Environmental and Social Management Framework (ESMF)

(Approved by the Government of Tamil Nadu vide G.O. (Ms) No.44, Municipal Administration and Water Supply Department, Dated 05.03.2015)

VOLUME- II

GUIDANCE MANUAL

MARCH 2015

Tamil Nadu Urban Infrastructure Financial Services Limited

TNUIFSL

Contents

Document-1

ENVIRONMENTAL SCREENING FORM

(to be prepared by the Borrowers for each project)

Name of the Borrower:

Project location :

Project :

Project Components				
Sl.no	**Components**	**Details**		
1	Brief description of the project proposal			
2	Number of project sites and Project components			
3	Details of Alignment and Component			
4	Location of the Project Sites & Current Use (Provide information for all sites involved in the project)			
	Biological Environment			
Sl.no	**Components**	**Yes**	**No**	**Details**
5	Is the project adjacent to any of the following (Provide information for all sites and alignment of the project)			
(i).	Cultural Heritage site			
(ii).	Protected Area			
(iii).	Wet Land/ Mangrove/ Estuarine Region			
(iv).	Natural Forests			
(v).	Other Sensitive Environmental Components as listed in ESMF			
(vi).	Residences, schools, hospitals etc			
(vii).	Drinking water source, upstream and			

	downstream uses of rivers etc			
(viii).	Lowlying areas prone to flooding / areas of Tidal Influence (CRZ)			
6.	Does the proposed project could cause the following			
(i).	Impact on Surrounding Environmental Conditions			
(ii).	Degradation of land / eco-systems			
(iii).	Loss or impacts on Cultural / heritage properties			
(iv).	Water Resource Problems			
(v).	Pollution of Water bodies / ground water			
(vi).	Cutting of Trees / Loss of Vegetation			
(vii).	Health & Safety Risks in the neighbourhood			
(viii).	Potential risk of habitat fragmentation due to the clearing activities? (eg. Hindrance to the local bio diversity like disturbing the migratory path of animals/ birds etc.)			
	Physical Environment			
	Components	**Yes**	**No**	**Details**
7	Will the project affects the River flow pattern, stream pattern or any other irrigation canal?			
8	Water quantity? Estimated usage of water quantity for the project			
9	Estimated energy consumption for the project activities			
10	Any other resources proposed to be utilized for project activity? (eg.,			

	ground water)			
	Geology / Soils			
	Components	**Yes**	**No**	**Details**
11	Does the project activity involve cutting and filling/ blasting etc…?			
12	Will the project cause physical changes in the project area (e.g., changes to the topography) due to excavation, earthwork etc…?			
13	Will the project involve any quarrying/ mining etc?			
	Pollution			
	Components	**Yes**	**No**	**Details**
14	Will the project use or store dangerous substances (e.g., large quantities of hazardous chemicals/ materials like Chlorine, Diesel, Petroleum products etc…)?			
15	Will the project produce solid or liquid wastes?			
16	Will the project cause air pollution or increase in emission of pollutants?			
17	Will the project generate or increase noise?			
18	Will the project generate water pollution (water bodies/ groundwater)?			
19	Will the project cause construction Hazard to workers/ residents			
20	Is there a potential for release of toxic gases or accident risks			

	Environmental Enhancement Measures			
	Components	**Yes**	**No**	**Details**
21	Has the Project design considered the following?			
(i).	Is the project design considering energy conservation measures/ energy recovery options?			
(ii).	Is the project considering waste minimisation or waste reuse/recycle options?			
(iii).	Has the project design considered RWH or any other environmental enhancement measure?			
(iv).	Has the project design considered extreme events, drought, flood, natural disasters?			
	General			
22	Please indicate whether any other features of the project that could influence ambient environment			
23	Has any consultation with the public or stakeholders been conducted?			

Date: _____ _____

Signature and name of the Borrower

Enclosures: (Provide maps with the geographical location of the project; and an appropriately-scaled map clearly showing the project area and project sites with land use, existing buildings, infrastructure, vegetation, adjacent land use, utility lines, access roads and any planned construction, as required).

