



## PMC FOR CHENNAI PERUR 400 MLD DESALINATION PLANT AND ALLIED WORKS

### Concept Design Report for 400 MLD Desalination Plant (CP1) at Perur

Reference No. Loan ID-P267

Contract No.: CNT/ CON/DESAL /ICB/Gol/016/2018-19

Submitted on 23 April 2021

### VOLUME III ENVIRONMENTAL & SOCIAL SAFEGUARD REVIEW REPORT

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TATA Consulting Engineers Limited,  
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CHENNAI METROPOLITAN WATER SUPPLY &  
SEWERAGE BOARD (CMWSSB)



## PMC for Chennai Perur 400 MLD Desalination Plant and allied works



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## **IMPORTANT NOTICE**

This report is confidential and is provided solely for the purposes of briefing the Client on the planned activities to be undertaken by the Project Management Consultant ("PMC") during the course of the Consulting Services under the Chennai 400 MLD Desalination Plant project]. This report is provided pursuant to a Consultancy Agreement between PMC consisting of SMEC International Pty Ltd ("SMEC"), as a lead consultant with Joint venture partners, consisting of TCE Consulting Engineers Ltd. (TCE), NJS Engineers India Pvt. Ltd. (NJSEI) and SMEC (India) Private Limited and CMWSSB, under which PMC undertook to perform a specific and limited task for CMWSSB.

This report is strictly limited to the matters stated in it and subject to the various assumptions, qualifications and limitations in it and does not apply by implication to other matters. SMEC makes no representation that the scope, assumptions, qualifications and exclusions set out in this report will be suitable or sufficient for other purposes nor that the content of the report covers all matters which you may regard as material for your purposes.

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LIST OF ABBREVIATIONS

CMWSSB	:	Chennai Metropolitan Water Supply and Sewerage Board
COD	:	Chemical Oxygen demand
CP	:	Contract Package
CPCB	:	Central Pollution Control Board
CRZ	:	Coastal Zone Regulation
DG	:	Diesel Generator
DO	:	Dissolved Oxygen
DSP	:	Desalination Plant
EIA	:	Environmental Impact Assessment
EMP	:	Environmental Management Plan
FMB	:	Field Measurement Book
G.O.	:	Government Order.
IIT	:	Indian Institute of Technology
JICA	:	Japan International Cooperation Agency
NGO	:	Non-Governmental Organisation
NIOT	:	National Institute of Ocean Technology
PIU	:	Project Implementation Unit
PMC	:	Project Management Consultant
PPE	:	Personal Protective Equipments
RO	:	Reverse Osmosis
TNCZMA	:	Tamil Nadu Coastal Zone Management Authority
TNPCB	:	Tamil Nadu Pollution Control Board

## 1 INTRODUCTION

### 1.1 Project Background

Chennai is currently experiencing a chronic water shortage due to the impacts of climate change and failure of recent monsoons to deliver enough rainfall and associated stream flow to refill the existing water supply system's surface water sources.

To improve the current water supply situation, the Chennai Metropolitan Water Supply and Sewerage Board ("CMWSSB" or "the Client") has obtained a loan from the Japan International Cooperation Agency ("JICA") through the Tamil Nadu Government, to implement a 400 MLD Sea Water Reverse Osmosis Desalination plant at Perur.

CMWSSB has selected a Project Management Consultant ("PMC") through a competitive bidding process to support the CMWSSB Project Implementation Unit ("PIU") for implementation of the 400 MLD Seawater Desalination Plant and its components (collectively referred to as the "Project"). A Consultancy Contract agreement was signed dated January 09, 2020, for Consulting Services with the PMC for the Project.

The PMC is a Consortium comprising of SMEC International Pty Ltd., Australia as the lead member of the consortium, Tata Consulting Engineers Limited (TCE), NJS Engineers India Pvt. Ltd. (NJSEI) and SMEC (India) Private Limited who are joint venture partners and jointly liable for the execution of the project.

After receipt of the Notice to Proceed issued by CMWSSB on January 13, 2020, the PMC team commenced services on January 20, 2020, with the initial mobilization of project personnel. Under the reporting obligations of the Contract, and as per the letter issued by CMWSSB, an Environmental Review Report is to be submitted. PMC started its activities from the day of notice to proceed and continued its effort even in an undulating period of COVID-19 to meet the project schedule and to achieve overall project success. This report is based on the previous Environmental studies conducted by M/s. AECOM and JICA preparatory report and Minutes of discussion (MoD) with JICA.

The following scope of services pertaining to Environment is included under clause 3.5 of Request for Proposal

- 1) Review and update Environmental Management Plan (EMP) according to the actual site conditions, designs, technical specifications and contract documents (and in compliance to the Environmental Conditions (EC) as given under Coastal Regulatory Zone (CRZ) Clearance).
- 2) Review and update the Environmental Monitoring Plan (EMoP) according to the updated EMP;
- 3) During the preparation of bidding documents, clearly identify environmental responsibilities as explained in the Environmental Impact Assessment (EIA), Final Report of Preparatory Survey and EMP;
- 4) Assist CMWSSB to review the Construction Contractor's Environmental Management Program to be prepared by the contractor in accordance with EMP, relevant plans and JICA Environmental Guidelines and to make recommendations to CMWSSB regarding any necessary amendments for its approval.
- 5) Supervision of EMP implementation and implementation of regular compliance monitoring according to EMoP to ensure that the construction works are implemented in accordance with the EMP;
- 6) Assist CMWSSB to implement the measures identified in the EMP;
- 7) Monitor the effectiveness of EMP and negative impacts on the environment caused by the construction works and provide technical advice, including a feasible solution, so that CMWSSB can improve the situation when necessary;
- 8) Assist CMWSSB in monitoring the compliance with conditions stated in the environmental permit certifications and the requirements under EMP and JICA Environmental Guidelines;

- 9) Assist CMWSSB in preparation of the answer to the request from JICA's advisory committee for environmental and social considerations if necessary; and
- 10) Assistance to CMWSSB in the capacity building of CMWSSB staff on environmental management through on-the-job training so that the EMoP would be carried out appropriately in the O&M of the seawater desalination plant.

With the view of fulfilling Task 3, an Environmental review report has been prepared by PMC for discussions with the PIU team to firm up the Client's requirements and preferences in completion of Task 3. The Comments received from CMWSSB vide emailed dated 3<sup>rd</sup> August 2020 were incorporated in this report.

## 1.2 Project Scope for Contract Package (CP1 & CP2-1)

The major components within the Scope of Work for the Contract Package CP1 and CP2-1 components i.e. Construction of 400 MLD Sea Water Reverse Osmosis (SWRO) Desalination Plant project of Perur, Chennai and Construction of pump house at Perur DSP are discussed below:

The detailed components of the Contract Package (CP1 and CP2) are summarised in Table 1.

**Table 1: Project Scope of Work for CP1 and CP2**

Sr. No.	Component	Construction Items
CP1	Construction of the Perur DSP (400 MLD)	<ul style="list-style-type: none"> <li>- Seawater intake facilities</li> <li>- Pre-treatment facility</li> <li>- Seawater desalination facilities by Reverse Osmosis (RO) technology</li> <li>- Post-treatment facility for remineralization and disinfection</li> <li>- Product Water Tank and Potable water tank</li> <li>- Potable water discharge pipelines</li> <li>- Sludge &amp; wastewater treatment facility</li> <li>- All other buildings and structures are necessary for the seawater desalination plant.</li> </ul>
CP2-1	Construction of Pumping station at Perur DSP	<ul style="list-style-type: none"> <li>- Construction of Pumphouse and Pumping facility in the premises of Perur DSP</li> </ul>

### 1.3 Report structure

This Environmental review report is structured into the following sections:

#### **Introduction**

- Project Background
- Scope and Objectives
- Site location and Environmental Setting

#### **Environmental review report Inputs**

##### **Data Collection, Site visit and review of Information**

- Site visit inferences
- List of available reports and statutory clearances
- Identification of Data gaps

##### **Policy legal and Administrative framework**

- JICA environmental guidelines
- Regulation, Laws and Consent requirements
- Discharge standards- air, water and noise

##### **Review of EIA report**

##### **Review and updation of CRZ clearance**

##### **Review and updation of the Environmental Management Plan**

##### **Review and updation of the Environmental Monitoring Plan**

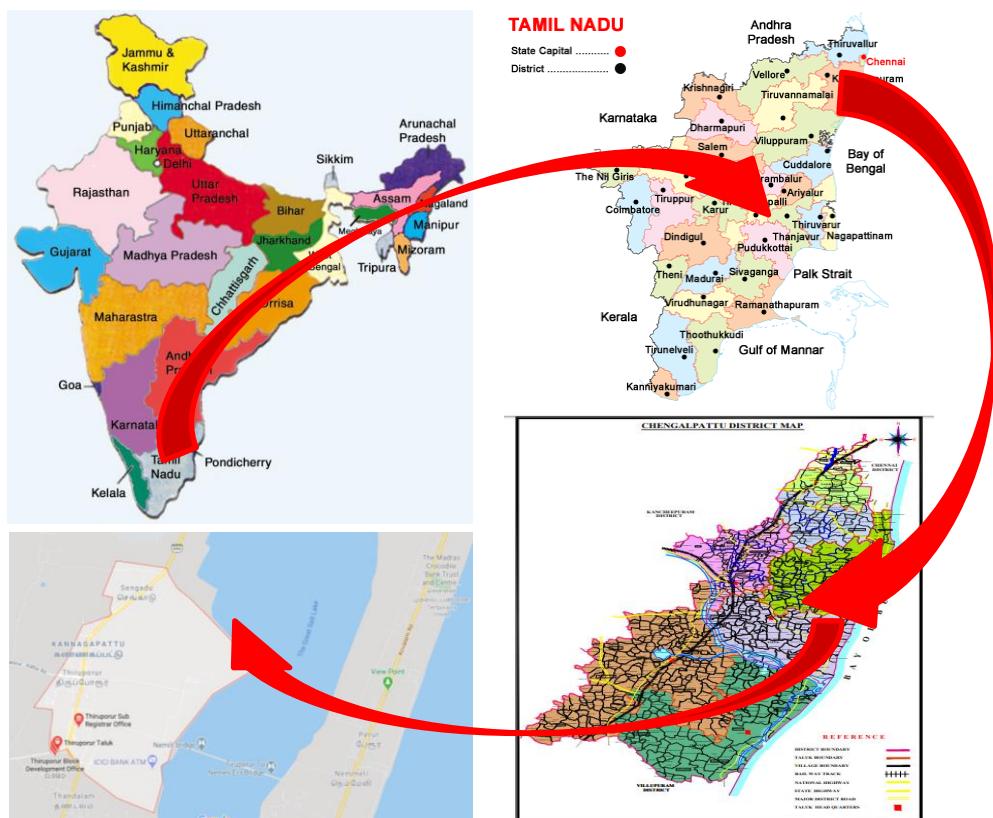
##### **Conclusion and Recommendation**

### 1.4 Site Location and Environmental Setting

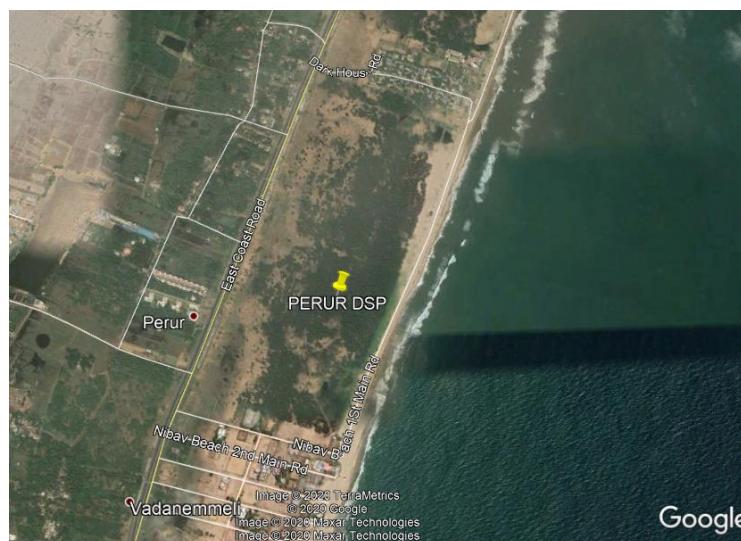
The proposed construction site for the Desalination plant is located at Perur village, about 40 km from Chennai city centre. The total area of the plot is approximately 34.63 ha. It is situated along the coastal side of the East Coast Road (ECR). Its ground elevation is chart datum +3.0 to +7.5m. ECR is approximately + 11 m AMSL.

There are two numbers of graveyards identified within the proposed site. The one on the southern side of the sea coast and another one on the northern side towards the East Coast Road (ECR). It is understood that the graveyards must be left undisturbed and shall be protected by a compound wall all across and proper drainage shall be made draining towards the sea.

The proposed land has been identified under survey number – 208/ 2B3 belonging to the M/s. Arulmigu Alavandar Nayakar Trust maintained by The Hindu Religious and Endowment (HR&CE) Department, Government of Tamil Nadu (GoTN). The land is procured by CMWSSB on a long term lease basis. (CMWSSB to confirm the Usufruct Agreement of land). The location map of proposed project site is shown in Figure 1. The satellite image of the proposed Perur site is shown in Figure 2. The details of the local site conditions are given below in Table 3.



**Figure 1: Indicative Location of the proposed project site**



**Figure 2: Satellite Image of Proposed Perur Site**

**Table 2: Environmental Setting of the Proposed DSP site**

Particulars	Details
Site Location	District: Chengalpattu / Taluk: Thiruporur/ Village: Perur
Site coordinates	12°42.828' N, 80°13.725' E
Nearest highway	State Highway SH 49, East Coast Road
Nearest railway station	Othivakkam railway station
Nearest Airport	Chennai Airport
Nearest Sea Port	Chennai Sea Port
Nearest town/ City	Chengalpattu, Pudupattinam, Tirukalukundram, Nandivaram-Guduvancheri
Archaeologically Important places	Mahabalipuram – 11 Km, Tiger Cave - 7 km
Seismic zone	Zone -III as per IS: 1893 (Part -1) 2016

**Table 3: Typical Meteorological data for Perur DSP**

Meteorological Parameters	Unit	Values
Mean Ambient temperature (min./ max.)	° C	24.5 / 33.5
Barometric pressure	K Pa	100.1/ 101.35
Relative humidity (min./ average/ max.)	%	57 / 70 / 83
Main wind direction		South westerly
Average Annual rainfall	mm	1399.3
Average rainfall during Southwest monsoon (June to September)	mm	454.3
Average rainfall during Northeast monsoon (October to December)	mm	837.1
Maximum rainfall within 24 hours	mm	346.6

Source : Indian Meteorological Department Chennai, Meenambakkam, 1981- 2010

During the site reconnaissance survey, the land earmarked for the purpose of 400 MLD Desalination plant, which includes land for the potable water pumping station was visited. The site visit photographs are presented in Annexure -1. The Climatological data of Chennai from Indian Meteorological Department is furnished as Annexure -8. The seismicity map of the proposed project area is furnished in Annexure – 9.

## 2 ENVIRONMENTAL REVIEW REPORT INPUTS

The environmental review report has been prepared by duly considering the available data and data information collected from various sources, preliminary discussions with CMWSSB, Site visit to Proposed Perur DSP site and the existing desalination plant visit at Nemmeli. Based on the information/ data collation and analysis, the inferences are presented.

The objective of this Environmental review report are furnished below, but not limited to, the following:

- To present the inferences based on the available technical information/ data
- Identification of further study and investigations requirements
- Evaluation and providing observations on the past study reports
- Clearly identify environmental responsibilities as explained in the EIA, Final Report of Preparatory Survey and EMP to be part of bid documents.
- Provide a platform to discuss and obtain any feedback from PIU.

This report covers only the Environment related chapters for CP1 and CP2-1 packages. The Social Impact Assessment of the proposed Perur site will be covered in a separate report.

### 3 DATA COLLECTION AND REVIEW OF TECHNICAL INFORMATION

The PMC team has collected the various data/ report/ details/ drawings as a part of the preparation of environmental review report to facilitate for the development of Final Environmental review Report for CP1 components and the related study of the work. The following key reference data information has been reviewed by the PMC team during project activities and informs our view on the required approach and methodology and key Project risks, as defined in the Inception Report submitted to CMWSSB on 28.02.2020:

- Terms of Reference (TOR) of the Consultancy Services
- Environmental Impact Assessment report for Proposed Perur DSP
- Preparatory Survey on Chennai Seawater Desalination Plant Project, Final Report (February 2017, JICA, Nippon Koei et al.)
- Additional details requested by EAC of MoEF & CC for issuing CRZ clearance for 400 MLD Desalination Plant
- Minutes of Discussions on Chennai Seawater Desalination Plant Project between Japanese International Cooperation Agency and Chennai Metropolitan Water Supply and Sewerage Board (19 January 2018) – complete with all attachments
- CRZ map prepared by Anna university
- CRZ Clearance for setting up of 400 MLD capacity desalination Plant at Perur, East Coast Road, Chennai, Tamil Nadu – reg. (Ministry of Environment, Forest and Climate Change, GOI, 25/10/2018)
- TNPCB NOC letter for setting up of Perur DSP
- FMB Sketch for Perur Desalination Plant
- Consent to Establish from TNPCB for 150 MLD Nemmeli DSP
- Initial Consent to Operate from TNPCB for 100 MLD Nemmeli DSP

In addition to client-supplied data, relevant Indian and international standards and practices pertaining to Environment in similar projects have been referenced to guide the initial review of Project details and gain insight into the areas of the Project scope that warrant further investigation by the PMC team.

A comprehensive “first pass” list of information requirements was compiled and formally issued by the PMC to CMWSSB on 11<sup>th</sup> March 2020 pertaining to data required for environmental review of the project and other data. PMC received the data pertaining to environment dated 18<sup>th</sup> March 2020, 23<sup>rd</sup> May 2020 and 29<sup>th</sup> June 2020. The following data and information collected from CMWSSB and the PMC gratefully acknowledge the assistance of the PIU in coordinating with departments to collect and furnish copies of this information listed below in Table 4.

**Table 4: Details of Documents and Data Sources**

SI No.	Components	Documents / Previous Study Reports / Data	Source	Status of Data Collection
1.	AECOM DPR	Detailed Project Report for Proposed 400 MLD Sea Water Reverse Osmosis Desalination Plant at Perur along ECR, Chennai, Tamil Nadu (Prepared by M/s AECOM)	CMWSSB	Completed
2	AECOM EIA report	EIA Report for the project prepared by M/s AECOM	CMWSSB	Received
3	DL CRZ clearance	Copy of the application submitted by CMWSSB for CRZ clearance to District Coastal Zone	CMWSSB	Kancheepuram District Coastal regulation

SI No.	Components	Documents / Previous Study Reports / Data	Source	Status of Data Collection
		Management Authority (DL-CZMA) with CRZ Map (of 1:4000 scale) to Kancheepuram District Coastal regulation zone management authority		zone management authority – Application and recommendation letter received.
4	TN CRZ clearance	Recommendation letter from TNCZMA, vide letter No. 844/EC 3/2016-1, dated 14.01.2016 and letter No.24117/EC.3/2017-1 dated 09.01.2018, indicating conditions for CRZ clearance.	CMWSSB	Letter No. 844/EC 3/2016-1, dated 14.01.2016 – Received
5	JICA Drawings	Preparatory Survey for Chennai Desalination Plant Project - Draft Final Report Drawings (JICA & M/s Nippon Koei Co. Ltd. On Nov.2016)	CMWSSB	Completed
6	JICA Report Appendices	Preparatory Survey for Chennai Desalination Plant Project - Draft Final Report Appendices (JICA & M/s Nippon Koei Co. Ltd. on Nov.2016)	CMWSSB	Completed
7	CRZ Letter-MoEF &CC	CRZ Clearance: Letter from Ministry of Environment & Forest and Climate F&CC, New Delhi (Oct'2018)	CMWSSB	Completed
8	FMB Sketch	FMB Sketch for Perur Desalination Plant	CMWSSB	Completed
9	TNPCB- CTE	CTEs of existing desalination plant at Nemmeli	CMWSSB	Received
10	TNPCB – CTO	CTO of an existing desalination plant at Nemmeli	CMWSSB	Received

A formal incoming document register is being maintained by the PMC to monitor the status of information requests and ensure that outstanding information is actively managed.

As stated above, the present review report refers to the Past EIA report and its supplementary reports prepared by M/s AECOM, JICA Preparatory Survey other data collected as indicated in Table -4. Existing studies and reports have been studied and will be further reviewed and evaluated if necessary. Accordingly, the Environmental responsibilities are recommended /updated and modified.

### 3.1 Site visit

The site visit to proposed Perur desalination plant, Water storage tank and Pumping station and Substation was carried out on 07.03.2020 by the following Engineers from PMC team.

1. Mr. Nagesh Chinnam, Senior Pipeline Engineer, Tata Consulting Engineers Ltd.
2. Dr. Alok Kumar, Environmental Specialist, Tata Consulting Engineers Ltd.
3. Mr. S. M. Karthikaeswaran, Environmental Specialist, Tata Consulting Engineers Ltd.

The team also visited existing Nemmeli DSP and had discussions with the CMWSSB officials and Plant operators. Also, another site visit dated 20.3.2020 was made by Mr S. M. Karthikaeswaran for data collection.

The following are the outcomes/data collected and observations during the site visits:

1. The site has a plantation of Casuarina trees, and this needs to be removed for developing the project.

2. The nearby coast of Nemmeli plant had shoreline protection by rocks and tripods. Similar protection may be required for the proposed plant.
3. The phenomenon of white particles and COD is a recent phenomenon and is restricted to a limited area of the Bay of Bengal
4. During a joint site visit, the intake seawater sampling location at Nemmeli plant was shown to the consultant for collecting raw seawater samples.
5. CMWSSB officials informed that dual redundant power supply is in place for the Nemmeli plant and the supplies are from substations that supply power to Mahindra world city and Siruseri SIPCOT. Also, DG set is available for power supply to critical loads.
6. The land area proposed to be leased for Perur site is about 85.51 acres.
7. Data regarding Contact details of Authorized recycler for used RO membrane and Cartridge Filter.
8. During the site visit, the current practice of waste disposal methods was also discussed/ observed.
9. PMC team also requested to furnish the following data.
  - Consent to Establish (CTE) and Consent to Operate (CTO) letters from TNPCB at Nemmeli and Minjur plants.
  - Compliance reports to statutory authority, i.e., TNPCB/ TNCZMA of existing desalination plants if any.

The site visit photographs are furnished in Annexure -1

## 4 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

### 4.1 JICA Environmental and Social Framework

JICA requires the consideration of environmental and social matters in all aspects of JICA operations. The requirements for environmental and social considerations as described in JICA guidelines for environmental and social considerations (April 2010) are to be taken into consideration for any project to be financed by JICA loan. JICA guidelines endeavours to achieve transparency, predictability, and accountability in support for and examination of environmental and social considerations.

### 4.2 Screening and Categorisation

The requirement of the JICA Guidelines is dependent on “project categorization” of the Project, which is stipulated in the JICA Guidelines, as shown in Table 5. Currently, the Chennai Seawater Desalination Project (the Project) has been classified as “Category B” by JICA. However, if the project is likely to have any significant adverse impacts on the environment and society in the Study, the Project may be recategorized as “Category A”.

**Table 5: Project Category in the JICA Guidelines**

Category	Description
A	The projects are classified as “Category A” if they are likely to have significant adverse impacts on the environment and society. Projects with complicated or unprecedented impacts that are difficult to assess, or projects with a wide range of impacts or irreversible impacts, are also classified as “Category A”. These impacts may affect an area broader than the sites or facilities subject to physical construction. “Category A”, in principle, includes projects in sensitive sectors, projects that have characteristics that are liable to cause adverse environmental impacts, and projects located in or near sensitive areas.
B	The projects are classified as “Category B” if their potential adverse impacts on the environment and society are less adverse than those of “Category A” projects. Generally, they are site-specific; few if any are irreversible; and in most cases, normal mitigation measures can be designed more readily.
C	The projects are classified as “Category C” if they are likely to have a minimal or little adverse impact on the environment and society.

Based on the Initial Environmental Examination carried out by JICA, the proposed Perur 400 MLD desalination project is categorised under “B”. Since the project is not located in a sensitive area, nor has sensitive characteristics, nor falls into sensitive sectors under the JICA guidelines for environmental and social considerations (April 2010), and its potential adverse impacts on the environment are not likely to be significant. Details are categorisation are available in JICA website:

[https://www.jica.go.jp/english/our\\_work/social\\_environmental/id/asia/south/india/c8h0vm0000ahd\\_af4.html](https://www.jica.go.jp/english/our_work/social_environmental/id/asia/south/india/c8h0vm0000ahd_af4.html)

It may be noted that the status of Environmental monitoring for each contract packages (CP) shall be communicated to JICA as part of Quarterly progress report. JICA would disclose information on the status of environmental monitoring of the project in collaboration with CMWSSB in its website in order to ensure transparency, accountability and to promote the participation of various stakeholders.

#### 4.3 Regulations, Laws and Permitting

There are various acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. The specific regulatory compliance requirements of the subproject are shown in Table 6.

**Table 6: Specific Regulatory Compliance Requirements for the Proposed Perur DSP and allied works**

Policy/ Law	Description	Requirement	Project Phase/ Applicability
National Environment Policy (NEP), 2006.	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislation by central, state and local government. The dominant theme of this policy is to promote the betterment of livelihoods without compromising or degrading environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.	The projects should adhere to the NEP principle of “enhancing and conservation of environmental resources and abatement of pollution”.	All phases of the project
EIA Notification,2006	The EIA Notification of 2006 and 2009 (replacing the EIA Notification of 1994), set out the requirement for environmental assessment in India. This states that Environmental Clearance is required for certain defined activities/projects, and this must be obtained before any construction work, or land preparation (except land acquisition) may commence. Projects are categorized as A or B, depending on the scale of the project and the nature of its impacts. Category A projects require Environmental Clearance from the National Ministry of Environment, Forest and Climate Change (MoEF & CC). Category B projects require Environmental Clearance from the State Environmental Impact Assessment Authority (SEIAA).	Desalination projects not classified under EIA notification, 2006	Not Applicable
CRZ Notification, 2011	To impose restrictions on activities, operations and process within the Coastal Regulation Zone (CRZ)	Desalination plants are permitted activity with permission from MoEF &CC. Application to be submitted along with EIA	Project Development Stage – CRZ clearance obtained

Policy/ Law	Description	Requirement	Project Phase/ Applicability
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	<p>Control of water pollution is achieved through administering conditions imposed in consent issued under the provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quality and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the Project has the potential to generate sewage or trade effluent will come under the purview of this Act, its rules and amendments. Such projects must obtain Consent to Establish (CTE) under Section 25 of the Act from Tamil Nadu State Pollution Control Board (TNPCB) before starting implementation and Consent to Operate (CTO) before commissioning. The Water Act also requires the occupier of such subprojects to take measures for abating the possible pollution of receiving water bodies.</p>	Desalination plant requires Consent to Establish & Operate Certificate	Construction and Operation phase
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	<p>The subprojects having the potential to emit air pollutants into the atmosphere must obtain CTE under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from TNPCB before starting implementation and CTO before commissioning the project. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.</p>	<p>For the project, the following will require CTE and CTO from TNPCB: if, (i) diesel generators; (ii) hot mix plants; and (iii) stone crushers, installed for construction.</p> <p>All relevant forms, prescribed fees and procedures to obtain the CFE and CFO can be found on the TNPCB website (<a href="http://www.tnpcb.gov.in">www.tnpcb.gov.in</a>).</p> <p>If procuring using a third party, contractor to ensure that the plants, from where materials are being purchased (Hot mix plants, Crushers and Batching plants etc.) are having CTE/CTO and copy should be collected</p>	Construction and Operation phase

Policy/ Law	Description	Requirement	Project Phase/ Applicability
		from the third party and submitted in PIU.	
The Motor Vehicles Act, 1988 (59 of 1988) (14 Oct. 1988)	<p>The subprojects having the potential to emit smoke and vapour carrying air pollutants, and enforcement of other applicable rules as per the motor vehicle act</p> <p>As per Rule no 115. Emission of smoke, vapour, etc. from motor vehicles and Rule no 116. Test for smoke emission level and carbon monoxide level for motor vehicles of the Central Motor Vehicles Rules, 1989</p>	Pollution under control (PUC) certificate is required for all construction and vehicle used for the subproject.	Construction and Operation phase
Environment (Protection) Act, 1986 and CPCB Environmental Standards.	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards notified.	<p>Annexure 2 provides applicable standards for ambient air quality which should be followed during the construction phase.</p> <p>Annexure 2 also provides a comparison of national standards and internationally recognized guidelines with respect to ambient air and noise,</p>	Construction and Operation phase
Noise Pollution (Regulation and Control) Rules, 2002 amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	Annexure 2 provides applicable noise standards. Contractors are required to ensure all noise-producing activities during civil works conform to applicable standards	Construction and Operation phase
National Institute of Occupational Safety and Health (NIOSH) Publication No. 98-126	NIOSH has laid down criteria for a recommended standard: occupational noise exposure. The standard is a combination of noise exposure levels and duration that no worker exposure shall equal or exceed.	Internationally recognized environmental standards. Contractors are required to provide hearing-protection equipment and ensure exposures of workers to noise-generating activities are within allowed NIOSH standards.	Construction and maintenance

Policy/ Law	Description	Requirement	Project Phase/ Applicability
Municipal Solid Wastes Management Rules, 2016	Rules to manage municipal solid waste generated; provides rules for segregation, storage, collection, processing and disposal.	The solid waste generated at proposed facilities shall be managed and disposed of in accordance with the Rules.	Construction and Operation phase
Construction and Demolition (C&D) Waste Management Rules 2016	C&D waste generated during the construction phase needs to be managed as per this rule.	The C&D waste generated during the construction phase needs to be transported to designated place for disposal in consultation with the municipality and Tamil Nadu Pollution Control Board (TNPCB)	Construction phase
Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016	According to the Rules, hazardous wastes are wastes having constituents specified in Schedule II of the Rules if their concentration is equal to or more than the limit indicated in the said schedule.	Hazardous waste such as Paints, varnishes etc., the excavated material is to be stored and disposed of only in such facilities as may be authorized by the TNPCB for the purpose.	Construction phase and Operation phase
Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 as amended	As per Rule 6, every user agency, who wants to use any forest land for non-forest purposes, shall seek approval of the Central Government.	The land belongs to HR &CE department of GoTN. Tree cutting is proposed to be carried out as per G.O (Ms) No. 157 issued on 29 <sup>th</sup> April 2016.	Not applicable
Indian Wildlife (Protection) Act, 1972 amended 1993 and Rules 1995; Wildlife (Protection) Amendment Act, 2002	An Act to provide for the comprehensive protection of wild animals, birds and plants. This would cover matters concerning Appointment of forest authorities, hunting of wild animals, protection of specified plants, conservation of national parks and sanctuaries, trade commerce in relation to plants and animals and prevention of any offences.  Wildlife protected areas are notified under this act.	Not applicable as subprojects components are not located in a designated protected area.	Not Applicable
Manufacture, Storage, and Import of Hazardous	Defines hazardous chemicals <ul style="list-style-type: none"><li>• Stipulates rules, procedures to manufacture, storage and import of hazardous chemicals</li></ul>	Requires permission, authorization from various agencies if the total storage exceeds specified quantity; for the hazardous material	Chlorine tonners usage for disinfection not proposed.

