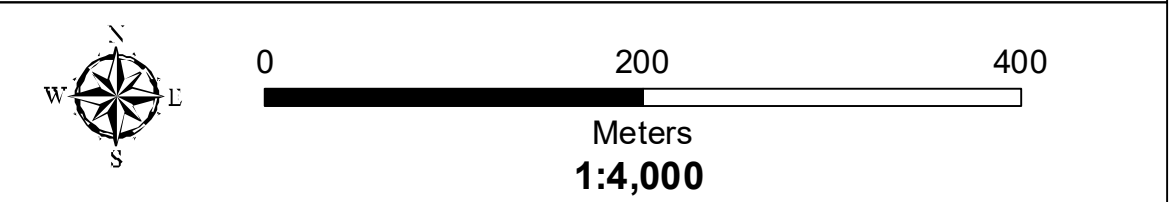
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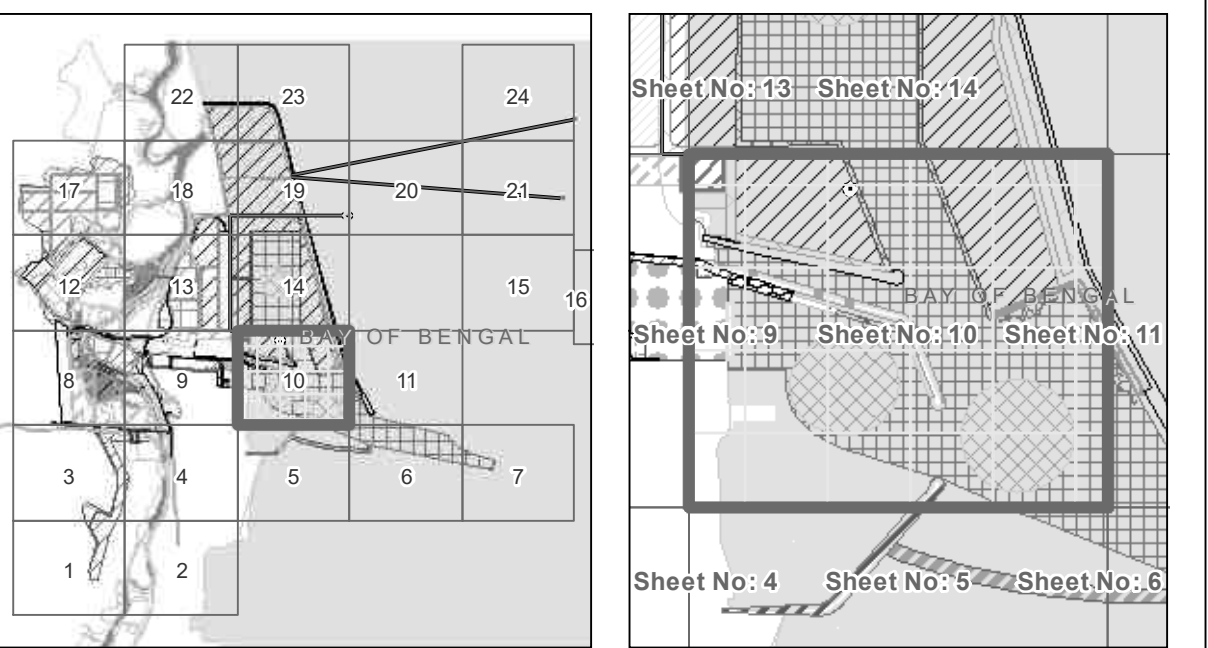
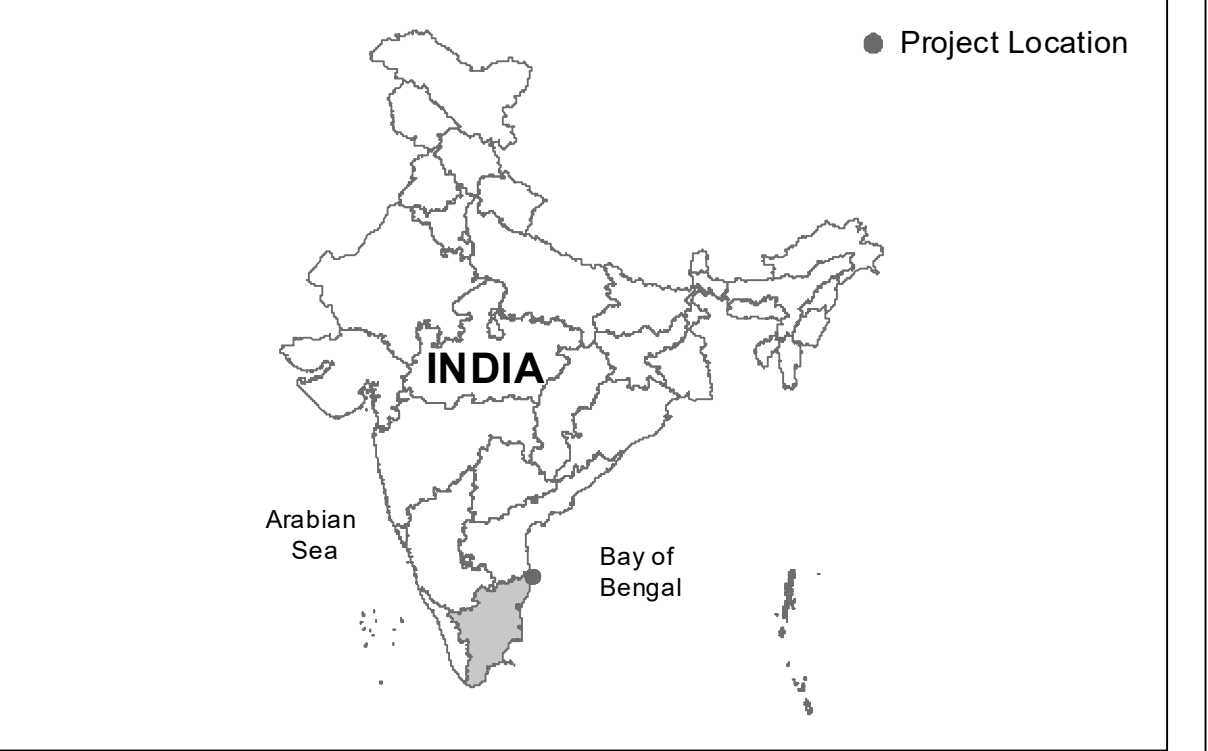
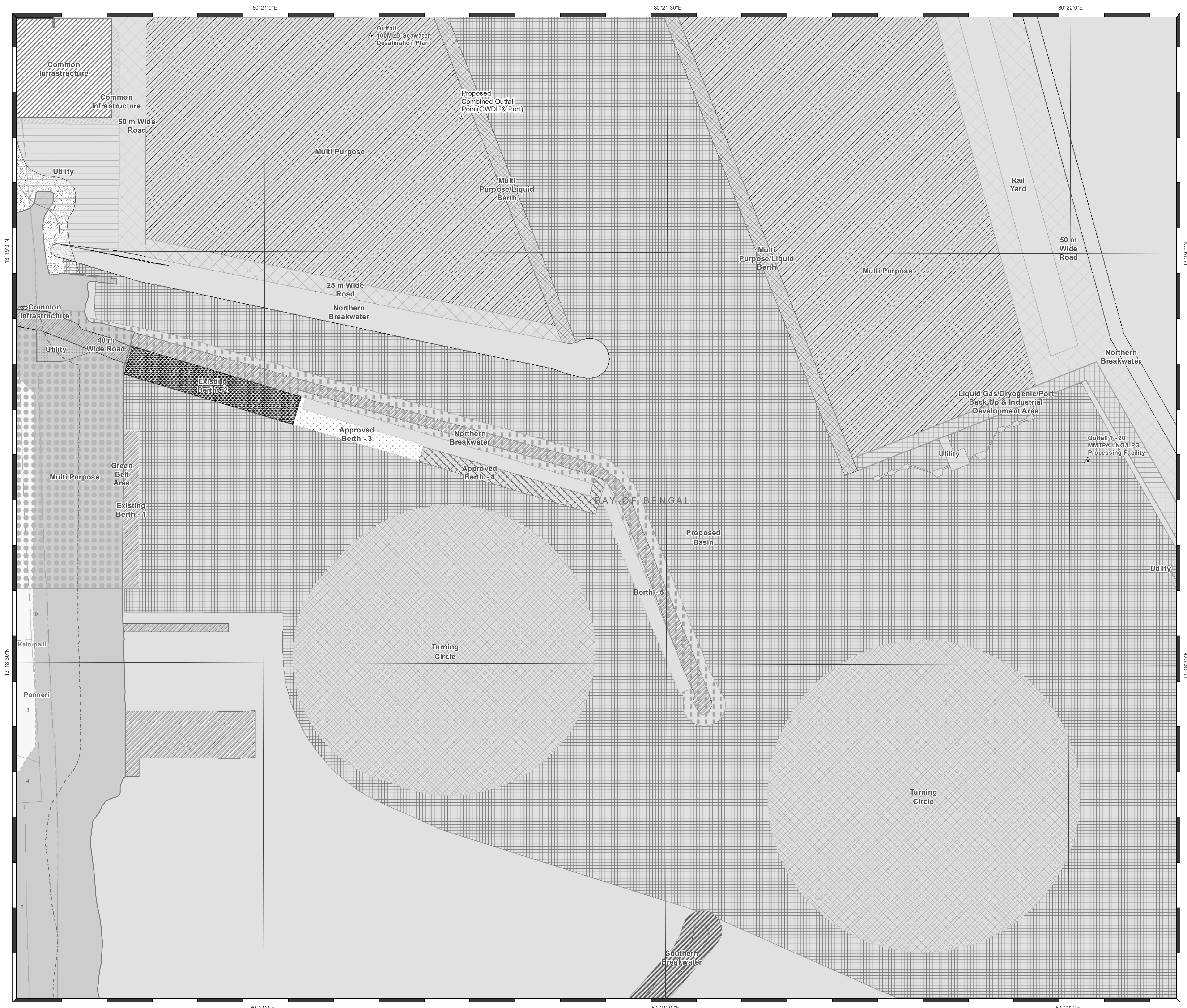
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M/s. Adani Ports & SEZ Limited

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<ul style="list-style-type: none"> ▲ Proposed Combined Intake Point(CWDL & Port) ▲ Intake - 100MLD Seawater Desalination Plant ▲ Existing Spoil Ground ▲ Existing Berth - 1 ▲ Existing Berth - 2 ▲ Existing Berth - 3 ▲ Existing Berth - 4 	<ul style="list-style-type: none"> ○ Proposed Combined Outfall Point(CWDL & Port) ▲ Intake 2 & Outfall 2 - 20 MMTPA LNG/LPG Processing Facility ▲ Existing Green Belt ▲ Existing Liquid Gas/Cryogenic/Port Back Up & Industrial Development Area ▲ Existing Multi Purpose ▲ Existing Multi Purpose/Port Back up & Industrial Development Area ▲ Existing Northern Breakwater 	<ul style="list-style-type: none"> — Proposed SPM Pipeline — Proposed Pipeline Route to Intake Point ▲ Intake 1 - 20 MMTPA LNG/LPG Processing Facility ▲ Outfall - 100MLD Seawater Desalination Plant ▲ Outfall 1 - 20 MMTPA LNG/LPG Processing Facility ▲ Existing Southern Breakwater ▲ Proposed SPM 1 ▲ Proposed SPM 2 ▲ Proposed 15 m Wide Road ▲ Proposed 20 m Wide Road 	<ul style="list-style-type: none"> ▲ Intake 1 - 20 MMTPA LNG/LPG Processing Facility ▲ Outfall - 100MLD Seawater Desalination Plant ▲ Outfall 1 - 20 MMTPA LNG/LPG Processing Facility ▲ Existing Southern Breakwater ▲ Proposed SPM 1 ▲ Proposed SPM 2 ▲ Proposed 15 m Wide Road ▲ Proposed 20 m Wide Road ▲ Proposed 25 m Wide Road ▲ Proposed 50 m Wide Road ▲ Proposed Barge Berth ▲ Proposed Basin ▲ Proposed Intake Pond ▲ Proposed Common Infrastructure ▲ Proposed Green Belt ▲ Proposed Liquid Gas/Cryogenic ▲ Proposed Liquid Gas/Cryogenic/Port Back Up & Industrial Development Area ▲ Proposed Basin ▲ Proposed Multi Purpose 	<ul style="list-style-type: none"> ▲ Proposed Multi Purpose Back Up ▲ Proposed Multi Purpose/Liquid Berth ▲ Proposed Multi Purpose/Port Back up & Industrial Development Area ▲ Proposed Northern Rail Link ▲ Proposed ROB ▲ Proposed Rail Corridor ▲ Proposed Rail Yard ▲ Proposed Northern Breakwater ▲ Proposed Southern Break Water ▲ Proposed Turning Circle ▲ Proposed Utility
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Figure 2: CRZ Map of the Proposed Project Site (For Details Refer Report No. NCSCM/GEO/CRZ/2022/00)



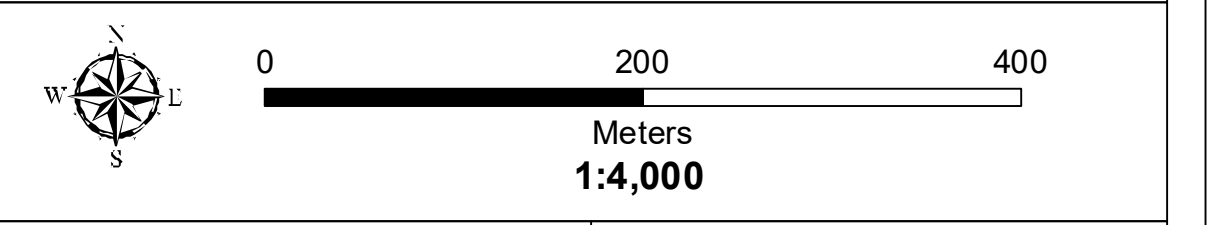
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Legend

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HTL, LTL AND CRZ FOR THE PROPOSED EXPANSION OF KATTUPALLI PORT, KATTUPALLI VILLAGE, PONNERI TALUK, TIRUVALLUR DISTRICT, TAMIL NADU.