Document-2

SOCIAL SCREENING FORM

(to be prepared by the Borrowers for each project)

Name of the Borrower:

Project location :

Project :

Land Use, Resettlement, and/or Land Acquisition				
Sl.no	**Components**	**Yes**	**No**	**Details**
1	Does the project involve acquisition of private land?			
2	Alienation of any type of Government land including that owned by Urban Local Body?			
3	Clearance of encroachment from Government/ Urban Local body Land?			
4	Clearance of squatters/hawkers from Government/ Urban Local Body Land?			
5	Number of structures, both authorized and/or unauthorized to be acquired/ cleared/			
6	Number of household to be displaced?			
7	Details of village common properties to be alienated Pasture Land (acres) Cremation/ burial ground and others specify?			
8	Describe existing land uses on and around the project area (e.g., community facilities, agriculture, tourism, private property)?			

9	Will the project result in construction workers or other people moving into or having access to the area (for a long time period and in large numbers compared to permanent residents)?			
10	Are financial compensation measures expected to be needed?			
Loss of Crops, Fruit Trees, Household Infrastructure and livelihood				
Sl.no	**Components**	**Yes**	**No**	**Details**
11	Will the project result in the permanent or temporary loss of the following?			
11.1	Crops?			
11.2	Fruit trees / coconut palms? Specify with numbers			
11.3	Petty Shops/ Kiosks			
11.4	Vegetable/Fish/Meat vending			
11.5	Cycle repair shop			
11.6	Garage			
11.7	Tea stalls			
11.8	Grazing			
11.9	Loss of access to forest produce (NTFP)			
11.10	Any others - specify			
Welfare, Employment, and Gender				
Sl.no	**Components**	**Yes**	**No**	**Details**
12	Is the project likely to provide local employment opportunities, including employment opportunities for women?			

13	Is the project being planned with sufficient attention to local poverty alleviation objectives?			
14	Is the project being designed with sufficient local participation (including the participation of women) in the planning, design, and implementation process?			
Historical, Archaeological, or Cultural Heritage Sites				
Sl.no	**Components**	**Yes**	**No**	**Details**
Based on available sources, consultation with local authorities, local knowledge and/or observations, could the project alter:				
15	Historical heritage site(s) or require excavation near the same?			
16	Archaeological heritage site(s) or require excavation near the same?			
17	Cultural heritage site(s) or require excavation near the same?			
18	Graves, or sacred locations or require excavations near the same?			
	Tribal Population/Indigenous People			
19	Does this project involves acquisition of any land belonging to Scheduled Tribes?			
	Beneficiaries			
20	Population proposed to be benefitted by the proposed project			
21	No. of Females proposed to be benefitted by the proposed project			
22	Vulnerable households /population to be benefitted			
23	No. of BPL Families to be benefitted			

Date: _____

Signature and name of the Borrower

Enclosures: Land details for the project sites, location, survey numbers, extent available and required, land use classification, current use of the site, land ownership, alienation/acquisition

status, FMB extracts, as required along with a certificate giving availability of sites required for the project by the borrower.

Document- 3

TERMS OF REFERENCE TO PREPARE ENVIRONMENTAL ASSESSMENT REPORT FOR E I PROJECTS

1.0 Brief Introduction

A brief introduction to the project shall be provided in this section
.A brief description of the project area / city and salient features of the city shall be presented in this section, such as geographic location, climate, rainfall, soil profile, wind direction, existing drainage system, need for the proposed project etc.

2.0 The Project Objectives and Need

A brief profile of the status of existing infrastructure in the project city with respect to the proposed project, service levels, problems & issues and salient features of the proposed project shall be discussed in this section along with the environmental implications of the proposed project by covering the following objectives.

- Establish the environmental baseline in the study area
- identify and assess the adverse environmental impacts; and provide requisite measures to address these impacts
- identify the opportunities for environmental enhancements in the project area and provide requisite guidance/plans in this regard
- Identify and assess the climate change related aspects of the project
- Wherever relevant integrate the measures (mitigation and enhancement related) in the project planning and design;
- Develop appropriate management plans and codes of practices for implementing, monitoring and reporting of the environmental mitigation and enhancement measures suggested.