Policy/ Law	Description	Requirement	Project Phase/ Applicability
Chemical Rules, 1989	<ul style="list-style-type: none"> <li>Requires permission, authorization from various agencies if the total storage exceeds specified quantity; requires an emergency management plan</li> </ul>	used for the project like fuel oil for DG sets, Storage of chlorine (threshold quantity greater than 10 tons, but less than 25 tons)	DG set is proposed to be used during flushing and other critical loads during the shutdown. Hence not applicable.
Indian Explosives Act, 1884, Explosive rules, 2008, Gas cylinder rules, 2004	Set of acts and rules to provide a grant of approval, licences for, storage of explosives, prescribing safe procedures and methods	Grant of licence for storing fuel oil, lubricants, diesel, Chlorine gas cylinders etc. at the project site - Chief Controller of Explosives/ as applicable	
The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act 2010	<p>The Rules designate areas within a radius of 100m and 200m from the “protected property/ monument/ area” as “prohibited area” and “regulated area” respectively.</p> <p>Henceforth, no permission for construction of any public projects or any other nature shall be granted in the prohibited areas of the protected monument and protected area.</p> <p>In respect of the regulated area, the Competent Authority may grant permission for construction, reconstruction, repair and renovation based on the recommendation of the National Monument Authority duly taking note of heritage bye-laws, which shall be prepared in respect of each protected monument and protected area.</p>	There is no protected property/ monument/ area” as “prohibited area” and “regulated area” on the project corridor. The Mamallapuram a tourist site, which is 11 Km from the proposed site.	Construction phase
Public Liability Insurance Act, 1991	To provide for damages to victims of an accident which occurs as a result of handling any hazardous substance. The Act applies to all owners associated with the production or handling of any hazardous chemicals. Every owner to take Insurance policy if quantity exceeds the quantity specified in Act	Applicable in case the quantity in excess of the amount indicated below is stored Chlorine – 10 tons, Sodium Chlorate – 25 tons, Diesel – 25 tons	Not applicable
The National Green Tribunal (NGT) Act, 2010	NGT provides effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any	Stakeholders / affected persons may approach NGT to resolve project induced environmental issues	Construction and Operation phase

Policy/ Law	Description	Requirement	Project Phase/ Applicability
	legal right relating to the environment and giving relief and compensation for damages to persons and property and matters connected therewith. NGT has jurisdiction over matters related to Water Act, 1974; Water Cess Act, 1977; Forest (Conservation) Act, 1980; Air Act, 1981; Environment (Protection) Act, 1986; Public Liability Insurance Act, 1991; and Biodiversity Act, 2002. Consequently, no other court will have jurisdiction over the matters related to the environment falling under the above-referred Acts. Being a dedicated tribunal for environmental matters with the necessary expertise to handle environmental disputes.		
Regulation of Polychlorinated Biphenyls (PCB) Order, 2016.	The order bans the import of Polychlorinated Biphenyls containing equipment.	No equipment containing PCB shall be used in the project. <i>All transformers proposed for this project are to be PCB free.</i>	Construction phase
Tamil Nadu Fire Service Act, 1985	Directorate of Fire Service is empowered to issue No Objection Certificate under Section 13 of the Tamil Nadu Fire Service Act, 1985. Occupier/ Property, used for any purpose that is likely to cause a risk of fire, should take such precautions as specified in the No Objection Certificate / Fire Licence.	Requires No objection certificate from Divisional Fire Officer, Kancheepuram	Construction phase
Tamil Nadu Maritime Board Act, 1995	Is the nodal agency of Government of Tamil Nadu for managing all its coastal resources and infrastructures.	Consent for the erection of offshore structure to be obtained	Project development stage
Contract Labour (Regulation and Abolition) Act, 1970	The Act provides for certain welfare measures to be provided by the Contractor to contract labour, and in case the Contractor fails to provide, the same is required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration, and the Contractor is required to take a License from the designated Officer. The Act applies to	<ul style="list-style-type: none"> <li>• Applicable to all construction works</li> <li>• Implementing Agency to obtain a Certificate of Registration as the principal employer</li> </ul>	Construction and Operation phase

Policy/ Law	Description	Requirement	Project Phase/ Applicability
	the establishments or Contractor of a principal employer if they employ 20 or more contract labour.		
The Child Labour (Prohibition and Regulation) Amendment Act, 2016  The Child Labour (Prohibition and Regulation) Act, 1986	No child below 14 years of age will be employed or permitted to work in any of the occupations set forth in the Act's Part A of the Schedule or any workshop wherein any of the processes set forth in Part B of the Schedule.  The child can help his family or family enterprise, which is other than any hazardous occupations or processes set forth in the Schedule, after his school hours or during vacations	No children between the age of 14 to 18 years will be engaged in hazardous working conditions.	Construction and Operation phase
The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979	The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.,	<ul style="list-style-type: none"> <li>• Contractor shall register with Labour Department if Inter-state migrant workmen are engaged</li> <li>• Adequate and appropriate amenities and facilities to be provided to workers - housing, medical aid, traveling expenses</li> </ul>	Construction and Operation phase
The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996	All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act.	<ul style="list-style-type: none"> <li>• All such establishments are required to pay Cess at a rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation</li> </ul>	Construction phase

Policy/ Law	Description	Requirement	Project Phase/ Applicability
		<p>for workers near the workplace etc.</p> <p>The employer (CMWSSB) to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government as per form [see rule 23 (1)] application for registration of establishments employing building workers</p>	
Minimum Wages Act, 1948.	<p>The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.</p>	<ul style="list-style-type: none"> <li>All construction workers should be paid not less than the prescribed minimum wage.</li> </ul>	Construction and Operation phase
Workmen Compensation Act, 1923.	<p>The Act provides for compensation in case of injury by accident arising out of and during employment.</p>	<ul style="list-style-type: none"> <li>Compensation for workers in case of injury by accident.</li> </ul>	Construction and Operation phase
Equal Remuneration Act, 1979.	<p>The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.</p>	<ul style="list-style-type: none"> <li>Equal wages for work of equal nature to male and female workers.</li> </ul>	Construction and Operation phase

#### 4.4 Clearances/ Permissions to be obtained by DBO Contractor

The indicative list of Clearance and Permissions required for the proposed project is furnished in Table 7. The Principal Employer and DBO Contractor should ascertain the requirements and obtain all necessary clearances/ permission prior to the start of construction and during the operation phase.

**Table 7: Clearances and Permissions Required for Proposed Perur DSP works**

Sl. No.	Construction activity	Statutory authority	Regulatory requirement	Implementation responsibility	Supervision
1.	Intake and Outfall pipe laying, Pumping station and Desalination plant	Ministry of Environment and Forests and Climate Change (MoEF & CC)	Coastal zone regulations, 2011	CMWSSB	---
2.	Construction of Desalination facility	Tamil Nadu Pollution Control Board (TNPCB)	Consent to Establish from State Pollution Control Board under Water Act 1974 & Air Act 1981	CMWSSB	---
3.	Generation of Brine and Sewage, potential to emit air pollution (including but not limited to diesel generators and vehicles)	Tamil Nadu Pollution Control Board (TNPCB)	Consent to Operate from the State Pollution Control Board under the Water Act 1974 & Air Act 1981	Contractor	PIU - CMWSSB
4.	Generation of Municipal solid waste	Tamil Nadu Pollution Control Board (TNPCB)	Authorization under MSW (M&H) Rules 2016	Contractor	PIU- CMWSSB
5.	Noise generation	Tamil Nadu Pollution Control Board (TNPCB)	Noise pollution (Regulation and Control) rules, 2000 and its amendments, 2010	Contractor	PIU- CMWSSB
6.	Generation of Hazardous waste	Tamil Nadu Pollution Control Board (TNPCB)	Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016	Contractor	PIU- CMWSSB
7.	Construction of Desalination facility	Divisional Fire Officer, Kancheepuram	NOC from Fire dept., Tamil Nadu Fire Service Act, 1985	Contractor	PIU- CMWSSB
8.	Employment of Contract labour	Registration under The Contract Labour (Regulation & Abolition) Act, 1970 as Principal Employer	Tamil Nadu Labour Department	Principal Employer – certificate of registration and labour license Contractor to take separate labour license	PIU- CMWSSB
9.	Intake and Outfall pipe laying, Pumping station construction	Tamil Nadu Maritime Board	Consent for the erection of offshore structure to be obtained Tamil Nadu Maritime Board as per	Principal Employer	PIU- CMWSSB

Sl. No.	Construction activity	Statutory authority	Regulatory requirement	Implementation responsibility	Supervision
			Tamil Nadu Maritime Board Act, 1995		
10.	Engagement of Labour	Office of the Labour Commissioner	- Labour license from labour commissioner office as per The Contract Labour (Regulation and Abolition) Act, 1970. The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979	Principal Employer – labour license	PIU-CMWSSB

The Applicable Ambient Air Quality and Noise Standards for the project is furnished in Annexure -2. The Applicable Standards for Discharge of Brine Into Deep Marine Outfall is furnished in Annexure -3. The Applicable Diesel Engine Emission and Noise standards is furnished in Annexure - 5

#### 4.4.1 Land acquisition

The Project does not require land acquisitions and resettlements as Perur DSP is proposed to be constructed in CRZ. The land in Perur for the project is planned to be leased for 30 years from the landowner (M/s. Arulmigu Alavandar Nayakkar Trust (a religious and charitable group) maintained by the Hindu Religion and Charitable Endowments (HR&CE) Department of the Government of Tamil Nadu (GoTN) to CMWSSB. The “Casuarina” trees planted in the Perur site by the Forest Department of GoTN. This is to be removed by following conditions imposed by GoTN as per the Governmental Order of G.O (Ms) No. 157 issued on 29<sup>th</sup> April 2016.

- Casuarina plantation of 9 years old has been planted by the Forest Department on the sharing basis agreement of 30% for the Forest Department and 70% for the Trust (Land Owner of the Perur site).
- CMWSSB has to contact the Forest Department or TNPL (Tamil Nadu Newsprint and Papers Limited) to determine the value of the Casuarina trees.
- Compensation amount for the loss of the Casuarina plantation in the rented land should be paid as a single instalment by the CMWSSB to the Trust.

PMC recommends CMWSSB shall formally write to Forest Department citing the G.O. from GoTN for sharing the cost from Casuarina timber on 30% and 70% sharing to Forest Department and M/s. Alavandar trust.

## 5 REVIEW OF EIA REPORT

The Environmental baseline monitoring carried out by AECOM as part of the EIA report was in the year 2013. As per EIA guidelines of MoEF & CC, more than 3 years old baseline data has no validity.

Further, CRZ clearance conditions for Perur project are referred below, which also imply for fresh baseline survey/ Post environmental monitoring to be carried out:

- Soil and groundwater samples in and around the SWRO Desalination Plant shall be tested regularly to ascertain that there is no threat to groundwater quality through ingress/ leaching of seawater.
- 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.
- 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.
- The Ministry of Environment, Forest & Climate Change (MoEF&CC) or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary in the interest of the environment and the same shall be complied with.
- Full co-operation shall be extended to the officials from the Regional Office of MoEF&CC, during monitoring of the 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.
- 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 TNPCB.
- The project activity should not affect the coastal ecosystem, including marine flora and fauna.
- A system shall be evolved for close and continuous monitoring during the construction and post-construction places through reputed institutions such as National Centre for Sustainable Coastal Management (NCSCM), Anna University, Chennai/NIOT, Chennai/ IIT Madras. Periodically report shall be furnished to the Tamil Nadu State Coastal Zone Management Authority on the site conditions every year to take mitigation measures on the event of any adverse impacts on the coastal.
- The impact on the corals, marine organisms, Turtle nesting, etc., due to the above constructions, in the long run, should be evaluated and monitored through experts, in which, ecologists should be included.

Accurate and recent baseline data before commencing construction activity would be useful in revising/ updating the Environmental Management Plan (EMP) and further monitoring and reporting to regulatory agencies.

Based on the above facts, PMC recommends that the baseline study be included in the DBO contractor's scope of work at Pre-construction stage. In Annexure 6, the scope of work to be included in CP1 document as part of the Contractor's scope is furnished.

### **ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES:**

The proposed project is likely to create impacts on the environment in two distinct phases of project namely:

- During the construction phase, which may be regarded as a temporary or short term; and
- During the operational phase, which will have long-term effects.

The construction and operational phases of the proposed project comprise of various activities, each of which will have some impact on one or more environmental parameters. Various impacts during the operational phase of the project have been studied to estimate the impact on the environment and are discussed briefly in the subsequent sections.

The EIA report has covered the following Anticipated Environmental Impacts.

- Impact due to burial of intake and outfall pipelines below the seabed
- Impact due to seawater intake head
- Construction of outfall diffuser
- Discharge of Brine reject
- Impact on turtles
- Impact on fisheries and fishermen
- Impact on shoreline

The above impacts and environmental management plan are discussed in Table 13 and Table 14. The Impact on the shoreline is presented in Annexure – 10

Apart from the above, the following impacts were identified, and suitable mitigation measures are discussed hereunder

- Impact of domestic sewage generation
- Impact of Solid waste generation

#### **Impact of domestic sewage generation and anticipated mitigation measures**

Domestic wastewater generated from toilets and Canteen building during operational phase from the proposed Perur DSP. The estimation of domestic sewage generation is furnished in Table -8 below:

**Table 8: Estimate of Domestic sewage quantity generation**

S. No.	No. of persons	Per capita (lpcd)	Estimated wastewater generation (L)	Unit
1	No. of Persons in general shift	54	45	2430
2	No. of Persons in 24/7 works	79	135	10665
	<b>TOTAL</b>	<b>133</b>	<b>13.095</b>	<b>KLD</b>
	90% of water is sewage		11.7855	KLD
	10% infiltration		12.96	KLD
	<b>Say</b>		<b>13.5</b>	<b>KLD</b>

The minimum capacity of the plant shall be 13.5 KLD.

The reclaimed water from the package sewage treatment plant shall be recycled and reused for Landscaping and toilet flushing. The Applicable standards for Recycle and reuse of Treated water from Package Sewage Treatment Plant is furnished in Annexure -3. Typical Package Sewage Treatment Plant Process flow diagram is furnished in Annexure – 12.

#### **Impact of Solid waste generation**

Municipal solid waste is likely to be generated during the operation phase of the project. The estimate of domestic solid waste generation is furnished in Table -9.

**Table 9: Domestic Solid Waste of DSP**

Category	3 (shift)/ day	Operation 7days/week	Waste Unit (kg/person/ day)	Total Waste/ week (kg/week)
<b>Staff</b>	54	553	0.571*	<b>315.76</b>
<b>Labour</b>	79	378	0.571*	<b>215.83</b>
<b>Total</b>	<b>133</b>	<b>931</b>	<b>0.571*</b>	<b>531.59</b>

\* Data of the Kanchipuram District (Source: Sustainable Solid Waste Management in India by Ranjith Kharvel Annapu Department of Earth and Environmental Engineering Fu Foundation School of Engineering and Applied Science Columbia University, New York, Jan 10, 2012)

The solid wastes (garbage) generated at the plant site will be segregated into organic and inorganic components and collected in separate bins. The generated solid waste generated from the Perur DSP will be disposed to a local solid waste management service contractor as and when required.

## 6 REVIEW OF CRZ CLEARANCE CONDITIONS

### 6.1 Status and validity of CRZ clearance

Based on the provisions stipulated in the notifications Coastal Regulation Zone Clearance (CRZC) stipulated in the CRZ Notification (No. S.O. 19 (E), 6<sup>th</sup> January 2011), environmental clearances required for the Project composed of Seawater Reverse Osmosis Desalination Plant (DSP) at Perur.

The CRZ clearance for the Perur DSP project was obtained from MoEF &CC dated 25.10.2018. The validity of CRZ clearance for commencement and operation is furnished in the table below:

**Table 10: Timeline of CRZ clearance**

Sl. No.	Date of receipt of CRZ clearance	Duration of Validity as per CRZ notification	Last date of validity
1.	25 <sup>th</sup> October 2018	5 years	25 <sup>th</sup> October 2023

### 6.2 Review and Implementation plan for CRZ clearance conditions

The following are the specific and general conditions included in MoEF &CC CRZ clearance letter for the Perur DSP project. The Conditions and associated action plan are furnished in Table below. The block diagram indicating the implementation scheme of CRZ conditions and EMP is furnished in Figure – 3.

**Table 11: Action plan for MoEF &CC Specific and General Conditions**

S. No.	CRZ Conditions	Remarks	Action
<b>PART A – SPECIFIC CONDITIONS:</b>			
(i)	The project proponent shall implement the shoreline erosion control and management plan framed by the State government, as may be applicable in the area.	Refer Annexure – 10	PMC – to include in the bid document Contractor- Execution CMWSSB- Monitoring and Reporting
(ii)	The project proponent shall submit an undertaking to the TNCZMA before the commencement of work of the proposed plant stating that it shall bear the full cost of environmental damage and restitution arising due to setting up of the proposed 400 MLD desalination plant.	Undertaking letter to TNCZMA	CMWSSB
(iii)	All conditions/ recommendations stipulated by the Tamil Nadu Coastal Zone Management Authority (TNCZMA) vide its letter no. 844/EC.3/2016-1, dated 14.01.2016 and letter No. 24117/EC.3/2017-1, dated 09.01.2018 respectively, shall strictly be complied with.	Refer Table – 10 for TNCZMA Conditions and Implementation plan	TNCZMA vide its letter no. 844/EC.3/2016-1, dated 14.01.2016
(iv)	'NOC' from Tamil Nadu Pollution Control Board for the discharge of brine water into the sea after necessary safeguards shall be obtained prior to commencement of operation.	NOC/ Consent to Operate to be obtained by the Contractor before commissioning.	Execution-Contractor, monitoring & Reporting - CMWSSB
(v)	'Consent to Establish' shall be obtained from State Pollution Control Board under the Air (Prevention and Control of Pollution) Act, 1981 and the Water (Prevention	Consent to Establish to be applied by CMWSSB to TNPCB	Monitoring & Reporting - CMWSSB

S. No.	CRZ Conditions	Remarks	Action
	and Control of Pollution) Act, 1974, as may be applicable, prior to commencement of work.	upon receipt of land documents.	
(vi)	The project proponent shall ensure that the temporary structures installed for the laying of pipelines are removed within three months of accomplishment of the work.	Condition to be included in the bid document	PMC Monitoring & Reporting - CMWSSB
(vii)	The project proponent shall ensure that the structure proposed to be set up is Tsunami resistant.	In Bid document, provision for connection to National Tsunami warning system with Plant SCADA to be introduced and the project site will be filled up to + 6.5 m with reference to CD for tsunami protection.	PMC Monitoring & Reporting - CMWSSB
(viii)	The construction in CRZ areas shall be done strictly in accordance with the provisions of CRZ Notification, 2011 and as amended from time to time.	Condition to be included in the bid document	PMC Monitoring & Reporting - CMWSSB
(ix)	Solid waste shall be collected, treated and disposed of in accordance with the Solid Waste Management Rules, 2016.	Condition to be included in bid document	PMC Monitoring & Reporting - CMWSSB
(x)	There shall be no dressing or alteration of the sand dunes, natural features including landscape changes for beautification, recreation and other such purpose.	Condition to be included in bid document	PMC Monitoring & Reporting – CMWSSB
(xi)	Soil and groundwater samples in and around the SWRO Desalination Plant shall be tested regularly to ascertain that there is no threat to groundwater quality through ingress/leaching of seawater	<ul style="list-style-type: none"> <li>- Condition to be included in bid document</li> <li>- Contractor to collect sampling and analysis during the O&amp;M period and submit copies to CMWSSB</li> </ul>	<ul style="list-style-type: none"> <li>- PMC</li> <li>- CMWSSB to submit copies of analysis report to NCZMA/ JICA and MoEF&amp;CC and upload in its website.</li> </ul>
<b><u>PART B – GENERAL CONDITIONS:</u></b>			
(i)	A copy of the clearance letter shall be uploaded on the websites of the Company/Proponent and concerned State Pollution Control Board. The Clearance letter shall also be displayed at the Regional Office, District Industries centre and Collector's Office/Tehsildar's office for 30 days.	CRZ Clearance letter uploaded in CMWSSB website.	CMWSSB

S. No.	CRZ Conditions	Remarks	Action
(ii)	The funds earmarked for environmental protection measures shall be kept in a separate account and shall not be diverted for other purposes. The year-wise expenditure shall be reported to this Ministry and its concerned Regional Office.	This is a compliance requirement by CMWSSB	CMWSSB
(iii)	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.	Noted	Noted
(iv)	Adequate provision for infrastructure facilities including water supply, fuel and sanitation must be ensured for construction workers during the construction phase of the project to avoid any damage to the environment.	<ul style="list-style-type: none"> <li>- Condition to be included in bid document</li> <li>- Contractor to ensure these facilities are available throughout the construction phase</li> </ul>	<ul style="list-style-type: none"> <li>- PMC</li> <li>- Contractor</li> <li>- Monitoring &amp; Reporting - CMWSSB</li> </ul>
(v)	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.	Environmental Compliance reports from the contractor will be reviewed by PMC and submitted to CMWSSB for onward submission to MoEF&CC	<ul style="list-style-type: none"> <li>-PMC</li> <li>-Monitoring, Reporting - CMWSSB</li> </ul>
(vi)	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 the environment and the same shall be complied with.	Noted	Based on additional/ Modified conditions if any, the necessary action to be proposed.
(vii)	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.	Noted	No Action
(viii)	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 CRZ Notification, 2011.	Noted	No Action
(ix)	Full co-operation shall be extended to the officials from the Regional Office of MoEF&CC, during monitoring of the implementation of environmental safeguards stipulated. It	Noted	CMWSSB to forward a complete set of all the documents

S. No.	CRZ Conditions	Remarks	Action
	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.		submitted to MoEF&CC to the concerned Regional Office of MoEF&CC.
(x)	In the case, if any change(s) in the scope of the project, the project would require a fresh appraisal by this Ministry.	Noted	In case of any change in the scope, amendment proposal to be submitted by CMWSSB
(xi)	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.	Noted	No action
(xii)	All other statutory clearances such as the approvals for storages 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.	<ul style="list-style-type: none"> <li>- CRZ clearance and Consent to Establish (CTE) from TNPCB etc are part of CMWSSB responsibilities</li> <li>- For all other clearances, Contractor shall be responsible.</li> </ul>	<ul style="list-style-type: none"> <li>- PMC to include these responsibilities in the Bid document.</li> <li>- Contractor</li> </ul>
(xiii)	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 <a href="http://www.envfor.nic.in">http://www.envfor.nic.in</a> . 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.	Noted	No action
<b><u>Other Conditions</u></b>			
4.	This Clearance is subject to the 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.	This is a compliance requirement by CMWSSB	CMWSSB
5.	Any appeal against the clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as	30 day period is already completed	CMWSSB

S. No.	CRZ Conditions	Remarks	Action
	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.	This is a compliance requirement by CMWSSB	CMWSSB
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.	Refer reply to Specific condition xi	---
8.	The environmental statement for each financial year ending 31 <sup>st</sup> 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.	Based on the operational data from the plant - CMWSSB to file Form V yearly. Environmental statement for the financial year. Ending the 31st March to be submitted to TNPCB on or before the thirtieth day of September every year.	CMWSSB to upload yearly Environmental statement on its website along with the status of compliance of clearance conditions. Also, a copy of the same to be emailed to the Regional Office of MoEF &CC

The following are the conditions included in TNCZMA clearance letter for the Perur DSP project. The Conditions and associated action plan are furnished in the below Table.

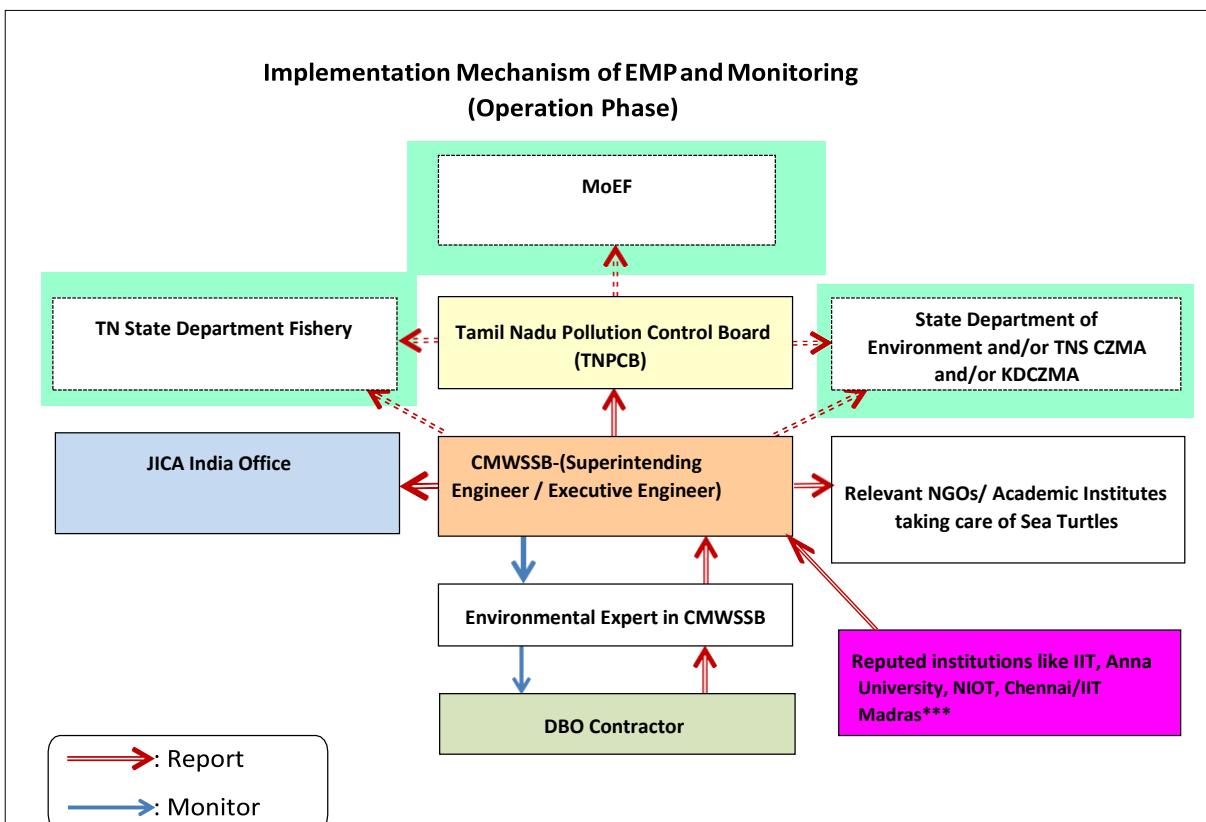
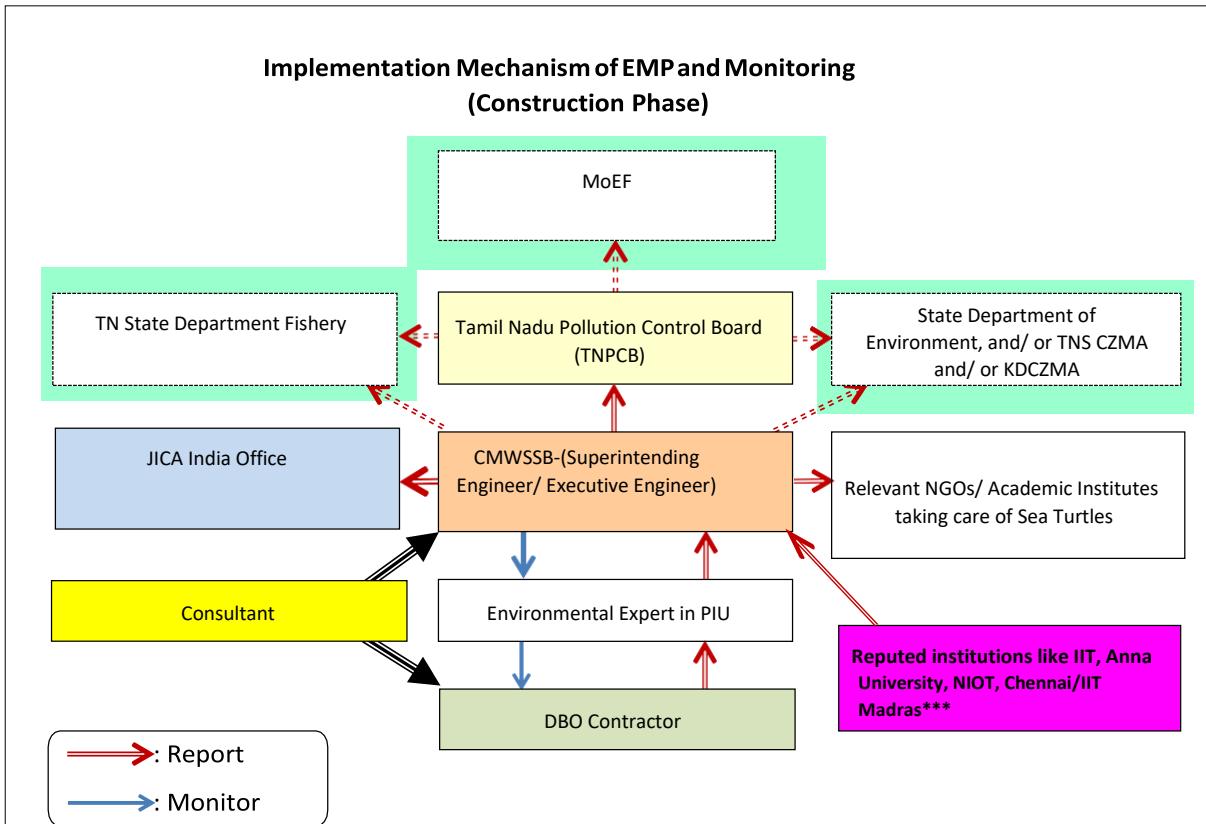
**Table 12: An action plan for KDJMA/ TNCZMA Conditions**

S. No.	CRZ Conditions	Remarks	Action
a)	Proposed activities should not cause coastal erosion and alter the beach configuration.	PMC and contractor will ensure that this to be implemented as per the requirement and same will be reported by CMWSSB to the statutory authority.	PMC/ Contractor/ Monitoring & Reporting - CMWSSB
b)	Untreated chemical waste generated due to membrane protection activity and the sewage generated should not be discharged into the sea.	Untreated chemical waste generated due to membrane protection activity will be neutralised in Neutralisation pit	- PMC to include the requirement in Bid document. - Contractor- execution

S. No.	CRZ Conditions	Remarks	Action
		<p>and then discharged through Outfall.</p> <p>Sewage generated to be treated in the package treatment plant and treated sewage to be used for landscaping and toilet flushing</p>	<ul style="list-style-type: none"> <li>- Monitoring &amp; Reporting - CMWSSB</li> </ul>
c)	The project activity should not affect the coastal ecosystem, including marine flora and fauna.	<p>PMC and contractor will ensure that this to be implemented as per the requirement and same will be reported by CMWSSB to the statutory authority.</p>	<p>PMC/ Contractor</p> <p>Monitoring &amp; Reporting - CMWSSB</p>
d)	It may be ensured that mercury concentration is not present in the end product.	<p>This is a compliance requirement mentioned by IS:10500 for potable water</p> <p>PMC and contractor will ensure that this implemented as per the requirement and same will be reported by CMWSSB to the statutory authority.</p>	<p>PMC/Contractor</p> <p>Monitoring &amp; Reporting - CMWSSB</p>
e)	The proponent should ensure that the saline water shall not gain access into the ground while conveying or processing the seawater.	Discharge through outfall pipe in the deep sea.	<p>PMC to include the requirement in Bid document.</p> <p>Monitoring &amp; Reporting - CMWSSB</p>
f)	Marine water quality should be monitored at the outfall area every quarter and results sent to Tamil Nadu state Coastal Zone Management Authority.	Contractor to monitor the Marine water quality during the operational phase	<p>Consolidated report to be submitted to TNCZMA quarterly by CMWSSB</p>
g)	A system shall be evolved for close and continuous monitoring during the construction and post-construction places through reputed institutions such as National Centre for Sustainable Coastal Management (NCSCM), Anna University, Chennai/NIOT, Chennai/ IIT Madras. Periodically report shall be furnished	As per the terms CMWSSB has to take on board any of the recommended agencies for close monitoring of EMP.	<p>PMC/ Contractor</p> <p>Monitoring &amp; Reporting - CMWSSB</p>

S. No.	CRZ Conditions	Remarks	Action
	to the Tamil Nadu State Coastal Zone Management Authority on the site conditions every year to take mitigation measures on the event of any adverse impacts on the coastal.		
h)	The impact on the corals, marine organisms, Turtle nesting, etc., due to the above constructions, in the long run, should be evaluated and monitored through experts, in which, ecologists should be included.	An ecologist shall be included in the team of the recommended agency under (g)	CMWSSB Monitoring & Reporting by CMWSSB
i)	The activities such as intake pipelines and outfall line and intake arrangement in the sea and the pipeline should not cause hindrance to fishing activities and boat movement.	During the operational phase, the intake and outfall pipes are laid 1m below the sea bed and hence no hindrance envisaged	Monitoring and Reporting by CMWSSB
j)	Marking the intake and outfall pipelines adequately such that fishing vessels and fishers are made aware of its presence.	Marker buoys will be installed	PMC to include in Bid document Monitoring and Reporting by CMWSSB
k)	No blasting or drilling activities in CRZ is permissible.	Noted	PMC to include in Bid document Monitoring and Reporting by CMWSSB
l)	The proponent should not prevent the public from easy access to the beach	There would be temporary obstruction during the construction phase. However, after construction, there would not be any restriction for the movement of the public on the beach.	CMWSSB Monitoring and Reporting by CMWSSB
m)	The proponent shall implement the Green belt as envisaged in EIA report.	Noted	PMC to include green belt scope in the bid document Monitoring and Reporting by CMWSSB
n)	A turtle conservation plan shall be prepared and implemented during the project period.	Noted	PMC to include in Bid document Monitoring and Reporting by CMWSSB

Note: Compliance conditions reporting to MoEF&CC shall be through CMWSSB



NOTE: \*\*\* - Based on TNCZMA condition no. (g) Reputed institution

**Figure 3: Implementation Mechanism of CRZ conditions/ EMP and Monitoring**

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## **7 ENVIRONMENTAL MANAGEMENT PLAN**

This chapter will present the Environmental Management Plan (EMP) for the proposed Perur DSP works.