Verified by _____ Approved by _____

REVISED FINAL DRAFT MAP

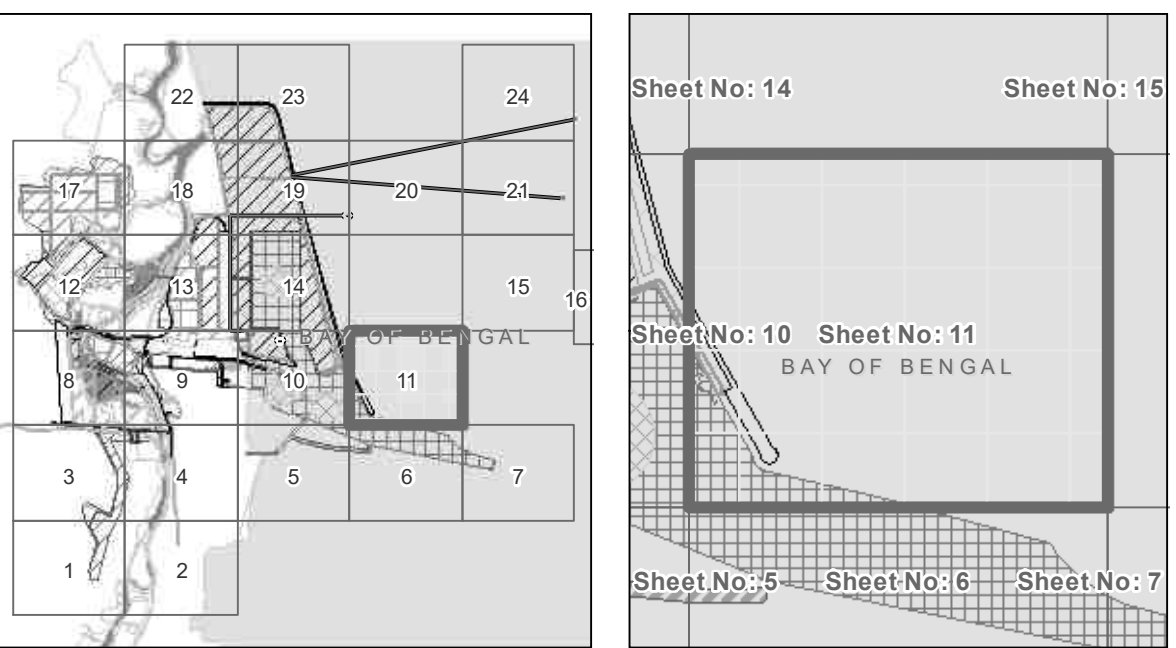
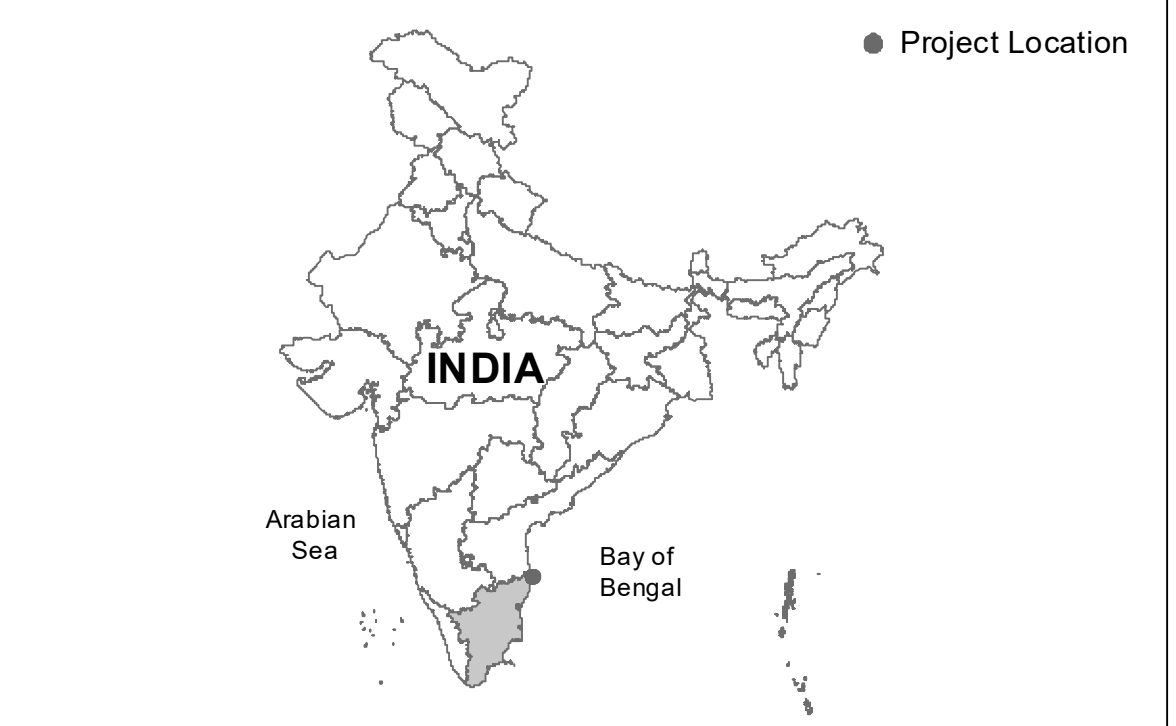
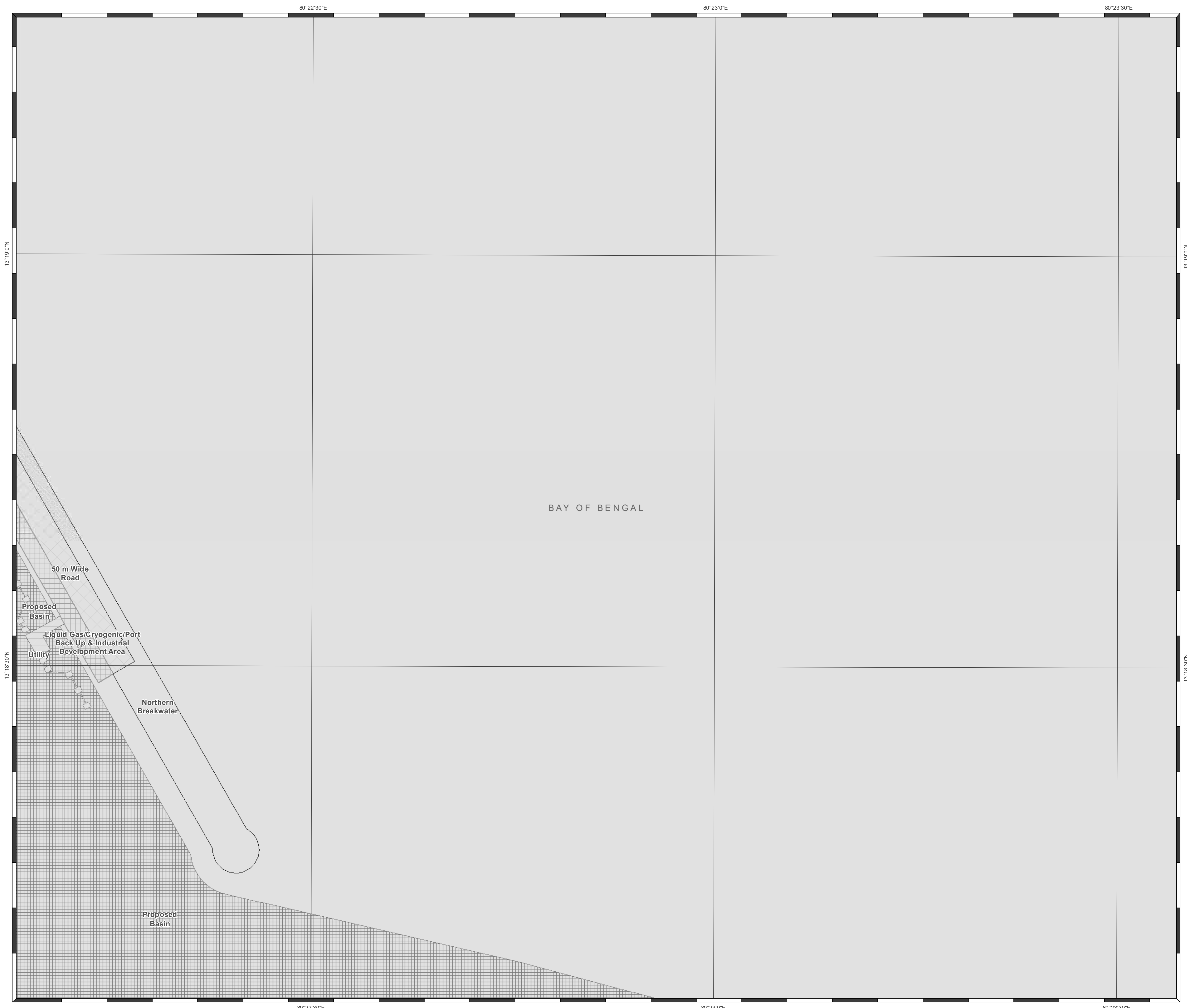


National Centre for Sustainable Coastal Management (Ministry of Environment, Forest & Climate Change) Chennai - 25

Prepared for M/s. Adani Ports & SEZ Limited

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▨ Existing Berth - 1	▨ Existing 40 m Wide Road	▨ Existing Multi Purpose	▨ Proposed SPM 2
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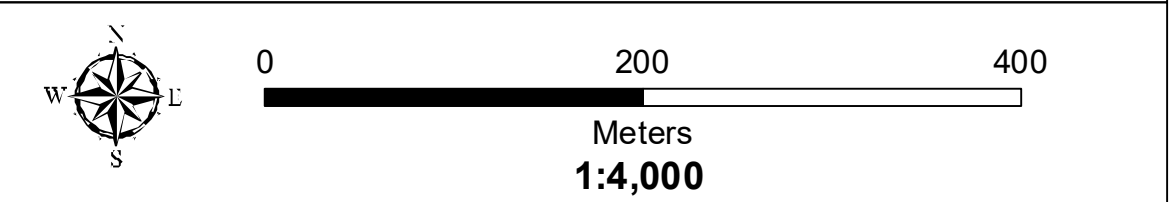
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HTL, LTL AND CRZ FOR THE PROPOSED EXPANSION OF KATTUPALLI PORT, KATTUPALLI VILLAGE, PONNERI TALUK, TIRUVALLUR DISTRICT, TAMIL NADU.



Verified by _____ Approved by _____

REVISED FINAL DRAFT MAP

Prepared by



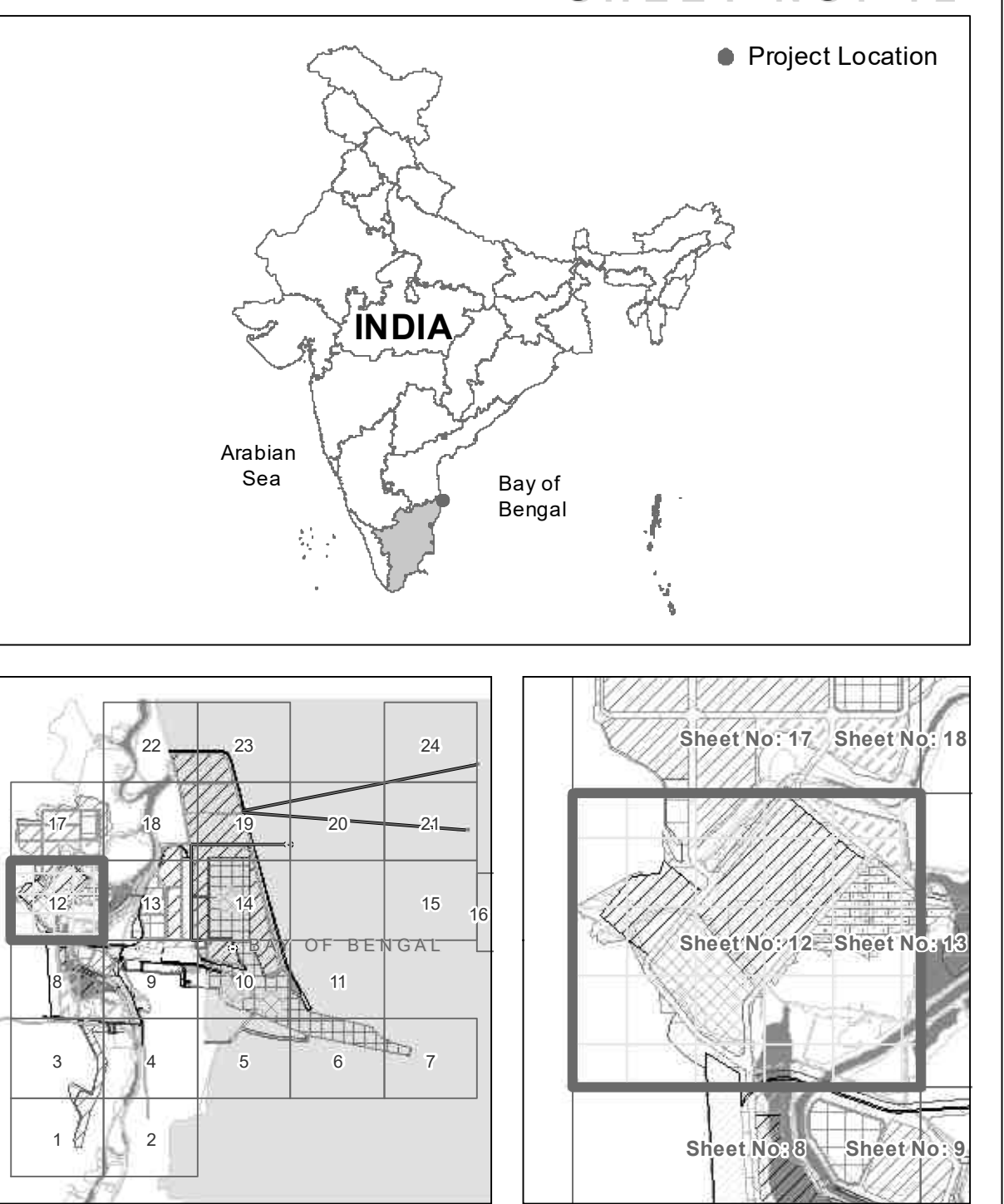
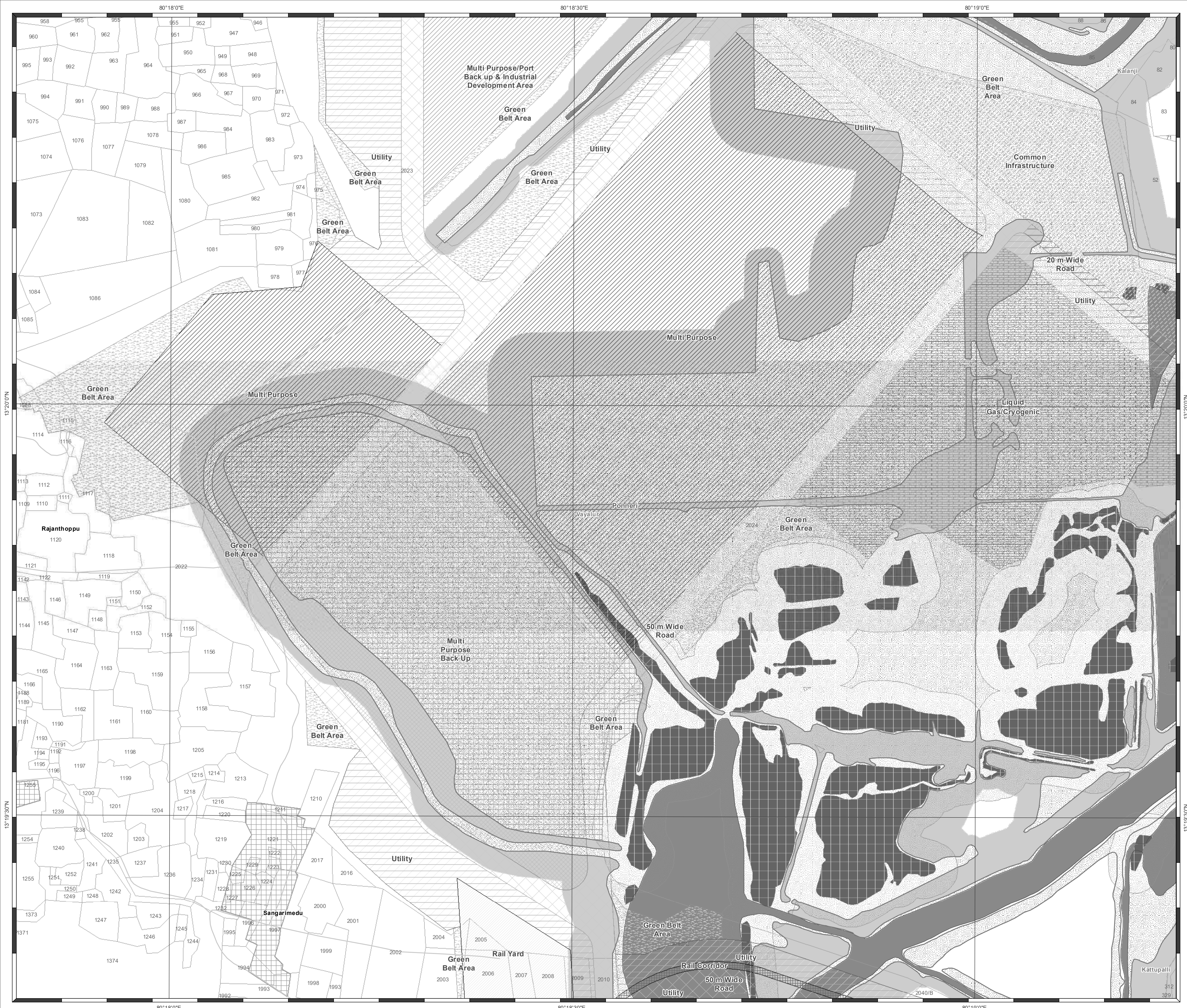
National Centre for Sustainable Coastal Management
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Chennai - 25

Prepared for

M/s. Adani Ports & SEZ Limited

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				▨ Proposed ROB	▨ Proposed Multi Purpose Back Up
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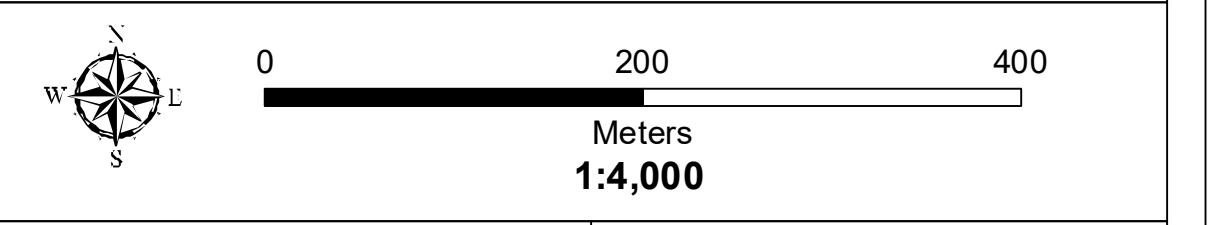
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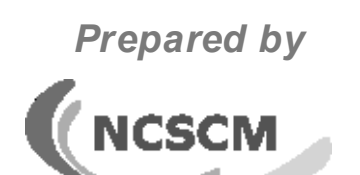
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REVISED FINAL DRAFT MAP