The EA shall be carried out in line with the Government of India (GoI)'s regulations (EIA Notification), and to suit ESMF.

The EA shall comprise filling the screening format, Environmental screening, Project EA, and the Environmental Management Plans (EMPs) & Mitigation measures. The EA shall be carried out in a consultative manner through "Stakeholder Consultations", at various stages, with the affected communities, NGOs, selected government agencies and other stakeholders.

3.0 Scope of Work

The following are the tasks to be performed by the consultants while conducting Environmental Assessment for the project including nature, scale and magnitude of impacts that the project is likely to cause on environment.

Task 1 Description of Project

A succinct description of the proposed project shall be provided covering: (a) status analysis of the existing infrastructure (b) description of each of the proposed components, activities and sub-activities. The task shall also bring out the rational, the need for the proposed

project and list out the various benefits of project implementation. As part of this activity, the consultant shall provide necessary maps to scale

Task 2 Review of Earlier Studies

The consultants shall review various earlier studies such as feasibility and detailed project reports, etc., of the project and understand the project and various aspects associated with the same. This shall provide a base to formulate the environmental surveys necessary for the project and assessing impacts of the same.

Task 3 Legislative and Regulatory Considerations

A review of the legal and regulatory provisions applicable for the project shall be carried out in this task and provide relevance of the law or regulations to the sub-project. The objective of the review is to bring out the legal and policy issues to be addressed in the project at various stages of project development such as planning, design, execution and operation. In addition to the environmental laws such as EP Act, Water Act, Air Act, EIA notifications etc., the consultants shall review applicable operational policies / directives of the EFA.

The review shall thus provide a complete list of regulatory formalities required for the project and various clearances required from different regulatory agencies including State Pollution Control Board.

Task 4 Preparation of Environmental Profile

An environmental profile of the project influence area shall be prepared, based on appropriate primary & secondary surveys and field investigations. The objective of this profile is to establish existing environmental conditions of the project area, in terms of air, water, noise, soil and other environmental parameters, which should form the basis for prediction of impacts due to proposed project activities. As part of this, the environmentally sensitive land uses (protected natural areas, areas of ecological value, sensitive receptors like schools, hospitals etc) would also be identified and plotted on a map to scale.

The extent and duration (atleast one season for rapid assessment and the three seasons for full detailed assessment) of surveys shall be judiciously decided by the consultant as per requirements of the environmental regulations applicable in India and guidelines of international funding agencies. The profile prepared shall be adequate enough to predict impacts of the project and shall cater to the requirements of obtaining necessary environmental clearances from the authorities.

The profile shall essentially include all physical, ecological and socio-economic components of the project environment and bring out the salient and sensitive features of the same. Important aspects such as reserve forests, national parks, major water bodies, structures of archaeological / historic importance, and other environmental resources (if any) shall be identified and salient features of the same shall be presented.

In addition to the basic environmental profile, quality of water supplied by the present water supply system, potential points of cross contamination and health profile of the project area population shall also be brought out in detail through appropriate sampling surveys and field investigations.

Detailed activities to be carried out under environmental assessment is given under section 4.0.

Task 5 Determination of Potential Impacts

Based on the environmental profile of the project area prepared above and the proposed project activities discussed under Activity 1, the consultants shall carry out environmental screening to determine the nature of impacts and level of Environmental Assessment to be carried out (Section 5.0 provide the details to be carried out).

- In case of low or insignificant level of impacts, where an EMP will suffice, the consultant shall review the recent versions of generic EMPs available with TNUIFSL and carry out necessary changes to suit the project requirements.

- As part of screening, if medium to high impacts, requiring a detailed EA and stand alone EMP, the consultant shall carry out detailed impact analysis. The consultant shall predict environmental impacts of the project components, activities and sub-activities on various environmental attributes (bio, geo and physical) through appropriate analytical tools and techniques such as modelling techniques, over lays, etc. Significant or insignificant, permanent or temporary, reversible or irreversible, negative or positive impacts shall be categorised separately and presented for each phase of project development.