**Environmental Management Plan (EMP):** An EMP is an instrument that details:

- (a) the measures to be taken during the implementation and operation of a project to eliminate or offset adverse environmental impacts or to reduce them to acceptable levels; and
- (b) the actions needed to implement these measures. EMPs are therefore, important tools for ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented through all phases of the project life cycle.

The various EMP measures during Pre-construction, Construction and Operation phase are listed in Table- 13 and Table - 14.

**Table 13: Environmental Management Plan for the proposed Perur DSP and its Pumping Station (CP1 and CP2-1)**

**Pre -Construction Phase**

Sr. No.	Project-related Issues	Mitigation Measures to be taken	Responsibilities	
			Planning and Execution	Supervision/ Monitoring
I.	<b>Pre-Construction Stage</b>			
i	Assure compliance with relevant construction field legislation	<p>All clearances required from other departments and Environmental aspects shall be ensured and made available before the start of work. Acquire construction permit and Provide Water management guidelines.</p> <p>The project requires Consent to Establish (CtE) under the Water and Air Act from the State Pollution Control Board.</p>	Contractor	CMWSSB
ii	Utility Relocation	<ul style="list-style-type: none"> <li>Identify the common utilities that would be affected, such as telephone cables, electric cables, electric poles, water pipelines etc.</li> <li>Affected utilities shall be relocated with prior approval of the concerned agencies before construction starts.</li> <li>Alternate temporary arrangement for crossing over shall be provided.</li> </ul>	Planning - CMWSSB Execution - Contractor	CMWSSB
iii.	Supply of Material and resources	<p>Procurement of construction material only from permitted sites and licensed/ authorized quarries.</p> <p>Identify locally available resources/ materials and eco-friendly materials.</p>	Contractor	CMWSSB
iv.	Water	The Contractor will be responsible for arranging an adequate supply of water of the required quantity for the entire construction period. Groundwater extraction not permitted in the area. The contractor will minimize the wastage of water during construction.	Contractor	CMWSSB

Sr. No.	Project-related Issues	Mitigation Measures to be taken	Responsibilities	
			Planning and Execution	Supervision/ Monitoring
v.	Appointment of Environment Health & Safety Officer	The contractor will appoint qualified and experienced Environmental Engineer, who will dedicatedly work and ensure implementation of EMP, including Occupational health and safety issues at the camp, construction work sites.	Contractor	CMWSSB
vi	Other Construction Vehicles, Equipment and Machinery	All vehicles, equipment and machinery to be procured for construction/ protection work will conform to the relevant Bureau of Indian Standard (BIS) norms/ CPCB standards. The discharge standards promulgated under the Environment Protection Act, 1986 and Motor Vehicles Act, 1988 will be strictly adhered to.  Soundproof DG set as per regulations will be used at the project site.  The contractor will maintain records of Pollution Under Control (PUC) certificates for all vehicles used during the contract period, which will be produced to the Project Implementation Unit for verification whenever required.	Contractor	CMWSSB
vii	Land Acquisition/ Resettlement & Rehabilitation (R&R)	R&R issue is not involved as proposed land is in the CRZ area. However, the site has tree plantation, which needs to be cleared.  These trees to be cleared in accordance with the provisions given under Government order (G.O.157) dated 29.4.2016  The plan is to be prepared for clearing the trees, i.e. cutting Schedules, coordination with the Forest Department and/ or, TN-Newsprint and Papers, Total value of the trees, Budget allocations, compensation to the landowner, auction systems and management of tree cutting for pulps, waste management, construction vehicle and equipment managements etc., for Perur DSP site.	CMWSSB	CMWSSB

**Table 14: Environmental Management Plan for the proposed Perur DSP and its Pumping Station (CP1 and CP2-1)**

**Construction & Operation Phase**

Sr. No.	Project Activity	Relevant Environmental components likely to be impacted	Nature of Impact	Likely Impacts and their significance in the absence of Mitigation Measures	Proposed Mitigation Measures	Responsibilities		
						Planning	Execution	Monitoring
A	<b>Construction Phase</b>							
i.	Trenching for Intake and outfall pipelines	Marine water quality	Short Term, Localised, Reversible	<ul style="list-style-type: none"> <li>– Increase in turbidity affecting the Photosynthetic process affecting the aquatic productivity.</li> <li>– Suspended Particles will affect the filter feeders, and adult fish will migrate from the site of impact</li> <li>– Change in marine water quality due to aqueous discharges (oily waste, sanitary wastes) from dredgers, barges and workboats</li> </ul>	<ul style="list-style-type: none"> <li>– Check turbidity levels with baseline levels as a reference during the entire monitoring programme</li> <li>– Use of good engineering tools like cutter suction dredger for trenching to be used</li> <li>– Controlled method of dredging with the latest technology which will limit the plume generation</li> </ul>	Contractor	Contractor	CMWSSB
				<ul style="list-style-type: none"> <li>– Trenching will disturb the sea bed resulting in loss of seagrass beds and associated benthic communities</li> <li>– Boat movement and fishing activity will be restricted</li> <li>– The decrease in DO levels</li> <li>– Increase in noise levels</li> <li>– Removal of benthic communities</li> </ul>	<ul style="list-style-type: none"> <li>– Discharge of waste into the sea will be prohibited</li> <li>– Oil Spill control measures will be adopted</li> <li>– Ensure slop tanks will be provided to barges/ workboats for collection of liquid/ solid waste &amp; Marine environmental monitoring program</li> <li>– Silt fences (Pollution Control Equipment) are utilized for</li> </ul>			

Sr. No.	Project Activity	Relevant Environmental components likely to be impacted	Nature of Impact	Likely Impacts and their significance in the absence of Mitigation Measures	Proposed Mitigation Measures			Responsibilities		
					Planning	Execution	Monitoring	Planning	Execution	Monitoring
				<ul style="list-style-type: none"> <li>– Increase in species diversity and density in areas adjoining dredging site</li> <li>– Smothering or blanketing of sub-tidal communities.</li> </ul>	<ul style="list-style-type: none"> <li>– controlling turbid water during the construction of trenches for the pipelines</li> <li>– To complete the trenching works in the shortest duration.</li> <li>– Environmental education on the marine ecosystem as well as the habitat of sea turtles to workers, labourers, and surrounding villagers.</li> <li>– Preparation of reports of Sea turtle sightings in and around the seashore in Perur to relevant official entities and NGOs.</li> <li>– Avoidance of installations of intake/ outfall pipelines during the sea turtles egg laying seasons.</li> <li>– Actions to be taken in cases where sea turtles are observed in and around the seashore in Perur such as to contact to relevant NGOs and official entities handling sea turtle conservations and monitoring for getting necessary instructions.</li> </ul>					

Sr. No.	Project Activity	Relevant Environmental components likely to be impacted	Nature of Impact	Likely Impacts and their significance in the absence of Mitigation Measures	Proposed Mitigation Measures	Responsibilities		
						Planning	Execution	Monitoring
i.					<ul style="list-style-type: none"> <li>- Temporary suspension of the constructions for DSP.</li> <li>- Announcement of the existence of sea turtles to the contractor(s), construction workers/labourers and surrounding communities.</li> </ul>			
			Mangrove area	Long Term Localised Non-Reversible	<ul style="list-style-type: none"> <li>- Impact on nearby mangrove</li> </ul>	<ul style="list-style-type: none"> <li>- No mangroves were observed at the proposed project site</li> <li>- The impact is not envisaged</li> </ul>	Contractor	Contractor
ii.	Seawater Intake head	Entrapment of fishes and other organisms	Continuous	<ul style="list-style-type: none"> <li>- Impact on Fish and Fish larvae</li> </ul>	<ul style="list-style-type: none"> <li>- Deep Water Intake having velocity cap and screen is proposed.</li> <li>- The intake velocity is limited to 0.12 m/s</li> <li>- The bar screen of 0.1 m width is to be installed</li> <li>- Above are the design consideration included in the project</li> </ul>			
		Entrainment of smaller organisms such as fish larvae.						
iii	Fishing	Fishermen and fishing travellers	Short Term Localised Reversible	<ul style="list-style-type: none"> <li>- Impact on fishing due to Construction works</li> <li>- During the trenching for laying the submarine pipeline, the fisherman will not be allowed to cross over the</li> </ul>	<ul style="list-style-type: none"> <li>- Proposed construction is planned within CMWSSB areas near Approach Channel and at existing Anchorage areas where fishing activities are not permitted:</li> </ul>	CMWSSB	CMWSSB	CMWSSB

Sr. No.	Project Activity	Relevant Environmental components likely to be impacted	Nature of Impact	Likely Impacts and their significance in the absence of Mitigation Measures	Proposed Mitigation Measures	Responsibilities		
						Planning	Execution	Monitoring
				areas where trenching is being done. This is a short term impact and completely reversible as there will not be any prohibition of fisherman crossing the areas above the path where the submarine pipeline is laid	<ul style="list-style-type: none"> <li>– however, the following measures are suggested:</li> <li>– Signboards will be placed at the construction site to make fishermen aware of ongoing activities</li> <li>– Necessary marker buoys will be installed</li> <li>– Interactions will be initiated with a fishing community prior to commencement of construction</li> <li>– Construction shall be limited to as per development plan.</li> <li>– Proper Planning execution of offshore construction activities to ensure the completion of construction as per schedule</li> <li>– Ensure slop tanks will be provided to barges/ workboats for collection of liquid/ solid waste</li> <li>– Trenching will be done only in small stretches, and so fishing activities can continue as normal in all other areas except where the active trenching/ laying of the</li> </ul>			

Sr. No.	Project Activity	Relevant Environmental components likely to be impacted	Nature of Impact	Likely Impacts and their significance in the absence of Mitigation Measures	Proposed Mitigation Measures	Responsibilities		
						Planning	Execution	Monitoring
					pipeline is being done. There will not be any prohibition of fisherman crossing the areas above the submarine pipeline are laid below the sea bed.			
iv.	Outfall diffuser	Marine water quality	Continuous	<ul style="list-style-type: none"> <li>- Increased Salinity</li> <li>- Chlorine concentration to be maintained below 0.2 ppm</li> </ul>	<ul style="list-style-type: none"> <li>- Faster dilution of moderately high salinity levels to ambient levels.</li> <li>- Brine diffuser with high brine diffusion efficiency has been proposed.</li> <li>- Monitoring of marine water quality for timely action during exceedance of specified value.</li> </ul> <ul style="list-style-type: none"> <li>- Chlorine dosing rate to intake seawater is designed for elimination of marine growth at intake and inside pipeline.</li> <li>- Residual Cl<sub>2</sub> concentration will be approximately 0.2 ppm at the outlet of the pre-treatment system by consuming Cl<sub>2</sub> in the intake and pre-treatment processes.</li> <li>- To protect the RO membrane from chlorine attack, Sodium Bisulfite (SBS) is injected for removing Cl<sub>2</sub></li> </ul>	Contractor	Contractor	CMWSSB

Sr. No.	Project Activity	Relevant Environmental components likely to be impacted	Nature of Impact	Likely Impacts and their significance in the absence of Mitigation Measures	Proposed Mitigation Measures	Responsibilities		
						Planning	Execution	Monitoring
					<p>at the inlet of the RO membrane. Accordingly, the brine has no chlorine as calculated in the above equation.</p> <ul style="list-style-type: none"> <li>- RO reject contains an excess SMBS which can reduce the Cl<sub>2</sub> concentration in the discharge. During regular operation, the Cl<sub>2</sub> concentration of the discharge from DSP can be maintained less than 0.2 ppm.</li> </ul>			
v.	Vehicle movement	Air quality	Short Term Localised Reversible	<ul style="list-style-type: none"> <li>- Negative Impact of Air quality</li> </ul>	<ul style="list-style-type: none"> <li>- Periodic inspection of exhaust gases of dump trucks, other trucks and heavy equipment to be used.</li> <li>- Water spraying for heavy vehicles, equipment and trucks operation on-site in dry season to avoid dust uplift and air pollution.</li> </ul>	Contractor	Contractor	CMWSSB
vi.	Manpower for Construction works	Water Quality	Short Term Localised Reversible	<ul style="list-style-type: none"> <li>- Negative Impact of water quality</li> </ul>	<ul style="list-style-type: none"> <li>- Construction office will be provided with an adequate number of toilets as per labour laws and connected with a septic tank or modular STP for treatment of wastewater.</li> </ul>	Contractor	Contractor	CMWSSB

Sr. No.	Project Activity	Relevant Environmental components likely to be impacted	Nature of Impact	Likely Impacts and their significance in the absence of Mitigation Measures	Proposed Mitigation Measures	Responsibilities		
						Planning	Execution	Monitoring
					<ul style="list-style-type: none"> <li>- Once the construction is over, Septic tank to be removed and closed.</li> </ul>			
vii	Noise and Vibration	Noise Quality	Short Term Localised Reversible	<ul style="list-style-type: none"> <li>- Negative Impact of noise quality</li> </ul>	<ul style="list-style-type: none"> <li>- Periodical inspection of silencers of dump trucks, other trucks and heavy equipment.</li> <li>- PPEs to be provided to all labours working at the site.</li> </ul>	Contractor	Contractor	CMWSSB
viii.	Solid waste management	Soil Quality	Short Term Localised Reversible	<ul style="list-style-type: none"> <li>- Impacts due to disposal of solid waste</li> </ul>	<ul style="list-style-type: none"> <li>- Periodical de-sludge activities for toilets in construction sites by the use of public services or by the service providers.</li> <li>- Waste oil (from hydraulic systems, etc.) collection and treatment by solid waste collection companies. Storage at DSP site to be provided with secondary containment (Dike) for avoiding any spillages.</li> <li>- Surplus soil management by back-filling.</li> <li>- Being a greenfield project, Construction waste and debris waste generation are minimal. The minor quantity generated will be</li> </ul>	Contractor	Contractor	CMWSSB

Sr. No.	Project Activity	Relevant Environmental components likely to be impacted	Nature of Impact	Likely Impacts and their significance in the absence of Mitigation Measures	Proposed Mitigation Measures	Responsibilities		
						Planning	Execution	Monitoring
					utilized within the DSP for various construction works			
ix.	Handling of Hazardous Waste	Human safety and property loss	Short Term Localised	- Fire accidents due to hazardous material handling	<ul style="list-style-type: none"> <li>- Spilled oil and fuel management as hazardous waste. This to be removed from the site and sent to hazardous waste treatment and disposal facility as per Hazardous Wastes (Management, Handling and Transboundary Movement) Rules 2016 India shall be referred.</li> <li>- Hazardous materials such as lubricants, paints, compressed gases, varnishes etc., will be stored and disposed of as per the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules 2016 India</li> <li>- Hazardous wastes will be disposed of through approved TNPCB/ CPCB vendors.</li> </ul>	Contractor	Contractor	CMWSSB
<b>B Operation Phase</b>								
i.	Potable water production	Water Quality	Localised Reversible	- Impact on offshore water quality	- Periodical maintenance of Screens, Membrane CIP systems of DSP operation, filter	O & M Contractor	O&M Contractor	CMWSSB

Sr. No.	Project Activity	Relevant Environmental components likely to be impacted	Nature of Impact	Likely Impacts and their significance in the absence of Mitigation Measures	Proposed Mitigation Measures			Responsibilities		
					Planning	Execution	Monitoring	Planning	Execution	Monitoring
				<p>backwashing, Belt filter press washing and Sewage Treatment Plant (STP) based on relevant O&amp;M manuals and instructions of such facilities.</p> <ul style="list-style-type: none"> <li>– Due to the operation of Blowers, DG sets</li> </ul>	<ul style="list-style-type: none"> <li>– Provision of acoustic enclosures for equipments</li> <li>– Personal Protecting Equipment (PPE).</li> </ul>					

## 8 SUMMARY OF WASTE MANAGEMENT PLAN FOR PERUR DSP

The summary of the waste management plan for the Perur DSP and its pump station during the operational phase of the project is presented in Table below:

**Table 15: Summary of Waste Management Plan for Perur DSP**

S. No.	Waste	Description
A.	<b>Liquid Waste</b>	
1	Screenings	<ul style="list-style-type: none"> <li>• Screenings will be flushed from the screens into wire baskets. The solids will be trucked for municipal landfill.</li> <li>• The wash-water from the screens will be part of the feed seawater.</li> </ul>
2	Pre-Treatment Sludge	<p>Wastewater will be generated in the pre-treatment system by the following treatment units:</p> <ul style="list-style-type: none"> <li>• Lamella clarifiers – settled sludge.</li> <li>• DAF (Dissolved Air Flotation) sludge.</li> <li>• Backwash wastewater from gravity dual media filters.</li> </ul> <p>It is proposed to treat the <i>Lamella clarifier</i> and <i>DAF sludge</i> in a dedicated wastewater treatment plant.</p> <p><i>Filter backwash</i> wastewater from gravity dual media filters will have low solid loading and so it will be routed to the outfall tank for disposal to the sea along with RO brine.</p>
3	RO Reject	RO reject will be directly transferred to the outfall tank where it will mix with the other wastewater streams and finally discharged to Sea through diffusers.
4	Membrane CIP Wastewater	<ul style="list-style-type: none"> <li>• The membrane CIP (Cleaning-in-Place) wastewater after chemical treatment in neutralization pit will be transferred to the outfall tank for disposal to the sea along with RO brine.</li> <li>• RO flush water will also be directed to the outfall tank through neutralization pit.</li> </ul>
5	Limestone Filter Backwash wastewater	<ul style="list-style-type: none"> <li>• The limestone filter backwash wastewater will be routed through neutralization pit to outfall tank for disposal to sea.</li> </ul>
6	Domestic Sewage	<ul style="list-style-type: none"> <li>• Domestic sewage is planned to be treated separately from all other liquid waste streams. A dedicated sewage treatment plant (STP) – package type will be constructed within the plant premises to treat sewage and greywater from the canteen and Admin. Building and other building toilets.</li> <li>• The effluent will be further treated to a standard suitable for re-use for irrigation, toilet flushing</li> </ul>
B.	<b>Solid Waste</b>	
1	Screenings	Screenings are planned to be disposed of to an authorised municipal landfill.
2	Spent Membranes	<ul style="list-style-type: none"> <li>• Spent membranes are planned to be disposed of to an authorised municipal landfill.</li> </ul> <p>These membranes shall be rinsed with fresh water (or permeate) prior to disposal.</p>

S. No.	Waste	Description
3	Solid from the wastewater treatment plant	<p>Wastewater treatment plant treats wastewater generated from Lamella clarifier and DAF. De-watered sludge (up to 25% solids) would be generated from the wastewater plant. This sludge would be mainly of marine sand and silica. The hazardous content in this sludge would be below the threshold as per Schedule-II of Hazardous Waste Management (HWM) Rules 2016.</p> <p>Following options were explored for disposal of de-watered sludge:</p> <ul style="list-style-type: none"> <li>(1) Disposal to the nearest solid waste dumping grounds at Perungudi and Kodungaiyur or any other abandoned quarry with approval from Tamil Nadu Pollution Control Board (TNPCB).</li> <li>(2) Disposal to common Hazardous Waste Treatment Storage and Disposal Facility (CHWTSDF), which is located in Gummidipoondi in SIPCOT estate, located at about 109 km from Perur.</li> </ul> <p>The option (1) seems more feasible considering the quantum of waste and its transportation. It is proposed that the Collection, transportation and disposal will be in the scope of the DBO Contractor.</p>
4	Domestic Solid waste	The domestic solid waste generated from the Perur DSP will be disposed to a local solid waste management service contractor as and when required.

## 9 ENVIRONMENTAL MONITORING PLAN (EMoP)

The environmental monitoring programme helps in signalling the potential problems resulting from the proposed project activities and will allow for prompt implementation of corrective measures. The environmental monitoring will be required during both construction and operational phases. The following parameters are proposed to be monitored:

- Terrestrial Water Quality (Ground water and Surface water)
- Air Quality
- Noise Intensity
- Soil Quality
- Marine Water Quality
- Marine Ecological Monitoring
- Marine Sediment Quality

Environmental monitoring during the pre-construction phase is important to set up the baseline data and to predict the deviation from baseline data and adverse impacts during construction and operations phases. Pre-construction phase monitoring has been done for the proposed project for air, noise, water, soil quality and ecology. The results so obtained are part of the EIA report. The EIA report baseline study was carried out in 2013 and as per EIA guidelines of MoEF & CC, more than 3 years old baseline data has no validity. Hence PMC recommends the DBO contractor to carry out the fresh baseline study before the start of any construction activity for 3 month duration.

**Table 16: Environmental Monitoring Plan**

Environmental Item	Monitoring Item	Location	Frequency	Responsible Organization
<b>Construction Phase</b>				
Air Pollution*	<ul style="list-style-type: none"> <li>• Visual inspection of discharge conditions of exhaust gases (such as black smoke) of dump trucks, other trucks and heavy equipment and maintenance of the inspection logbook.</li> </ul>	Construction site	Daily	Contractors
	<ul style="list-style-type: none"> <li>• Visual inspection on soil dust diffusions in dry season for water spraying.</li> </ul>	Construction site	Daily (Dry Season only)	Contractors
Water Quality	<ul style="list-style-type: none"> <li>• Visual inspection of sewage water leakage (overflow), bad odour, the emergence of vector flies and de-sludge activities for the on-site toilets</li> </ul>	Construction site	Once/ month	Contractors
	<ul style="list-style-type: none"> <li>• Checking Turbidity levels with baseline levels turbid water in the sea during installations of intake/outfall pipelines</li> </ul>	Intake/ outfall installation sea areas	Daily for the installation period	Contractors
Wastes	<ul style="list-style-type: none"> <li>• Waste composition, quantity, transportation and treatment methods</li> </ul>	Construction site	Once/ month	Contractors

Environmental Item	Monitoring Item	Location	Frequency	Responsible Organization
Soil Contamination	<ul style="list-style-type: none"> <li>Visual inspection of leakage conditions of oil and fuel leakages (from Engine, hydraulic power units and fuel tanks) of dump trucks, other trucks and heavy equipment</li> </ul>	Construction site	Daily	Contractors
Noise and Vibration*	<ul style="list-style-type: none"> <li>Visual inspection (common sensation) of silencer conditions of dump trucks, other trucks and heavy Equipment</li> </ul>	Construction site	Daily	Contractors
Ecosystem	<ul style="list-style-type: none"> <li>Visual inspection on turbid water in the sea during installations of intake/outfall pipelines</li> </ul>	Intake/outfall installation sea areas	Daily for the installation period	Contractors
	<ul style="list-style-type: none"> <li>Implementation of environmental education on the marine ecosystem and sea turtles.</li> </ul>	Construction site and surrounding communities	Twice/ year	Contractors/ CMWSSB
	<ul style="list-style-type: none"> <li>Information on Sea turtle sightings in and around the seashore in Perur</li> </ul>	Construction site	In the event of Sightings	Contractors/ CMWSSB
	<ul style="list-style-type: none"> <li>Actions on sea turtle sighting (construction suspensions periods, records of the announcements and relevant entities contacted) taken by CMWSSB</li> </ul>	Construction site and surrounding communities	In the event of Sightings	CMWSSB
Land Acquisition/ / Resettlement	<ul style="list-style-type: none"> <li>Implementation of tree cutting action plan (Per-Construction Stage)</li> </ul>	Construction site	Once/week	Contractors/ CMWSSB
Living and Livelihood	<ul style="list-style-type: none"> <li>Checking Turbidity levels with baseline levels turbid water in the sea during installations of intake/ outfall pipelines</li> <li>Pipelines installation schedules</li> <li>Installation (Construction) Management</li> </ul>	Intake/ outfall installation sea areas	Daily for the installation period	Contractors
Social Infrastructure and Services	<ul style="list-style-type: none"> <li>Implementation of construction vehicle management plans</li> <li>Implementation of meetings with communities</li> </ul>	<p>Construction site</p> <p>Construction site and surrounding communities</p>	<p>Daily</p> <p>Where necessary</p>	<p>Contractors</p> <p>CMWSSB/ Contractors</p>

Environmental Item	Monitoring Item	Location	Frequency	Responsible Organization
Risk of infectious diseases such as HIV/AIDS	<ul style="list-style-type: none"> <li>Implementation of Health and Sanitation education on STD.</li> </ul>	Construction site and surrounding communities	Once/ year	
Working Conditions/ Work Safety	Visual inspection on the utilization of PPE by workers/labours	Construction site	Daily	CMWSSB/ Contractors
Accidents	Implementation of Traffic safety education	Construction site and surrounding communities	Once/ year	CMWSSB/ Contractors
<b>Operational Phase</b>				
Water Quality	Water quality of Raw seawater and Potable water in DSP	DSP	Daily	DSP Operator
	Concentration of Brine diffusion	Seawater at the nearest beach	Daily	DSP Operator
	<ul style="list-style-type: none"> <li>Visual inspection of sewage leakage (overflow), bad odour, the emergence of vector flies of Sewage Treatment Plant (STP)</li> </ul>	DSP	Once/month	DSP Operator
	<ul style="list-style-type: none"> <li>Operational Inspection in accordance with instructions on the STP as suggested by the STP construction sub-contractor including Inlet and outlet quantity and quality monitoring</li> </ul>	DSP	Daily	DSP Operator
Ecosystem	<ul style="list-style-type: none"> <li>Implementation of Meetings on environmental education.</li> </ul>	DSP and surrounding communities	Once/ year	DSP Operator/ CMWSSB
	<ul style="list-style-type: none"> <li>Information on Sea turtle sightings in and around the seashore in Perur</li> </ul>	DSP and surrounding communities	In the event of Sightings	DSP Operator/ CMWSSB
	Actions (Records of the announcements and relevant entities contacted) taken by CMWSSB	DSP and surrounding communities	In the event of Sightings	CMWSSB

The CRZ Notification, 2011 stipulates the post-clearance monitoring, which is required to be submitted half-yearly compliance reports in respect of the stipulated terms and conditions of the clearance to regulatory authorities. In this regard, in the official CRZ clearance process for the DSP in Perur, KDCZMA and TNSCZMA have made recommendations in which several monitoring activities have been included these are presented in Table 17 and Table 18.