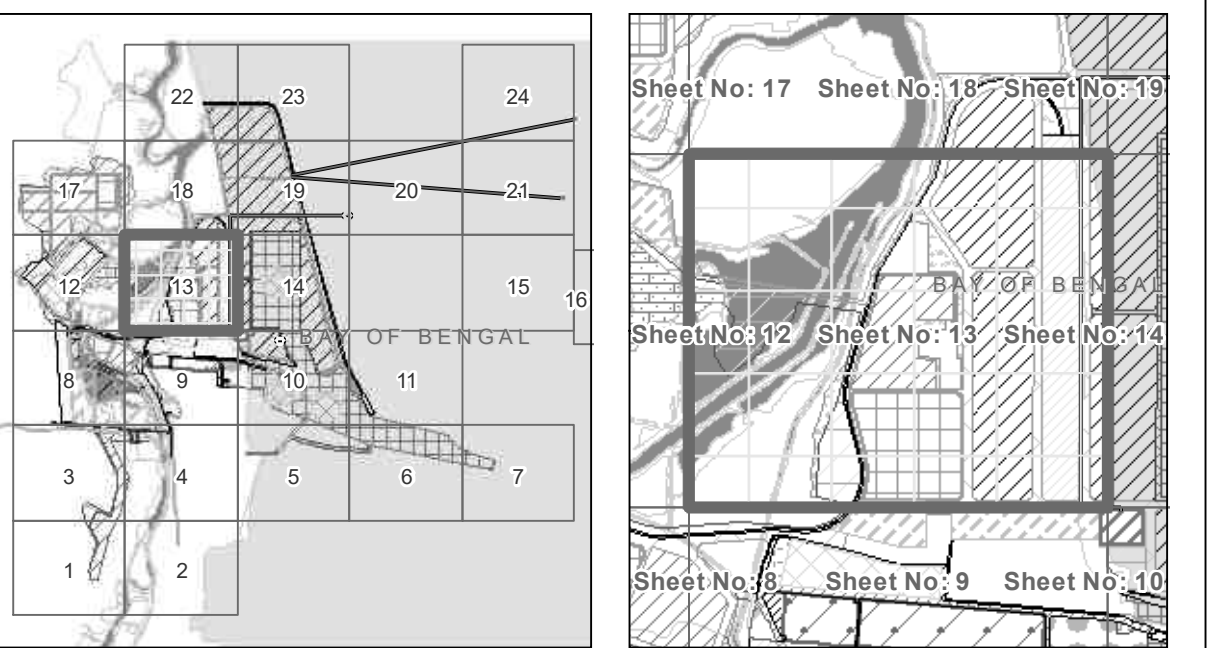
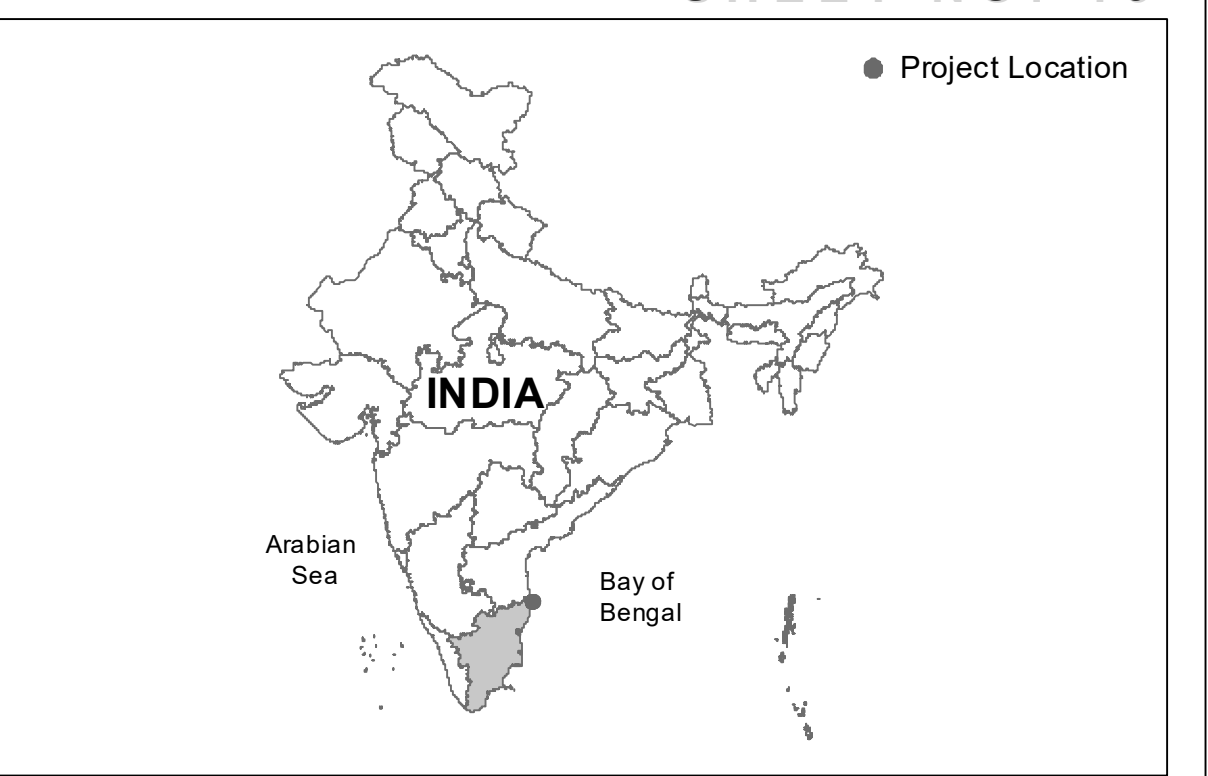
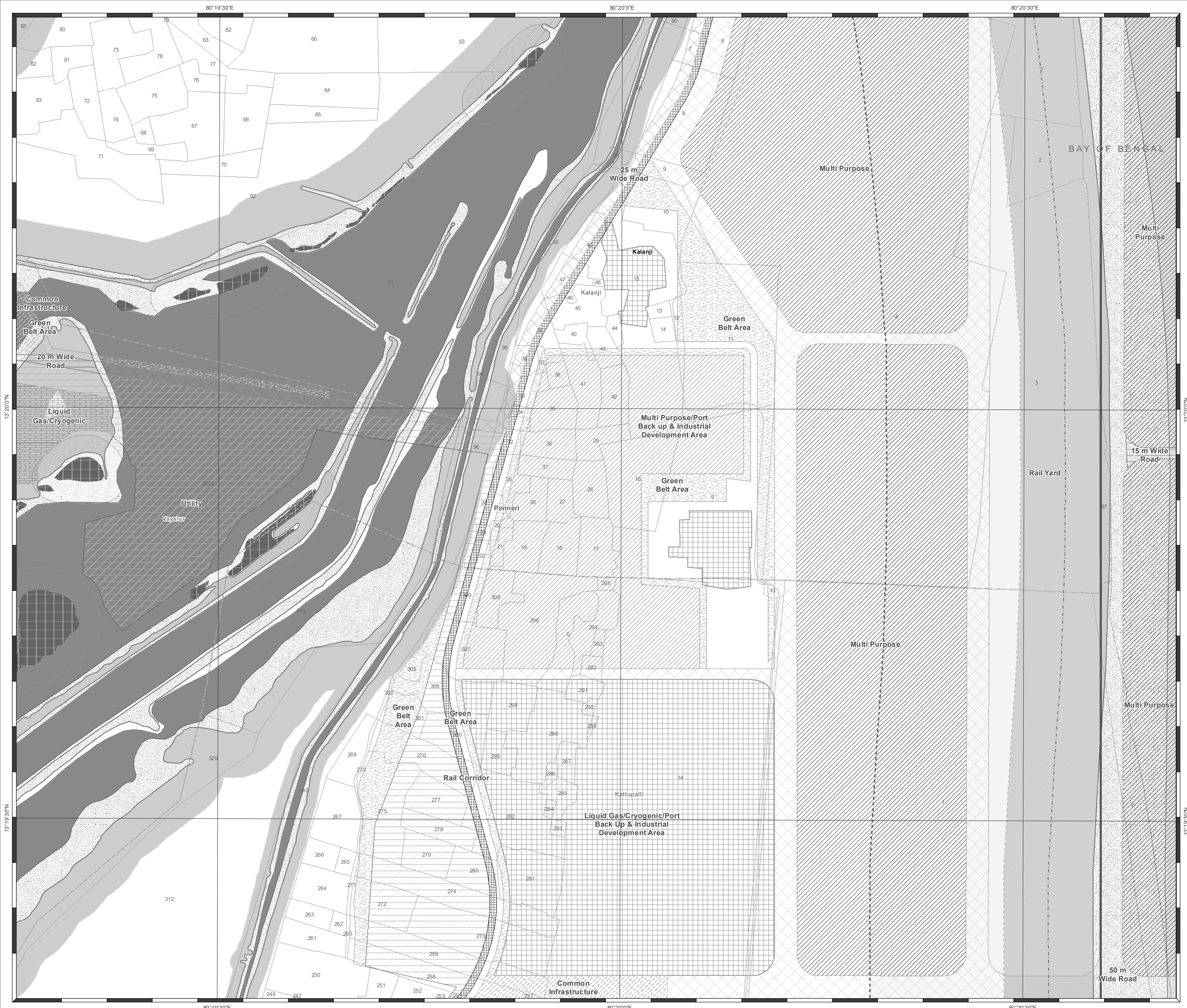


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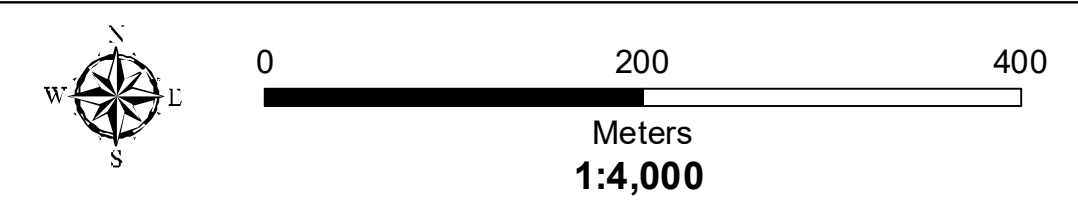
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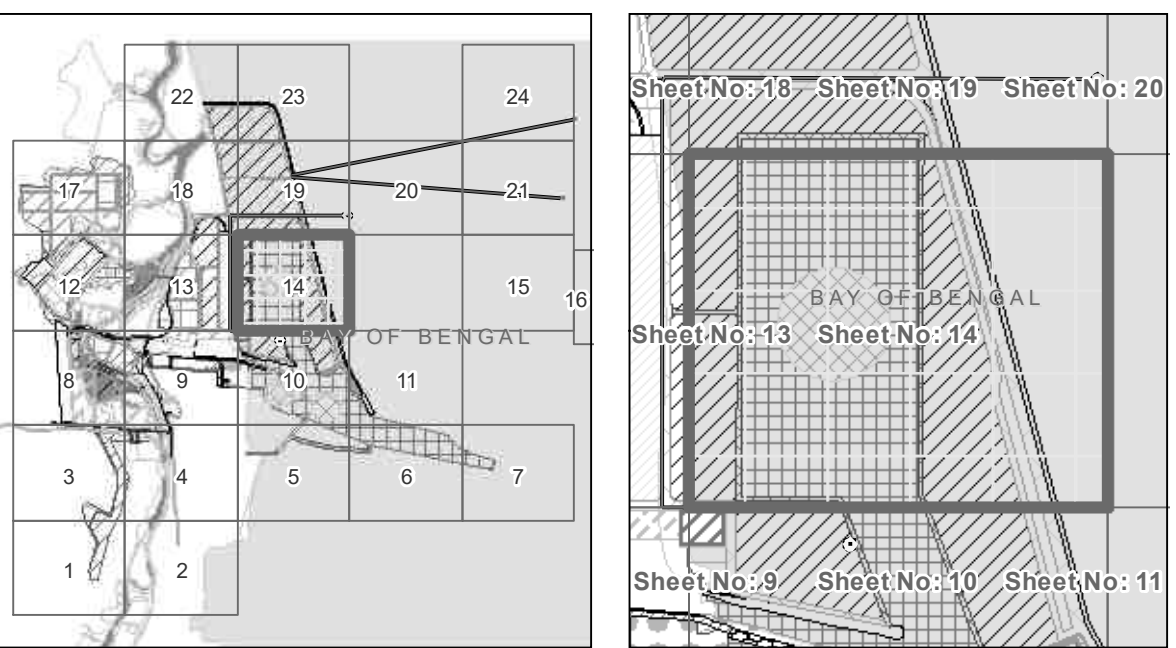
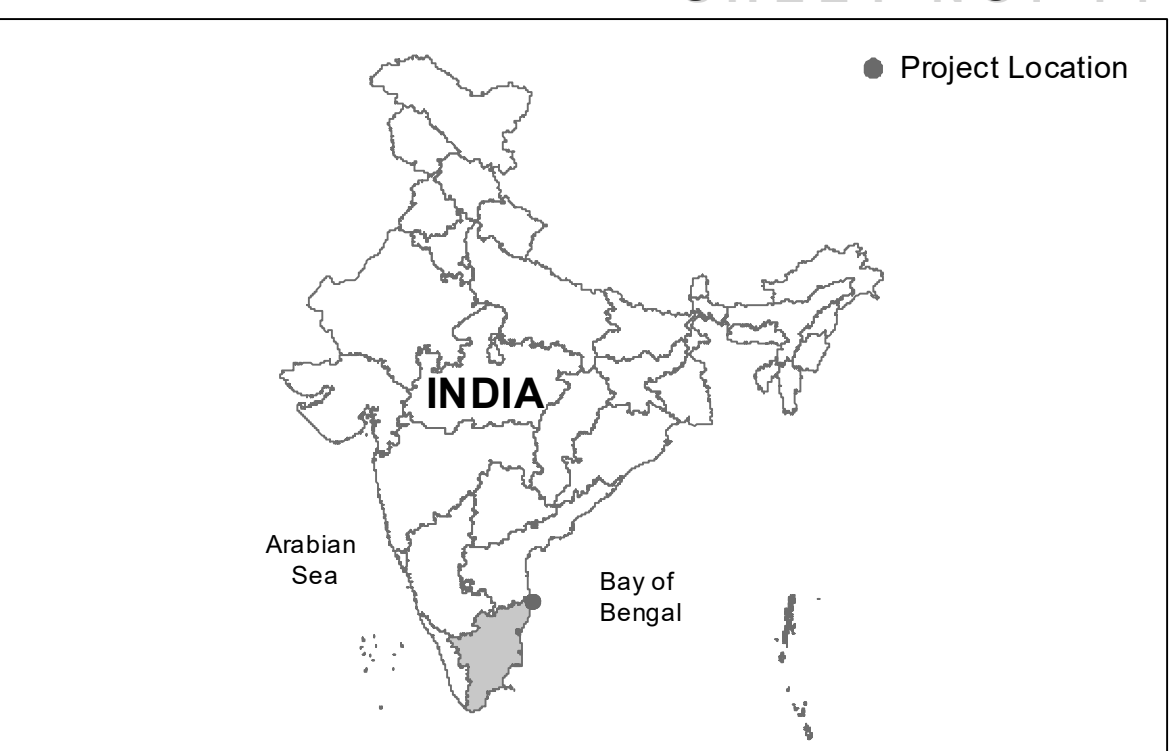
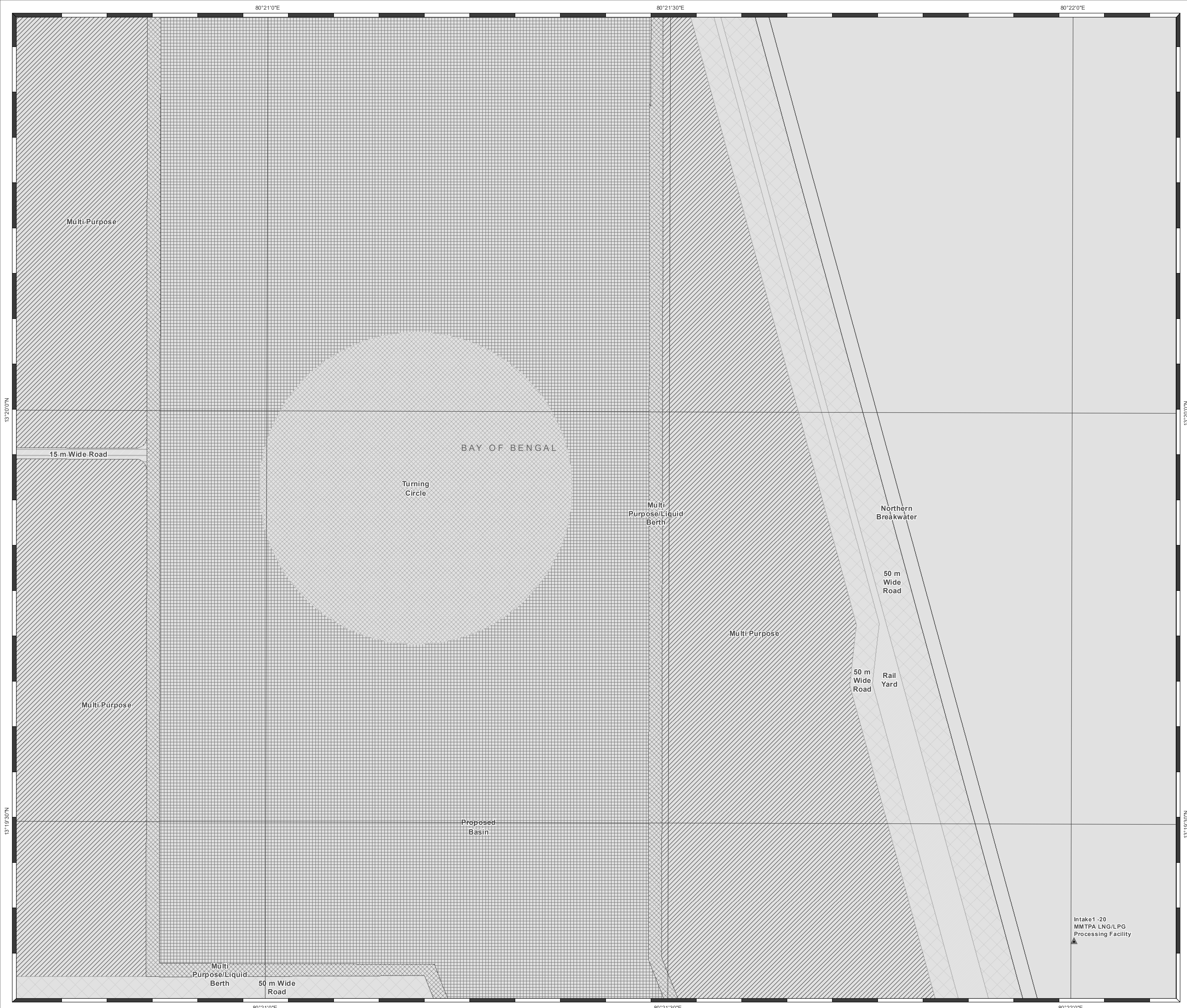
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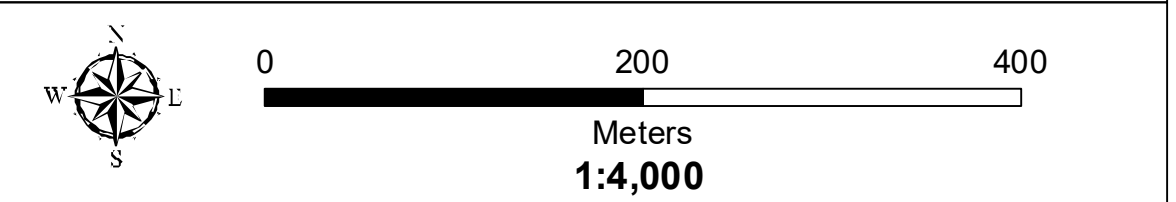
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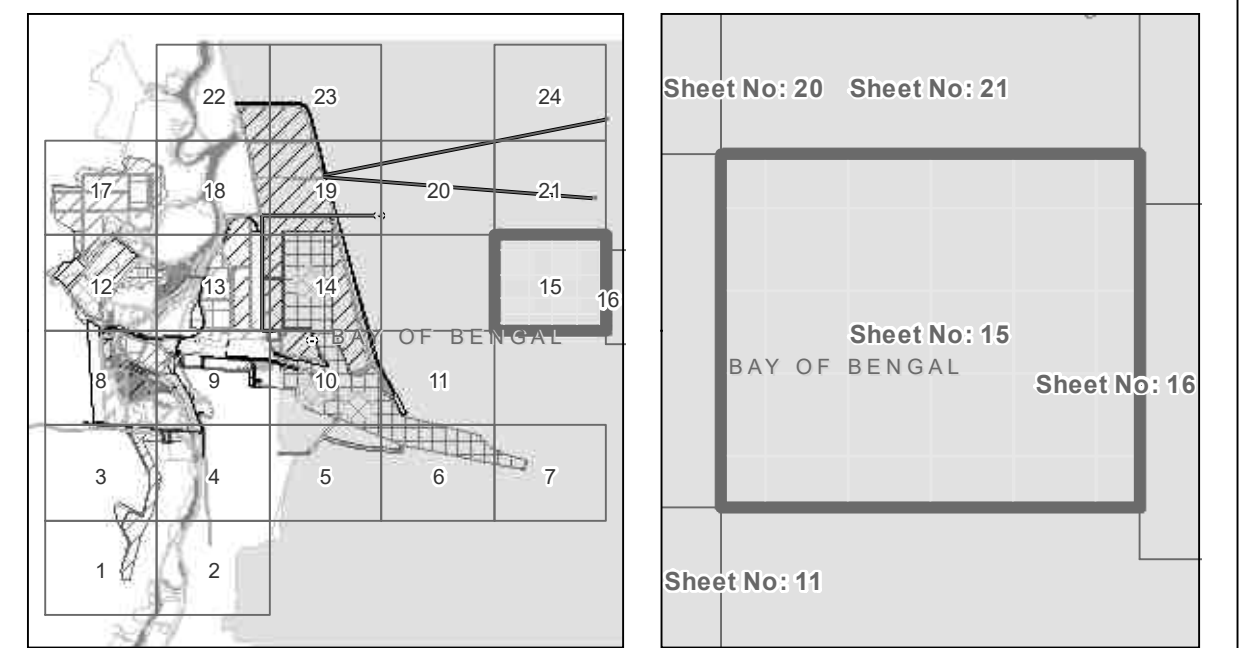
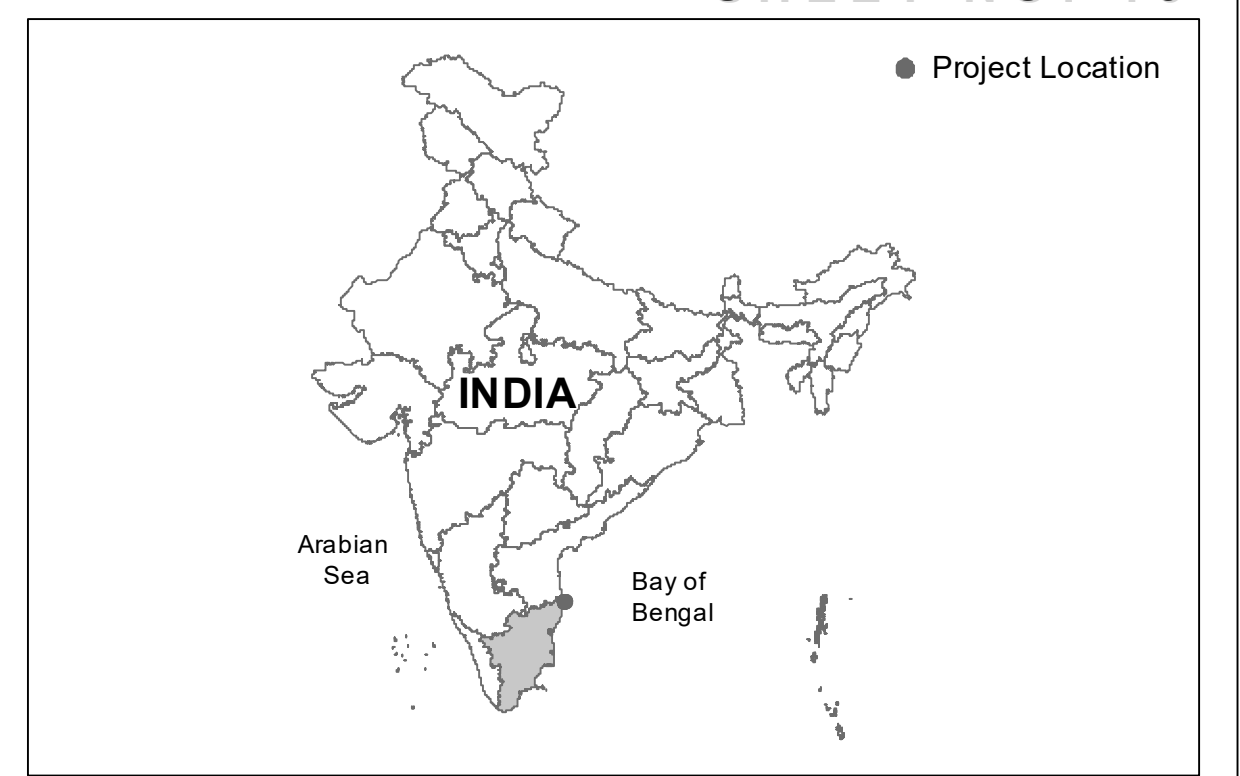
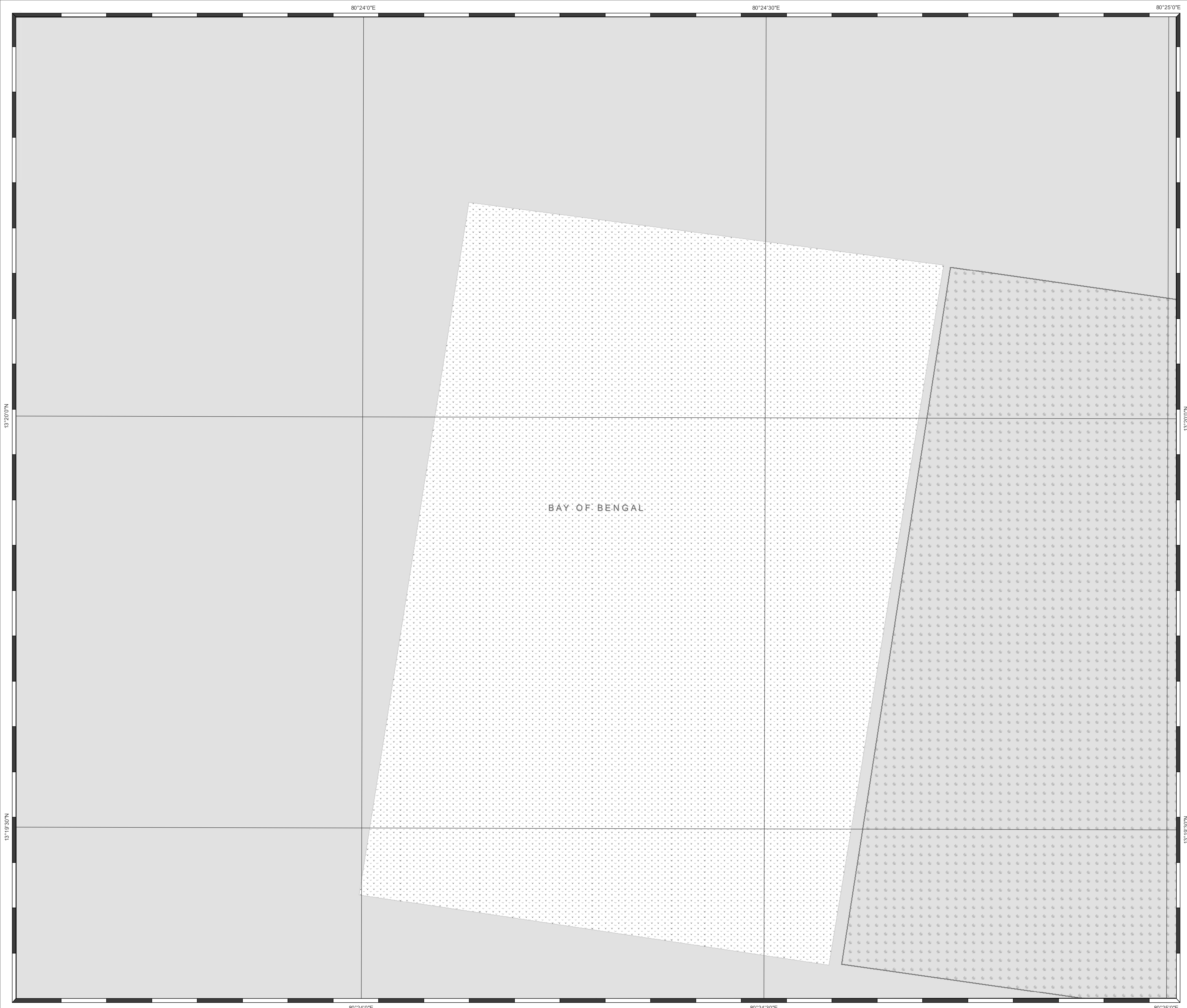