- Based on the outcome of the screening, if subsequent relevance to climate change is envisaged in the project implementation or during operation, then the consultants shall collect relevant information and appraise the climate change impact. The consultants shall identify adaptation needs of the project, review for greenhouse gas reduction potential and identify necessary measures for implementation.

All identified impacts shall be summarised in an easily understandable format and the magnitude and significance of each impact shall be explained in detail.

An analysis of various project alternatives, including the 'Project' and 'No Project' scenario shall be brought out and impacts shall be analysed for each scenario. Based on the above analysis the best alternative that causes minimum or no impact shall be recommended for implementation.

Task 6 Stakeholder Consultations

The consultants shall carry out consultations with Experts, NGOs, Forest Department (if applicable) and other selected Government Agencies and other stakeholders to (a) collect baseline information, (b) obtain a better understanding of the potential impacts (c) appreciate the perspectives/concerns of the stakeholders, and (d) secure their active involvement during subsequent stages of the project as appropriate. For E1 projects atleast two consultations shall be conducted, one after screening and the second with the draft final EA / EMP.

Consultations shall be preceded by a systematic stakeholder analysis, which would (a)

identify the individual or stakeholder groups relevant to the project and to environmental issues, (b) include expert opinion and inputs, (c) determine the nature and scope of consultation with each type of stakeholders, and (d) determine the tools to be used in contacting and consulting each type of stakeholders. A systematic consultation plan with attendant schedules will be prepared for subsequent stages of project preparation as well as implementation and operation, as required. Where community consensus is required in respect of proposed mitigation measures for impacts on community assets including water bodies, places of worships etc., specific plan for modification/relocation etc have to be disclosed and consensus obtained.

Task 7 Development of an Environmental Management Plan / Determination of Mitigation measures

The consultants using outputs of the above tasks shall develop an implementable Environmental Management Plan (EMP) for the project. Development of an Environmental Management Plan is detailed under Section 5.0 below

4.0 Environmental Screening and EA activities to be carried out in detailed

1.1.1.1 4.1 Environment Screening

1. Environmental screening shall be undertaken to identify the environmental hot spots along the project corridors, project relevance to climate change and determine the level of environmental analysis required for the EA. The consultant shall carry out a preliminary analysis to assess the nature, scale and magnitude of the impacts that the project is likely to cause on environment. In case of significant environmental impacts encountered (may be applicable to the entire project/specific project interventions/specific locations), The consultants shall explore possible alternatives to the project and/or project components in a consultative manner. The deliverable at this stage will be **Environmental Screening Report.**
2. The screening exercise shall be supported through secondary and primary information collection and, stakeholder consultations on existing environment scenario. As part of the screening exercise the consultants shall:

   (a) Identify sensitive locations in the project area including regionally or nationally recognized environmental resources and sensitive manmade land uses like hospitals, schools, etc

   (b) Establish baseline environmental quality with regard to air, water and noise at sensitive receptors.

   (c) List and map common property resources such as roadside trees; forests, large water bodies; and major physical cultural properties, etc.

   (d) Identify Human settlement, physical infrastructure and project activities that would result in severance.
3. The consultants shall also appraise the project in terms of substantial greenhouse gas reduction potential and substantial need of adaptation to possible climate change.

4.2 Project EA

1. Existing Environment and Baseline Conditions: Baseline assessment shall be carried out based on the outcome of Environmental Screening carried out for the project. The

baseline conditions shall be established through detailed primary level field surveys. At this stage the consultants shall prepare detailed maps showing candidate sites for environmental improvements. The specific tasks under this include the following:

2. Data Collection: Data shall be collected on relevant physical, biological and socio-economic conditions to establish the current environmental status of the project area. The data collection should be undertaken to arrive at meaningful information that will facilitate assessment of impacts and preparing management plan. Broadly, the following form of the data categories shall be covered (the consultant is also encouraged to use professional judgement and local knowledge in defining other data requirements):

   The current land uses at the proposed project site and the study area using maps plotted to appropriate scale, covering lakes/ponds and their uses, forests and its classification, ecologically sensitive areas (sanctuaries, national parks, wildlife corridors, identified areas of nesting, mangroves and / or of interest of migratory birds, etc.), prominent land marks, sensitive receptors, community severance, village settlements, agricultural lands, pasture and barren lands, various categories of CRZ areas if any, etc.