**Table 17: Monitoring Activities requested by CZMAs**

CZMA	Monitoring Activity	Frequency	Submitted to
Kancheepuram District (KDCZMA)	Post-project marine quality Including water quality and biological characteristics	Continuous	Not specified
	Marine biodiversity	Twice in a year	MOEF/ TNPCB
	The concentration of toxic trace metals in the reject water	Periodical	Not specified
	A moored data buoy shall be maintained in the vicinity of the effluent discharge to continuously monitor the changes in the selected physicochemical parameters (salinity, temperature, DO, current, etc.).	Periodical during the construction and operation phases	Not specified
	The high salinity rejects water may be periodically monitored for the physicochemical and toxic trace metal contents through appropriate standard procedures.	Periodical	Not specified
Tamil Nadu State (TNSCZMA)	Marine water at the outfall area	Every Quarter	TNSCZMA
	Periodical report on the site conditions to take mitigation measures on the event of any adverse impacts on the coast	Every Year	TNSCZMA
	Impact on the corals*, marine organisms, Turtle nesting etc. should be evaluated and monitored through experts (ecologists).	Not specified	Not specified

\*: Corals have not been observed around Perur seashore and offshore (See Appendix 7.1)

Source: JICA Study Team based on recommendations from KDCZMA and TNSCZMA

### (1) Marine Environmental Monitoring proposed in EIA

In the EIA report (2014), marine environmental monitoring activities of Seawater & Sediment Quality, Marine Benthic Fauna, and Intake Seawater outfall have been proposed as shown in Table -18 below

**Table 18: Marine Environmental Monitoring Proposed in the EIA Report**

Monitoring	Purpose	Parameter	Frequency
Seawater & Sediment Quality	To monitor impacts on seawater and sediment quality	Measurements of levels of nutrients and heavy metals in water and sediment samples collected from sides at risk of pollution	Each season: April (Fair Weather), July (SW monsoon) and November (NE monsoon)
Marine Benthic Fauna	To determine the composition and distribution of major groups of fauna	Benthic fauna composition in the water outfall region	Each season as indicated above
Intake	To determine the incidence of entrapment and mortality of marine fauna	Screens on pump stations and the effectiveness of management measure	Each season as indicated above
	To determine the impact of entrainment within and external ponds/ storage sump/well to assess the loss of fishery	Record an abundance of fauna within the pond/storage sump/well	Each season as indicated above
Seawater outfall	To determine the effect of increased temp/salinity on the plankton	Monitor abundance and distribution of both phytoplankton and zooplankton near the outfall	Each season as indicated above
		Monitor abundance and distribution of benthic animal communities near the outfall	Each season as indicated above

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The Scope of Work for Environmental monitoring for inclusion in CP1 bid document is furnished in Annexure – 6. The Items requiring Environmental monitoring as spelt out in JICA Environmental and Social guidelines is furnished in Annexure – 7. These items were also taken in to consideration in Preparation of Environmental Monitoring Plan for the subproject. The Environmental Monitoring Forms which are to be included in CP1 bid document is furnished in Annexure – 11.

### **9.1 Risk Assessment**

As part of post project monitoring to manage and control the risk and also to mitigate the impacts of the proposed activities and effective functioning of the Perur DSP, it is suggested that an Operation and Maintenance manual shall be prepared and strictly followed. It should include a Comprehensive Maintenance Management System (CMMS) Guidelines, Emergency Procedures, Incident Management Plan and Environmental Response Plan. In case of any emergency incident management plan shall be followed to reduce impact due to risk.

### **9.2 Disaster Management Plan**

Project site is prone to natural disasters like Cyclones, Tsunami, Earth quake and Flooding. Coordination with National and State agency for Disaster management and implementation of necessary management plan at site in case of emergency will be the key to address natural disasters. Early warning system for Tsunami by interlinking to National Tsunami warning system is proposed for the project.

## 10 ENVIRONMENTAL MANAGEMENT COST ESTIMATION

A capital cost provision of about **INR. 98.84 Lakhs** has been kept in the project cost towards the environmental protection, control and mitigation measures and implementation of the EMP. The Operation cost of implementing EMP is estimated to be about **INR. 41.25 Lakhs**. The budgetary cost estimate for the EMP is given in Table below

**Table 19: Environmental Management Plan – Capital Cost**

S. No.	Purpose	Cost Items	Cost in INR
1	Package Sewage treatment Plant of 13.5 KLD capacity	Sewage treatment from Admin building and Canteen area etc.,	17,08,688
2	Solid waste collection (Blue and green) bins	Dustbins for waste collection	75,400
3	Environmental Monitoring Construction Phase including Initial Baseline monitoring	Marine and Terrestrial Environment	81,00,000
<b>Total Capital cost</b>			<b>98,84,088</b>

**Table 20: Environmental Management Plan – Annual Recurring Cost**

S.No.	Purpose	Cost Items	Cost in INR
1	Package Sewage treatment Plant of 13.5 KLD capacity	Operation and Maintenance of Package Sewage treatment plant	50,000
2	Maintenance of Solid waste collection bins	Dustbins for waste collection	75,400
3	Statutory compliance for environmental protection	Environmental Monitoring of Marine and terrestrial environment	27,00,000
4	Underwater Inspection - External Inspection of Intake Heads and Outfall Diffuser point	Underwater Inspection using Remote Operating Vehicle (ROV) of 3 pipelines of internal diameter 2.5 meters and length 750 meters, 1150 meters and 1150 meters respectively	13,00,000
<b>Total Recurring cost</b>			<b>41,25,400</b>

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## 11 CONCLUSION AND RECOMMENDATIONS

- a) The 400 MLD desalination plant is conceived to avoid chronic and severe water surface water and ground water shortage in Chennai Metropolitan area which are not only sufficient to satisfy the growing water demand due to population growth and economic growth but are also vulnerable to draught.
- b) The project is classified under Category "B" under JICA Environmental guidelines, 2010.
- c) All potential impacts were reviewed and updated in relation to pre-construction, construction, and operation phases of the project cycle. Planning principles and design considerations have been reviewed and incorporated into the site planning and design process wherever possible. Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) have been reviewed and updated to according to the actual site conditions, and modified design changes from DPR and JICA preparatory report in order to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result significant measures have already been included in the designs of the DSP facility.
- d) The project has obtained CRZ clearance from MoEF & CC. Upon receipt of the Land lease agreement, Consent to Establish (CTE) from TNPCB to be applied.
- e) There are four nos. of sand dunes above 3 m height along the longitudinal stretch of the project boundary. These sand dunes are to be managed such that there is no dressing of these Sand dunes during proposed construction activity.
- f) NOC from Tamil Nadu Maritime Board (TNMB) for the laying of intake and outfall structures also to be obtained.
- g) The budgetary Capital cost estimate for implementation of EMP is estimated to be **INR. 98.84 lakhs** and the Operation cost of implementing EMP is estimated to be **INR. 41.25 Lakhs**.
- h) The EMP and EMoP are required to be updated by Contractor during the implementation phase to reflect any changes, amendments.

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## 12 ANNEXURES

The following annexures are included with this Report:

- Annexure 1: Site Visit photographs
- Annexure 2: Applicable Ambient Air Quality and Noise Standards - National Ambient Air Quality Standards
- Annexure 3: Applicable Standards for Discharge of Treated Water from Package Sewage Treatment Plant
- Annexure 4: Applicable Standards for Discharge of Brine Into Deep Marine Outfall
- Annexure 5: Diesel Engine Emission and Noise standards
- Annexure 6: Scope of Work for Environmental Baseline monitoring for inclusion in CP1 bid document
- Annexure 7: Items requiring Monitoring based on JICA guidelines
- Annexure 8: Indian Meteorological data – Meenambakkam
- Annexure 9: Seismic Map of Project location
- Annexure 10: Monitoring Forms
- Annexure 11: Typical Package Sewage Treatment Plant Process flow diagram
- Annexure 12: CRZ clearance letters
- Annexure 13: Tamil Nadu Govt. G.O. on DSP land lease

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## **Annexure 1: Site Visit Photographs**



Causarina Plantation in Site



Causarina Plantation in Site



View of Project Site from ECR road



View of Project Site from ECR road



Shoreline Protection at Existing Nemmeli plant



Shoreline Protection at Existing Nemmeli plant



**Boat Berthing**



**Sand Dune**



**Graveyards on the Southern side of Plot**



**Graveyards on the Northern side of Plot**



**Used Cartridge Filters for sale to Authorised recyclers- Nemmeli DSP**



**SWRO used membranes- Nemmeli DSP**

**Annexure 2: Applicable Ambient Air Quality and Noise Standards**

**National Ambient Air Quality Standards**

Parameter	Location <sup>a</sup>	India Ambient Air Quality Standard ( $\mu\text{g}/\text{m}^3$ ) <sup>b</sup>	WHO Air Quality Guidelines ( $\mu\text{g}/\text{m}^3$ )	
			Global Update <sup>c</sup> 2005	Second Edition 2000
PM10	Industrial Residential, Rural and Other Areas	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-
	Sensitive Area	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-
PM25	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)	-
	Sensitive Area	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)	-
SO <sub>2</sub>	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-
	Sensitive Area	20 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-
NO <sub>2</sub>	Industrial Residential, Rural and Other Areas	40 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-
	Sensitive Area	30 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-
CO	Industrial Residential, Rural and Other Areas	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)
	Sensitive Area	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)
Ozone (O <sub>3</sub> )	Industrial Residential, Rural and Other Areas	100 (8-hr) 180 (1-hr)	100 (8-hr)	
	Sensitive Area	100 (8-hr) 180 (1-hr)	100 (8-hr)	
Lead (Pb)	Industrial, Residential, Rural and Other Areas	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual)
	Sensitive Area	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual)

Parameter	Location <sup>a</sup>	India Ambient Air Quality Standard ( $\mu\text{g}/\text{m}^3$ ) <sup>b</sup>	WHO Air Quality Guidelines ( $\mu\text{g}/\text{m}^3$ )	
			Global Update <sup>c</sup> 2005	Second Edition 2000
Ammonia (NH <sub>3</sub> )	Industrial Residential, Rural and Other Areas	100 (Annual) 400 (24-hr)		
	Sensitive Area	100 (Annual) 400 (24-hr)		
Benzene (C <sub>6</sub> H <sub>6</sub> )	Industrial Residential, Rural and Other Areas	5 (Annual)		
	Sensitive Area	5 (Annual)		
Benzo(o)pyrene (BaP) particulate phase only	Industrial Residential, Rural and Other Areas	0.001 (Annual)		
	Sensitive Area	0.001 (Annual)		
Arsenic (As)	Industrial Residential, Rural and Other Areas	0.006 (Annual)		
	Sensitive Area	0.006 (Annual)		
Nickel (Ni)	Industrial Residential, Rural and Other Areas	0.02 (Annual)		
	Sensitive Area	0.02 (Annual)		

a Sensitive area refers to such areas notified by the India Central Government.

b Notification by Ministry of Environment and Forests, Government of India Environment (Protection) Seventh Amendment Rules, 2009

c WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. *Global update 2005*. WHO. 2006

d Air Quality Guidelines for Europe Second Edition. WHO 2000.

### Applicable Ambient Noise Standards

Receptor/ Source	India National Noise Level Standards (dBA)		WHO Guidelines Value For Noise Levels Measured Out of Doors <sup>b</sup> (One Hour LA <sub>q</sub> in dBA)	
	Day	Night	07:00 – 22:00	22:00 – 07:00
Industrial area	75	70	70	70
Commercial area	65	55	70	70
Residential Area	55	45	55	45
Silent Zone	50	40	55	45

a Noise Pollution (Regulation and Control) Rules, 2002 as amended up to 2010.

b Guidelines for Community Noise. WHO. 1999

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**Annexure 3: Applicable Standards for Recycle and Reuse of Treated Water from  
Package Sewage Treatment Plant**

Pollutants	Units	Indian Standards <sup>a.</sup>
BOD	mg/l	≤10
COD	mg/l	≤50
Total nitrogen	mg/l	≤10
Total phosphorus	mg/l	≤1
Total suspended solids	mg/l	≤10
Total coliform bacteria	MPN / 100 ml	≤100 (desirable)
Residual Chlorine <sup>b</sup>	mg/l	≥ 1

<sup>a:</sup> as per NGT Ruling Dated 30-04-2019

<sup>b:</sup> as per General standards for discharge of Pollutants to Inland surface water

**Annexure 4: Applicable Standards for Discharge of Brine Into Deep Marine Outfall**

**The Environment (Protection) Rules, 1986**

**<sup>1</sup>[SCHEDULE – VI]**

(See rule 3A)

**GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS PART-A: EFFLUENTS**

<b>S. No.</b>	<b>Parameter</b>	<b>Standards</b>			
		<b>Inland surface water</b>	<b>Public Sewers</b>	<b>Land for Irrigation</b>	<b>Marine Coastal areas</b>
<b>1</b>	<b>2</b>	<b>3</b>			
		<b>(a)</b>	<b>(b)</b>	<b>( c)</b>	<b>(d)</b>
1	Colour and odour	See 6 of Annexure-I	--	See 6 of Annexure-I	See 6 of Annexure-I
2	Suspended solids mg/l, Max.	100	600	200	(a) For process wastewater- 100 (b) For cooling water effluent 10 per cent above total suspended matter of influent.
3	Particulate size of suspended solids	Shall pass 850 microns IS Sieve	--	--	(a) Floatable solids, max. 3 mm. (b) Settle able solids, max. 850 microns.
24	***	*	--	***	--
5	pH Value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
6	Temperature	shall not exceed 5oC above the receiving water temperature	--	--	shall not exceed 5oC above the receiving water temperature

1 Schedule VI inserted by Rule 2(d) of the Environment (Protection) Second Amendment Rules, 1993 notified vide G.S.R. 422(E) dated 19.05.1993, published in the Gazette No. 174 dated 19.05.1993.

2 Omitted by Rule 2(d)(i) of the Environment (Protection) Third Amendment Rules, 1993 vide Notification No.G.S.R.801(E), dated 31.12.1993.

S. No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for Irrigation	Marine Coastal areas
1	2	3			
		(a)	(b)	(c)	(d)
7	Oil and grease mg/l Max.	10	20	10	20
8	Total residual chlorin mg/l Max.	1.0	--	--	1.0
9	Ammonical nitrogen (as N), mg/l Max.	50	50	--	50
10	Total Kjeldahl Nitrogen (as NH3) mg/l, Max.	100	--	--	100
11	Free ammonia (as NH3) mg/l, Max.	5.0	--	--	5.0
12	Biochemical Oxygen demand <sup>1</sup> [3 days at 27oC] mg/l max.	30	350	100	100
13	Chemical Oxygen Demand, mg/l, max.	250	--	--	250
14	Arsenic (as As), mg/l, max	0.2	0.2	0.2	0.2
15	Mercury (as Hg), mg/l, Max	0.01	0.01	--	0.01
16	Lead (as Pb) mg/l, Max.	0.1	1.0	--	2.0
17	Cadmium (as Cd) mg/l, Max.	2.0	1.0	--	2.0
18	Hexavalent Chromium (as Cr+6), mg/l max.	0.1	2.0	--	1.0

1 Substituted by Rule2 of the Environment (Protection) Amendment Rules, 1996 notified by G.S.R.176, dated 2.4.1996 may be read as BOD (3 days at 27oC) wherever BOD 5 days 20oC occurred.'

S. No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for Irrigation	Marine Coastal areas
1	2	3			
		(a)	(b)	(c)	(d)
19	Total chromium (as Cr.) mg/l, Max.	2.0	2.0	--	2.0
20	Copper (as Cu) mg/l, Max.	3.0	3.0	--	3.0
21	Zinc (As Zn.) mg/l, Max.	5.0	15	--	15
22	Selenium (as Se.) mg/l, Max.	0.05	0.05	--	0.05
23	Nickel (as Ni) mg/l, Max.	3.0	3.0	--	5.0
124	***	*	*	*	*
125	***	*	*	*	*
126	***	*	*	*	*
27	Cyanide (as CN) mg/l Max.	0.2	2.0	0.2	0.2
128	***	*	*	*	*
29	Fluoride (as F) mg/l Max.	2.0	15	--	15
30	Dissolved Phosphates (as P), mg/l Max.	5.0	--	--	--
31	***	*	*	*	*
32	Sulphide (as S) mg/l Max.	2.0	--	--	5.0
33	Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH) mg/l, Max.	1.0	5.0	--	5.0

1 Omitted by Rule 2(d)(i) of the Environment (Protection) Third Amendment Rules, 1993 vide Notification No.G.S.R.801(E), dated 31.12.1993

S. No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for Irrigation	Marine Coastal areas
1	2	3			
		(a)	(b)	(c)	(d)
34	Radioactive materials : (a) Alpha emitter microcurie/ml.	10 <sup>-7</sup>	10 <sup>-7</sup>	10 <sup>-8</sup>	10 <sup>-7</sup>
	(b) Beta emitter micro curie/ml.	10 <sup>-6</sup>	10 <sup>-6</sup>	10 <sup>-7</sup>	10 <sup>-6</sup>
35	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
36	Manganese (as Mn)	2 mg/l	2 mg/l	--	2 mg/l
37	Iron (as Fe)	3 mg/l	3 mg/l	--	3 mg/l
38	Vanadium (as V)	0.2 mg/l	0.2 mg/l	*	0.2 mg/l
140	***	*	*	*	*

1 Omitted by Rule 2(d)(i) of the Environment (Protection) Third Amendment Rules, 1993 vide Notification No. G.S.R. 801(E) dated 31.12.1993

## Annexure 5: Diesel Engine Emission and Noise standards

### 5.3.3 Emission Standards for Diesel Engines (Engine Rating more than 0.8 MW (800 KW) for Power Plant, Generator set applications and other requirements (Source: CPCB PCLS/02/2010 Sixth Edition)

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 <sub>x</sub> (as NO <sub>2</sub> ) (At 15% O <sub>2</sub> ), 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 <sub>2</sub> ), mg/Nm <sup>3</sup>	Both A and B		150	100				
PM (at 15% O <sub>2</sub> ), mg/Nm <sup>3</sup>	Diesel Fuels-HSD & LDO	Both A and B	75	75				
	Furnace Oils-LSHS & FO	Both A and B	150	100				
CO (at 15% O <sub>2</sub> ), mg/Nm <sup>3</sup>	Both A and B		150	150				
Sulphur content in fuel	A		< 2%					
	B		< 4%					
Fuel specification	For A only	Up to 5 MW	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 metre: (i). $14 Q^{0.3}$ , Q= Total SO <sub>2</sub> emission from the plant in kg/hr. (ii). Minimum 6m above the building where generator set is installed. (iii) 30 m.							

Note : NHMC : Non Methane Hydrocarbon.

Category A:	Areas within the municipal limits of towns/cities having population more than 10 lakhs and also up to 5 km beyond the municipal limits of such towns/cities.
Category B:	Areas not covered by Category A

Continuous monitoring of Oxides of Nitrogen shall be done by the plants whose total engine capacity is more than 50 MW. However, minimum once in six month monitoring for other parameters shall be adopted by the plants.

### 5.3.5 Noise Limit for Generator Sets run with Diesel (Source: CPCB PCLS/02/2010 Sixth Edition)

- Noise Limit for diesel generator sets (up to 1000 KVA) manufactured on or after the 1<sup>st</sup> January, 2005: 75 dB(A) at 1 metre from the enclosure surface.

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#### **Annexure 6: Scope of Work for Environmental monitoring for inclusion in CP1 bid document**

The following paragraphs are proposed to be included in CP1 bid document as part of the contractor's scope.

The following Environmental sampling programme shall be carried out as a minimum requirement by the Bidder before the commencing construction activity. Bidder to submit the Approach and methodology of environmental monitoring to Employer's representative for review and approval. Bidder shall submit results of the Sampling programme to the Employer's representative for approval. The initial environmental monitoring shall be carried for a duration of three months. Thereafter during construction period monthly reports to be submitted to Employer's representative. The consolidated six-monthly reports are required to be submitted to MoEF &CC and TNPCB as part of regulatory compliance.

#### **SAMPLING PROGRAM – PART B**

##### **I. AMBIENT AIR QUALITY**

Parameters	No. of Locations	Frequency of monitoring	Total Samples per week	Total samples per Month	Method
SO <sub>2</sub> (24 hrly)	5	2	10	40	West and Gaeke
NO <sub>x</sub> (24 hrly)	5	2	10	40	Arsenite modified J and H
RSPM 10µm (24 hrly)	5	2	10	40	HVS
PM 2.5µm (24 hrly)	5	2	10	40	HVS with cyclone
CO (8 hourly)	5	2	10	40	As per MOEF Guidelines
Volatile organic compounds (VOCs) 24 hourly	5	2	10	40	As per MOEF Guidelines
Hydro carbon (HC) 24 hourly	5	2	10	40	Gas Chromatographer

##### **II. METEOROLOGY**

Parameter	No. of Location	Frequency	Days	Total samples per Month	Method
- Wind speed - Wind direction - Relative humidity - Temperature, - Rainfall	1	1 hourly continuous	Monthly	1	Automatic weather station and as per IMD specification & MoEF Guidelines

### III. NOISE LEVEL

Parameters	No. of locations and Frequency	Minimum no. of sample per month
Equivalent noise level (L <sub>eq</sub> ) for day time and night time (L <sub>d</sub> , L <sub>n</sub> , and L <sub>dn</sub> ).	5 locations & hourly interval at each location	5

### IV. WATER QUALITY

Parameters	No. of Location	Frequency	Minimum No. of samples per month
(As per IS 10500) Colour, Odour, Temp, pH, turbidity, Total Hardness (Mg & Ca), TDS, total alkalinity, chloride, sulphate, nitrate, fluoride, Na, K, Calcium, Magnesium, phenolic compounds, Mineral oil, Cyanides, Anionic detergents, Residual chorine, Boron, Cadmium, Arsenic, Copper, Lead, Manganese, Iron, Chromium VI, Selenium, Zinc, Aluminium, Mercury, Pesticides, Total coliform, E-coli	2 groundwater + 3 surface water	5	5

### V. SOIL QUALITY

Parameters	No. of Location and Frequency	Frequency	Total No. of samples per month
Bulk density, Salinity, Porosity, Texture Class (Percent wise silt, clay & sand), pH, Electrical conductivity, Cation exchange capacity, Sodium, Potassium, Nitrogen, Magnesium, Phosphorous, Sodium Absorption Ratio (SAR), Water holding capacity, Iron, Copper, Zinc, Manganese, Nickel, Permeability, physiochemical analysis and relevant metals.	5	Monthly	5

**Note:** Soil samples shall be collected from three different depths, i.e., 30 cm, 60 cm and 90 cm and homogenized samples to be used for analysis.

## SAMPLING PROGRAM – PART B

### I. MARINE WATER QUALITY:

Sr. No.	Parameters	Number of Locations	Minimum Number of Samples per month
1. Salinity		5	5
2. Electrical Conductivity			
3. Temperature			
4. Turbidity			
5. Suspended Solids			
6. pH			
7. Dissolved Oxygen (DO)			
8. Biological Oxygen Demand (BOD)			
9. Nitrates as NO <sub>3</sub> -2			
10. Ammonical Nitrogen			
11. Nitrites as NO <sub>2</sub> -2			
12. Total Nitrogen			
13. Inorganic Phosphate			
14. Total Phosphate			
15. Silicates			
16. Phosphates as PO <sub>4</sub> -2			
17. Chlorides as Cl-			
18. Sulphates as SO <sub>4</sub> -2			
19. Total Nitrogen			
20. Heavy Metals			
20.1 • Zinc			
20.2 • Mercury			
20.3 • Cadmium			
20.4 • Lead			
20.5 • Copper			
20.6 • Iron			
21. Oil and Grease			
22. Petroleum Hydrocarbons			

## II. SEDIMENT QUALITY:

The sediment samples will be collected using a suitable grab. After collection, the samples shall be sieved and subjected to Physico-chemical analysis. The samples collected will be tested for the following parameters:

Sr. No.	Parameters	Number of Locations	Minimum Number of Samples per month
1.	pH		
2.	Texture		
3.	Oil & Grease		
4.	Petroleum Hydrocarbons		
5.	Organic Matter		
6.	Total Volatile Solids		
7.	Chlorides as Cl-		
8.	Phosphates as PO <sub>4</sub> -2		
9.	Nitrites as NO <sub>2</sub> -2		
10.	Nitrates as NO <sub>3</sub> -2		
11.	Sulphates as SO <sub>4</sub> -2		
12.	Sodium		
13.	Potassium		
14.	Magnesium		
15.	Total Kjeldahl Nitrogen		
16.	Heavy Metals		
16.1	Zinc		
16.2	Nickel		
16.3	Cadmium		
16.4	Copper		
16.5	Lead		
16.6	Mercury		
16.7	Iron		

## III. BIOLOGICAL PARAMETERS:

The marine water and sediment samples shall be collected as analyzed for the following biological parameters:

**List of Biological Parameters for Marine Water Samples**

Sr. No.	Parameters	Number of Locations	Minimum Number of Samples per month
1.	Primary Productivity		
2.	Chlorophyll -a		
3.	Phaeophytin		
4.	Total Biomass		

Sr. No.	Parameters	Number of Locations	Minimum Number of Samples per month
5.	Oxidizable particulate organic carbon		
6.	Phytoplankton		
6.1	Abundance		
6.2	Number and name of groups		
6.3	Total number and name of the species of each group present		
6.4	Density (total numbers of individual species present)		
6.5	Total biomass		
7.	Zooplankton		
7.1	Abundance		
7.2	Number and name of groups		
7.3	Total number and name of the species of each group present		
7.4	Density (total numbers of individual species present)		
8.	Bacteriological parameters		

#### List of Biological Parameters for Sediment Samples

Sr. No.	Parameters	Number of Locations	Minimum Number of Samples per month
1.	Benthic Organisms		
2.	Meio fauna		
3.	Microfauna		
4.	Macrofauna		
5.	Abundance		
6.	Number and name of each group present		
7.	Total number and name of species of each group present		
8.	Density (total numbers of individuals of each species)		

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## **Annexure 7: Items requiring monitoring based on JICA guidelines, 2010**

Appendix 6 of the JICA guidelines are reproduced below:

Items that require monitoring shall be decided on according to the sector and nature of the project, with reference to the following list of items.

### **Items**

#### **1. Permits and approvals, explanations**

- Response to matters indicated by authorities

#### **2. Anti-pollution measures**

- Air quality: SO<sub>2</sub>, NO<sub>2</sub>, CO, O<sub>2</sub>, soot and dust, suspended particulate matter, coarse particulates, etc.
- Water quality: pH, SS (suspended solids), BOD (biochemical oxygen demand) and COD (chemical oxygen demand), DO (dissolved oxygen), total nitrogen, total phosphorus, heavy metals, hydrocarbons, phenols, cyanogen compounds, mineral oils, water temperature, etc.
- Waste
- Noise and vibration
- Odours

#### **3. Natural environment**

- Ecosystems: impact on valuable species, countermeasures, etc.

#### **4. Social environment**

- Resettlement
- Lifestyle and livelihood

**NB:** For air and water quality, specify whether you are monitoring emission levels or environmental levels. Also, it should be noted that the items which require monitoring will differ depending on whether the impact in question will occur during construction or during the operation of the project.