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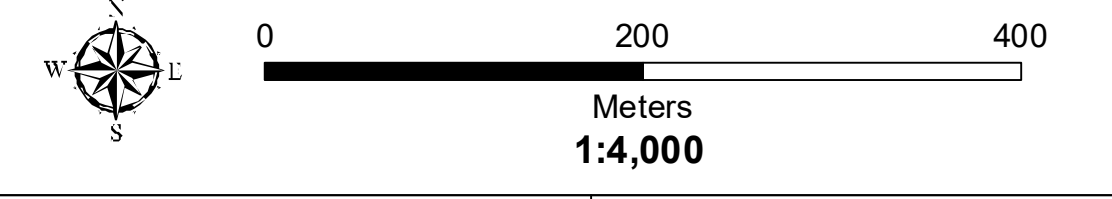


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HTL, LTL AND CRZ FOR THE PROPOSED EXPANSION OF KATTUPALLI PORT, KATTUPALLI VILLAGE, PONNERI TALUK, TIRUVALLUR DISTRICT, TAMIL NADU.



Verified by _____ Approved by _____

REVISED FINAL DRAFT MAP

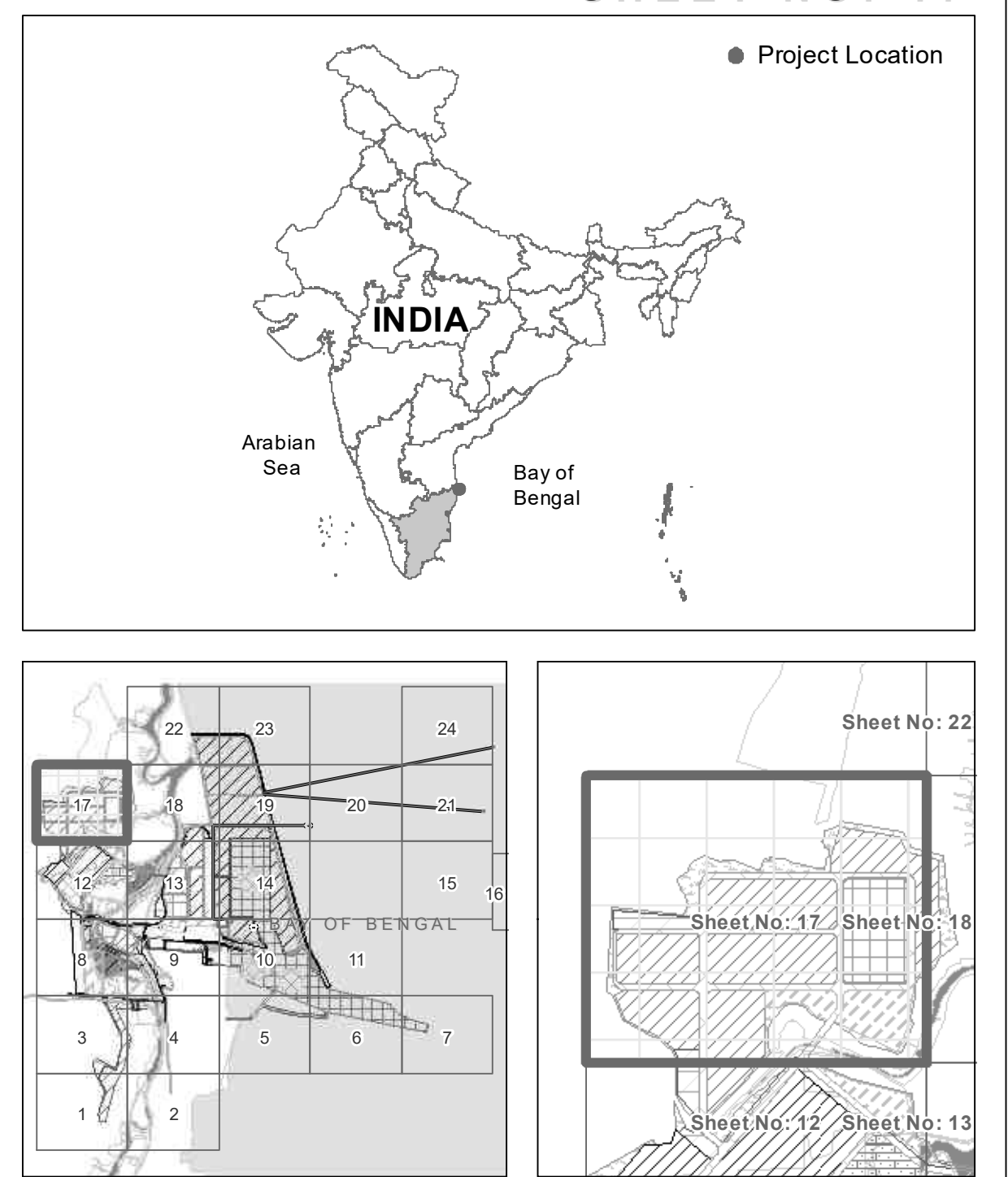


Prepared by
National Centre for Sustainable Coastal Management
(Ministry of Environment, Forest & Climate Change)
Chennai - 25

Prepared for
M/s. Adani Ports & SEZ Limited

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Figure 2: CRZ Map of the Proposed Project Site (For Details Refer Report No. NCSCM/GEO/CRZ/2022/00)