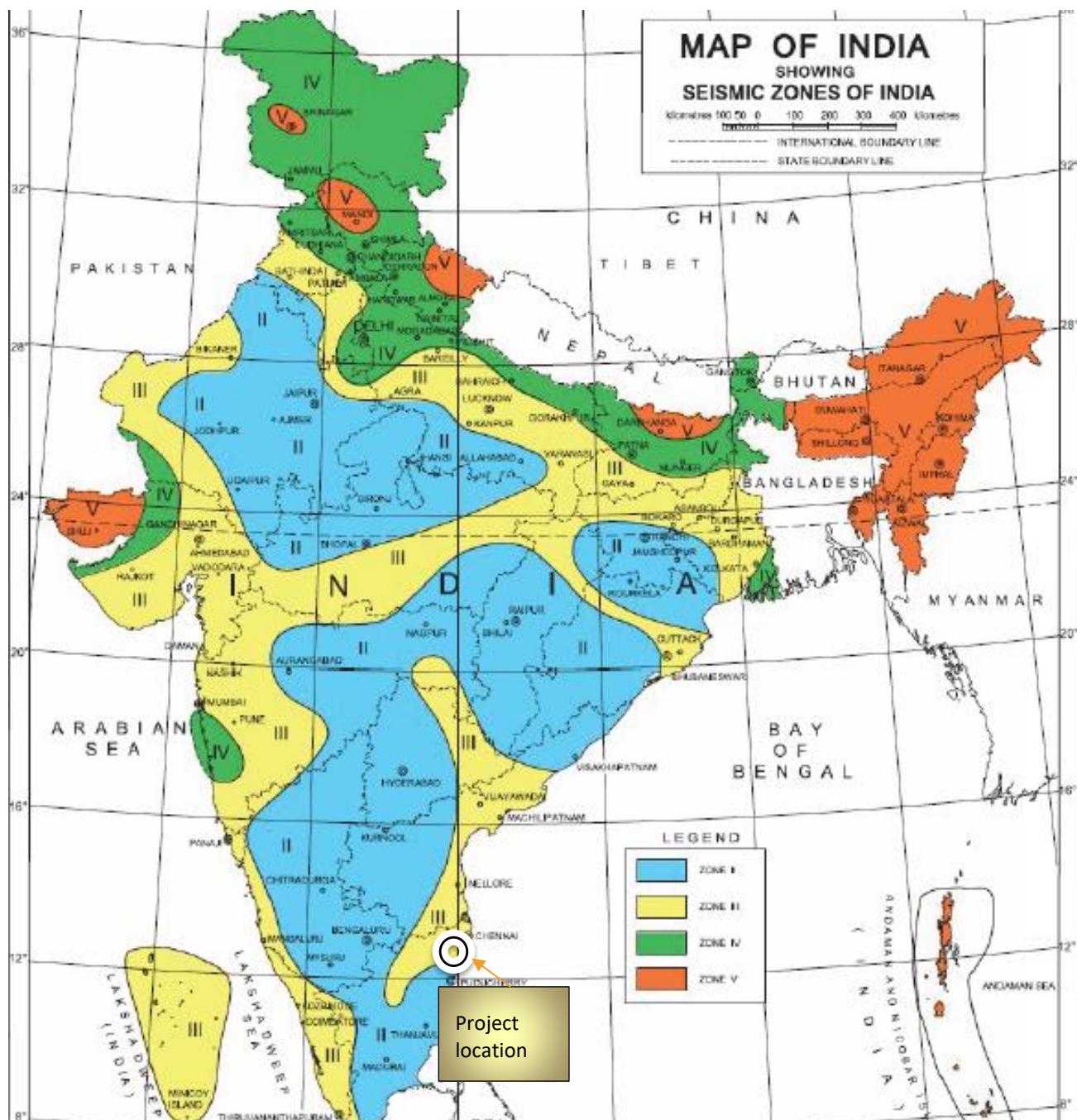
**Annexure 8: Climatological data of Chennai – Indian Meteorological Department**

BACK

स्टेशन : चेन्ऩई (मिनाम्बक्कम) (A)		अक्षांश LAT. 13° 00'		देशांश LONG. 80° 11'		उच्चारी तला यात्रा से ऊँचाई HEIGHT ABOVE M.S.L.		चौंडा METRES		प्राप्ति पा. आधारित BASED ON OBSERVATIONS 1981-2010												
महीना	देशांश का वर्ग दर्जा	नाम तापामान										नामी										
		मात्रा			तापमान			आदाना		मेंटर की यात्रा		प्राप्ति का वर्ग दर्जा	वर्षों से दिलचस्पी वाले वर्ष									
महीना	देशांश का वर्ग दर्जा	AIR TEMPERATURE						EXTREMES		HUMIDITY		CLOUD AMOUNTS										
MONTH	STATION LEVEL PRESSURE	DRY BULB	WET BULB	DAILY MAX	DAILY MIN	HIGHEST IN THE MONTH	LOWEST IN THE MONTH	HIGHEST DATE AND YEAR	LOWEST DATE AND YEAR	RELATIVE HUMIDITY	VAPOUR PRESSURE	ALL CLOUDS	LOW CLOUDS	RAINFALL								
	एफ.सी.ए. NPa	फै. से. डिसे. °C	फै. से. डिसे. °C	फै. से. डिसे. °C	फै. से. डिसे. °C	फै. से. डिसे. °C	फै. से. डिसे. °C	फै. से. डिसे. °C	फै. से. डिसे. °C	प्रतिशत %	एफ.सी.ए. NPa	घोराता के अवस्था Octas of sky	मिल. mm	मिल. mm	मिल. mm	मिल. mm	मिल. mm	मील. मि. कि. मि. Km/h				
जनवरी	I	1013.5	23.5	21.6	29.5	20.8	31.6	18.6	33.9 25 2006	15.7	27	83	24.2	3.8	1.7	31.5	1.5	169.8 1986	0	91.7 28	5.2	
	II	1010.2	26.5	21.8						64	1969	22.4	3.8	1.5								
फरवरी	I	1012.3	24.9	22.6	31.4	21.8	34.1	19.1	36.6 22 1998	16	4	81	25.6	3	1.5	4.6	0.5	283.8 1984	0	136.8 24	6.3	
	II	1008.9	28	22.8						62	1989	23.8	2.7	0.9								
मार्च	I	1010.6	27.5	24.4	33.7	23.8	37	21.2	40.6 29 1953	18.2	2	76	28.2	3.3	1.8	4.8	0.4	262.8 1944	0	88.1 5	7.7	
	II	1006.8	29.7	24.5						63	1989	26.6	2.6	0.6								
अप्रैल	I	1008.2	30.2	26.3	35.7	26.2	39.4	23.6	42.7 30 1991	20.7	27	72	31	4.3	2.5	14.2	0.9	162.5 2005	0	121.6 6	9.3	
	II	1004.3	31.2	26.4						67	1968	30.5	3.5	0.8								
मई	I	1004.9	31.5	26.1	38.2	27.7	42.2	24.2	49.1 13 2001	21	26	64	29.6	4.5	1.3	52.9	1.8	392.3 1952	0	214.9 17	10	
	II	1001.3	32.7	26.9						62	2005	30.7	4.6	1.3								
जून	I	1003.7	30.8	24.9	37.5	27.4	40.6	23.8	43.2 4 2003	21	22	60	26.6	5.4	1	63.5	4.2	511.8 1996	7	282.2 14	10.2	
	II	1000.2	33	26.1						57	1961	28.2	6	2.5								
जुलाई	I	1004.4	29.3	24.5	35.6	26.3	38.7	23	40.1 1 1982	20.6	14	66	27	6	1.3	107.8	6.7	265.8 1954	1.1	85.8 16	8.9	
	II	1001	31.9	25.7						60	1985	28.1	6.4	2.5								
अगस्त	I	1005.2	28.6	24.6	34.8	25.8	37.4	23	39.6 18 2004	21.4	16	71	27.7	5.9	1.4	137.2	8.6	395.3 1967	5.5	98.7 16	8.5	
	II	1001.7	31.3	25.9						63	1967	28.9	6.3	2.6								
सितंबर	I	1006.6	28.4	25	34.3	25.4	36.9	22.6	39.2 28 2002	20.9	7	75	29.1	5.4	1.6	145.8	7.7	342.8 1985	10.8	199 30	7.1	
	II	1003	30.3	25.8						69	1969	29.6	5.8	2.3								
अक्टूबर	I	1008.6	27.4	25	32.2	24.5	36.5	22.2	37.1 1 1965	19.6	31	81	29.8	5.5	2.2	298.1	10.6	891.8 1943	26.1	229.6 10	5.4	
	II	1005.4	28.8	25.2						74	1974	29.3	5.7	2.3								
नवंबर	I	1011	25.8	23.8	30	23	32.8	20.2	35.6 3 1998	16.7	8	83	27.8	5.3	2.5	373	10.9	1071.4 1954	29.5	346.6 25	5.1	
	II	1008.1	27	23.7						75	1954	26.7	5.5	2.5								
दिसंबर	I	1013.1	24.4	22.3	29	21.6	30.9	18.9	33.1 10 2010	16.1	31	83	25.4	4.5	2.1	166	5.8	720.4 1978	0	282.8 3	5.3	
	II	1010.2	26.2	22.2						69	1947	23.6	4.8	2.2								
अंकित या यात्रा का वर्ग	I	1008.5	27.7	24.3	33.5	24.5	42.6	18	49.1 13	15.7	27	74	27.7	4.7	1.7	1399.3	59.7	2397.9	689.6	346.6	25	7.4
	II	1005.1	29.8	24.8						65	1969	27.4	4.8	1.8								
अंकितों की संख्या	I	30	30	30	30	30	30	30	110	110		30	30	30	30	30	30	30	56	56	65	30
	II																					

### Annexure 9: Seismicity Map

As per the IS:1893 (Part-1) 2016 of Bureau of Indian Standards (BIS), the project location/ study area falls in the semi-arid region and the climate of the area is generally hot. The project location/study area falls in Zone III, which is categorized as a Moderate Risk Zone. The seismicity map of India is shown in below



## Annexure 10: Monitoring Forms

### 1. Pre-Construction Phase (Tree cutting)

The latest results of the below-monitoring items shall be submitted to the lenders as part of the Progress Report throughout the pre-construction phase.

#### Air Pollution

##### Exhaust Gases

Date	Type of Construction Vehicles/ Equipment	Fleet/ Registration Number	Exhaust Gases Discharge Conditions			Frequency
(Day, Month, Year)			Items	Yes	No	If Yes, Measures Taken
			Black Smoke			
			White Smoke			
			Others (Specify)			

Log Book: to be prepared and recorded by the contractor(s) which is submitted to CMWSSB monthly.

If any problem arises, such vehicles and equipment to be sustained to use or be replaced by appropriate ones.

#### Soil Dust (Dry Season only)

Date	Location	Dust and dried sandy soil stirred up by construction activities			Frequency
(Day, Month, Year)	Construction Site including access roads	Items	Yes	No	If Yes, Measures Taken (such as water supplying)
		Dusts			
		Dried Sandy Soil			
		Others (Specify)			

Log Book: to be prepared and recorded by the contractor(s) which is submitted to CMWSSB monthly.

#### Land Acquisition/Resettlement (Progress of the tree cutting)

Items	Implementation (as of : )			Frequency
Cutting Schedule	1. As scheduled ( )	2. Delayed ( months)	3. Postpone ( )	Once/week
Total Value of Trees	1. Decided ( Rs)	2. Under evaluation ( )	3. No action ( )	
Budget Allocation	1. Allocated by ( )	2. Under discussion ( )	3. No action ( )	
Compensation to Landowner	1. Compensated ( )	2. Under preparation ( )	3. No action ( )	
Auction for tree cutting	1. Conducted (when )	2. Under preparation ( )	3. No action ( )	
Waste Management	1. Properly Managed ( )	2. Under preparation ( )	3. No action ( )	

Progress of the preparation and implementation shall be submitted to CMWSSB monthly.

## 2. Construction Phase Monitoring Form

The latest results of the below-monitoring items shall be submitted to the lenders as part of the Quarterly Progress Report throughout the construction phase.

### Air Pollution

#### Exhaust Gases

Date	Type of Construction Vehicles/ Equipment	Fleet/ Registration Number	Exhaust Gases Discharge Conditions			Frequency
(Day, Month, Year)			Items	Yes	No	If Yes, Measures Taken
			Black Smoke			
			White Smoke			
			Others (Specify )			

Logbook: to be prepared and recorded by the contractor(s) which is submitted to CMWSSB monthly.

If any problem arises, such vehicles and equipment to be sustained to use or be replaced by appropriate ones.-

#### Soil Dust (Dry Season only)

Date	Location	Dust and dried sandy soil stirred up by construction activities			Frequency
(Day, Month, Year)	Construction Site including access roads	Items	Yes	No	If Yes, Measures Taken (such as water supplying)
		Dusts			
		Dried Sandy Soil			
		Others (Specify )			

Log Book: to be prepared and recorded by the contractor(s) which is submitted to CMWSSB monthly.

### Water Quality

- On-site toilets

Date	On-site Toilet Number/location	Sewerage water Conditions			Frequency
(Day, Month, Year)		Items	Yes	No	If Yes, Measures Taken
		Black (sewage) water leakage			
		Bad odour			
		Emergency of Flies			
		Others (Specify )			

Log Book: to be prepared and recorded by the contractor(s) which is submitted to CMWSSB monthly.

### Turbidity (Seawater Turbidity during the installation of intake/outfall pipelines)

Date (Day, Month, Year)	Location of installation of Intake/outfall (GPS position)	Turbid water Conditions			Frequency	
		Item s	Yes	No	If Yes, Measures Taken	Daily
Intake ( )	Silts					
Outfall ( )	Sea sands					
GPS Position	Bottom sediments					
	Others (Specify )					

Log Book: to be prepared and recorded by the contractor(s) which is submitted to CMWSSB monthly.

### Soil Contamination

#### Oil and Fuel leakage (spill)

Date (Day, Month, Year)	Type of Construction Vehicles/ Equipment	Fleet/ Registration Number	Oil/Fuel Leakage Conditions			Frequency	
			Items	Yes	No	If Yes, Measures Taken	
			Engine oil				
			Hydric power unit oil				
			Fuel				
			Others (Specify )				

Log Book: to be prepared and recorded by the contractor(s) which is submitted to CMWSSB monthly.

If any problem arises, such vehicles and equipment to be sustained to use or be replaced by appropriate ones.

### Wastes

#### Construction wastes and debris

Waste Composition	Waste Quantity (ton/ month)	Transportation, Disposal/Treatment Methods (Specify: ex. Registered Service Provider, Officially final disposal site, registered treatment facility (or company))			Frequency	
		Transport	Disposal	Treatment	Remarks	
Construction Debris						
Surplus Soil						
Toxic and Chemical Waste						
Other (specify)						

- Noise and Vibration
- Noise from Construction Vehicles and Equipment

Visual Inspection Date	Type of Construction Vehicles/ Equipment	Fleet/ Registration Number	Condition of Silencer equipped with construction Vehicles /Equipment			Frequency
(Day, Month, Year)			Items	Yes	No	If Yes, Measures Taken (such as water sprinkling)
			Properly Equipped			
			Damaged			
			Large noise discharge			
			Others (Specify )			

Log Book: to be prepared and recorded by the contractor(s) which is submitted to CMWSSB monthly.

If any problem arises, such vehicles and equipment to be sustained to use or be replaced by appropriate ones.

- Ecosystem
- Turbidity

Date	Location of installation of Intake/outfall (GPS position)	Turbid water Conditions			Frequency
(Day, Month, Year)	Intake ( ) Outfall ( ) GPS Position	Items	Yes	No	If Yes, Measures Taken
		Silts			
		Sea sands			
		Bottom sediments			
		Others (Specify )			

- Environmental Education on Marine ecosystems and Sea Turtles

Date	Venue	Agenda	Lecturer	Number of Participants	Materials paraded	Frequency
(Day, Month, Year)				Community ( )		Twice/year
				Worker/ Labor ( )		
				Others (Specify )		
				Total ( )		

Participant list and educational materials shall be attached.

- **Sea Turtles Sightings**

Item		Sighting Report			Frequency
Sea turtles	Time/Date	Place (In or around Perur DSP construction site)	Sighted by whom (ex, Villager, Worker/ labour, rumour and others)	Description of the Sighting	Actions were taken to the sightings
					See the Actions on Sea Turtle

\*During the egg-laying season of sea turtles, hearing survey on the sighting shall be done in the surrounding communities twice of the season

#### **Actions on Sea Turtle Sightings**

Item		Sighting Report			Frequency
Actions on Sea turtle sighting	Construction Suspension Periods		Records of the announcements	Relevant entities contacted	In the event of Sighting

#### **Living and Livelihood**

- **Seawater Turbidity during the installation of intake/outfall pipelines**

Date	Location of installation of Intake/outfall (GPS position)	Turbid water Conditions	Frequency	
(Day, Month, Year)	Intake ( ) Outfall ( ) GPS Position	Items	Yes	No
		Silts		
		Sea sands		
		Bottom sediments		
		Others (Specify )		

- Pipelines installation schedules and Installation (Construction) Management

Date	Location	Type	Space used	Area (m <sup>2</sup> )	Duration of use	Condition of Space	Compensation budget and status (Specify)	Frequency
(Day, Month, Year)		1. Paddy Field, 2. Farmland, 3. Others ()						Daily during the installation

**Social Infrastructure and Services**

- Road Traffic

Date	Location	Construction Vehicle Management				Frequency
		Traffic Control (Specify the details)	Time Restriction	Avoidance of Rush Hour	Avoidance of Rush Hour	
(Day, Month, Year)						Daily

Log Book: to be prepared and recorded by the contractor(s) which is submitted to CMWSSB monthly.

- Commercial Activities (for the transmission pipelines installations)

Date	Location	Management				Frequency
		Diversion Route	Time Restriction	No Control	Others (Specify)	
(Day, Month, Year)						Daily during the installation

- Meetings with surrounding Communities (for the transmission pipelines installations)

Date	Location /Community	Meeting Venue	Number of Participants	Agenda	Opinions Requests	Countermeasures	Frequency
(Day, Month, Year)			Community ( ) Officials ( ) Others (Specify ) Total ( )				Where necessary

Participant list and meeting minutes shall be attached.

- Risks of Infectious diseases such as HIV/AIDS

- Health and Sanitation Education

Date	Venue	Agenda	Lecturer	Number of Participants	Materials paraded	Frequency
(Day, Month, Year)				Community ( ) Worker/Labor ( ) Others (Specify) Total ( )		Once/year

Participant list and educational materials shall be attached.

- Working Conditions/Work safety for the construction

- Personnel Protective Equipment (PPE)

Date	Monitoring Item	If any problems, measures are taken	Frequency
(Day, Month, Year)	PPE: such as Helmet, Gloves, Masks, shoes -		Daily

Log Book: to be prepared and recorded by the contractor(s) which is submitted to CMWSSB monthly.

- Accidents

- Meetings with surrounding Communities

Date	Venue	Agenda	Lecturer	Number of Participants	Materials paraded	Frequency
(Day, Month, Year)				Community ( ) Worker/Labor ( ) Others (Specify) Total ( )		Once/year

### 3. Operation Phase Monitoring Form

The latest results of the below-monitoring items shall be submitted to the Employer on a biannual basis.

#### Water Quality

##### Raw Seawater and Potable Water

S. No.	Seawater	Raw	Potable	Frequency
		seawater	water	
1	Silt Density Index	✓		Daily
2	pH	✓	✓	Daily
3	Total Dissolved Solids	✓	✓	Daily
4	Temperature	✓	✓	Daily
5	Electrical conductivity	✓	✓	Daily
6	Turbidity	✓	✓	Daily
7	Residual chlorine	✓	✓	Daily
8	Boron content	✓	✓	Daily
9	Langelier index	-	✓	Daily
10	Oxidation-reduction potential	-	-	Daily
11	Alkalinity	-	✓	Daily

Operational Monitoring Report on the Raw Seawater and Potable Water monitored at DSP can be attached

#### Brine Concentration

Date	Sampling Location	Brine Concentration (ppt)	Remarks	Frequency
				Daily

#### - Domestic Water (Sewerage Treatment Plant in DSP)

Monitoring Item	Method	If any negative results measures (Ex: Stop STP operation, Stop DSP operation, resipre work, pesticide inputs and others)	Frequency
Bad Odor	Visual Inspection (Common sensation)		Once/month
Water Leakage	Visual Inspection		
generation of flies	Visual Inspection		
Other necessary actions to be monitored as per the instruction and manuals on the operation and maintenance of aerated wastewater treatment facilities (STP) is to be installed.			Once/month (or instructions of the Contractor of STP)

## Ecosystem

### Environmental Education on Marin ecosystems and Sea Turtles

Date	Venue	Agenda	Lecturer	Number of Participants	Materials paraded	Frequency
(Day, Month, Year)				Community ( ) Worker/Labor ( ) Others (Specify ) Total ( )		Once/year

Participant list and educational materials shall be attached.

## Sea Turtles Sightings

Item		Sighting Report			Frequency
Sea turtles	Time/ Date	Place (In or around Perur DSP site)	Sighted by whom (ex, Villager, Worker/labour, rumour and others)	Description of the Sighting	Actions were taken to the sightings
					See the Actions on Sea Turtle Sightings (specified below)

\*During the egg-laying season of sea turtles, hearing survey on the sighting shall be done in the surrounding communities twice of the season.

## Actions on Sea Turtle Sightings

Item		Sighting Report		Frequency
Actions on Sea turtle sighting	Construction Suspension Periods	Records of the announcements	relevant entities contacted)	In the event of Sighting

#### 4. EIA Monitoring format for EIA and CZMAs Recommendations

##### Construction Phase

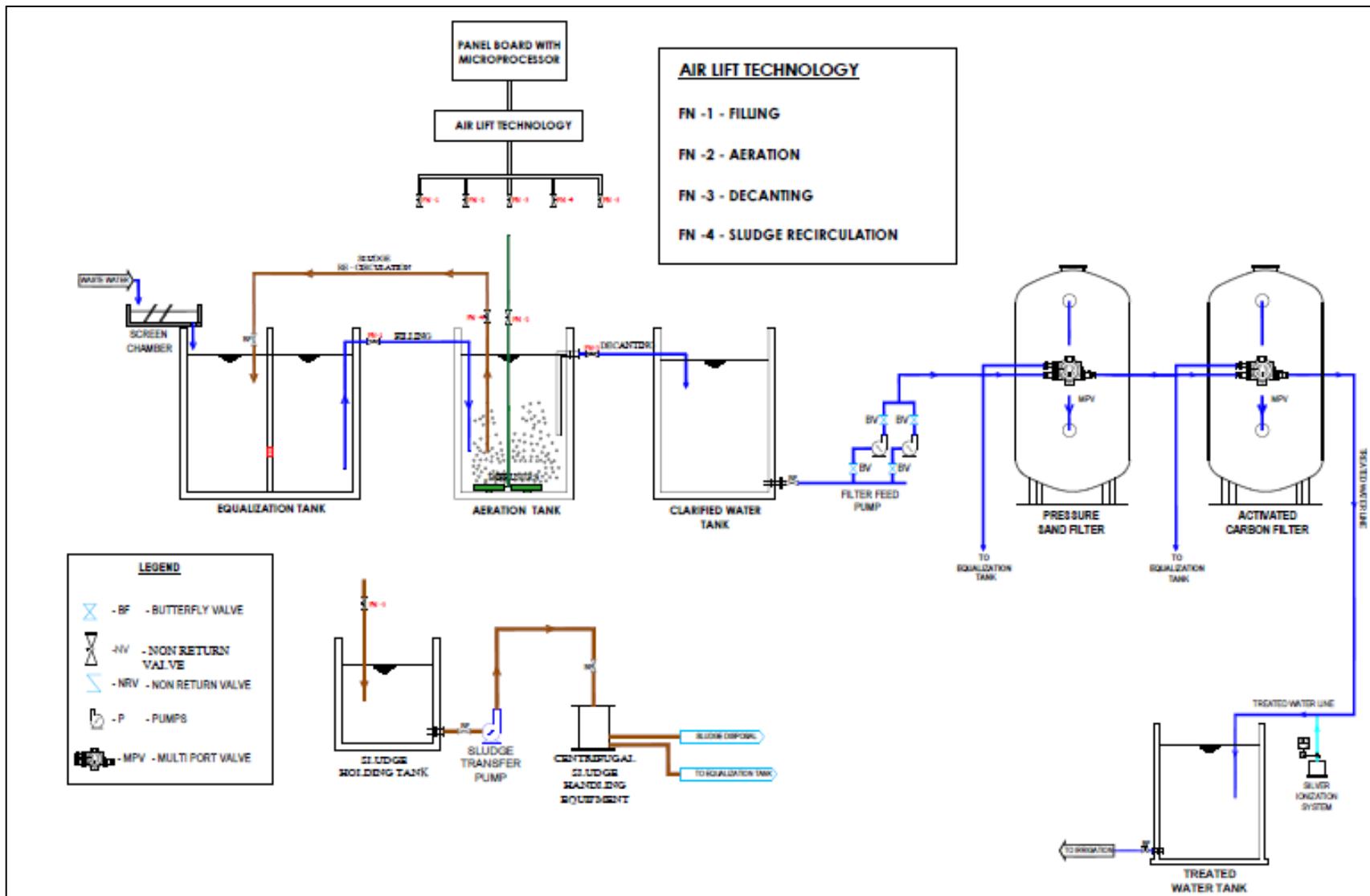
Environmental Items	Monitoring Items	Parameters	Frequency	Recommended by	Monitoring Results
Water Quality	Changes in the selected physiochemical parameters	Salinity, temperature, DO, current etc.	Periodically	Kancheepuram District CZMA	
General Environment	Site conditions	Any adverse impacts on the coast	Every Year	Tamil Nadu State CZMA	

##### Operation Phase

Environmental Items	Monitoring Items	Parameters	Frequency	Recommended by	Monitoring Results
Water Quality	Seawater & Sediment Quality	Nutrients and heavy metals	Each season: April (Fair Weather), July (SW monsoon) and November (NE monsoon)	EIA Report	
Ecosystem	Marine Benthic Fauna	Benthic fauna composition	Each season as indicated above	EIA Report	
Ecosystem	Intake entrapment of marine fauna	Screens on pump stations and Effectiveness of management measure	Each season as indicated above	EIA Report	
Ecosystem	Entrainment of marine fauna	Abundance of fauna within the pond/ storage sump/well	Each season as indicated above	EIA Report	
Ecosystem	Seawater outfall	Abundance and distribution of both phytoplankton and zooplankton	Each season as indicated above	EIA Report	
Ecosystem		Abundance and distribution of benthic animal communities	Each season as indicated above	EIA Report	

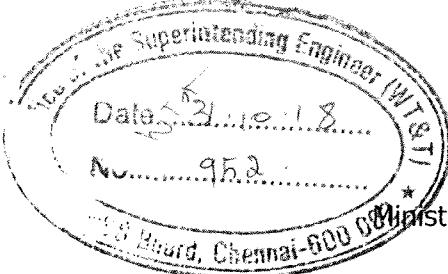
Environmental Items	Monitoring Items	Parameters	Frequency	Recommended by	Monitoring Results
Water Quality/ Ecosystem	Post-project marine quality	Marine quality including water quality and biological characteristics.	Continuous	Kancheepuram District CZMA	
Ecosystem	Marine biodiversity	Not specified	Twice in a year	Kancheepuram District CZMA	
Water Quality	Reject water	Concentration of toxic trace metals	Periodical	Kancheepuram District CZMA	
Water Quality	Changes in the selected physiochemical parameters	Salinity, temperature, DO, current etc.	Periodical during the construction and operation phases	Kancheepuram District CZMA	
Water Quality	The high salinity reject water (maybe monitored through appropriate standard procedures)	Physiochemical and toxic trace metal contents	Periodical	Kancheepuram District CZMA	
Water Quality	Marine water	Parameter is not specified/ to be monitored at the outfall area	Every Quarter	Tamil Nadu State CZMA	
General Environment	Site conditions	Any adverse impacts on the coast	Every Year	Tamil Nadu State CZMA	
Ecosystem	Impact on marine organisms, Turtle nesting etc.	Marine organisms, Turtle nesting etc.	Not specified (to be monitored by experts)	Tamil Nadu State CZMA	

**Annexure 11: Typical Package Sewage Treatment Plant Process Flow Diagram**



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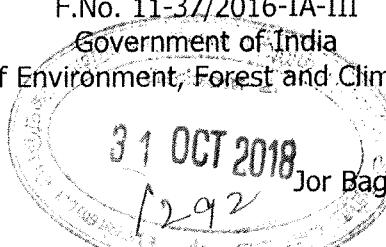
## **Annexure 12: CRZ Clearance letter**



F.No. 11-37/2016-IA-III

Government of India

Ministry of Environment, Forest and Climate Change

Indira Paryavaran Bhawan,  
Jor Bagh Road, New Delhi - 110003

Dated: 25.10.2018



To,

Chennai Metropolitan Water Supply & Sewerage Board  
No.1, Pumping Station Road,  
Chintadripet, Chennai-600 002

**Sub: CRZ Clearance for setting up of 400 MLD capacity desalination Plant at Perur, East Coast Road, Chennai, Tamil Nadu - reg.**

Sir,

This has reference to your proposal No. IA/TN/MIS/59770/2016, received in this Ministry seeking CRZ Clearance for setting up of 400 MLD capacity desalination Plant at Perur, East Coast Road, Chennai, Tamil Nadu, 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 in the 165<sup>th</sup> meeting held on 16-17 January, 2017; 175<sup>th</sup> meeting held on 28<sup>th</sup> November, 2017; and 190<sup>th</sup> Meeting held on 08.05.2018 respectively. The project has been recommended for CRZ clearance by the Expert Appraisal Committee (EAC) - Infrastructure Development, Coastal Regulation Zone, Building/Construction and Miscellaneous projects in its 190<sup>th</sup> meeting held on 08.05.2018. The details of the project, as per the documents submitted by you and as informed to the EAC are noted as under:

- i) The proposed project is for setting up of a 400 MLD Desalination plant involving laying of sea water intake pipeline, outfall pipeline, construction of seawater intake head and outfall diffuser along with intake sump and a pump house.
- ii) The proposed project is aimed at augmentation of drinking water supply in the southern and western parts of Chennai city with no perennial source of surface water.
- iii) The site is located at Eastern side of East Coast Road (ECR) at 120° 42' 44" N, 800° 14' 26" E is approximately 40 km south from the city.
- iv) Two intake structure at 10 m depth and two intake pipe each of 2500 mm dia. of HDPE will be set up. The sea water intake head will be located at a distance of about 1150m from the shoreline at 10 m depth.
- v) The outfall will be a single pipeline of 2500 mm dia HDPE. The outfall diffuser will be located at 750 m distance from the shoreline at 8 m water depth.
- vi) For Reverse osmosis two permeate storage tanks will be used.
- vii) The seawater of 47791.66 m<sup>3</sup> /hour will be drawn from the sea and about 31125 m<sup>3</sup> /hour of brine reject will be released into the sea.
- viii) The proposed project site is located in CRZ- III and CRZ- IV as per CZMP.

SE / Pesal

S. S.  
31 Oct 18  
EWT/DC

EE (Nammi)

J. S.  
S. S.  
11/11/18

AEC / Hwang

30.10.18  
S. S.  
EWT/DC

- ix) CRZ map indicating HTL, LTL demarcation in 1:4000 scale with the proposed desalination plant route superimposed on the map has been prepared by IRS, Anna University.
- x) The total power requirement for running the plant will be sourced from the grid supply of TNEB.
- xi) The total cost of the project will be Rs 3912.16 crores.
- xii) The TNCZMA has recommended the project for CRZ clearance vide its letter Nos. 844/EC.3/2016-1, dated 14.01.2016 and No. 24117/EC.3/2017-1, dated 09.01.2018, respectively.

3. Based on the information submitted by you as at para no. 2 above and presentation made before the EAC (Infrastructure Development, Coastal Regulation Zone, Building / Construction and Miscellaneous projects) in its 190<sup>th</sup> meeting held on 08.05.2018, and in acceptance of the recommendation of the EAC, the Ministry of Environment, Forest and Climate Change hereby accords CRZ Clearance to the above project viz '*Setting up of 400 MLD capacity desalination Plant based on Sea Water Reverse Osmosis at Perur, East Coast road, Chennai, Tamil Nadu*', subject to the following specific and general conditions:

#### **PART A - SPECIFIC CONDITIONS:**

- (i) The project proponent shall implement the shoreline erosion control and management plan framed by the State government, as may be applicable in the area.
- (ii) The project proponent shall submit an undertaking to the TNCZMA before commencement of work of the proposed plant stating that it shall bear full cost of environmental damage and restitution arising due to setting up of the proposed 400 MLD desalination plant.
- (iii) All conditions/recommendations stipulated by the Tamil Nadu Coastal Zone Management Authority (TNCZMA) vide its letter no. 844/EC.3/2016-1, dated 14.01.2016 and letter No. 24117/EC.3/2017-1, dated 09.01.2018 respectively, shall strictly be complied with.
- (iv) 'NOC' from Tamil Nadu Pollution Control Board for discharge of brine water into the sea after necessary safeguards shall be obtained prior to commencement of operation.
- (v) 'Consent to Establish' shall be obtained from State Pollution Control Board under the Air (Prevention and Control of Pollution) Act, 1981 and the Water (Prevention and Control of Pollution) Act, 1974, as may be applicable, prior to commencement of work.
- (vi) The project proponent shall ensure that the temporary structures installed for laying of pipe lines are removed within three months of accomplishment of the work.

- (vii) The project proponent shall ensure that the structure proposed to be set up is Tsunami resistant.
- (viii) The construction in CRZ areas shall be done strictly in accordance with the provisions of CRZ Notification, 2011 and as amended from time to time.
- (ix) Solid waste shall be collected, treated and disposed of in accordance with the Solid Waste Management Rules, 2016.
- (x) There shall be no dressing or alteration of the sand dunes, natural features including landscape changes for beautification, recreation and other such purpose.
- (xi) Soil and ground water samples in and around the SWRO Desalination Plant shall be tested regularly to ascertain that there is no threat to ground water quality through ingress/leaching of sea water.

**PART B - GENERAL CONDITIONS:**

- (i) A copy of the clearance letter shall be uploaded on the websites of the Company/Proponent and concerned State Pollution Control Board. The Clearance letter shall also be displayed at the Regional Office, District Industries centre and Collector's Office/ Tehsildar's office for 30 days.
- (ii) The funds earmarked for environmental protection measures shall be kept in a separate account and shall not be diverted for other purpose. Year-wise expenditure shall be reported to this Ministry and its concerned Regional Office.
- (iii) 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.
- (iv) Adequate provision for infrastructure facilities including water supply, fuel and sanitation must be ensured for construction workers during the construction phase of the project to avoid any damage to the environment.
- (v) 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.
- (vi) 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.
- (vii) 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.

- (viii) 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 CRZ Notification, 2011.
- (ix) 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.
- (x) In the case of any change(s) in the scope of the project, the project would require a fresh appraisal by this Ministry.
- (xi) 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.
- (xii) 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.
- (xiii) 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 31<sup>st</sup> 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/ Sc 'F'

*Copy to:*

1. The Secretary, Environment & Forests Department, Govt of Tamil Nadu, Saint George Port, Chennai.
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD- cum-Office Complex, East Arjun Nagar, Delhi - 110032.
3. The Chairman, Tamil Nadu State Pollution Control Board, 76, Mount Salai, Guindy, Chennai – 600032.
4. The Member Secretary, Tamil Nadu Coastal Zone Management Authority, Department of Environment and Forests, Government of Tamil Nadu, First Panaqal Building, Saidapet, Chennai 600015.
5. The APCCF (C), MoEF&CC, RO, 1<sup>st</sup> Floor, Handloom Export Promotion Council, 34, Cathedral Garden Road, Nungambakkam, Chennai-600034.
6. Guard File.
7. Monitoring File



(W. Bharat Singh)  
Director/ Sc 'F'





Environment & Forests (EC-3)  
Department,  
Secretariat, Chennai – 600 009

Letter No. 844/EC.3/2016-1, Dated 14.01.2016

From  
Thiru Hans Raj Verma, I.A.S.,  
Principal Secretary to Government

To  
The Chairman,  
National Coastal Zone Management Authority,  
Government of India,  
Ministry of Environment and Forests and Climate Change,  
New Delhi – 110 003. (w.e.)

Sir,

Sub.: Proposed Construction of 400 MLD sea water reverse osmosis desalination plant at Perur village, Thiruporur taluk, Kancheepuram distict proposed by Chennai Metropolitan Water Supply & Sewerage Board, Chennai – Clearance under CRZ Notification 2011 requested – reg.

Ref.: From the Director of Environment Letter No. P1/790/2014, dated 14.1.2016.

I am to enclose a copy of the proposal received from the Director of Environment together with its enclosures and to state that the Member Secretary, Tamil Nadu State Coastal Zone Management Authority / Director of Environment has sent the proposal Proposed Construction of 400 MLD sea water reverse osmosis desalination plant at Perur village, Thiruporur taluk, Kancheepuram distict proposed by Chennai Metropolitan Water Supply & Sewerage Board (CMWSSB), Chennai and he has furnished the following details in this regard:

- M/s Chennai Metropolitan Water Supply & Sewerage Board (CMWSSB) has proposed to establish a 400 MLD Sea Water Reverse Osmosis Desalination Plant at Perur Village, Thiruporur Taluk, Kancheepuram District at a distance of 600 m in the northern side of the existing 100 MLD Seawater Desalination Plant at Nemmeli Village, Thiruporur Taluk, Kancheepuram district. The prime purpose of desalination plant is to remove most of the dissolved solids from filtered seawater to make it potable for supplying the Chennai City. The proposed project involves construction of the following activities:
  - a) Laying of seawater intake two pipeline
  - b) Laying of outfall pipeline
  - c) Construction of seawater intake head (offshore construction)
  - d) Construction of outfall diffuser (offshore construction)
  - e) Construction of seawater sump with pump house
  - f) Installation of pretreatment & reverse osmosis system.

- The sea water requirement for the proposed plant will be 47791.66 cu.m/hr (1147 MLD). The sea water will be drawn by laying two submarine pipelines. Both the seawater intake heads will be located at a distance of about 1150 m from the shoreline at 10m CD (Chart Datum) water depth. The water from the intake head will be drawn by gravity flow through the submarine pipeline buried 1 m below the sea floor.
- The proposed Desalination plant will have an offshore screen, offshore intake and outfall pipe, onshore screen, lamella clarifier, dissolved air floatation, gravity dual media filter, reverse osmosis system, post treatment, administration building, workshop building, chemicals storage building, product water storage & distribution.
- The backwash and sludge generated at periodic intervals from various treatment units would be discharged into the sea along with brine. The salinity of the return water released into the sea will be 71 ppt, which will have the salinity of the difference of 33 ppt higher than the seawater ambient salinity of 38 ppt. A chlorine dosage of 3ppm will be given to the drawn seawater and the return water discharged into the sea will have the concentration of around 0.2 ppm. The brine water discharged into the sea will be 31125 cu.m/hr (747 MLD). The outfall diffuser will be located at 750 m from the shoreline at the water depth of 8 m CD. The outfall will have a multiple port diffuser arrangemtn system with 18 Nos. x 600mm diameter. Limited excavation work will be carried out for construction of Civil structures. Some amount of leveling / grading through cut and fill is required to make the land suitable for construction. The domestic solid waste will be suitably disposed and the sewage generated will be treated and the treated sewage will be used for green belt development.
- The District Coastal Zone Management Authority, Kancheepuram district has recommended the project.
- The subject was placed before the 86<sup>th</sup> Tamil Nadu State Coastal Zone Authority (TNSCZMA) meeting held on 30.09.2015 and the TNSCZMA has requested the following details.
  - a) A detailed turtle nesting conservation plan in and around the project areas.
  - b) A report on the impact of eco system (flora and fauna) due to the intake and outfall pipelines shall be furnished and the mitigation measures taken on the adverse impacts shall be furnished.
  - c) As CMWSSB has already constructed a desalination plant at Nemmeli a report on the functioning of the said plant with reference to the conditions imposed in the Environmental Clearance should be furnished.
  - d) Baseline data of the Nemmeli plant, details of the 600MLD plant being constructed by Reliance in Rann of Kutch and other relevant baseline study reports shall be furnished to enable a comparison and obtain learning.
- The project site is falling in CRZ III, CRZ – I (inter tidal zone) and CRZ-IV (sea water area). The total project cost is Rs. 2891.70 crores. As per CRZ Notification 2011, vide para 4 (i) (a), para 8 t CRZ I (i) (b) and 8-III CRZ III A (h) & B(v) the above activities are permissible activities. However the

project requires clearance from the Ministry of Environment and Forests, Government of India vide para 4 (ii) (h) of Coastal Regulation Zone Notification 2011.

- The subject along with the above details are placed before the 87th meeting of the State Coastal Zone Management Authority held on 14.01.2016 and the Authority resolved to recommend the proposal to the Ministry of Environment Forests & Climate Change, Government of India, subject to the following conditions:-
  - a) The proposed activities should not cause coastal erosion and alter the beach configuration.
  - b) Untreated chemical waste generated due to membrane protection activity and the sewage generated should not be discharged into the sea.
  - c) The project activity should not affect the coastal ecosystem including marine flora and fauna.
  - d) It may be ensured that mercury concentration is not present in the end product.
  - e) The proponent should ensure that the saline water shall not gain access into ground while conveying or processing the sea water.
  - f) Marine water quality should be monitored at the outfall area every quarter and results sent to Tamil Nadu State Coastal Zone Management Authority.
  - g) A system shall be evolved for a close and continuous monitoring during the construction and post construction phases through reputed institutions such as National Center for Sustainable Coastal Management (NCSCM), Anna University, Chennai/NIOT, Chennai / IIT Chennai. Periodical report shall be furnished to the Tamil Nadu State Coastal Zone Management Authority on the site conditions every year so as to take mitigation measures on the event of any adverse impacts on the coast.
  - h) The impact on the corals, marine organisms, Turtle nesting etc., due to the above constructions, in long run, should be evaluated and monitored through experts, in which, ecologists should be included.
  - i) The activities such as intake pipeline and outfall line and intake arrangement in sea and the pipeline should not cause hindrance to fishing activities and to boat movement.
  - j) Marking the intake and outfall pipelines adequately such that fishing vessels and fishermen are made aware of its presence.
  - k) No blasting or drilling activities in CRZ is permissible.
  - l) The proponent should not prevent public from easy access to the beach

m) The proponent shall implement the Green Belt as envisaged in EIA report.

2. The Member Secretary, Tamil Nadu State Coastal Zone Management Authority / Director of Environment has sent copy of proposal along with the reports, additional details, HTL map and minutes of the 87<sup>th</sup> meeting of Tamil Nadu State Coastal Zone Management Authority held on 14.01.2016 and requested that the proposals may be recommended to the Ministry of Environment and Forests and Climate Change, Government of India for clearance under Coastal Regulation Zone Notification, 2011.

3. In line with the recommendation of the Tamil Nadu State Coastal Zone Management Authority, this Government recommend the proposal of The Member Secretary, Tamil Nadu State Coastal Zone Management Authority / Director of Environment for the Proposed Construction of 400 MLD sea water reverse osmosis desalination plant at Perur village, Thiruporur taluk, Kancheepuram distict as proposed by Chennai Metropolitan Water Supply & Sewerage Board to the Chairman, National Coastal Zone Management Authority, Government of India, Ministry of Environment, Forests and Climate Change for clearance under Coastal Regulation Zone notification 2011, subject to the conditions mentioned at para-1 above.

Yours faithfully,

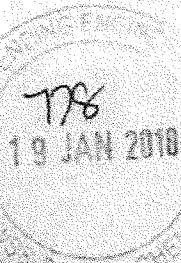
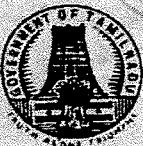
  
for Principal Secretary to Government

Copy to:

The Member Secretary,  
Tamil Nadu State Coastal Žone Management Authority /  
Director of Environment, Chennai-15  
(with a request to furnish 20 copies of the  
proposal of Government of India,  
Ministry of Environment, Forests & Climate Change,  
New Delhi)  
SF/SC

Immediate/

By Speed Post



**Environment & Forests (EC-3)  
Department, Secretariat,  
Chennai - 600 009**

**Letter No. 24117/EC.3/2017- 1 ,dated: 09/01/2018**

From

Thiru. Md. Nasimuddin, I.A.S.  
Principal Secretary to Government.

To

The Chairman,  
National Coastal Zone Management Authority,  
Government of India,  
Ministry of Environment, Forests & Climate Change,  
Agni Wing, 5<sup>th</sup> Floor,  
Indira Paryavaran Bhawan,  
Jor Bagh Road, Aliganj,  
New Delhi - 110 003. (w.e.)

Sir,

Sub: CRZ - Application for CRZ clearance - Setting up of 400 MLD SWRO Desalination Plant at Perur along ECR, Chennai - Fresh Recommendation requested as per EAC meeting proposed by CMWSSB - Clearance requested under CRZ Notification 2011 - requested - Regarding.

Ref: From the Member Secretary, Tamil Nadu State Coastal Zone Management Authority/ Director of Environment letter No R.C/P1/2410/2017, dated 08.12.2017

I am to enclose a copy of the proposal received from the Member Secretary, Tamil Nadu State Coastal Zone Management Authority/ Director of Environment together with its enclosures and to state that the Member Secretary, Tamil Nadu State Coastal Zone Management Authority/ Director of Environment has sent the proposal to establish a 400 MLD Sea Water Reverse Osmosis Desalination Plant at Perur Village, Thiruporur Taluk, Kancheepuram District at a distance of 600 m in the northern side of the existing 100 MLD Seawater Desalination Plant at Nemmeli Village, Thiruporur Taluk, Kancheepuram district, proposed by M/s. Chennai Metropolitan Water Supply & Sewerage Board (CMWSSB) and he has furnished following details:-

A. M/s Chennai Metropolitan Water Supply & Sewerage Board (CMWSSB) has proposed to establish a 400 MLD Sea Water Reverse Osmosis Desalination

*Recd/Recd*

*20/1/18*

*EE(DC)*

*J.  
20/1/18  
SE(CoRg)*

Plant at Perur Village, Thiruporur Taluk, Kancheepuram District at a distance of 600 m in the northern side of the existing 100 MLD Seawater Desalination Plant at Nemmeli Village, Thiruporur Taluk, Kancheepuram district. The prime purpose of desalination plant is to remove most of the dissolved solids from filtered seawater to make it potable for supplying the Chennai City. The proposed project involves construction of the following activities:

- i. Laying of seawater intake two pipeline
  - ii. Laying of outfall pipeline
  - iii. Construction of seawater intake head (offshore construction)
  - iv. Construction of outfall diffuser (offshore construction)
  - v. Construction of seawater sump with pump house
  - vi. Installation of pretreatment & reverse osmosis system.
- B.** The sea water requirement for the proposed plant will be 47791.66 cu.m/hr (1147 MLD). The sea water will be drawn by laying two submarine pipelines. Both the seawater intake heads will be located at a distance of about 1150 m from the shoreline at 10m CD (Chart Datum) water depth. The water from the intake head will be drawn by gravity flow through the submarine pipeline buried 1 m below the sea floor.
- C.** The proposed Desalination plant will have an offshore screen, offshore intake and outfall pipe, onshore screen, lamella clarifier, dissolved air floatation, gravity dual media filter, reverse osmosis system, post treatment, administration building, workshop building, chemicals storage building, product water storage & distribution.
- D.** The backwash and sludge generated at periodic intervals from various treatment units would be discharged into the sea along with brine. The salinity of the return water released into the sea will be 71 ppt, which will have the salinity of the difference of 33 ppt higher than the seawater ambient salinity of 38 ppt. A chlorine dosage of 3ppm will be given to the drawn seawater and the return water discharged into the sea will have the concentration of around 0.2 ppm. The brine water discharged into the sea will be 31125 cu.m/hr (747 MLD). The outfall diffuser will be located at 750 m from the shoreline at the water depth of 8 m CD. The outfall will have a multiple port diffuser arrangement system with 18 Nos. x 600mm diameter. Limited excavation work will be carried out for construction of Civil structures. Some amount of leveling / grading through cut and fill is required to make the land suitable for construction. The domestic solid waste will be suitably disposed and the sewage generated will be treated and the treated sewage will be used for green belt development.

- E.** The project site is falling in CRZ III, CRZ – I (inter tidal zone) and CRZ-IV (sea water area). The total project cost is Rs. 2891.70 crores. As per CRZ Notification 2011, vide para 4 (i) (a), para 8 I CRZ I (i) (b) and 8 III CRZ III A (h) & B(v) the above activities are permissible activities. However the project requires clearance from the MoEF., GoI vide para 4 (ii) (h) of CRZ Notification 2011.
- F.** The District Coastal Zone Management Authority, Kancheepuram district has recommended the project subject to certain conditions.
- G.** The proposal was placed before the 87<sup>th</sup> TNSCZMA meeting held on 14.01.2016 and the authority has resolved to recommend the proposal to the Ministry of Environment, Forests and Climate Change, Government of India subject to the certain specific conditions.
- H.** The above proposal was recommended to the Chairman, National Coastal Zone Management Authority, Government of India, Ministry of Environment, Forests and Climate Change, New Delhi vide Government letter No.844/EC.3/2016-1, dated 14.01.2016.
- I.** The proposal was placed before the 165<sup>th</sup> Expert Appraisal Committee on 16.01.2017 and the committee had deferred the projects for the want of the following information.

  - i. As stated by the Project Proponent (PP), both the desalination plants of 150 MLD and 400 MLD are situated at a distance of 600 m. EAC has raised a query why the both plants cannot be installed at the same location. The Committee also wanted to know financial as well as environment implications of two separate units against one single unit with 600 MLD capacity.
  - ii. Impact of shoreline change needs to be performed.
  - iii. Fresh recommendations from the TNSCZMA after examining all the documents as mentioned para 4.2 of CRZ Notification 2011 including NOC from concerned State Pollution Control Board.
- J.** The CMWSSB has submitted in letter dated 12.10.2017, the followings details with reference to the 400 MLD Desalination Plant and requested fresh recommendation from TNSCZMA to Ministry of Environment, Forests and Climate Change, Govt. of India as indicated in the 165<sup>th</sup> EAC meeting of MoEF & CC, Govt. of India.

  - i) Financial as well as environmental implications of two separate units. (i.e. proposed 150 MLD & 400 MLD) against one single unit with 600 MLD capacity.
  - ii) Impact of shoreline change have been prepared towards setting up of the 400 MLD SWRO Desalination Plant at Perur.
  - iii) The NOC received from Tamil Nadu Pollution Control Board.

- 4-
- iv) Details on Mathematical Model Study done for the impact of soil erosion due implementation of 150 MLD and 400 MLD plants.
  - K. The subject was placed before the 97<sup>th</sup> meeting of the Tamil Nadu State Coastal Zone Management Authority held on 29.11.2017 and the Authority resolved to recommend the proposal to the Ministry of Environment, Forests and Climate Change, Government of India.

3. The Member Secretary, Tamil Nadu State Coastal Zone Management Authority/Director of Environment has sent a copy of proposal along with its enclosures and minutes of the 97<sup>th</sup> meeting of TNSCZMA held on 29.11.2017 and requested that the proposals may be recommended to the Ministry of Environment, Forests and Climate Change, Government of India, subject to the following specific conditions:

- a) The proposed activities should not cause coastal erosion and alter the beach configuration.
- b) Untreated chemical waste generated due to membrane protection activity and the sewage generated should not be discharged into the sea.
- c) The project activity should not affect the coastal ecosystem including marine flora and fauna.
- d) It may be ensured that mercury concentration is not present in the end product.
- e) The proponent should ensure that the saline water shall not gain access into ground while conveying or processing the sea water.
- f) Marine water quality should be monitored at the outfall area every quarter and results sent to Tamil Nadu State Coastal Zone Management Authority..
- g) A system shall be evolved for a close and continuous monitoring during the construction and post construction phases through reputed institutions such as National Center for Sustainable Coastal Management (NCSCM), Anna University, Chennai/NIOT, Chennai / IIT Chennai. Periodical report shall be furnished to the Tamil Nadu State Coastal Zone Management Authority on the site conditions every year so as to take mitigation measures on the event of any adverse impacts on the coast.
- h) The impact on the corals, marine organisms, Turtle nesting etc., due to the above constructions, in long run, should be evaluated and monitored through experts, in which, ecologists should be included.

- i) The activities such as intake pipeline and outfall line and intake arrangement in sea and the pipeline should not cause hindrance to fishing activities and to boat movement.
- j) Marking the intake and outfall pipelines adequately such that fishing vessels and fishermen are made aware of its presence.
- k) No blasting or drilling activities in CRZ is permissible.
- l) The proponent should not prevent public from easy access to the beach.
- m) The proponent shall implement the Green Belt as envisaged in EIA report.
- n) Turtle conservation plan shall be prepared and implemented during the project period.

4. In line with the recommendation of the Tamil Nadu State Coastal Zone Management Authority, this Government recommend the proposal of Member Secretary, TNSCZMA/DOE, Chennai to setting up of 400 MLD SWRO Desalination Plant at Perur along ECR, Chennai proposed by M/s. Chennai Metropolitan Water Supply & Sewerage Board (CMWSSB) to the Chairman, National Coastal Zone Management Authority, Government of India, Ministry of Environment, Forests and Climate Change, New Delhi, for clearance under CRZ Notification, 2011, subject to the specific conditions mentioned at para 3 above.

H. J. S.  
12-1-18

For Principal Secretary to Government

✓  
12-1-18

Copy to:-

The Member Secretary, TNSCZMA/DOE, Chennai - 15.

1. Managing Director, Chennai Metropolitan Water Supply & Sewerage Board, Chennai - 2.

(with a request to furnish 20 copies of  
the proposal of GoI, MoEF&CC, New Delhi)  
SE/SC.



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### **Annexure 13: Tamil Nadu Govt. G.O. for DSP land Lease**



குருக்கம்



இந்து சமய அறநிலையத்துறை - காஞ்சிபுரம் மாவட்டம், திருக்கழுக்குன்றம் வட்டம், மாமல்லபுரம், நெம்மேலி அருள்மிகு ஆளவந்தார் அறக்கட்டளை - பேரூர் கிராமம், சர்வே எண்.208/2பி3-ல் உள்ள 85.51 ஏக்கர் நிலங்கள் - கடல்நீரை குடிநீராக மாற்றும் திட்டம் (நிலை 2) (Phase-II) - சட்டப்பிரிவு 34-ன் கீழ் நீண்டகால வாடகை அடிப்படையில் சென்னை பெருநகர குடிநீர் வழங்கல் மற்றும் வடிகால் வாரியத்திற்கு குத்தகைக்கு வழங்க இந்து சமய அறநிலையத்துறை ஆணையருக்கு அனுமதி அளித்தல் - ஆணை வெளியிடப்படுகிறது.

#### சுற்றுலா, பண்பாடு மற்றும் அறநிலையங்கள் (அடி 4.1)துறை

அரசாணை (நிலை) எண். 157

நாள்: 29.04.2016

துண்முகி வருடம், சித்திரை - 16  
திருவள்ளுவராண்டு - 2047

படிக்கப்பட்டது:-

- i) அரசாணை (நிலை) எண்.238, தமிழ்வளர்ச்சி, அறநிலையங்கள் மற்றும் செய்தி (அடி4-1)த் துறை, நாள் 08.06.2007.
- படிக்க:
- ii) இந்து சமய அறநிலையத்துறை ஆணையர் கடிதங்கள் ந.க.எண்.44988/2012/வி2, நாள் 03.07.2013, 06.02.2014 மற்றும் 07.01.2016.

#### ஆணை:-

மேலே முதலாவதாகப் படிக்கப்பட்ட அரசாணையில், சென்னை பெருநகர குடிநீர் வழங்கல் மற்றும் வடிகால் வாரியத்தினால் மேற்கொள்ளப்படும் கடல்நீரை குடிநீராக்கும் திட்டத்திற்கு (Phase-I) மாமல்லபுரம், நெம்மேலி ஆளவந்தார் அறக்கட்டளைக்குச் சொந்தமான நெம்மேலி மற்றும் கிருஷ்ணாஞ்காரணை கிராமங்களில் உள்ள 40.05 ஏக்கர் நிலங்களை நீண்டகால குத்தகையாக 30 ஆண்டுகளுக்கு சிறப்பு நிகழ்வாக மேற்படி நிலங்களின் சந்தை மதிப்பில் 0.05% தொகையை மாதக் குத்தகைத்தொகையாக நிர்ணயம் செய்தும் மூன்று வருடங்களுக்கு ஒரு முறை 15% குத்தகைத் தொகையை உயர்வு செய்தும் சென்னை பெருநகர குடிநீர் வழங்கல் மற்றும் வடிகால் வாரியத்திற்கு குத்தகைக்கு வழங்க இந்து சமய அறநிலையத்துறை ஆணையருக்கு அனுமதி அளித்து ஆணை வெளியிடப்பட்டது.

2. மேலே இரண்டாவதாகப் படிக்கப்பட்ட கடிதங்களில் இந்து சமய அறநிலையத்துறை ஆணையர் அவர்கள், காஞ்சிபுரம் மாவட்டம், திருக்கழுக்குன்றம் வட்டம், மாமல்லபுரம், நெம்மேலி, அருள்மிகு ஆளவந்தார் நாயக்கர் அறக்கட்டளை இந்து சமய அறநிலையத்துறை சட்டப்பிரிவு 46(iii)-ன் கீழ் விளம்புகை செய்யப்பட்ட, நிலை-1 செயல் அலுவலரால் நிர்வாகம்

SE / Desal  
Balramulu  
Dent  
  
In  
Enquiry  
CEM (M) - II  
CEM (M) - II  
AE / Desal  
K. S. S.  
S. S. S.  
CEM (M) - II  
- 140 -

செய்யப்பட்டு வரும் அறக்கட்டளையாகும் என்றும், இவ்வறக்கட்டளைக்குச் சொந்தமான சர்வே எண்.208/2பி3-ல் உள்ள சுமார் 66 ஏக்கர் நிலத்தினை கடல்நீரை குடிநீராக மாற்றும் திட்டத்திற்கு (Phase-II) வழங்குமாறு சென்னை குடிநீர் வழங்கல் மற்றும் வடிகால் வாரியம் கேட்டுள்ளதாகவும், இவ்வறக்கட்டளைக்குச் சொந்தமான பேரூர் கிராமம் சர்வே எண்.208/2பி3-ல் உள்ள 87.36 ஏக்கர் நிலத்தில் இடையே பயன்பாட்டில் உள்ள 4 மயானங்கள் மற்றும் அவற்றிற்கான தனி பாதைகள் அமைக்க ஆக மொத்தம் 1.85 ஏக்கர் நிலம் போக மீதுமின் 85.51 ஏக்கர் நிலத்தினை குத்தகைக்கு வழங்கலாமென தெரிவித்துள்ளார். மேலும், கடல்நீரை குடிநீராக மாற்றும் திட்டத்திற்கு மேலே முதலாவதாகப் படிக்கப்பட்ட அரசாணையில் நிலத்தின் சந்தை மதிப்பில் நிர்ணயம் செய்த 0.05% தொகை போலவே நிலத்தின் தற்போதைய வழிகாட்டி மதிப்பில் 0.05% தொகையினையே மேற்படி அறக்கட்டளைக்குச் சொந்தமான 85.51 ஏக்கர் நிலத்திற்கும் கீழ்க்கண்டவாறு குத்தகைத் தொகையாக நிர்ணயம் செய்யப்பட்டுள்ளது என்றும் ஆணையர் தெரிவித்துள்ளார்.

1	திருப்போரூர் சார்பதிவக வழிகாட்டுதல்படி 1 ஏக்கர் நிலம் விலை மதிப்பு (1 சதுர அடி 600/-) 1 சென்ட் = 436 ச.அடி 1 ஏக்கர் = 100 சென்ட் 1 ஏக்கர் = 43600 ச.அடி	-	43600 ச.அடி X ரூ.600 = ரூ.2,61,60,000/-
2	குடிநீர் வடிகால் வாரியம் கோரும் 85.51 ஏக்கர் நில மொத்த மதிப்பு	-	85.51x2,61,60,000/- வீதம் மொத்த மதிப்பு ரூ.223,69,41,600/-
3	0.05% வாடகை அடிப்படையில்	-	ரூ.223,69,41,600/-க்கு 0.05% வீதம் மாதம் ஒன்றுக்கு வாடகை ரூ.11,18,470.80/- ரூ.11,18,470/- ஆகும்

3. மேலும், கேட்புத்துறை கோரும் நிலத்தில் வனத்துறையினருக்கு 30% அறக்கட்டளைக்கு 70% என்கிற பங்கீட்டு ஒப்பந்தப்படி வனத்துறையினரால் 9 ஆண்டு வளர்ச்சியுள்ள சவுக்கு மரங்கள் நடவ செய்யப்பட்டுள்ளது என்றும் மேற்படி சவுக்கு மரங்கள் தொடர்பாக வனத்துறையிடமிருந்தோ அல்லது TNPL நிறுவனத்திடமிருந்தோ மதிப்பீடு பெற்று, அதற்குரிய தொகையினை சென்னை பெருநகர குடிநீர் வழங்கல் மற்றும் வடிகால் வாரியம் ஒரே தவணையில் தொகை முழுவதையும் அறக்கட்டளைக்கு செலுத்த வேண்டும் என்றும், கடல்நீரை குடிநீராக மாற்றும் திட்டம் முதல் நிலைக்கு (Phase-I) 30 ஆண்டு கால வாடகை அடிப்படையில் நிலம் வழங்கப்பட்டுள்ளதன் அடிப்படையில் தற்போது வழங்க உள்ள 85.51 ஏக்கர் நிலத்தையும் 30 ஆண்டுகால குத்தகைக்கு வழங்கலாம் எனவும், மேற்கண்ட கணக்கீட்டின்படியான மாத வாடகை ரூ.11,18,470/- தொகையில் மூன்று ஆண்டுகளுக்கு ஒருமுறை 15% உயர்வு செய்து செலுத்தவும் கீழ்க்கண்ட நிபந்தனைகளுக்கு உட்பட்டு கேட்புத்துறை ஒப்பந்த பத்திரிம் ஏற்படுத்தி கொள்ள செயல் அலுவலருக்கு அனுமதி வழங்க ஆணையருக்கு அனுமதி அளித்து அரசாணை பிறப்பிக்கலாம் என்றும் ஆணையர் தெரிவித்துள்ளார்.

- மேற்படி வாடகைக்கு விடப்படும் நிலத்திற்கான மாத வாடகை ரூ.11,18,470/- வீதம் ஒரு வருடத்திற்கான மொத்த வாடகை ரூ.1,34,21,640/-ஐ ஒவ்வொரு வருடத்தின் முதல் மாதத்தின் 5-ம் தேதிக்குள் ஒரே தவணையாக அறக்கட்டளைக்கு செலுத்துதல் வேண்டும்.

- ii) 6 மாத வாடகைத் தொகையை முன்பணமாக (Advance) அறக்கட்டளைக்கு செலுத்துதல் வேண்டும். மேலும் இது தொர்பாக, நாளிதழில் விளம்பரம் செய்தமைக்கான விளம்பரச் செலவினை கேட்புத்துறை, அறக்கட்டளைக்குச் செலுத்திட வேண்டும்.
- iii) முன்று வருடத்திற்கு ஒருமுறை மாத வாடகைத் தொகையுடன் கூடுதலாக 15% தொகையை உயர்வு செய்து செலுத்த வேண்டும். மேலும் 6 மாத வாடகை முன்பணத்திற்கும் (Advance) 3 வருடத்திற்கு ஒருமுறை 15% உயர்வு செய்து தர வேண்டும்.
- iv) வாடகை நிலத்தில் தற்போது பயிரிடப்பட்டுள்ள சுவக்கு மரங்களுக்கான இழப்பீட்டுத் தொகையை ஒரே தவணையாக சென்னை பெருநகர குடிநீர் வழங்கல் மற்றும் வடிகால் வாரியம் அறக்கட்டளைக்கு செலுத்திடல் வேண்டும்.
- v) வாடகைக்கான காலம் இவ்வுத்தரவு பிறப்பிக்கப்பட்ட நாளிலிருந்து 30 ஆண்டுகளுக்கு மட்டும்.
- vi) நிலம் எந்நோக்கத்திற்கு கேட்கப்படுகிறதோ அதற்காக மட்டுமே பயன்படுத்த வேண்டும்.
- vii) நிலம் எந்நிலையில் விடப்படுகிறதோ அந்த நிலையிலேயே திரும்ப ஒப்படைக்க வேண்டும். கழிவுகளால் நிலத்திற்கு பாதகமில்லாமலும், நிலத்தின் தன்மை மாறாமலும் பார்த்துக் கொள்ள வேண்டும்.
- viii) ஒப்பந்த காலத்திற்கு பிறகு நிலத்தினை அறக்கட்டளை வசம் ஒப்படைக்கும்போது கட்டிடங்கள் ஏதும் கட்டப்பட்டு இருந்தால் அதனை சேதப்படுத்தாமல் அறக்கட்டளை வசம் ஒப்படைப்பட செய்ய வேண்டும். அதற்குரிய தொகை எதுவும் அறக்கட்டளை வசம் கோரக்கூடாது.
- ix) மேற்காணும் நிபந்தனைகளை உள்ளடக்கி கேட்புத் துறையான சென்னை பெருநகர குடிநீர் வழங்கல் மற்றும் வடிகால் வாரியம் தனது சொந்த செலவில் வாடகை ஒப்பந்த பத்திரம் எழுதி பதிவு செய்து தர வேண்டும்.
- x) கட்டுமானங்கள் செய்யப்படும்போது செயல் அலுவலரிடம் தனி அனுமதி பெறப்பட வேண்டும்.
- xi) இந்து சமய அறநிலையத்துறை அவ்வப்பொழுது வெளியிடும் சட்டவிதிகள் மற்றும் நிபந்தனைகளுக்கு கட்டுப்பட வேண்டும்.