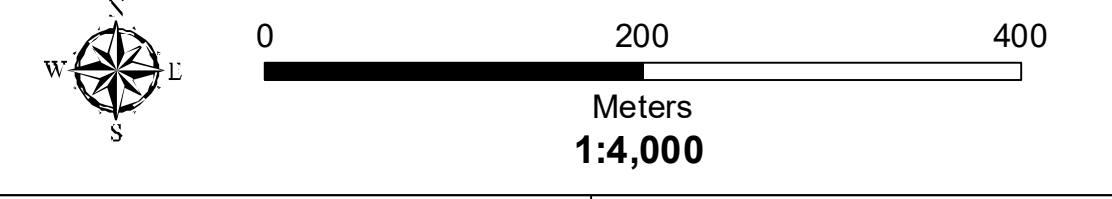


Mapped During: November,2020 & January, 2021

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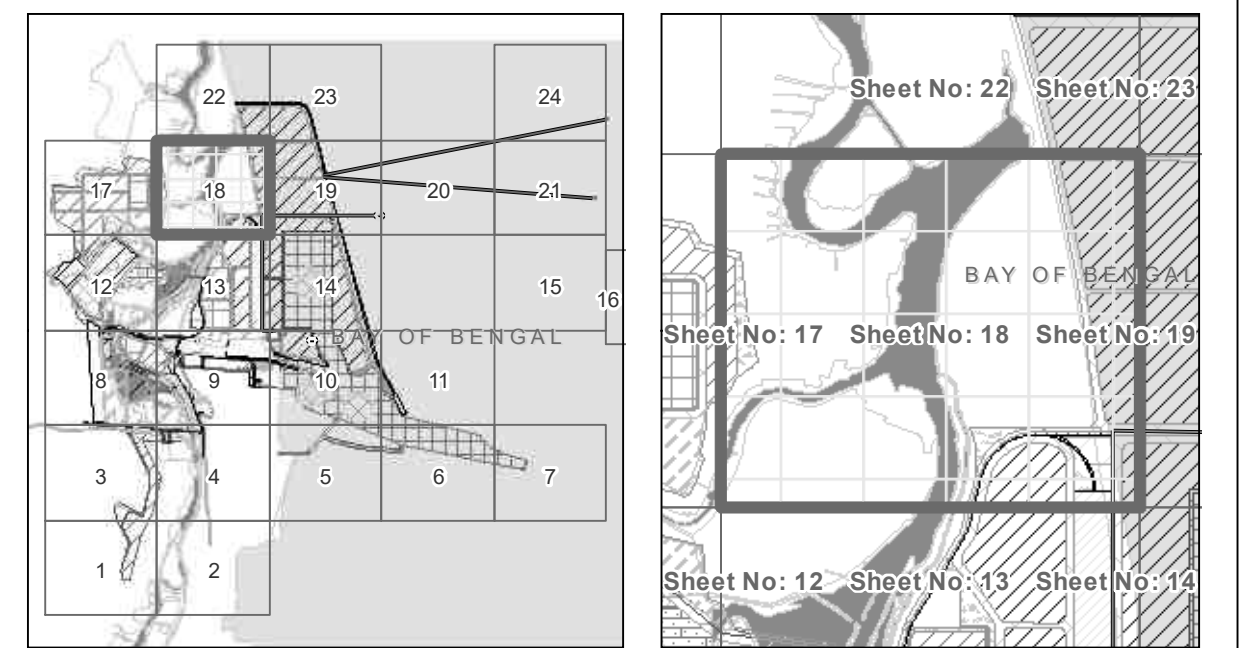
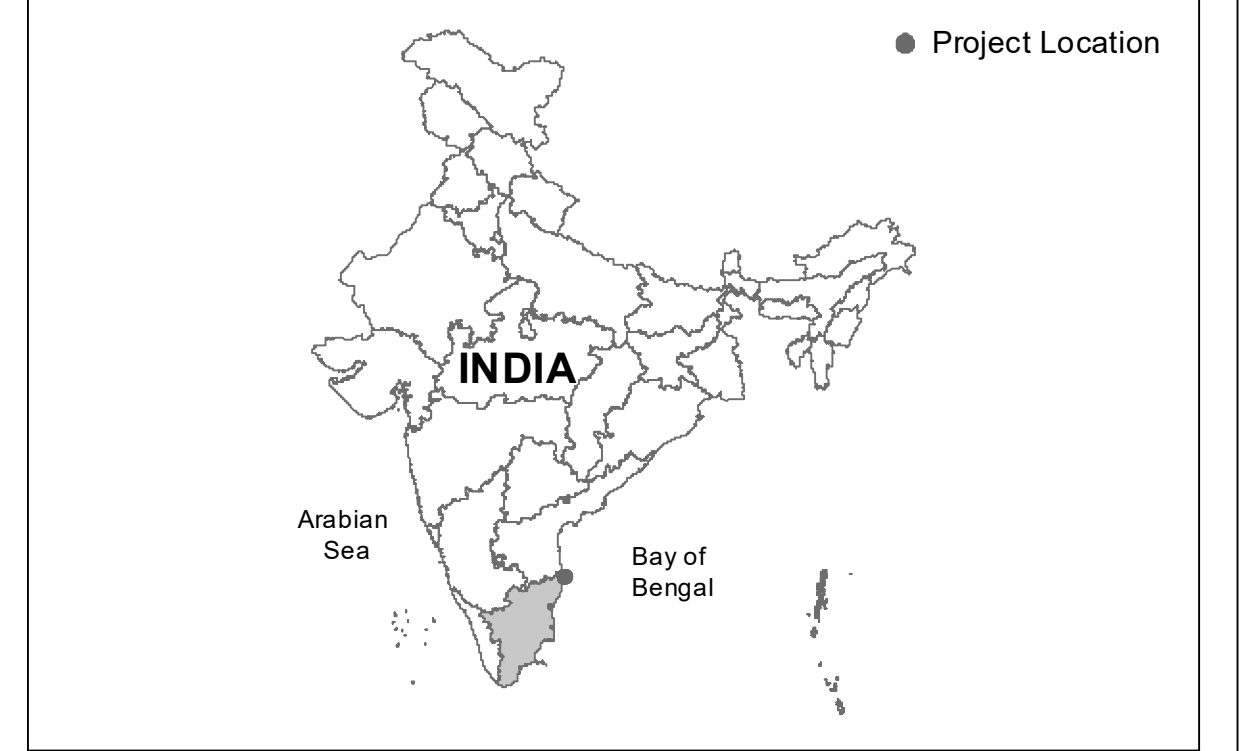
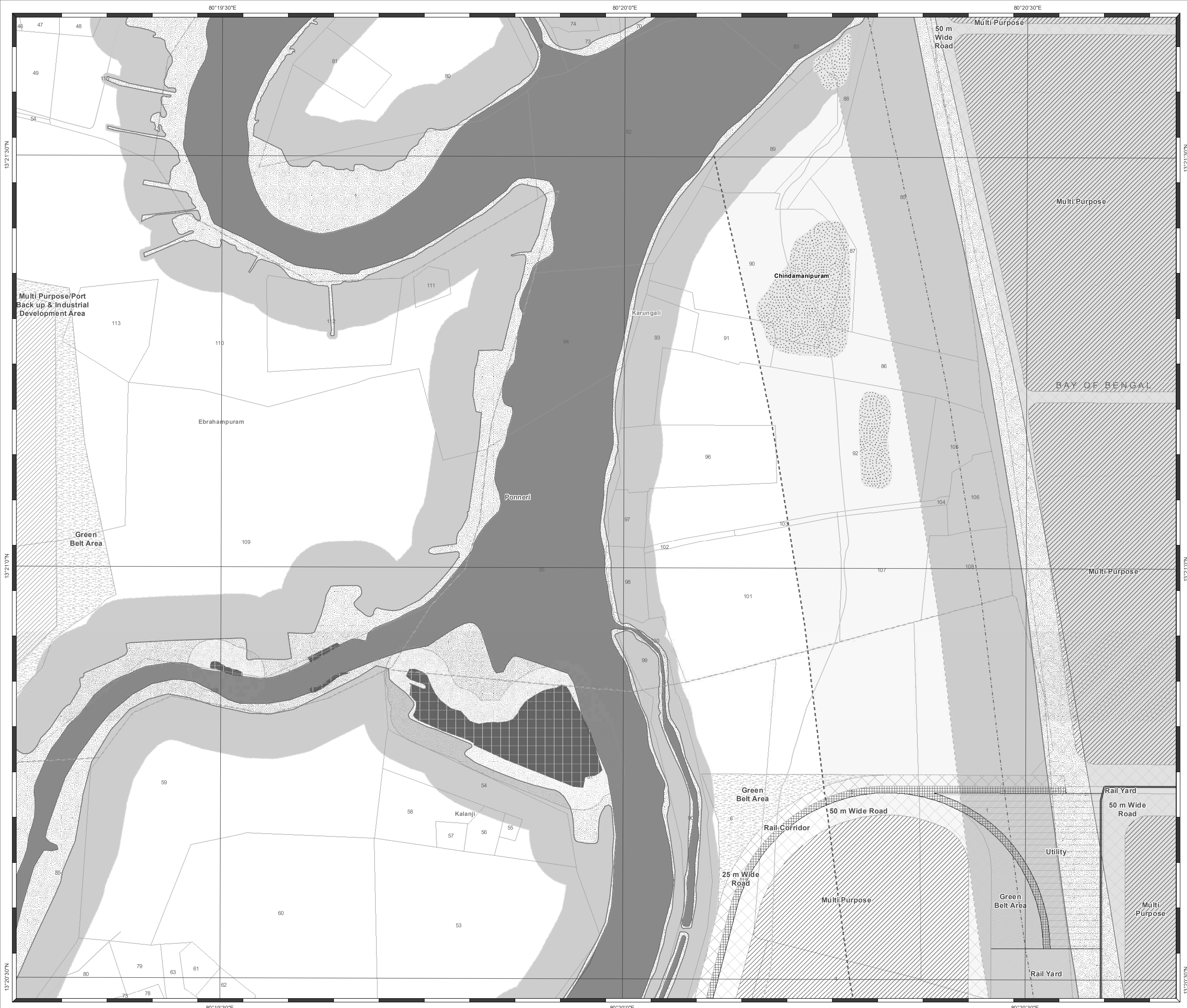


National Centre for Sustainable Coastal Management (Ministry of Environment, Forest & Climate Change) Chennai - 25

Prepared for M/s. Adani Ports & SEZ Limited

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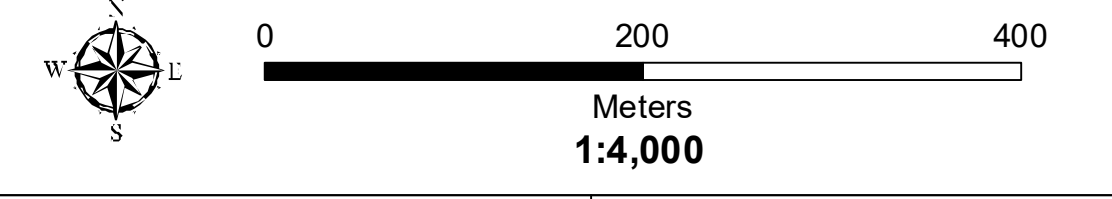


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Verified by _____ Approved by _____

REVISED FINAL DRAFT MAP

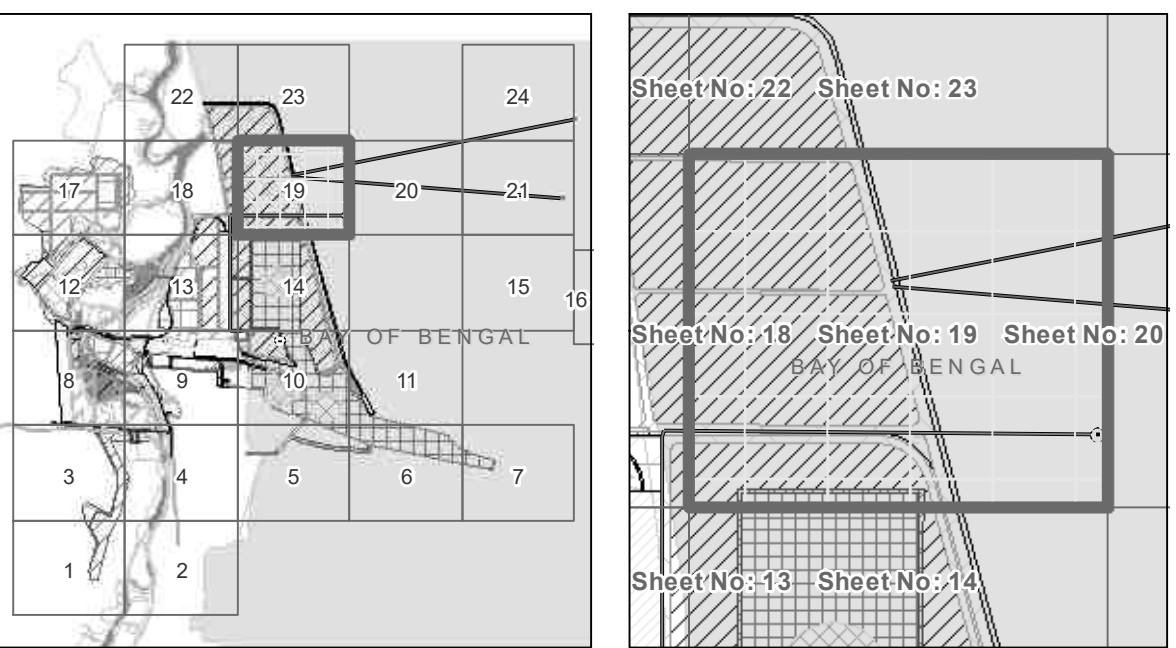
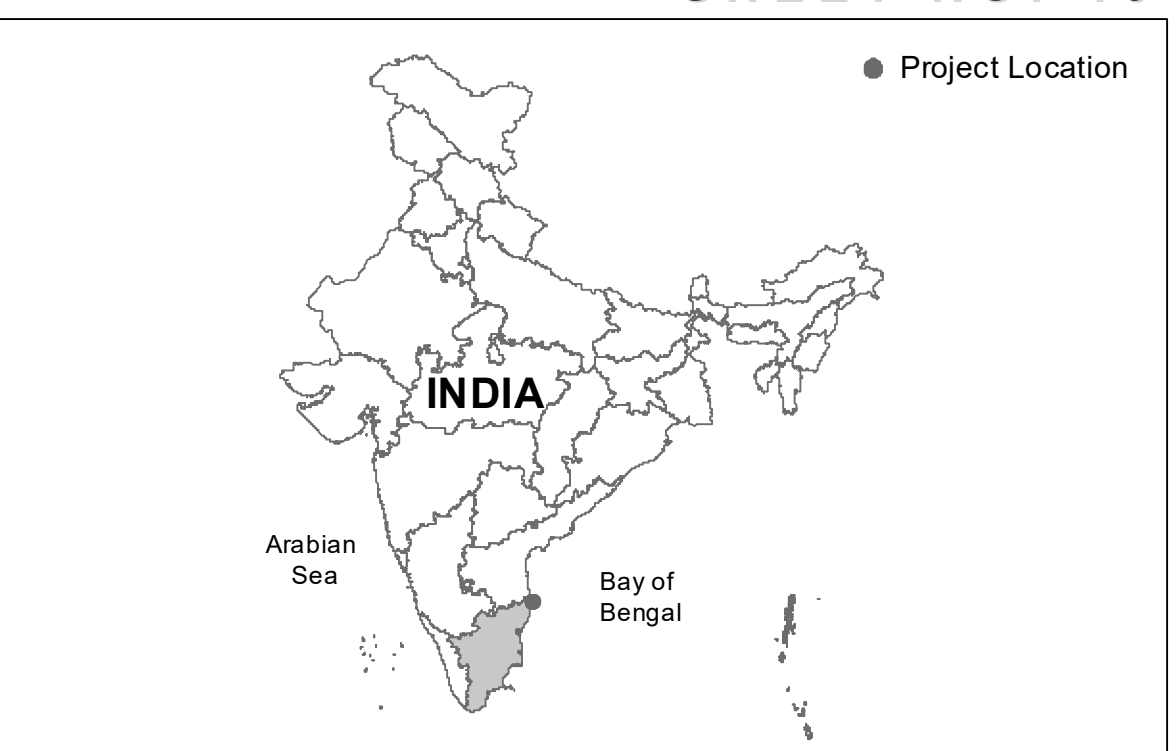
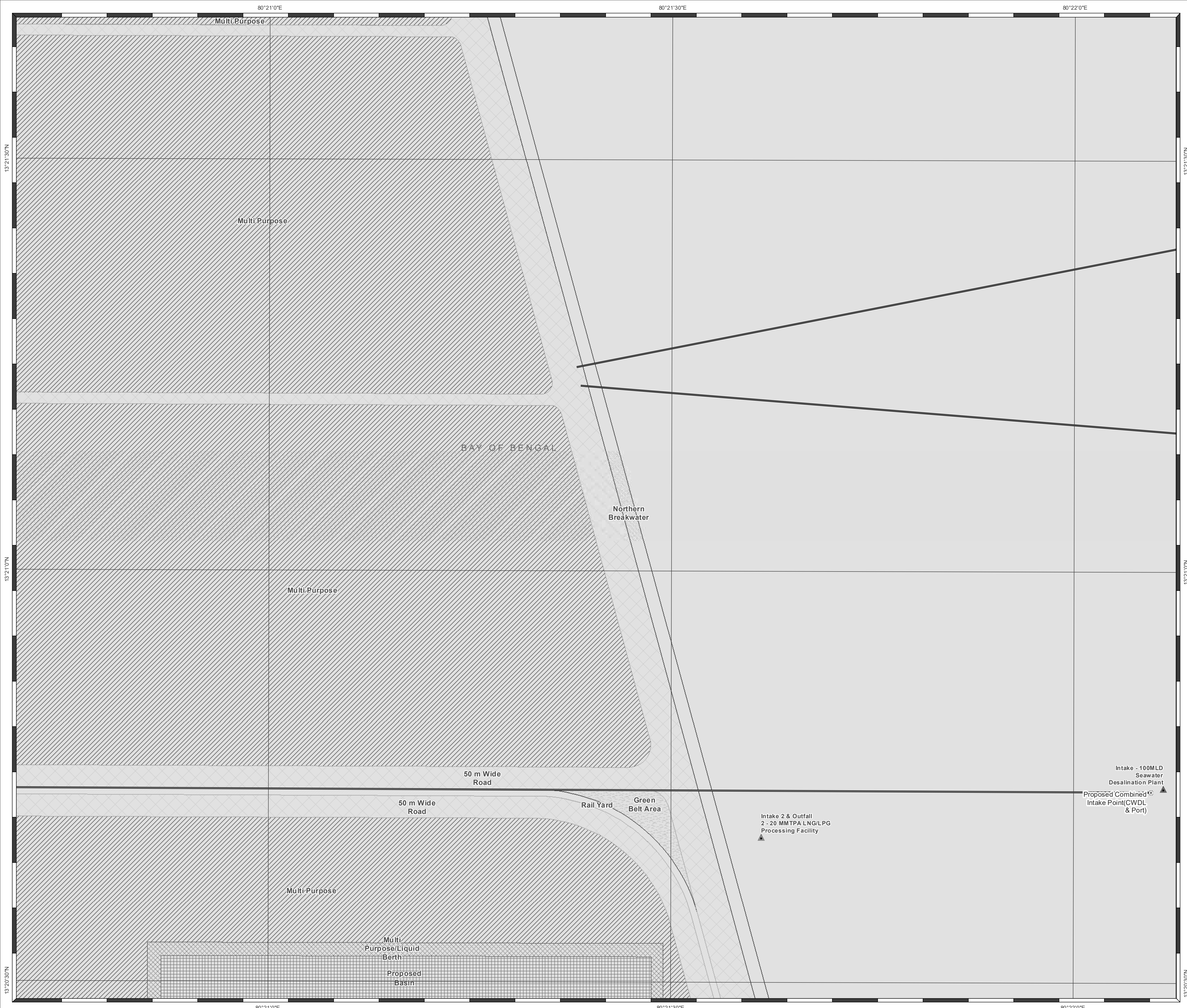


National Centre for Sustainable Coastal Management
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Chennai - 25

Prepared for
M/s. Adani Ports & SEZ Limited

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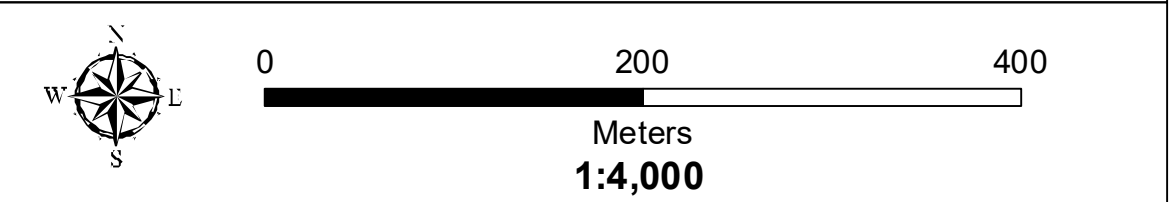
Mapped During: November, 2020 & January, 2021