4. இந்து சமய அறநிலையத்துறை ஆணையர் அவர்களின் கருத்துருவினை அரசு கவனமுடன் பரிசீலனை செய்தது. பரிசீலனைக்குப் பின்னர் அதனை ஏற்று, காஞ்சிபுரம் மாவட்டம், திருக்கழுக்குன்றும் வட்டம், மாமல்லபுரம், நெங்மேலி, அருள்மிகு ஆளவந்தார் நாயக்கர் அறக்கட்டளைக்குச் சொந்தமான பேரூர் கிராமத்தில் சர்வே எண்.208/2பி3-ல் உள்ள 85.51 ஏக்கர் நிலத்தினை கடல்நீரை குடிநீராக மாற்றும் திட்டத்திற்கு (நிலை 2) (Phase-II), வழிகாட்டி மதிப்பான சதுர அடி ஒன்றுக்கு ரூ.600/- வீதம் 85.51 ஏக்கர் நிலத்திற்கான மொத்த மதிப்பு தொகையான ரூ.223,69,41,600/-இல் 0.05 சதவீதத் தொகை ரூ.11,18,470/-ஜி (பதினொன்று இலட்சத்து பதினெட்டாயிரத்து நானுற்று எழுபது மட்டும்) மாதம் ஒன்றுக்கு குத்தகைத் தொகையாக நிர்ணயம் செய்து மேலே பத்தி 3-ல் குறிப்பிடுள்ள நிபந்தனைகளுக்குட்பட்டு 30 வருடங்களுக்கு குத்தகைக்கு சென்னை பெருநகர குடிநீர் வழங்கல் மற்றும் வடிகால் வாரியத்தினருக்கு வழங்கிட செயல் அலுவலருக்கு அனுமதி வழங்க

இந்து சமய அறநிலையத்துறை ஆணையருக்கு அனுமதி வழங்கலாம் என அரசு முடிவு செய்து அவ்வாறே ஆணையிடுகிறது.

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ஆணையர், இந்து சமய அறநிலையத்துறை, சென்னை-34

மேலாண்மை இயக்குநர்,

சென்னை பெருநகர குடிநீர் வழங்கல் மற்றும் வடிகால் வாரியம், எண்.1, பம்பிங் ஸ்டேஷன் ரோடு, சிந்தாதிரிப்பேட்டை, சென்னை-2.

செயல் அலுவலர், நெம்பேலி, அருள்மிகு ஆளவந்தார் அறுக்கட்டளை, மாமல்லபுரம், திருக்குழுக்குன்றும் வட்டம், காஞ்சிபுரம் மாவட்டம். (ஆணையர் வழியாக)

நகல்:-

நகராட்சி நிர்வாகம் மற்றும் குடிநீர் வழங்கல் துறை, சென்னை-9.

வருவாய்த்துறை, சென்னை-9.

நிதித்துறை, சென்னை-9.

மாண்புமிகு அமைச்சர் (உணவு, இந்து சமயம் மற்றும் அறநிலையங்கள்) அவர்களின் அலுவலகம், சென்னை-9.

மாண்புமிகு அமைச்சர் (நகராட்சி நிர்வாகம், ஊரகவளர்ச்சி, சுட்டம், நீதிமன்றங்கள் மற்றும் சிறைச்சாலைகள்) அவர்களின் அலுவலகம், சென்னை-9.

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சுற்றுலா, பண்பாடு மற்றும் அறநிலையங்கள்(பொது-2) துறை, சென்னை-9.

இருப்புக்கோப்பு/உபரி.

//ஆணைப்படி அனுப்பப்படுகிறது//

மை. அ. திரு. 29/14/16  
பிரிவு அலுவலர்

29/14/16



CHENNAI METROPOLITAN WATER SUPPLY & SEWERAGE BOARD  
(CMWSSB)



## PMC FOR CHENNAI PERUR 400 MLD DESALINATION PLANT AND ALLIED WORKS

### CP 1 - Social Safeguard Review (Concept Report)

April, 2021



SMEC International Pty. Ltd.  
in consortium with  
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This report is confidential and is provided solely for the purposes of briefing the Client on the planned activities to be undertaken by the Project Management Consultant ("PMC") during the course of the Consulting Services under the Chennai 400 MLD Desalination Plant project]. This report is provided pursuant to a Consultancy Agreement between SMEC International Pty Limited ("SMEC"), as lead consultant in the PMC and CMWSSB, under which SMEC undertook to perform a specific and limited task for CMWSSB.

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## Abbreviation and Acronyms

<b>Acronyms</b>	<b>Abbreviation</b>
AMSL	Above Mean Sea Level
BOQ	Bill of Quantity
C&M	Contracts and Monitoring
CMA	Chennai Metropolitan Area
CMWSSB	Chennai Metropolitan Water Supply & Sewerage Board
CP	Contract Package
CPCB	Central Pollution Control Board
CRZ	Coastal Regulation Zone
CRZC	Coastal Regulation Zone Clearance
CWDL	Chennai Water Desalination Ltd
CZMA	Coastal Zone Management Authority
CZMP	Coastal Zone Management Plan
DAE	Deputy Area Engineer
DFR	Detailed Final Report
DFR/FR	Draft Final Report/Final Report
DMA	District Metering Area
DP	Distribution Pipe
DPR	Detailed Project Report
DSP	Desalination Plant
ECR	East Coast Road
FR	Final Report
GCC	Greater Chennai Corporation
GER	Gross Enrollment Ratio
GO	Government Order
GOI	Government of India
GOJ	Government of Japan
GoTN	Government of Tamil Nadu
H.W.	Head Works
HO	Head Offices
HP	Horse Power
HP	High Pressure
HQ	Headquarters
HR&CE	Hindu Religious and Charitable Endowment
HRM	Human Resource Management
HSC	House Service Connection
ICR	Inception Report
IEC	Information Education Communication
IEE	Initial Environmental Examination
IMD	Indian Meteorological Department
IR	Impact Rate
IS	Indian Standards
JICA	Japan International Cooperation Agency
KL	Kilo litre
km	kilometre
KwH	kilowatt-hour
LAP	Land Acquisition and Resettlement Action Plan
m	metre
m/hr	metre per hour
M/P	Master Plan
m/s	metre per second
MA&WS	Municipal Administration & Water Supply
MOD	Minute of Discussion
mg/L	milligram per litre

<b>Acronyms</b>	<b>Abbreviation</b>
MIS	Management Information System
MLD	Million Litres per Day
mm	millimeter
MORD	Ministry of Rural Development
MSL	Mean Sea Level
NGO	Non-Governmental Organization
NH	National Highway
O&M	Operation and Maintenance
S/S	Substation
S.No.	Serial Number
SIA	Social Impact Assessment
SIM	Social Impact Management
TCE	Tata Consulting Engineers
TOR	Terms of Reference
TP	Town Panchayat
TP	Transmission Pipelines
UGT	Underground Tank
VP	Village Panchayat
WDS	Water Distribution Station
WDZ	Water Distribution Zone
WHO	World Health Organization
WRD	Water Resource Department
WSS	Water Supply System
WSSB	Water Supply & Sanitation Board
WTP	Water Treatment Plant

## Executive Summary

Chennai has experienced a chronic water shortage due to the impacts of climate change and failure of recent monsoons to deliver enough rainfall and associated stream flow to refill the existing water supply system's surface water sources. In order to improve the current water supply situation, the Chennai Metropolitan Water Supply and Sewerage Board ("CMWSSB" or "the Client") has obtained a loan from the Japan International Cooperation Agency ("JICA") through the Tamil Nadu Government, to supplement current supplies with a 400 MLD Sea Water Desalination plant at Perur. The Project Management Consultant ("PMC") selected by CMWSSB, is a Consortium comprising of SMEC International Pty Ltd., Australia as the lead member of the consortium, Tata Consulting Engineers Limited (TCE), NJS Engineers India Pvt. Ltd. (NJSEI) and SMEC (India) Private Limited as Consultants to the consortium.

Under the reporting obligations of the Contract, social safeguard aspects are expected to chip in Contract Packages (CPs) of the project through expert advice from two Social Communication Specialists comprises of International Expert (IE) and Local Expert (LE). This Social Safeguard Review Report as deliverables by PMC, describes the Social Safeguard issues and impacts in continuation to JICA project preparatory report. The report preparation followed a review of a number of documents, websites, Census survey data and primary information collected through a site visit.

The proposed Perur 400 MLD DSP is located in Nemmeli revenue village, Nemmeli village panchayat in Thiruporur Taluk (Thiruporur Block) of Chengalpattu district, Tamil Nadu State, India is covered under CP1. While Nemmeli kuppam and Sulerikaattu Kuppam are two habitations adjacent to the plant in North and South direction respectively; from plant construction and operation perspective, Nemmeli Kuppam is expected to have more interactive process than other habitations. There are 166 houses patta land in Nemmeli Kuppam, of which owners have occupied 142 houses, and rest are occupied by 24 tenants. After Tsunami devastation, 124 houses were constructed by the NGO 'World Vision' in the year 2005. All 142 families of this fishermen habitation practice Hindu religion (Hindu Meenavar Parvatharaja Kulam) and belong to Most Backward category defined by Government of Tamilnadu. Only a few tenants who have come from other areas belong to Most Backward and Backward communities. Impoverished (absolute deprivation) people and Project Affected Persons (PAPs) are not identified in the project site. As well as ethnic minorities and indigenous peoples are not identified in and around the project site. In general men of this habitation are engaged in fishing and allied activities, while women are engaged in selling of fish in neighbouring areas and dry fish preparation.

The Project do not require land acquisition and resettlement as the said DSP is planned to be constructed in a vacant leased land without presence of settlements and households. However, the presence of an open-well and two bore wells with a pump house connected with three phase line is being used for daily water supply through transmission pipeline to Perur and Perur colony habitations across the ECR and west of the site might hurdle supply of potable water to the said habitations unless left out from plant layout or alternate arrangement is considered. Similarly, during the construction of intake well for Chennai Perur 400 MLD DSP, there are possibilities of seawater flow towards Nemmeli Kuppam habitation from East-to-West direction, causing soil erosion. As a result, the fishermen boat parking area and the landing centre might get affected. Hence, probable construction activities for the protection of the landscape (Landing Centre) might be required. Apart from the above, possibilities of livelihoods disruption during the construction period of intake well might arise. Hence, temporary livelihood support may be desired for the period their livelihood is affected.

During the construction, there will be an influx of labour, which require preventive measures and appropriate action in particular to COVID-19 pandemic, HIV/AIDS, working condition and safety. Also, the Bay of Bengal and the coast of Tamilnadu is vulnerable to the impact of the cyclone and other natural disaster like Tsunami. Hence, to address to the immediate tragic; early warning and rapid response during and aftermath of such disaster in terms of health and food security can reduce the vulnerability.

This report is structured as follows:

Chapter 1: Provides an introduction to the project and salient features, the scope of PMC Social Unit and approach.

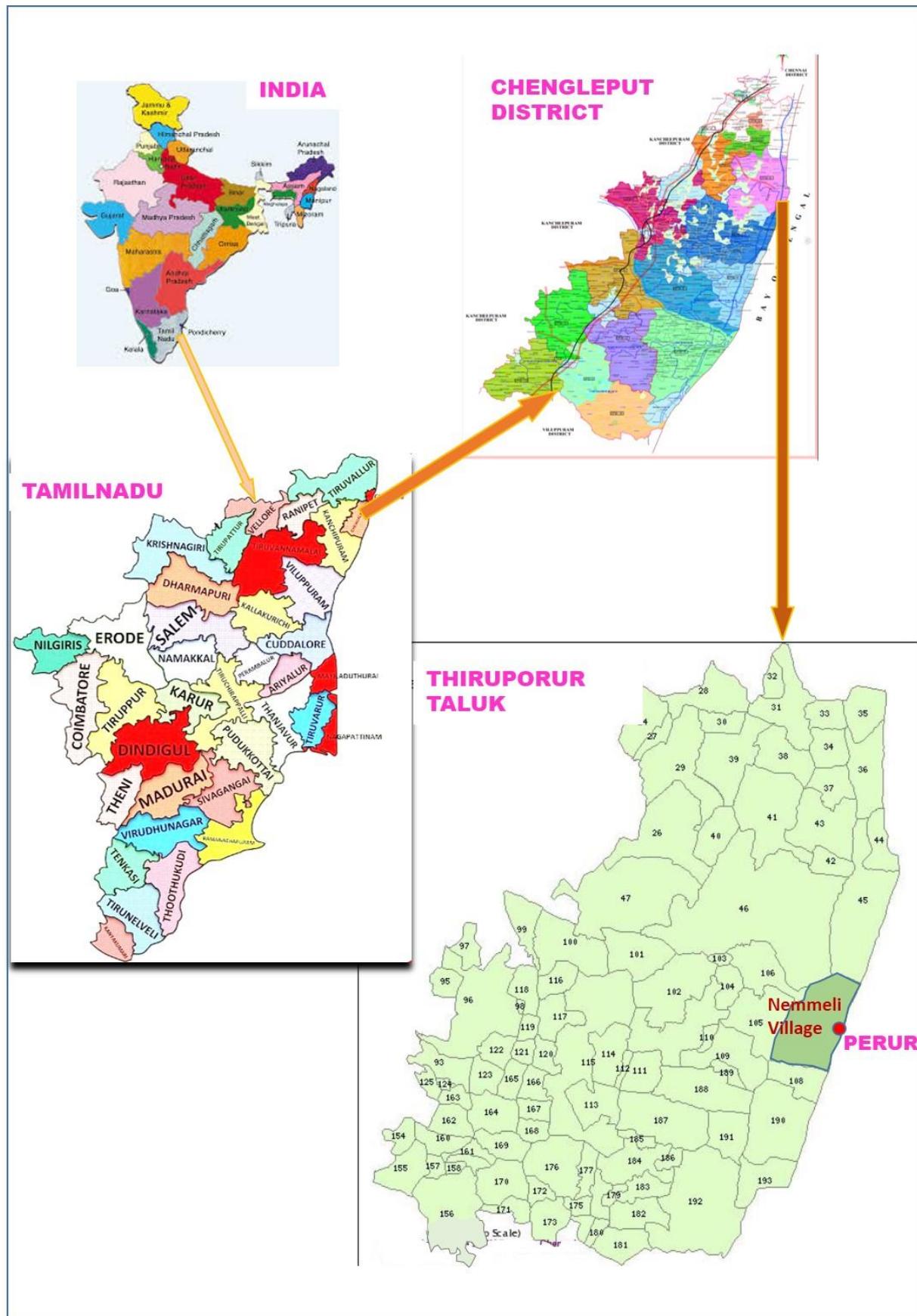
Chapter 2: Provides information on documents reviewed and sites visited.

Chapter 3: Provides Social Safeguard Situation Review & Analysis across CPs.

Chapter 4: CP -1 Issues, Concerns, Risk Analysis and Strategic Framework

Chapter 5: Provides Social Policy, Legal and Administrative Framework.

## Location Map



# 1 Introduction

## 1.1 Background

In recent years to 2019, Chennai has experienced a chronic water shortage due to the impacts of climate change and failure of recent monsoons to deliver enough rainfall and associated stream flow to refill the existing water supply system's surface water sources.

In order to improve the current water supply situation, the Chennai Metropolitan Water Supply and Sewerage Board ("CMWSSB" or "the Client") has obtained a loan from the Japan International Cooperation Agency ("JICA") through the Tamil Nadu Government, to supplement current supplies with a 400 MLD Sea Water Desalination plant at Perur.

CMWSSB has selected a Project Management Consultant ("PMC") through a competitive bidding process to support the CMWSSB Project Implementation Unit ("PIU") for development of the 400 MLD Seawater Desalination Plant and its components (collectively referred to as the "Project"). A Consultancy Contract agreement was signed dated January 09, 2020, for Consulting Services with the PMC for this Project.

The PMC is a Consortium comprising of SMEC International Pty Ltd., Australia as the lead member of the consortium, Tata Consulting Engineers Limited (TCE), NJS Engineers India Pvt. Ltd. (NJSEI) and SMEC (India) Private Limited as Associate Consultants to the consortium.

Social Communication Specialists of the PMC team commenced services at the site from October 1, 2020; whereas they were operating from home in September 2020, due to Covid-19 pandemic. This Social Safeguard Review Report ("this Report") describes the Social Safeguard aspects as Consulting Services to be delivered by the PMC in support of the Project. This report reviews the social safeguard issues and impacts in continuation to JICA project preparatory report.

## 1.2 Project Salient Feature

This Project consists of following components, which PMC have been assigned to carry out through Contract Package (CP-1).

**CP1 Construction of the Perur DSP (400 MLD):** Construction of a Sea Water Desalination Plant, which is named as the Perur Seawater Desalination Plant having a production capacity of 400 MLD in Perur Commune, Tamil Nadu State;

- ⦿ Seawater intake facilities
- ⦿ Pre-treatment facility
- ⦿ Seawater desalination facilities by reverse osmosis (RO) technology
- ⦿ Post-treatment facility for remineralisation and disinfection
- ⦿ Potable water storage
- ⦿ Effluent discharge pipelines
- ⦿ Substation for power receiving
- ⦿ All other buildings and structures are necessary for the seawater desalination plant such as administration building, storage, guardhouse, etc.

## 1.3 Objective

Adhering to JICA guideline and other international standards towards social safeguard, and aligning with overall project objectives; the social interventions need to play a major role in bringing understanding and harmony among the stakeholders while addressing statutory compliance towards minimising the adverse impact of infrastructure development across CPs.

## 1.4 Scope of Social Communication in the Project

Under the reporting obligations of the Contract, social communication aspects are expected to chip in Contract Packages (CPs) of the project through expert advice from two Social Communication Specialists comprises of International Expert (IE) and Local Expert (LE). The social communication scope matrix is presented in Table 1 below.

**Table 1: Social Communication Scope of Work for Contract Package CP-1**

Scope		CP1
I.	Provide assistance to CMWSSB for the capacity development in the acceleration of installation of service connections and water meters and improvement of customer care and publication with Organizational Expert	No
II.	Prepare requirement to the contractors from the viewpoint of social communication/consideration in the preparation of bid documents which Contractor is to comply with the requirement of JICA Guideline (April 2010), including guidelines of an international organization	Yes
III.	Supervise the contractors from the viewpoint of social communication for smooth implementation of the construction works	Yes

## 1.5 Approach and Methodology

This section describes how the Consultant has planned to implement social communication in line with the scope of services defined in the ToR (Refer: 1.4). Social communication is required to build understanding and support for smooth implementation of plan outlays. Accordingly, the approach to communicate with stakeholders has to be strategic, intensive and consultative to build awareness and minimise resistance. Hence, the basic suggestive strategy to follow is to address stakeholders' concerns, perceptions and motivations.

The Consultant recognises that coordination with stakeholders is necessary for the successful implementation of the project. With this realisation, working in close consultations with the key stakeholders will be emphasised; mainly with CMWSSB, Community Leaders/Citizen Charter, District Administration and any other as felt appropriate.

Accordingly, the following actions will be part of the process.

- ⦿ Desk research, which involved reviewing several key documents to identify pertinent and perceived issues across Contract Packages (CPs) affecting the key stakeholders ;
- ⦿ A Rapid Assessment Survey (RAS) through interviews with a range of potential stakeholders and conducting Focus Group Discussions (FGD);
- ⦿ Community/Public Consultation will be taken up as an integral part of the social assessment process of the Project. In terms of information dissemination to the Project Stakeholders on the Project; issues need to be addressed.
- ⦿ Review the families potentially requiring livelihood restoration and if necessary, develop and facilitate the implementation of action plans.

## 2 Data Collection and Review of Information

### 2.1 Review of Documents

The Social Safeguard Review report is based on various reference documents, site visits, discussion with government officials and interaction at the community level. The following documents we referred while preparing this report.

- ⌚ Terms of Reference (TOR) of the Consultancy Services
- ⌚ JICA Final Report on Preparatory Survey on Chennai Seawater Desalination Plant Project
- ⌚ Minutes of Discussions (MODs) on Chennai Seawater Desalination Plant Project between Japanese International Cooperation Agency and Chennai Metropolitan Water Supply and Sewerage Board.
- ⌚ JICA Safeguard Guideline (2010); the World Bank and Asian Development Bank Safeguard Policies and; National and Tamilnadu rehabilitation and resettlement policies.
- ⌚ Census 2011
- ⌚ District Websites

### 2.2 Site Visit

The social unit of PMC visited all CP sites in October 2020 for firsthand information. In consideration of the advance stage of CP1, several visits were made to the proposed 400 mld desalination site and neighbouring fishermen habitation Nemmeli kuppam and had a discussion with the fisher folks and residents of the habitation. Consultants also visited the village administrative office and other offices in the village panchayat for getting the demographic and social details of the hamlets in the Nemmeli panchayat.

### 3 Social Safeguard Situation Review & Analysis

The social safeguard review and analysis has been conducted considering each of contract packages (CPs) separately.

#### 3.1 Contract Package 1 (CP1): Perur 400 MLD Desalination Plant

CP1 (Contract Package 1) covers the construction of a Sea Water Desalination Plant, which is named as Chennai Perur Seawater Desalination Plant having a production capacity of 400 MLD with salient features of Seawater intake facilities, Pre-treatment facility, Seawater desalination facilities by reverse osmosis (RO) technology, Post-treatment facility for remineralisation and disinfection, Potable water storage, Effluent discharge pipelines, Substation for power receiving, All other buildings and structures necessary for the seawater desalination plant such as administration building, storage, guardhouse, etc.

Referring to Chennai Perur 400 MLD DSP; Nemmeli kuppam and Sulerikaattu Kuppam are two habitations adjacent to the plant in North and South direction respectively. However, from plant construction and operation perspective, Nemmeli Kuppam habitation is expected to have more interactive process than other habitations. Hence, a further detail socioeconomic aspect of Nemmeli Kuppam carries discussion.

##### 3.1.1 Socio-Economic Aspects

###### 3.1.1.1 Location

The proposed Perur 400 MLD Desalination Plant (DSP) is located in Nemmeli revenue village, Nemmeli village panchayat in Thiruppur Taluk (Thiruppur Block) of Chengalpattu district (earlier Kanchipuram District), Tamil Nadu State, India. The village is bifurcated into East and West part by the State Highways- 49, i.e. East Coast Road (ECR) towards Mamallapuram. In North-to-South direction. However, the proposed plant is located in the South-Eastern part of Nemmeli village and on the shore of Bay-of-Bengal. Moreover, this plant will be constructed about 0.8 kilometres distance on the North of already existing Nemmeli 100 MLD plant. The plot is having a width of 400 m and a length of 850 m with a total area of approximately 34 ha. Its ground elevation is chart datum + 3.0 to 7.5 m. ECR is approximately CD +11.0 m AMSL.

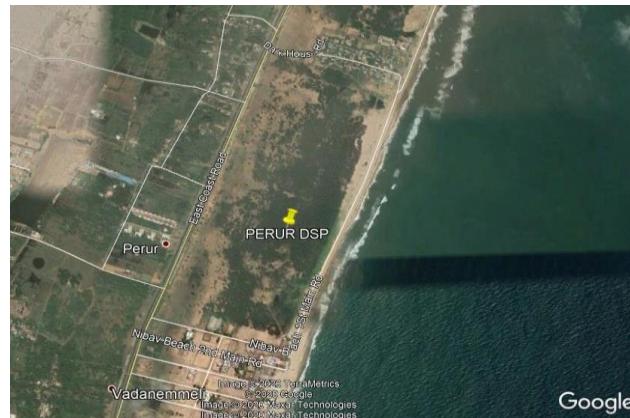


Figure 1: Proposed Site for 400 MLD Perur DSP, Water Storage Reservoir and Pumping Station

###### 3.1.2 Demographics

There are 166 houses in Nemmeli Kuppam, of which owners have occupied 142 houses, and rest are occupied by 24 tenants. All the 166 houses have patta land. After Tsunami devastation, 124 houses were constructed by the NGO 'World Vision' in the year 2005.

While Nemmeli village panchayat has 5.31% SC population and 3.2% ST population, Nemmeli Kuppam population belongs to Most Backward Category (MBC) and are fishermen community.

The total population of this habitation is 442 of which male and female are 230 (52%) and 212 (48%) respectively. However, proportional male and female population gap (4%) in Nemmeli Kuppam is higher as compared to village panchayat, district and the State proportional gap of 3.3%, 0.7% and 02% respectively.

The sex ratio (i.e., the number of females per thousand males) at Nemmeli Kuppam is 912 as compared to average ratio of Nemmeli village panchayat, Chengleput district and Tamilnadu as a whole; which stands at 936, 985 and 996 respectively. As per Census 2011, Nemmeli village panchayat has a literacy level of 72% (Male:78.32 & Female:65.26%)



Figure 2: Nemmeli Kuppam Settlement and Male & Female Ratio adjacent to Perur DSP

which is higher than the state average, but lower than the district average. However, regarding Nemmeli Kuppam it was learnt that almost all are literate, except a few older people above 80 years.

### 3.1.2.1 Ethnicity

All 142 families of this fishermen habitation practice Hindu religion (Hindu Meenavar Parvatharaja Kulam) and belong to Most Backward category defined by Government of Tamilnadu. Only a few tenants who have come from other areas belong to Most Backward and Backward communities. Impoverished (absolute deprivation) people and Project Affected Persons (PAPs) are not identified in the project site. As well as ethnic minorities and indigenous peoples are not identified in and around the project site.

*Figure 3: Hindu Religion Practice Place viz.; temple and cremation ground near Nemmeli Kuppam*



### 3.1.2.2 Economic Status

According to Census 2011, the total workforce of Nemmeli village panchayat counts 36.68% of the total population comprising of 94.08% main worker and 5.92% marginal worker, which is lower than the district and the State average of 41.42% and 45.58% respectively. Female participation in the workforce in Nemmeli village panchayat is minimum (almost at 40%) as compared to the district (58%) and state average (69.8%). Nearly 92% of the workforce in the village panchayat is under other workers group which comprises of fishermen, industrial worker, a worker in service industries, etc.

In Nemmeli Kuppam occupationally, in general, men are engaged in fishing and allied activities. Few men are working in the companies and offices during daytimes. Women are engaged in selling of fish in neighbouring areas and dry fish preparation. Educated youngsters are working in offices and companies located in ECR and OMR. Two of them are employed in the existing 100 MLD desalination plant located nearby. Few fishermen are doing fishing in the morning, and during the daytime, they are employed in the local companies. Nearly 30 members (women) from this habitation are employed under "The Mahatma Gandhi National Rural Employment Guarantee" program by Ministry of Rural Development, Government of India. They are getting employment for 100 days in a year on a wage rate of INR 256/day. On an average family earn INR 12000 to INR 15000 per month from fishing activity and around INR 10000 to INR 15000 as their wages from the companies.

### 3.1.2.3 Gender Perspective

The gender gap is defined "as the differences between women and men, especially in social, political, economic or intellectual, cultural attainments or attitude". A comparative analysis between the census 2001 and 2011 in the table below shows that there is a steady decline in the gender gap across the State, district and Nemmeli village panchayat in consideration to literacy which is a positive trend from a human capital development point of view. However, the increasing gap in workforce participation has more to do with macroeconomic perspective. Secondly, Nemmeli panchayat where women had participation in cultivation has declined due to an increase in non-agricultural activities when Chennai urbanisation spreads towards rural settlements. The details are given in Table-11 in Annexure

### 3.1.3 Impact

#### 3.1.3.1 Land Acquisition/Resettlement

In India, land acquisition and resettlement is regulated by "Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (Act 2013) governed by the Ministry of Rural Development (MORD) and Tamil Nadu Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules, 2017.

However, the Project do not require land acquisition and resettlement as the said DSP is planned to be constructed in a vacant leased land without presence of settlements and households. The site land is being leased to CMWSSB for 30 years from the landowner M/s Arulmigu Alavandar Nayakkar Trust, a religious and charitable group maintained by the Hindu Religion and Charitable Endowments (HR&CE) Department of the Government of Tamil Nadu (GOTN).

There are two burial grounds in the site, as was specified in the JICA preparatory report and understanding religious sentiments; the plant layout is being arranged in such a manner so that no facility would be constructed in the burial grounds. The presence of an open-well and two bore wells with a pump house connected with three phase line is being used for daily water supply through transmission pipeline to Perur and Perur colony habitations in the western side of the ECR. In case the construction and operation of the plant will require to interrupt the water supply to the said habitations; alternate arrangement should be placed for uninterrupted water supply prior to disconnecting existing water supply. Another well with a pump house is present inside the community hall compound and OHT at the backside of the community hall cater to the water needs of Nemmeli kuppam habitation.

### 3.1.3.2 Landscape/ Land use

During the construction of intake well for Chennai Perur 400 MLD DSP, there are possibilities of seawater flow towards Nemmeli Kuppam habitation from East-to-West direction, causing soil erosion. As a result, the fishermen boat parking area and the landing centre might get affected. Hence, probable construction activities for the protection of the landscape (Landing Centre) might be required.



Figure 4: Nemmeli Kuppam Landing Centre

### 3.1.3.3 Living and Livelihood

Access to potable water: There is the presence of one open-well, and two bore wells from where water is pumped through a three phase connected pump house to Perur colony and Perur in the Western side of ECR. In case the current water supply system to both the habitation is abandoned due to the boundary wall and upcoming plant; restoration of water supply systems to both habitations needs to be prioritised without disrupting access to potable water.

Community Toilet: One community toilet is present in the northern side of the plant site for the use of Nemmeli Kuppam habitation, which will be inaccessible once the boundary wall of the plant site is constructed. However, currently, this community toilet is not in use due to non-availability of water and is dilapidated; provisional budget for community usable toilet needs to be allocated, in case the requirement arises in due course.



Figure 5: Pumping Centre and Borewell at Perur DSP



Figure 6: Dilapidated Community toilet at Perur DSP site

Subsistence Grant for partial loss of livelihoods: There are possibilities of livelihoods disruption during construction period intake well. Hence, temporary livelihood support may be desired for the period their livelihood is affected considering 8 months per year as fishing period. However, in case any of the family member/s employed by the contractor part-time or full-time basis is expected to reduce vulnerability. However, there can be flexibility in adhering the condition according to the ground situation.

### 3.1.3.4 Water Right/Use of Water

As for as construction water concerned, necessary water of 0.5MLD for the DSP construction is planned to be procured from a nearby source as specified in the application form of CRZ clearance. In addition, the open well presence on the site from which two habitations are being supplied with potable water may be utilised for supply of potable water to labour camps and other parts in the site for human consumption; once the alternate arrangement is established for Perur and Perur colony habitations. However, during the operation phase, groundwater exploration is not perceived.

### **3.1.3.5 Heritage**

Local archaeological, historical, cultural, and religious heritages do not exist in the project site.

### **3.1.3.6 Social Capital and Social Organization such as decision-making bodies**

There are 4 Self Help Groups run by women of this habitation, and mainly they do microfinance through their loan amount. Any impacts on social capital and social organization are not perceived by the project.

### **3.1.3.7 Damage and Benefit**



Figure 7: Sea Shore situation after vertical dike of Nemmeli 100 MLD DSP

As specified earlier in the point 2.1.2.2 after visualising after effect of vertical protection dike in Nemmeli 100 MLD DSP, where the seawater is pushing further towards shore from East to West; there might be a possible effect on the landing centre in Nemmeli Kuppam during construction and operation period of Chennai Perur 400MLD DSP. Hence, civil works for the protection of the landing centre and adjacent area might be required.

### **3.1.3.8 Gender Issue**

Any impacts on gender are not expected by the project.

### **3.1.3.9 Rights of the Child**

Any impacts on the rights of the child are not expected by the project.

### **3.1.3.10 Risk of infectious diseases such as HIV/AIDS and COVID-19 pandemic**

Construction Phase: Temporary influxes of migrant labours increase the risks of STD such as HIV/AIDS during the construction period. Moreover, COVID-19 being pandemic will remain a threat during construction and operation phase. There is only one Public health sub-centre available for this Nemmeli village panchayat wherein a nurse is available for vaccination and immunization purpose. Also, Accidents associated with construction work is predicted.

Hence, health awareness and services measures will be of high priority.

### **3.1.3.11 Working Conditions/Work Safety**

While during the construction phase, occupational safety and working condition become major concern; regular supervision minimises such concerns.

### **3.1.3.12 Natural Disaster**

The Bay of Bengal and the coast of Tamilnadu is vulnerable to the impact of the cyclone and other natural disaster like Tsunami. Hence, to address to the immediate tragic; early warning and rapid response during and aftermath of such disaster in terms of health and food security can reduce the vulnerability.

## 4 CP 1 - Issues, Concerns, Risk Analysis and Strategic Framework

### 4.1 CP 1 - Issues, Concerns and Risk Analysis

Issues	Concerns	Risk Rating (Low/Medium/High)	Control Measures	Residual Risk
<b>CP1: Construction of Chennai Perur 400 MLD DSP</b>				
<b>Planning / Pre-construction Phase</b>				
Presence of Burial Ground/Cemetery at both the ends of the proposed DSP site layout	Hindrance to burial ground accessibility is expected and probable risk of objection by local communities during construction.	Medium	Both the burial grounds and cemetery should properly be excluded from the proposed DSP site layout and compounded with separate access.	NIL
Presence of Open/bore wells in the proposed DSP site	Possibility of water supply disruption to the Perur and Perur colony habitations. As a result, there is a probability of objection/lockdown by local communities during construction.	High	Should be excluded from the proposed allotted DSP layout and uninterrupted water supply is to be ensured	NIL
<b>Construction Phase</b>				
Construction of sea-dike near the intake wells that cause shore erosion and disruption to Nemmeli Kuppam Boat landing centre.	Impact to boat landing centre and temporary loss of livelihood for the families involved in fishing activities is anticipated. Hence, there are probabilities of unrest, damage claim and obstruction to construction activities by local communities.	Medium	The shore protection mechanism is to be planned. Compensation in the form of subsistence allowance has to be given to the project affected families for a certain period of time. Labour available in the vicinity of the plant site should be given priority according to their skill level.	Requirement of employment for a longer time might be anticipated by the workers recruited for the short term
Labour casualties, health and hygiene.	In the absence of primary health service facilities within closer proximity; Non-availability of emergency medical services is a major concern.	Medium	Set up and operate dispensary within the plant site during the construction period, with round the clock (24 hours) doctor availability and health support staff; essential first aid material, medicines and health kits according to the regulatory compliance; and ambulance (Multipurpose with advance life support system) on 24 hours availability.	Minimum
Tide of unemployment existing in Nemmeli panchayat	Financial and Moral support to the local residents could be assured to ensure better co-operation and harmony	Low	During the plant construction, local residents are to be given priority.	Demand on higher wages might arise; Unwarranted local politics may induce mob culture

Issues	Concerns	Risk Rating (Low/Medium/High)	Control Measures	Residual Risk
<b>Operation Phase</b>				
Threat to landing centre and other property due to discharged water.	Probabilities of unrest, damage claim and obstruction to operation by local communities.	Low	Shore protection related and other discharged water related issues to be addressed on a priority basis.	Demand for higher compensation for a longer time might arise
Prevailing un-employment among the local educated youth	Suitable employment could be assured to the educated youth belonging to the project area and neighbourhoods to increase the financial stability of their family	Medium	The skillset of the technically qualified youth (non-gender specific) can be developed by imparting project oriented education and training to ensure successful plant operation	Demand on higher wages and job promotion might arise.

## 4.2 CP 1 - Strategic Framework

Verifiable Indicator	Means of Verification	Frequency of Verification	Assumptions	Target groups	Implementation Responsibility	Monitoring Responsibility
<b>CP1: Construction of Chennai Perur 400 MLD DSP</b>						
<b>Output-1: Protection to Nemmeli Kuppam Shore/Landing Centre</b>						
Technical study for possible threat and protection mechanism.	Progress report and physical verification	Monthly	Construction of vertical protection dyke might create a negative impact on onshore/landing centre	Nemmeli Kuppam community	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB
Planning and execution of desired construction	Progress report and physical verification	Monthly			CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB
<b>Output-2: Protection to temporary loss of livelihoods</b>						
Identification of the project affected families.	Community consultation process and minutes of meetings.	Monthly	Possibilities of disruption of fishing activities during the construction of intake well.	Nemmeli Kuppam community	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB
Compensation in the form of subsistence allowance has to be provided to the project affected families	Progress report and related documents	Monthly	Fishermen practising fishing activities to be part of the identification process.	Nemmeli Kuppam community.	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB
Labour available in the vicinity of the plant site should be given priority according to their skill level.	Labour engagement records	Monthly	Family members found eligible for subsistence allowance will not be eligible for employment during construction activities.	Nemmeli Kuppam and peripheral communities	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB

Verifiable Indicator	Means of Verification	Frequency of Verification	Assumptions	Target groups	Implementation Responsibility	Monitoring Responsibility
<b>Output-3: Uninterrupted potable water supply to Perur and Perur colony habitations</b>						
Existing potable water supply system from open-well/Bore-well excluded from the proposed allotted DSP layout	Verification from final DSP layout and physical verification of boundary wall construction.	Monthly	No alternate potable water supply provision desired as the open-well/Bore-well location site is excluded from layout	Perur and Perur colony habitations	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB
<b>Output-4: Continued accessibility to burial/crematory grounds</b>						
The burial/crematory grounds excluded from the proposed allotted DSP layout	Verification from final DSP layout and physical verification of boundary wall construction.	Monthly	Habitations will be reluctant to leave current burial/crematory grounds	Nemmelii Kuppam, Perur, Perur colony and Sulerikattu Kuppam habitations	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB
<b>Output-5: Risk Reduction</b>						
Minimisation of after effects of cyclones and tsunami	Records on the number of living being transported to safer places	Daily basis post occurrence	Transport to short stay disaster shelter present on the western side of the DSP across ECR.	Nemmelii Kuppam habitats and labourers/worker at the plant site.	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB
	Number of persons and days relief (health and food) was Provided.	Daily basis post occurrence	Rapid temporary response just prior to government response.	Nemmelii Kuppam habitats and labourers/worker at the plant site.	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB
Minimisation of pandemic diseases such as COVID-19 through the implementation of guidelines appropriately.	Record verification and visit to the camps	Once/Month		Nemmelii Kuppam habitats and labourers/worker at the plant site.	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB
Minimisation of risk of infectious diseases such as HIV/AIDS through Implementation of Health and Sanitation awareness and education camps.		Twice/Year		Nemmelii Kuppam habitats and labourers/worker at the plant site.	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB
Appropriate working Conditions/ Work Safety	Visual inspection on the utilisation of PPE by workers/labours	Daily		Workers in the plant site.	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB
Minimised damage in the removal of temporary construction structures and demobilization of construction machinery	Site supervision and review information.	Daily		Workers in the plant site.	CMWSSB / Prospective Contractor	Project head /in-charge CMWSSB

## 5 Social Policy, Legal and Administrative Framework

### 5.1 JICA Environmental and Social Framework

JICA requires the consideration of social matters in all aspects of JICA operations and the requirements for social considerations as described in JICA guidelines (April 2010). Also, adherence to International Performance Standards has been suggested. JICA guidelines endeavours to achieve transparency, predictability, and accountability in support for and examination of social considerations.

### 5.2 Screening and Categorisation

The requirement of the JICA Guidelines is dependent on “project categorization” of the Project, which is stipulated in the JICA Guidelines, as shown in Table 5. Currently, the Chennai Seawater Desalination Project (the Project) has been classified as “Category B” by JICA. However, if the project is likely to have any significant adverse impacts on the environment and society in the Study, the Project may be recategorized as “Category A”.

**Table 2: Project Category in the JICA Guidelines**

Category	Description
A	Proposed projects are classified as “Category A” if they are likely to have significant adverse impacts on the environment and society. Projects with complicated or unprecedented impacts that are difficult to assess, or projects with a wide range of impacts or irreversible impacts, are also classified as “Category A”. These impacts may affect an area broader than the sites or facilities subject to physical construction. “Category A”, in principle, includes projects in sensitive sectors, projects that have characteristics that are liable to cause adverse environmental impacts, and projects located in or near sensitive areas.
B	Proposed projects are classified as “Category B” if their potential adverse impacts on the environment and society are less adverse than those of “Category A” projects. Generally, they are site-specific; few if any are irreversible; and in most cases, normal mitigation measures can be designed more readily.
C	Proposed projects are classified as “Category C” if they are likely to have a minimal or little adverse impact on the environment and society.

Based on the Initial Environmental Examination carried out by JICA, the proposed Chennai Perur 400 MLD desalination project is categorised under “B”. Since the project is not located in a sensitive area, nor has sensitive characteristics, nor falls into sensitive sectors under the JICA guidelines for environmental and social considerations (April 2010), and its potential adverse impacts on the environment are not likely to be significant. Details of categorisation are available in JICA website:

[https://www.jica.go.jp/english/our\\_work/social\\_environmental/id/asia/south/india/c8h0vm0000ahdaf4.html](https://www.jica.go.jp/english/our_work/social_environmental/id/asia/south/india/c8h0vm0000ahdaf4.html)

### 5.3 Regulations, Laws and Permitting

There are various acts, rules, policies and regulations currently in force in India that deal with social issues that could apply to infrastructure development. Some of the specific regulatory compliance requirements of the subproject are presented below.

#### 5.3.1 Tamil Nadu Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules, 2017

The Act provides for transparent and acceptable fair and enhanced compensation and assistance measures. It stipulates a more consultative and participatory approach in dealing with the Project Affected Persons. It emphasizes the rehabilitation and resettlement of the PAPs before the implementation of the actual project.

#### 5.3.2 The National Resettlement and Rehabilitation Policy (Ministry of Rural Development, Department of Land Resources), 2007

The NRRP 2007 was adopted by the Government of India on 31st October 2007 to address development-induced resettlement issues. The NRRP stipulates the minimum facilities to be ensured for persons displaced due to the acquisition of land for public purposes and to provide for the basic minimum requirements. All projects leading to the involuntary displacement of people must address the rehabilitation and resettlement issues comprehensively. The State

Governments, Public Sector Undertakings or agencies, and other requiring bodies shall be at liberty to put in place greater benefit levels than those prescribed in the NRRP.

The objectives of the Policy are:

- ⦿ to minimize displacement and to promote, as far as possible, non-displacing or least displacing alternatives;
- ⦿ to ensure adequate rehabilitation package and expeditious implementation of the rehabilitation process with the active participation of the affected families;
- ⦿ to ensure that special care is taken for protecting the rights of the weaker sections of society, especially members of the Scheduled Castes and Scheduled Tribes, and to create obligations on the State for their treatment with concern and sensitivity;
- ⦿ to provide a better standard of living, making concerted efforts for providing sustainable income to the affected families;
- ⦿ to integrate rehabilitation concerns into the development planning and implementation process; and
- ⦿ where displacement is on account of land acquisition, to facilitate the harmonious relationship between the requiring body and affected families through cooperation.

The NRRP is applicable for projects where over 400 families in the plains or 200 families in hilly or tribal or Desert Development Program (DDP) areas are displaced. However, the basic principles can be applied to resettling and rehabilitating regardless of the number affected. NRRP's provisions are intended to mitigate adverse impacts on Project Affected Families (PAFs). The non-title holders, under NRRP, are recognized as the people living in the affected area not less than three years at the time of declaration of the area as affected area. The NRRP addresses vulnerable families with adequate entitlements and provides special provisions for Scheduled Castes (SC) and Scheduled Tribes (ST) Families. The NRRP takes into account all the transparency as far as consultation, dissemination of information, disclosure and grievance is concerned. However, the law relating to the acquisition of privately owned immovable property is the Land Acquisition Act of 1894.

#### **5.3.3 The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014**

This act specifically aims to protect the rights of urban street vendors and to regulate street vending activities. It provides for Survey of street vendors and protection from eviction or relocation; issuance of a certificate for vending; provides for rights and obligations of street vendors; development of street vending plans; organizing of capacity building programmes to enable the street vendors to exercise the rights contemplated under this Act; undertake research, education and training programmes to advance knowledge and understanding of the role of the informal sector in the economy, in general, and the street vendors, in particular, and to raise awareness.

#### **5.3.4 The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights)Act, 2006.**

An Act to recognise and vest the forest rights and occupation in forest land in forest-dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in such forests for generations but whose rights could not be recorded; to provide for a framework for documenting the rights of the forest so vested and the nature of evidence required for such recognition and vesting in respect of forest land.

#### **5.3.5 Right to Information (RTI) Act, 2005**

The basic object of the Right to Information Act is to empower the citizens, promote transparency and accountability in the working of the Government, contain corruption, and make our democracy work for the people in real sense. It says that an informed citizen is better equipped to keep necessary vigil on the instruments of governance and make the government more accountable to the citizens.

#### **5.3.6 National Fisheries Policy (Draft) 2020**

The policy aims at comprehensive development of the fisheries sector through appropriate interventions to address the critical gaps with an overarching goal for growths in exports, an increase in farmer's income and better choice for consumers. It aims for robust management and regulatory framework with necessary legal backing for effective fisheries resource management through an Ecosystem Approach of Fisheries (EAF) management within the overall framework of relevant national and international instruments, policies and standards. To generate gainful employment and entrepreneurship opportunities along the value chain leading to the higher income of fishers and fish farmers, improve their living standards and usher in economic prosperity.

### 5.3.7 Tamil Nadu Marine Fishing Regulation Act 1983 (Amended in 2016)

An act to provide for the regulation, restriction and prohibition of fishing by fishing vessels in the sea along the whole or part of the coastline of the State

### 5.3.8 The operational policy of the World Bank on Social Safeguard

- ➲ **Indigenous People:** This policy applies for both positive and negative impacts on tribal population wherever the project activities are undertaken. Accordingly, the policy creates scope to study whether the project will have an impact on any individual or cluster of tribal people during any phase of the project.
- ➲ **Involuntary Resettlement:** Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs. Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs. Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.
- ➲ **Policy on Access to Information and Disclosure:** World Bank safeguards policy requires consultation with PAPs during planning and implementation of resettlement action plan and tribal development plan and public disclosure of drafts. Once the draft is prepared, it is to be made available at a place accessible to, and in a form, manner and language understandable to the displaced or affected people and local NGOs. RTFCTLARR, 2017 also requires disclosure of draft SIA and RAP and other project reports followed by mandatory Public Hearing. Consultations with PAPs or interested people, people in the vicinity of the project area is to be done and public disclosure on the project details, positive/negative social impacts and to get their feedback is to be carried out at appropriate intervals of the project period.

### 5.3.9 ADB's Safeguard Policy

Safeguard policy statement (SPS) are generally operational policies that seek to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process. ADB's safeguard policy framework consists of three operational policies on the Environment, Indigenous Peoples, and involuntary resettlement and brings them into a consolidated policy framework that enhances effectiveness and relevance. Accordingly,

- (i) impacts are to be identified and assessed early in the project cycle;
- (ii) plans to avoid, minimize, mitigate, or compensate for the potential adverse impacts are developed and implemented; and
- (iii) affected people are informed and consulted during project preparation and implementation.

### 5.3.10 Salient Features of Key Applicable Labour Laws

- 1) **Payment of Wages Act, 1936:** It lays down as to by what date the wages are to be paid when it will be paid and what deductions can be made from the wages of the workers.
- 2) **Minimum Wages Act, 1948:** The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is scheduled employment. Construction of buildings, roads, runways etc. are scheduled employments.
- 3) **The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996:** All the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay less at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.
- 4) **Inter-State Migrant Workmen's (Regulation of Employment & Conditions of Service) Act, 1979:** The Act applies to an establishment which employs 5 or more inter-state migrant workers through an intermediary (who has recruited workers in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home up to the establishment and back, etc.

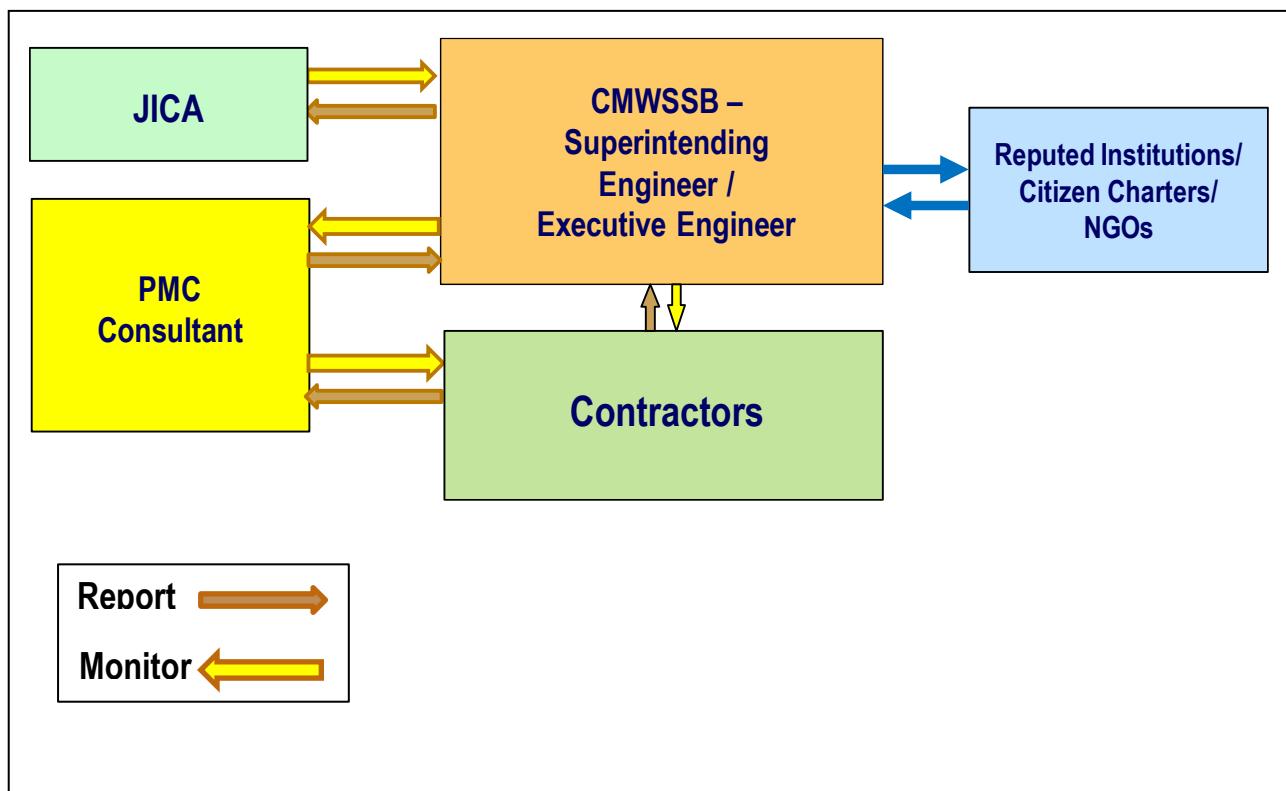
- 5) **Employees P.F. and Miscellaneous Provision Act, 1952:** The Act provides for monthly contribution by the employer plus workers @ 10% or 8.33%. The benefits payable under the Act are:
- (i) Pension or family pension on retirement or death, as the case may be.
  - (ii) Deposit linked insurance on the death in the harness of the worker.
  - (iii) Payment of P.F. accumulation on retirement/death etc.
- 6) **Employees Compensation Act, 1923:** The Act provides for compensation in case of injury, disease or death arising out of and during employment by certain employers to their employees for injury caused to them by accident. It enables an employee, and in case of death of an employee, his dependents, to get, at the cost of his employer compensation for employment injury if an employee contracts an occupational disease while in employment, it is also treated under the Act as injury caused by accident.
- 7) **The Personal Injuries (Compensation Insurance) Act, 1963:** This Act provides for the employer's liability and responsibility to pay compensation to employees where workers sustain personal injuries in the course of employment. The employer has to give the workers the insurance against the liability. The Act describes the term which is of major importance under the Act is called as partial disablement and total disablement.
- 8) **Employer's Liability Act, 1938:** This Act protects workers who bring suits for damages against employers in case of injuries endured in the course of employment. Such injuries could be on account of negligence on the part of the employer or persons employed by them in the maintenance of all machinery, equipment etc. in healthy and sound condition.
- 9) **Employee's State Insurance Act, 1948:** The Act provides for certain benefits to insured employees and their families in case of sickness, maternity and disablement arising out of an employment injury. The Act applies to all employees in factories (as defined) or establishments which may be so notified by the appropriate Government. The Act provides for the setting up of an Employees' State Insurance Fund, which is to be administered by the Employees State Insurance Corporation. Contributions to the Fund are paid by the employer and the employee at rates as prescribed by the Central Government. The Act also provides for benefits to dependents of insured persons in case of death as a result of an employment injury.
- 10) **Payment of Bonus Act, 1965:** The Act applies to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of the wages drawn in the relevant year. It applies to skilled or unskilled manual, supervisory, managerial, administrative, technical or clerical work for hire or reward to employees who draw a salary of Rs. 10,000/- per month or less. To be eligible for the bonus, the employee should have worked in the establishment for not less than 30 working days in the relevant year. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for applicability of this Act.
- 11) **Payment of Gratuity Act, 1972:** Gratuity is payable to an employee under the Act on the satisfaction of certain conditions - on separation if an employee has completed 5 years of service or more or on death, the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- 12) **Labour (Regulation and Abolition) Act, 1970:** The Act provides for certain welfare measures to be provided by the contractor to contract labour, and in case the Contractor fails to provide, the same is required to be provided, by the Principal Employer by Law. The Principal Employer is required to take Certificate of Registration, and the Contractor is required to take a license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ 20 or more contract labour.
- 13) **Equal Remuneration Act, 1979:** The Act provides that no employer shall pay to any worker employed by him in an establishment or employment, remuneration whether payable in cash or in-kind at the rates less favourable than those at which compensation is paid by him to the workers of the opposite sex in such establishment or employment. The Act further provides that no discrimination should be made against women at the time of recruitment. The Act also provides for not making discrimination against female employees in the matters of transfers, training and promotions etc.
- 14) **Maternity Benefit Act, 1951:** An Act to regulate the employment of women in certain establishments for certain periods before and after child-birth and to provide for maternity benefit and certain other benefits. It provides for maternity benefits, including leave, wages, bonus, nursing breaks etc.

- 15) **Sexual Harassment of Women at the Workplace (Prevention, Prohibition and Redressal) Act, 2013:** This Act defines sexual harassment in the workplace, provides for an enquiry procedure in case of complaints and mandates the setting up of an Internal Complaints Committee or a Local Complaints Committee.
- 16) **Child Labour (Prohibition and Regulation) Act, 1986:** The Act prohibits employment of children below 18 years of age in certain occupations and processes and provides for the regulation of employment of children in all other occupations and processes. Employment of child labour is prohibited in the Building and Construction Industry.
- 17) **Bonded Labour System (Abolition) Act, 1976:** The Act provides for the abolition of bonded labour system with a view to preventing the economic and physical exploitation of weaker sections of society. Bonded labour covers all forms of forced labour, including that arising out of a loan, debt or advance.

## 5.4 Institutional Arrangements

Under overall direction, guidance and coordination of the CMWSSB Project Implementation Unit (PIU), the prospective contractor will implement Chennai Perur 400 MLS Desalination Plant. The Project Management Consultant (PMC) appointed by PIU comprises of the subject, and sector-specific specialists to provide onsite expert guidance as well as supervise the progress and attainment of drafted specified guidelines by the contractor in compliance to the regulatory mandates. Social Communication Specialists will be interacting regular basis with the prospective contractors/contractor representative with regard to social safeguard compliance and facilitating during a public consultation; in particular to house pipe connection and water metering under CP-4.

*Table 3: Institutional Mechanism for Social Management Plan & Monitoring*



## 6 Annexure: Demographic Data from Census 2011

*Table 4: Administrative Profile of the Project Area – Revenue Administration & Monitoring*

District	Revenue Taluk	Revenue Village	Habitations
Chengleput	Thiruporur	Nemmeli	Pudukalpakkam, Nemmeli, Nemmeli kuppam, Kannima Nagar, Perur, Perur colony, Sulerikadu, Sulerikadu colony, Sulerikaattu kuppam and Krishnankaranai

*Table 5: Distribution of Population (2011) in Project Influence Districts*

Project affected State / Districts	Population		
	Male	Female	Total
Tamil Nadu	36137975	36009055	72147030
Chengleput District	1431166	1410406	2841572
Nemmeli	1974	1848	3822
Nemmeli kuppam (Project Influenced Area)	227	207	434

*Source: Census of India, 2011*

*Table 6: Sex Ratio in Project Influence Area*

State/District/Village	2011	
	Sex Ratio	Child Sex Ratio
Tamilnadu	996.43	943.27
Chengleput	985.49	958.59
Nemmeli	936.17	904.00
Nemmeli kuppam (Project Influenced Area)	911.89	

*Source: Census of India, 2011*

*Table 7: SC/ST population details of the Project influence area*

State/District/Village	SC population in %	ST population in %
Tamil Nadu	20.01	1.10
Chengleput	22.92	1.02
Nemmeli	5.31	3.24
Nemmeli kuppam (Project Influenced Area)	0	0

*Source: Census of India, 2011*

*Table 8: Status of literacy*

State/District/Village	Literacy rate in Percentage			Illiteracy rate in Percentage		
	Males	Females	Total	Males	Females	Total
Tamilnadu	77.59	66.09	71.85	22.41	23.91	28.15
Chengleput	80.92	72.35	76.67	19.08	27.65	23.33
Nemmeli	78.32	65.26	72.00	21.68	34.74	28.00

*Source: Census of India, 2011*

**Table 9: Number and percentage of Workers in the state, district and Project Affected Area**

<b>State</b>	<b>Population</b>	<b>Total Population</b>	<b>Total Workers</b>	<b>Main Workers</b>	<b>Marginal Workers</b>	<b>Non-Workers</b>
Tamilnadu	Males	36137975	21434978	18961194	2473784	14702997
			59.31	88.46%	11.54%	40.69%
	Females	36009055	11449703	8980987	2468716	24559352
			31.80%	78.44%	21.56%	68.20%
	Total Persons	72147030	32884681	27942181	4942500	39262349
			45.58%	84.97%	15.03%	54.42%
Chengleput	Males	1431166	837770	721215	116555	593396
			58.54%	86.09%	13.91%	41.46%
	Females	1410406	339083	240841	98242	1071323
			24.04%	71.03%	28.97%	75.96%
	Total Persons	2841572	1176853	962056	214797	1664719
			41.42%	81.75%	18.25%	58.58%
Nemmeli	Males	1974	1137	1115	22	837
			57.60%	98.07%	1.93%	42.40%
	Females	1848	265	204	61	1583
			14.34%	76.98%	23.02%	85.66%
	Total Persons	3822	1402	1319	83	2420
			36.68%	94.08%	5.92%	63.32%

Source: Census of India, 2011

**Table 10: Distribution of Work Force in the state, Chennai district and PIA**

<b>State/District/ Village</b>	<b>Population</b>	<b>Total Main Workers</b>	<b>Cultivators</b>	<b>Agricultural labourers</b>	<b>Household Industry Workers</b>	<b>Other Workers</b>
Tamil Nadu	Males	18961194	2512165	3808523	514637	12125869
			13.25%	20.09%	2.71%	63.95%
	Females	8980987	1343210	3425578	604821	3607378
			14.96%	38.14%	6.73%	40.17%
	Total Persons	27942181	3855375	7234101	1119458	15733247
			13.80%	25.89%	4.01%	56.31%
Chengleput	Males	721215	32840	56467	10792	621116
			4.55%	7.83%	1.50%	86.12%
	Females	240841	11873	39961	7122	181885
			4.93%	16.59%	2.96%	75.52%
	Total Persons	962056	44713	96428	17914	803001
			4.65%	10.02%	1.86%	83.47%
Nemmeli	Males	1115	52	25	14	1024
			4.66%	2.24%	1.26%	91.84%
	Females	204	6	3	8	187
			2.94%	1.47%	3.92%	91.67%
	Total Persons	1319	58	28	22	1211
			4.40%	2.12%	1.67%	91.81%

Source: Census of India, 2011

**Table 11: Gender Gap in Project Influence Area**

State/District/Village	Gender Gap			
	In Literacy		In Workforce Participation	
	2001	2011	2001	2011
Tamilnadu	15.50	11.50	26.11	27.51
Chengleput	14.05	8.57	27.23	34.50
Nemmeli	20.57	13.06	26.38	43.25

The CHENNAI 400 MLD DESALINATION PLANT is a Project being delivered by the Chennai Metropolitan Water Supply & Sewerage Board (CMWSSB) with the assistance of an Official Development Assistance (ODA) loan from the Japan International Cooperation Agency (JICA).

The Project Management Consultant (PMC) for the Chennai 400 MLD Desalination Plant project is a consortium led by SMEC International Pty Ltd in Consortium with TATA Consulting Engineers Limited (TCE), NJS Engineers India Pvt Ltd (NJSEI) and SMEC India Pvt Ltd.