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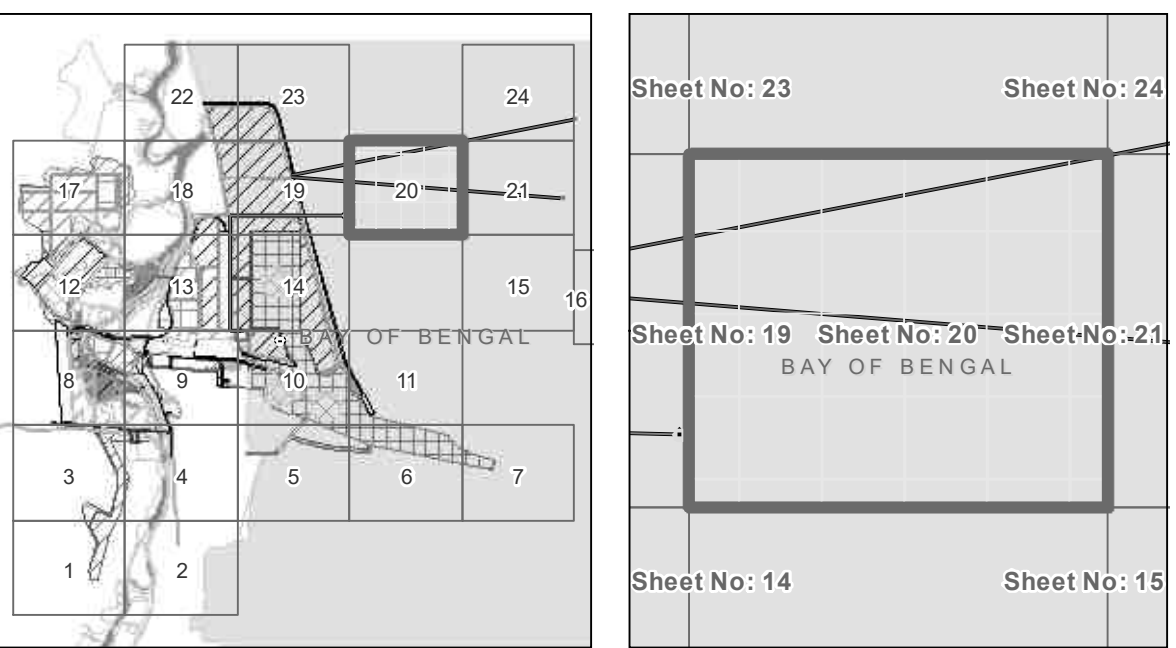
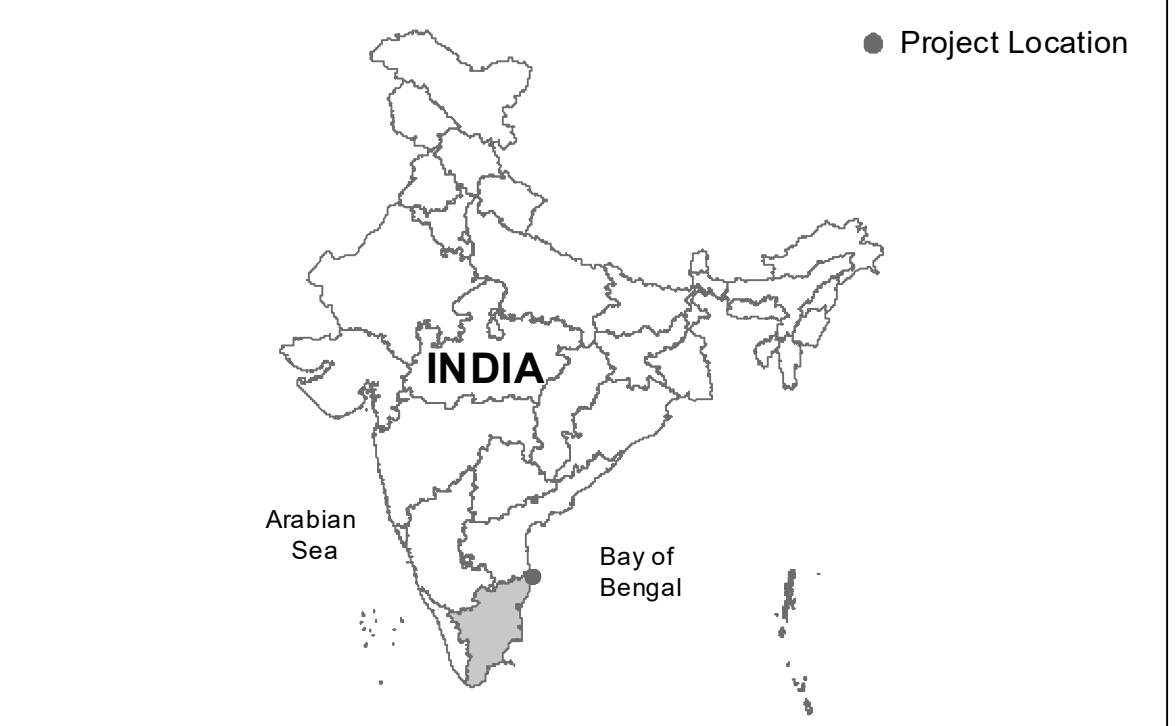
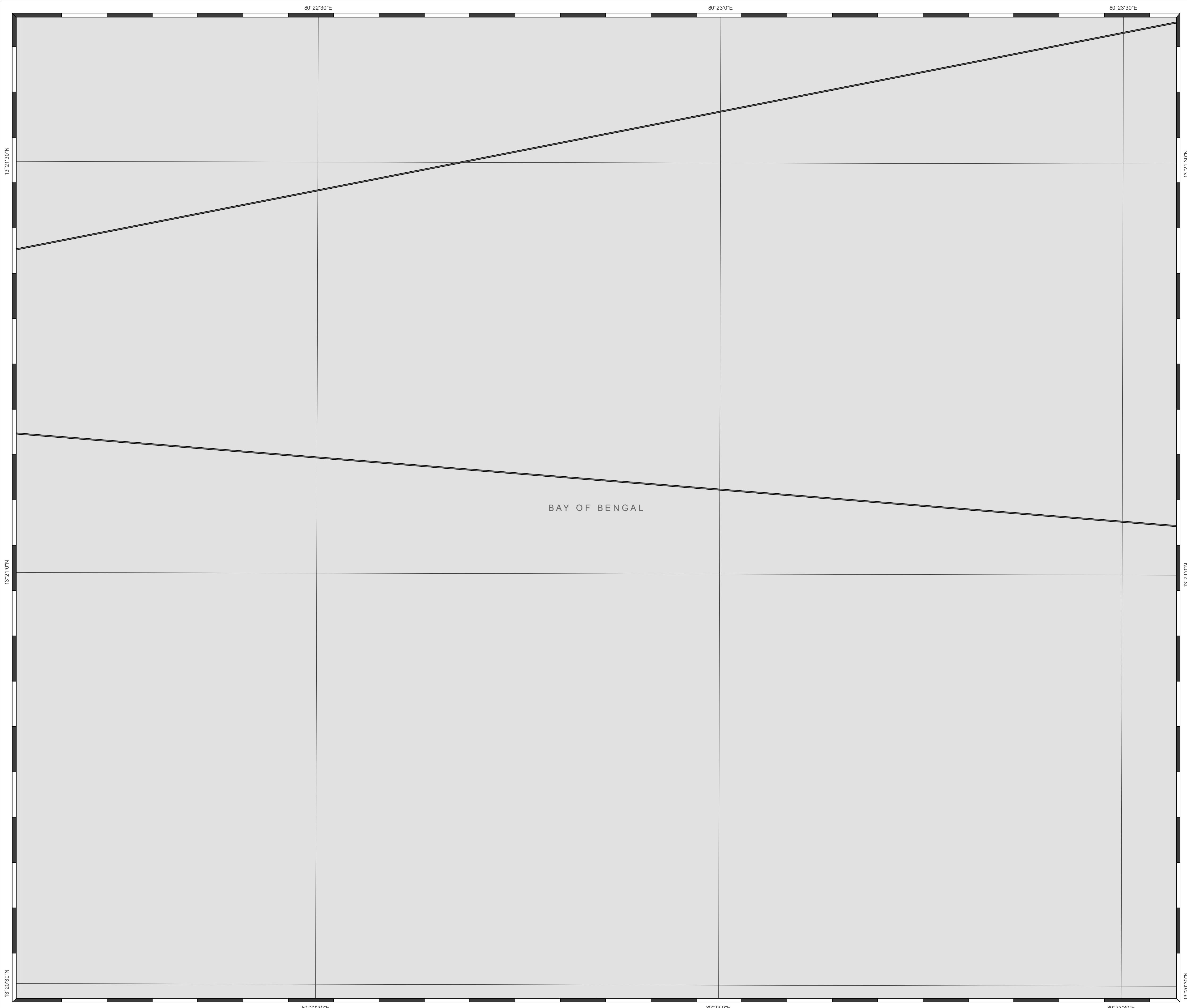
REVISED FINAL DRAFT MAP

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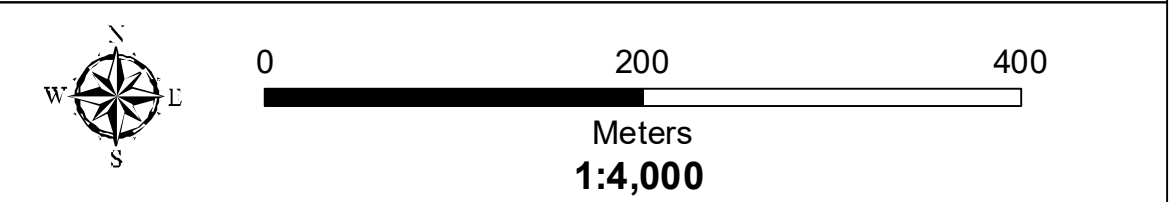
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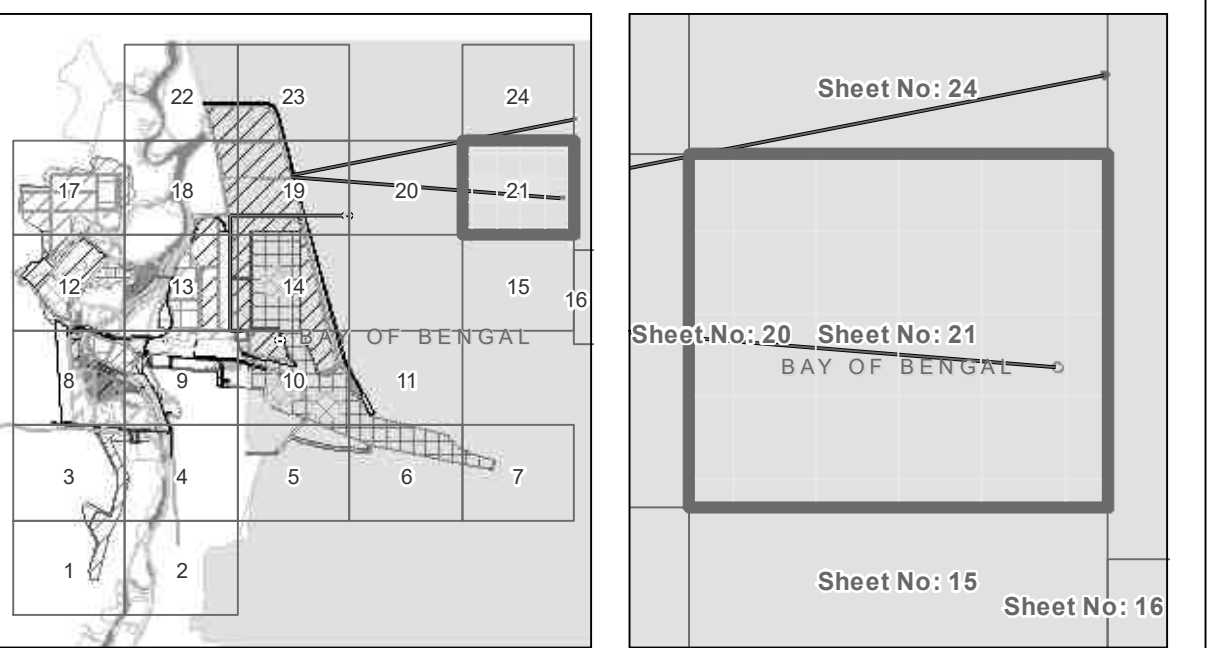
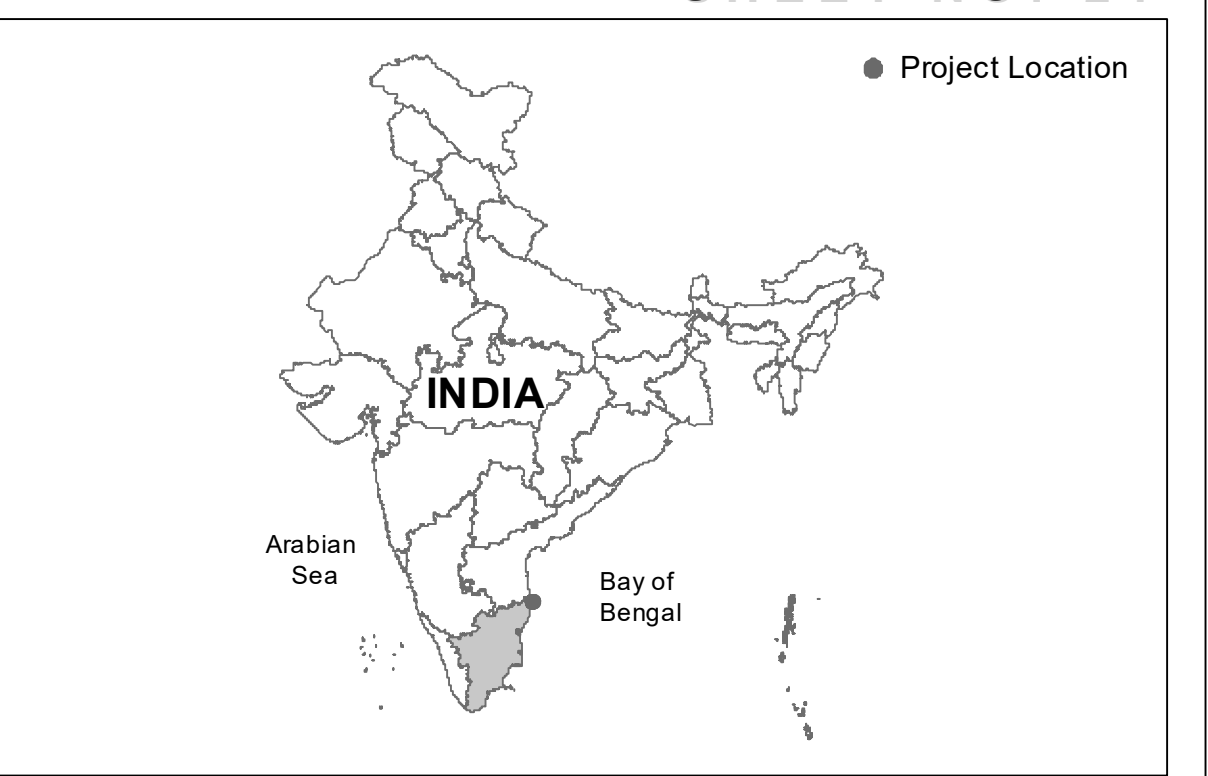
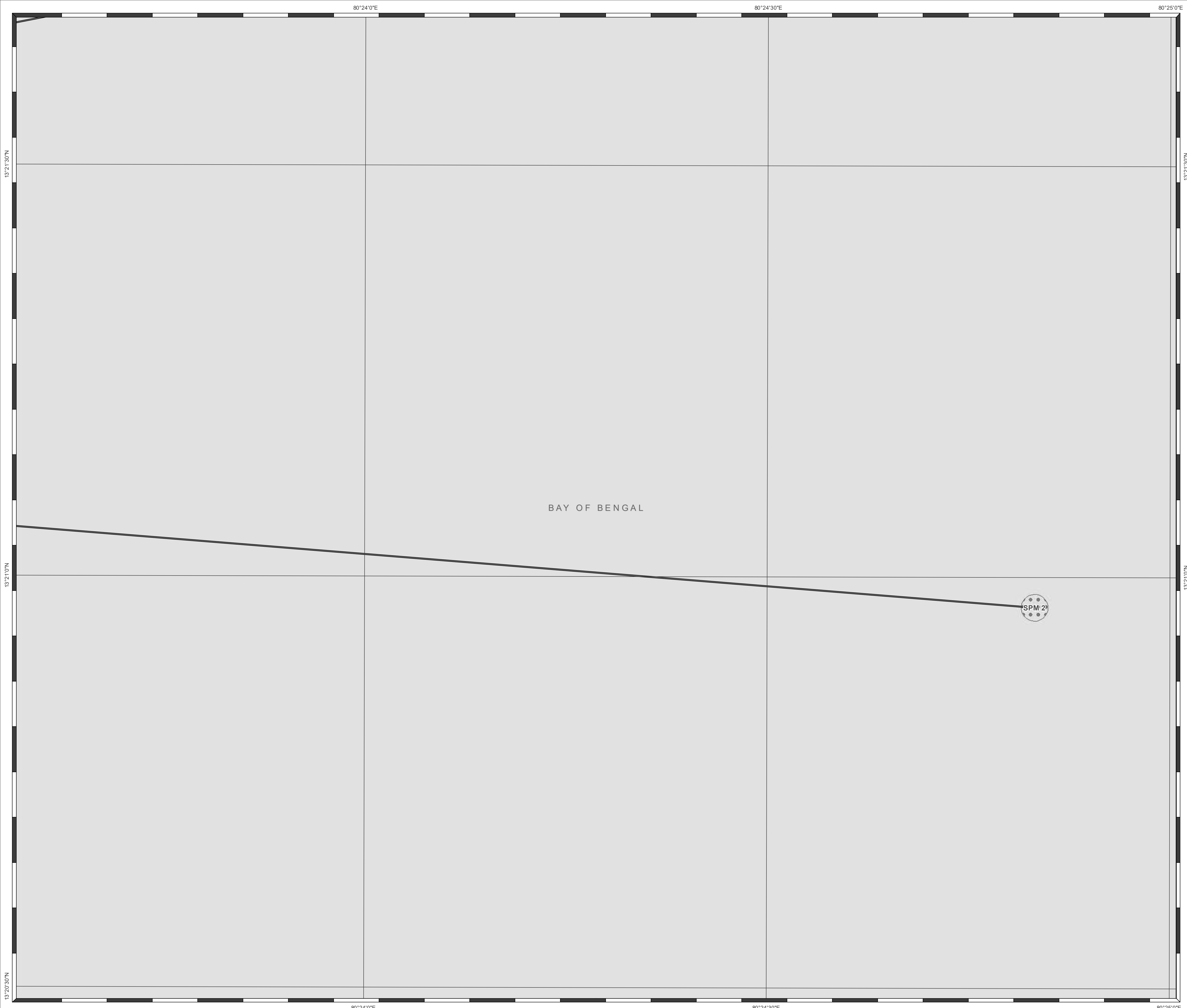
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M/s. Adani Ports & SEZ Limited

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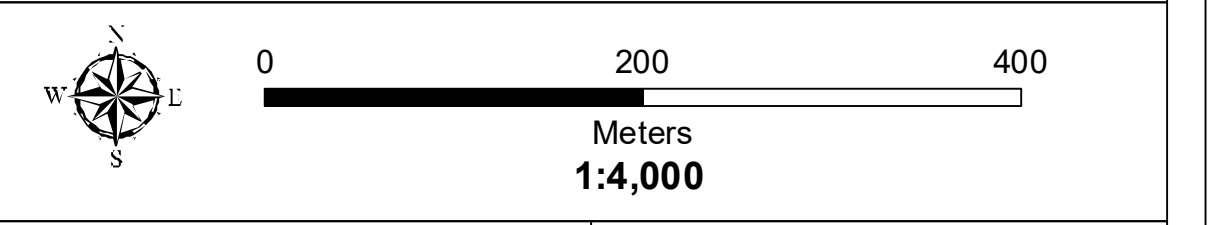
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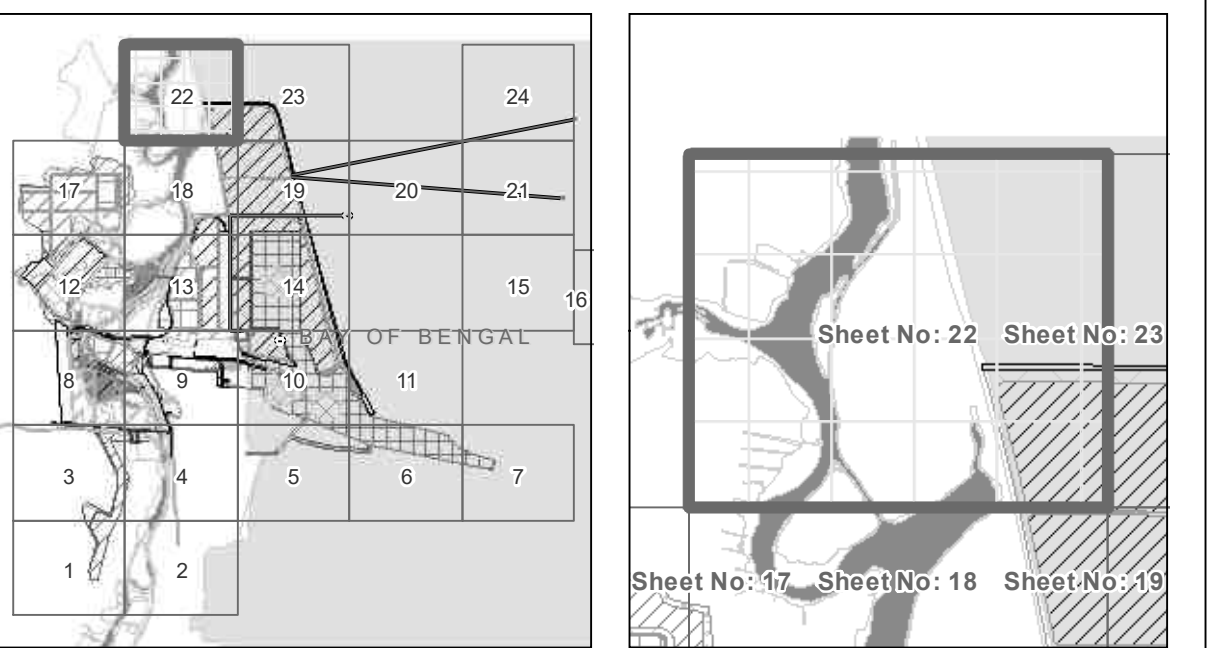
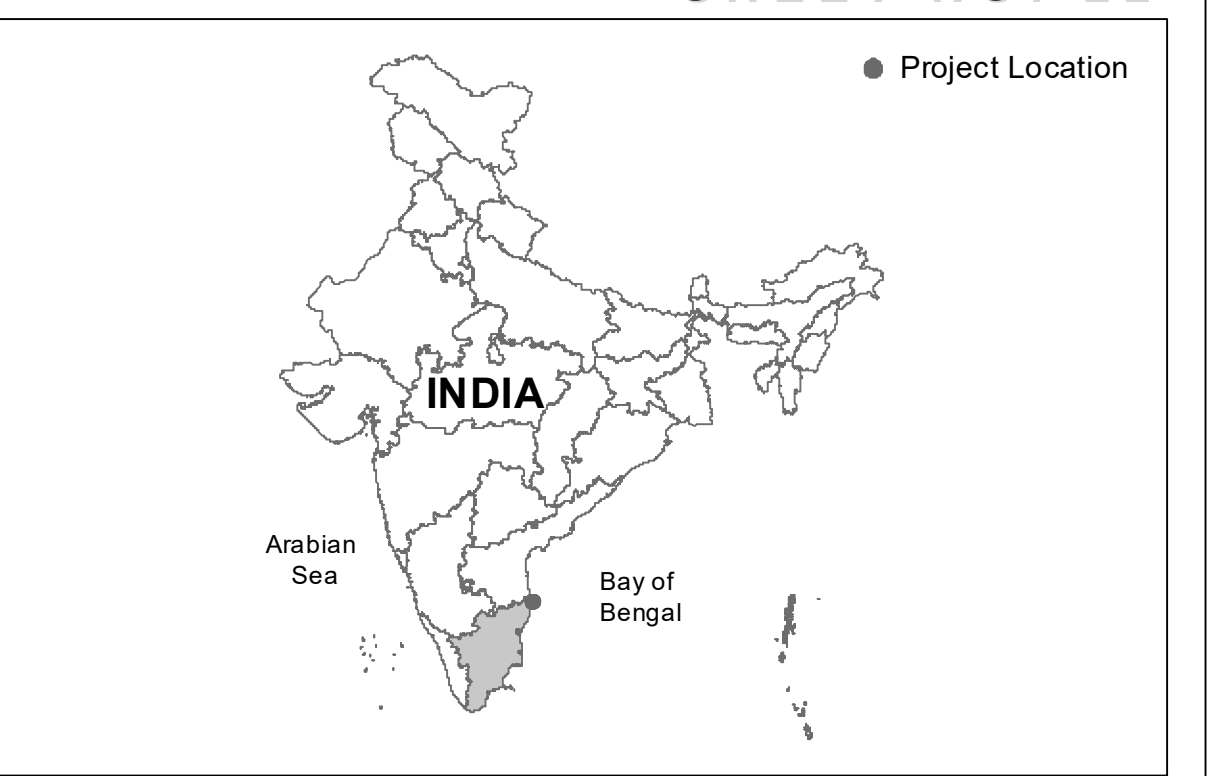
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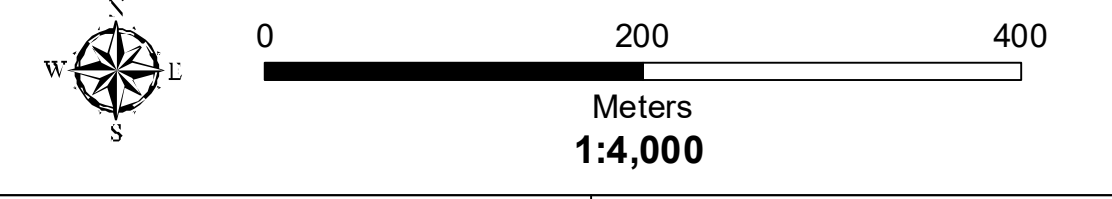
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- Survey Plots
- ▨ Village Boundary
- ▨ Chennai Metro City Boundary
- ▨ Taluk Boundary

Prepared in accordance with the approved CZMP of Tamil Nadu State as per CRZ Notification, 2011

HTL, LTL AND CRZ FOR THE PROPOSED EXPANSION OF KATTUPALLI PORT, KATTUPALLI VILLAGE, PONNERI TALUK, TIRUVALLUR DISTRICT, TAMIL NADU.



Verified by _____ Approved by _____

REVISED FINAL DRAFT MAP

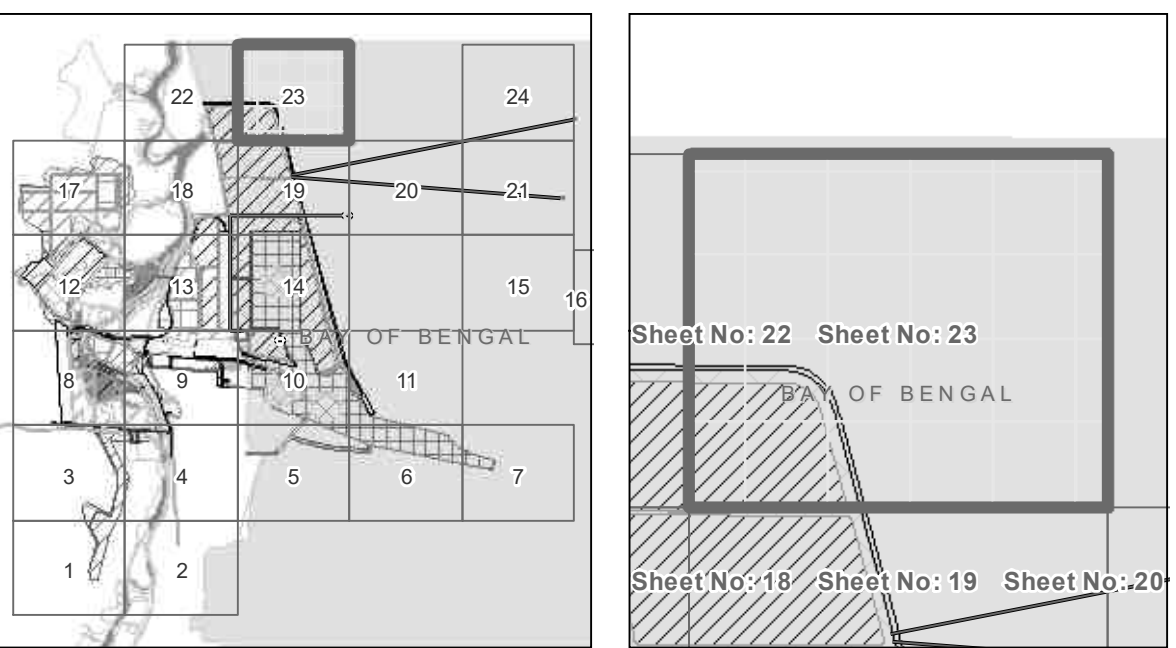
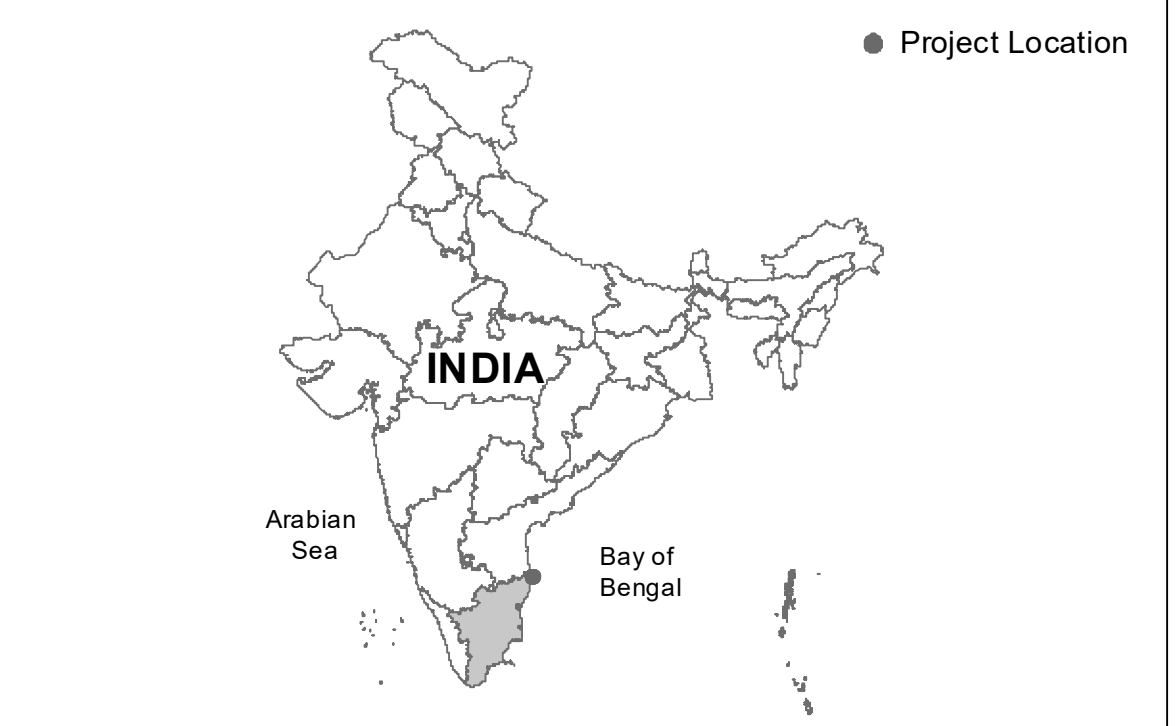
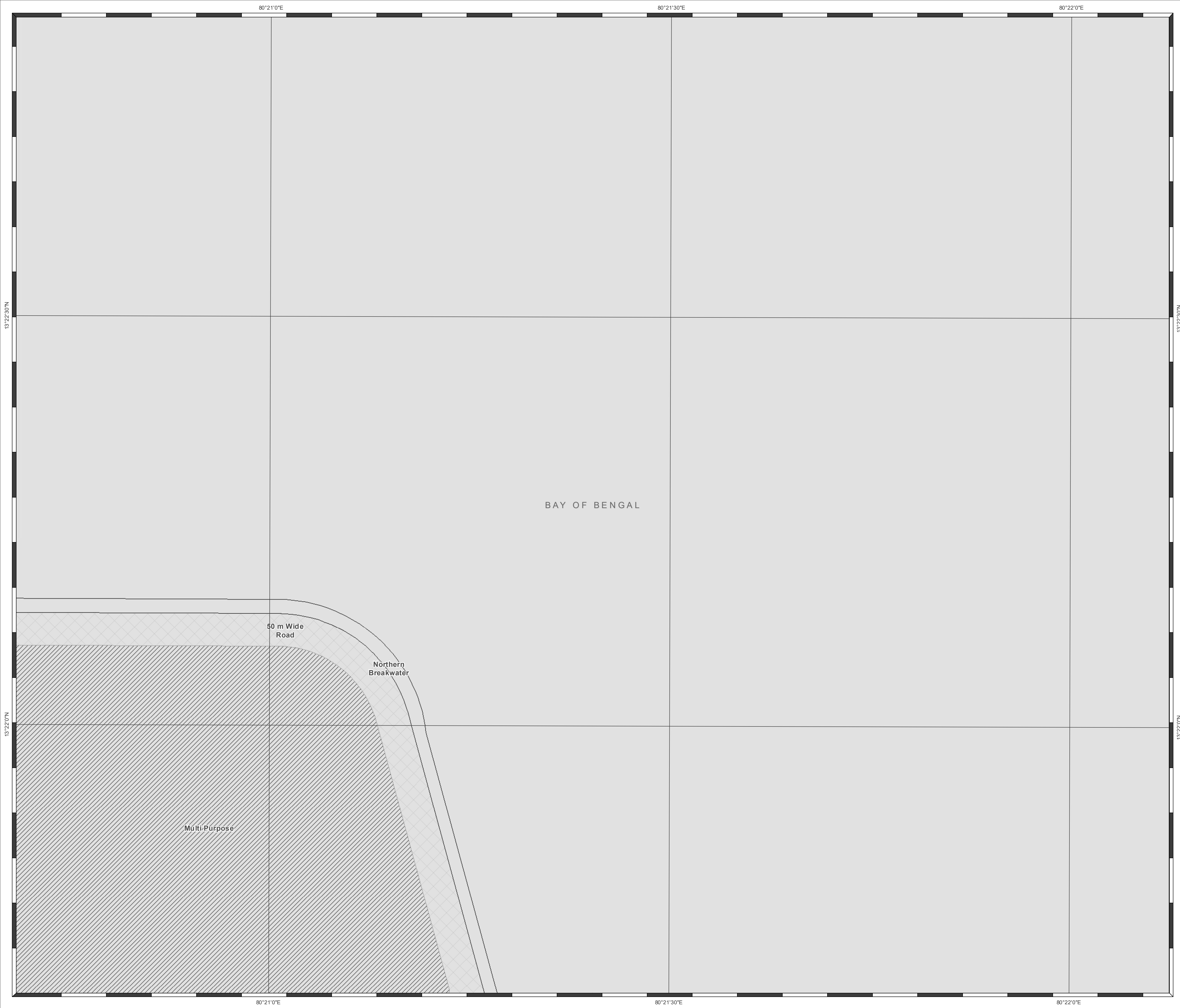


National Centre for Sustainable Coastal Management (Ministry of Environment, Forest & Climate Change) Chennai - 25

Prepared for M/s. Adani Ports & SEZ Limited

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Figure 2: CRZ Map of the Proposed Project Site (For Details Refer Report No. NCSCM/GEO/CRZ/2022/00)



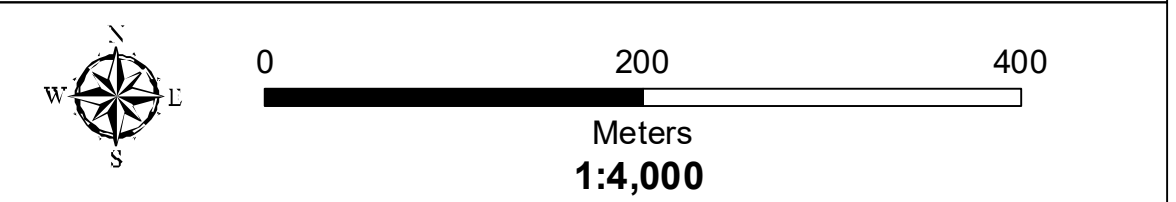
Mapped During: November, 2020 & January, 2021

Legend

- Road
- High Tide Line
- Low Tide Line
- - - 100 m Line in CRZ III Area
- - - 200 m CRZ Line - NDZ
- - - 500 m CRZ line
- - - CRZ Line for River or Creek
- ▨ Jetty/Breakwater
- ▧ Fisherman Settlement
- ▩ Mangroves - CRZ IA
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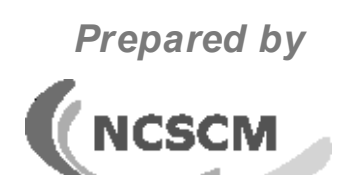
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HTL, LTL AND CRZ FOR THE PROPOSED EXPANSION OF KATTUPALLI PORT, KATTUPALLI VILLAGE, PONNERI TALUK, TIRUVALLUR DISTRICT, TAMIL NADU.



Verified by _____ Approved by _____

REVISED FINAL DRAFT MAP



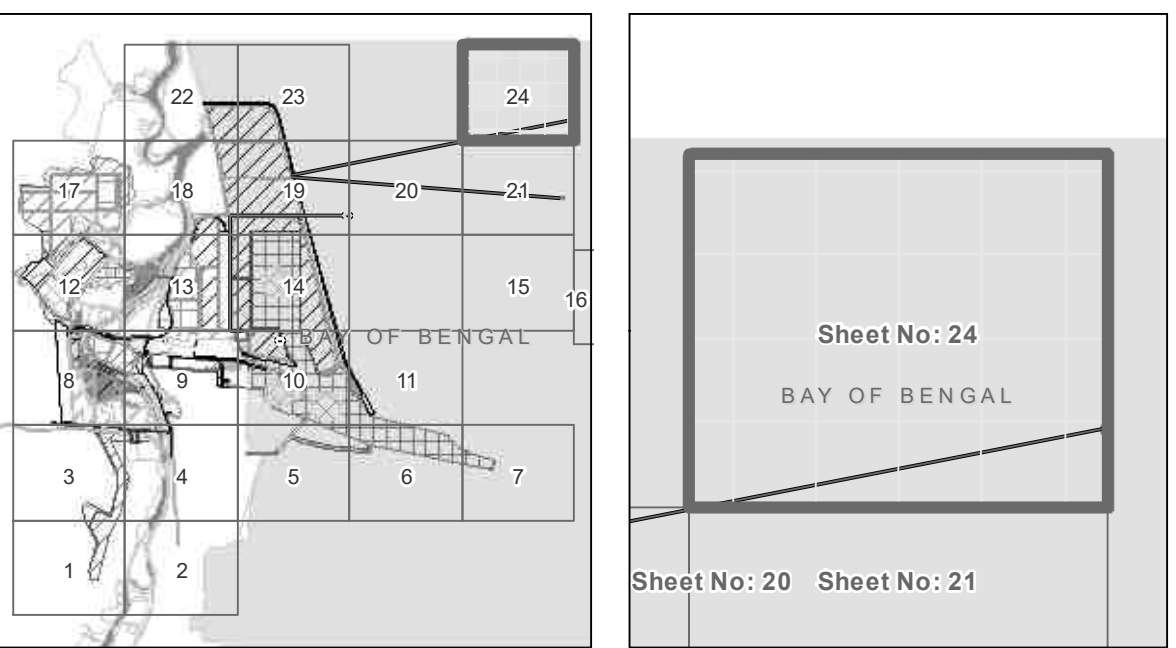
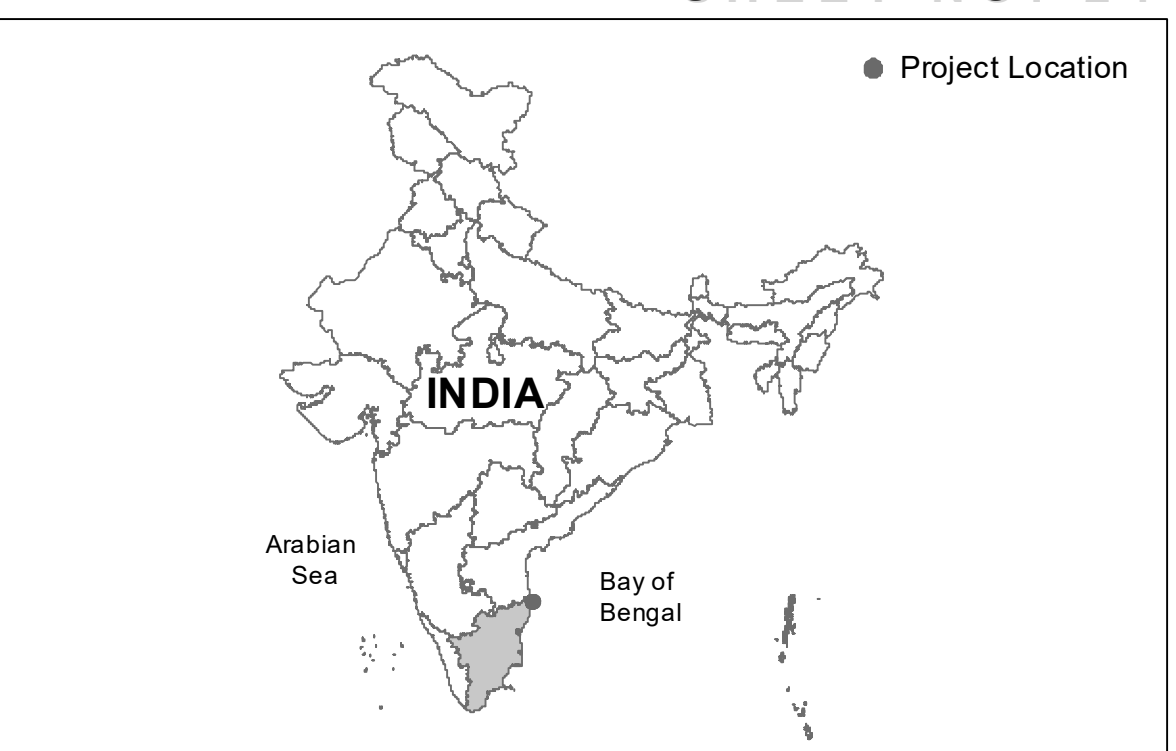
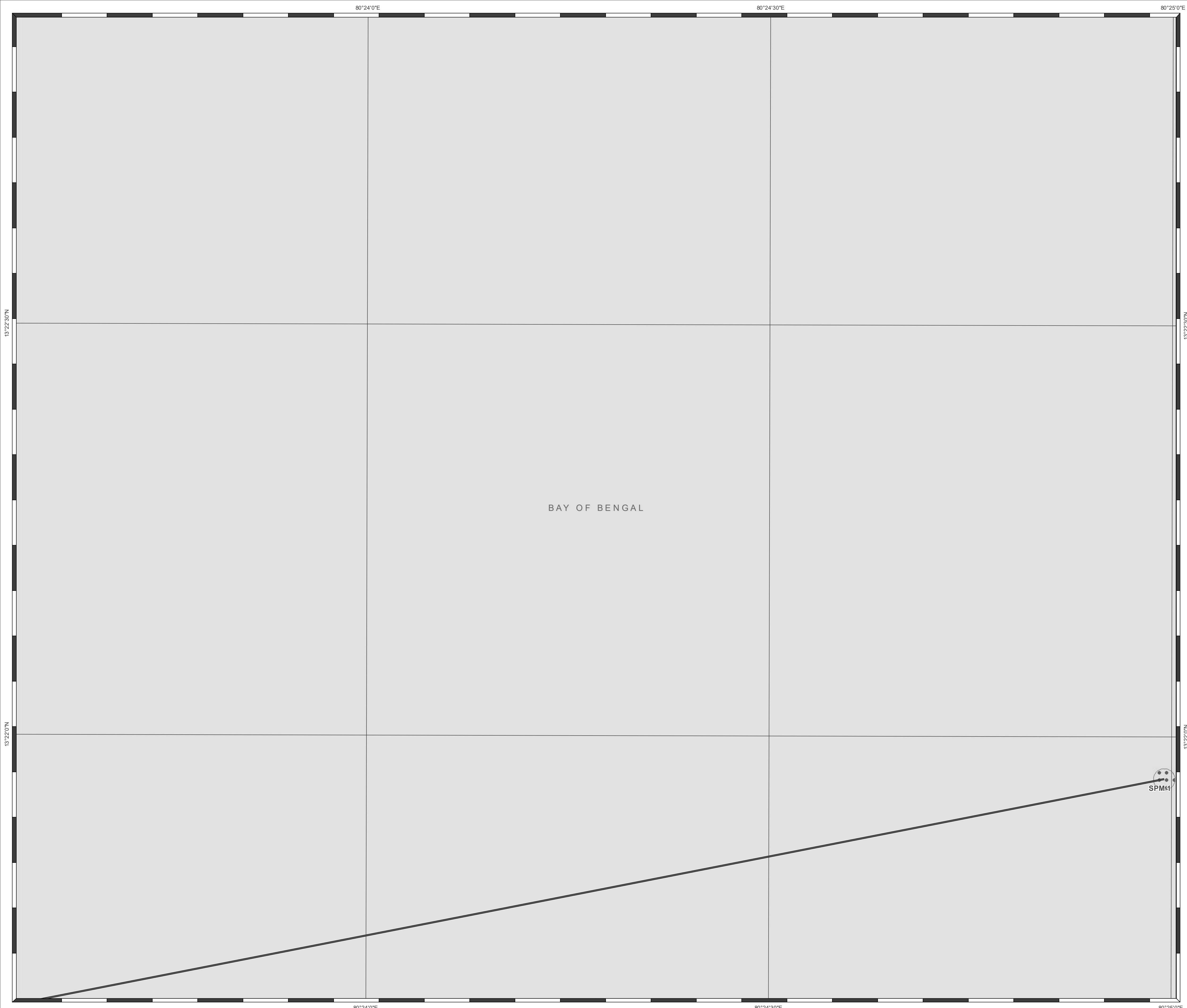
National Centre for Sustainable Coastal Management
(Ministry of Environment, Forest & Climate Change)
Chennai - 25

Prepared for
M/s. Adani Ports & SEZ Limited

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▲ Existing Multi Purpose	▲ Existing Rail Yard	▲ Existing Utility	▲ Existing Multi Purpose/Port Back up & Industrial Development Area
▲ Existing Northern Breakwater	▲ Existing Common Infrastructure	▲ Existing Northern Breakwater	▲ Existing Common Infrastructure
▲ Existing Southern Breakwater	▲ Proposed SPM 1	▲ Proposed SPM 2	▲ Proposed Bridge
▲ Proposed 25 m Wide Road	▲ Proposed 25 m Wide Road	▲ Proposed 50 m Wide Road	▲ Proposed Barge Berth
▲ Proposed 15 m Wide Road	▲ Proposed 20 m Wide Road	▲ Proposed Intake Pond	▲ Proposed Basin
▲ Proposed Common Infrastructure	▲ Proposed Multi Purpose Back Up	▲ Proposed Multi Purpose/Liquid Berth	▲ Proposed Multi Purpose/Port Back up & Industrial Development Area
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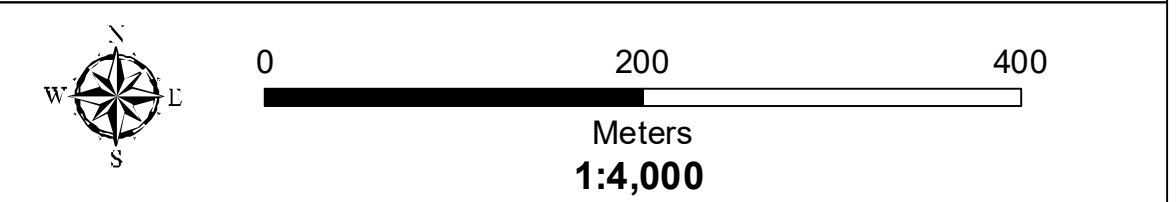
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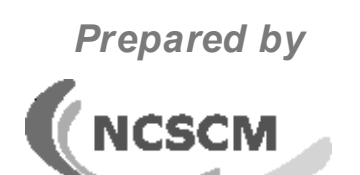
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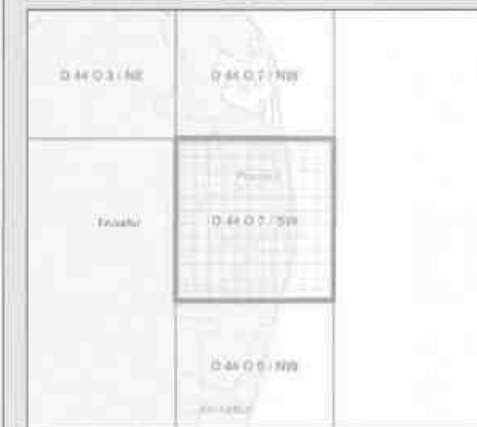
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ATTACHMENT 2
REVISED MASTER PLAN ON
APPROVED CZMP



- Legend**
- Lighthouse
 - Fishing Port
 - Fish Landing Centre
 - Flood
 - High Tide Line
 - Low Tide Line
 - Seawall
 - Fishing Wards
 - Chennai Metro City Boundary
 - Municipal/Other Urban Areas
 - Village Boundary
 - Taluk Boundary
 - Breakwater or Jetty
 - Survey Pits
 - Fish Drying or Boat Parking Area
 - Fishing Harbour
 - Fisherian Settlement



- CRZ Lines & Boundary**
- Hazard Line
 - 100 m Line in CRZ III Area
 - 200 m CRZ Line - NDZ
 - CVCA Boundary
 - Sand Dune Beyond CRZ Boundary
 - CRZ Boundary (500m Line, 100m for Bay, 100 m seaward of the creek whichever is less along the tidal influenced water bodies)
- CRZ CATEGORY**
- CRZ - I**
- CRZ - IA
 - 50 m Mangrove Buffer Zone - CRZ IA
 - CRZ - IB
- CRZ - II**
- CRZ - II
- CRZ - III**
- No Development Zone
 - 200 to 500 m from HTL
- CRZ - IV**
- CRZ - IVA
 - CRZ - IVB



- DATA SOURCE**
- 1) National Centre for Sustainable Coastal Management
 - 2) HTL, LTL, CVCA
 - 3) CRZ - IA
 - 4) Infrastructure facilities such as lighthouse, Road, Sea wall, Breakwater or Jetty
 - 5) Survey of India
 - 6) Present Line
 - 7) Tamil Nadu State Coastal Zone Management Authority
 - 8) Infrastructure facilities such as Fish Landing Centre, Fishing Harbour etc.
- ABBREVIATIONS**
- CRZ - Coastal Regulation Zone
 - NDZ - No Development Zone
 - CVCA - Coastal Vulnerable Coastal Areas



Map No.: TN 111

PREPARED AS PER COASTAL REGULATION ZONE NOTIFICATION 2011

Scrutinized by	Certified by	Approved by
Secretary, National Centre for Sustainable Coastal Management	Secretary, National Centre for Sustainable Coastal Management Ministry of Environment, Forest & Climate Change	Secretary, National Centre for Sustainable Coastal Management Ministry of Environment, Forest & Climate Change Government of India

Prepared by

NCSCM

National Centre for Sustainable Coastal Management
(Ministry of Environment, Forest & Climate Change)
Chennai - 600 025

Prepared for

Department of Environment
Government of Tamil Nadu

ATTACHMENT 3
LNTIEL NABET CERTIFICATE



Quality Council of India

National Accreditation Board for Education & Training



CERTIFICATE OF ACCREDITATION

L & T Infrastructure Engineering Ltd., Hyderabad

House No. 6-3-1192/1/1, 5th Floor, Block No. 3, White House, Kundan Bagh, Begumpet, Hyderabad – 500016

Accredited as Category - A organization under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations: Version 3 for preparing EIA-EMP reports in the following Sectors:

Sl. No.	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	River Valley Projects	3	1 (c)	A
2	Thermal power plants	4	1 (d)	A
3	Airports	29	7 (a)	A
4	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
5	Ports, harbours, break waters and dredging	33	7 (e)	A
6	Highways	34	7 (f)	A
7	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
8	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	B
9	Building and construction projects	38	8 (a)	B
10	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated June 05, 2020 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions as per the Scheme. The accreditation needs to be renewed before the expiry date by L & T Infrastructure Engineering Ltd., Hyderabad following due process of assessment.

Sd/-

Sr. Director, NABET

Dated: July 01, 2020

Certificate No.

NABET/EIA/2023/RA 0175

Valid till

March 02, 2023

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.





National Accreditation Board for Education and Training

(Member - International Accreditation Forum & Pacific Accreditation Cooperation)



May 29, 2023

QCI/NABET/ENV/ACO/23/2768

L & T Infrastructure Engineering Ltd.

1-10-39 to 44, 6C, 6th Floor, Gumidelli Towers,
Begumpet Airport Road, Begumpet,
Hyderabad-500 016-Telangana

Sub.: Extension of Validity of Accreditation till Aug 28, 2023 – regarding
Ref.. 1. Certificate no NABET/EIA/2023/RA 0175
2. Request e-mail dated May 29, 2023

Dear Sir/Madam

This has reference to the accreditation of your organization under QCI-NABET EIA Scheme, the validity **L & T Infrastructure Engineering Ltd**, is hereby extended till Aug 28, 2023 or completion of the assessment process, whichever is earlier.

The above extension is subject to the submitted documents/required information with respect to your application and timely submission and closure of NC/Obs during the process of assessment.

You are requested not to use this letter after the expiry of the above-stated date.

With best regards.

(A K Jha)
Sr. Director, NABET



L&T Infra Engineering

Communication Address

1-10-39 to 44, 6C, 6th floor ,

Gumidelli Towers, Begumpet Airport Road,

Hyderabad – 500 016

Phone: 91 -040 – 40354442 ; Fax: 91-040-40354430