   Physical - Geology, topography, soils, climate and meteorology (with emphasis on critical season considering water bodies and air quality), ambient air quality, surface and groundwater hydrology, existing sources of air emissions, existing water quality status of water bodies of importance.

3. Biological and Ecological assessment covering water bodies, fauna & flora, ecologically sensitive areas (perceived as well as officially listed).

4. Based on the outcome of screening report, the consultants shall carry out additional air and noise quality monitoring, which in future may depict the base line conditions for EMP monitoring.

   Critical areas of environmental importance shall be identified as an output of the current environmental status of the project sites

5. *Impact Prediction:* The Consultant shall identify positive and negative impacts likely to result from the proposed project, interpreting "environmental" throughout the EA to include socio-economic impacts as well as impacts on the natural environment. All the project activities during pre-construction, construction and operation phases shall be considered to assess the impacts. The impact assessment shall necessarily cover "no action" alternative in the analysis. The consultants shall regularly interact with technical and social team of the project to share the findings of the impact assessment. The assessment of environmental impacts shall necessarily cover (but not limited to) the following:

(a) Impacts on the water bodies (including, but not limited to the impacts on water source proposed to be developed for the project in case of a water supply scheme)
(b) Impacts on topography and surface drainage due the proposed project activities in the project area,
(c) Community and cultural severance, identified through consultations
(d) Expected impacts on the land use patterns at and around the proposed project facilities/components
(e) Impact on ecologically sensitive features including spawning areas in creeks/estuarine areas, etc.
(f) Detailed assessment of impacts on receiving water bodies (including source of water bodies and down stream impacts on riparian rights)
(g) Assess the change of stream course due to diversion channels to construction intake structures and its impact on downstream users

(h) Impact on Socio-economic aspects of the projects area
(i) The noise and air quality related impacts during construction period on sensitive receptors shall be assessed
(j) Impact on Trees, public utilities and other community structures, cross overs, etc to be assessed.
(k) Any impacts that are irreversible and/or cannot be avoided or mitigated should be identified
(l) The consideration of the aspects in terms of **climate change adaptation** (Climate Proofing) should ensure that the desired developmental impacts of the strategy or measure are not endangered despite the forecasted effects of climate change. Furthermore the assessment should analyse whether the capacity for adaptation can be further increased in the framework of the strategy or measure. In this regard the expected climate changes and their consequences for the strategy or measure will be analysed. This includes both direct effects (e.g. more frequent flooding or drying out of water sources) and indirect effects of climate change. The analysis will also examine the longer targeted period of impacts beyond the formal period of the strategy or measure. On this basis, options will be developed and implemented to increase the capacity of the project to adapt.

(m) The assessment and consideration of the potential for **greenhouse gas reduction** (Emission Saving) to avoid substantial greenhouse gas emissions. First, the expected development of greenhouse gases in the project area/sector will be assessed, followed by review of the planned strategy or measures for their contribution to greenhouse gas emissions and if there are potentials for reducing greenhouse gas emissions. On this basis, options to contribute to greenhouse gas reduction shall be developed, and if applicable taking into consideration the developmental impacts.

5.0 **Environmental Management Plan**

The EMP should suggest ways / options for mitigating negative impacts of the project, the preventive measures necessary. Where required, EMP shall include community consensus for the mitigation measures proposed. The EMP shall identify the means / agency responsible for implementation of the same and recommend suitable monitoring mechanism for the EMP. The EMP shall be in the form of contract covenants and shall provide detailed cost estimates converted into BOQ items wherever necessary and applicable for implementation of the same. The consultant shall also recommend an appropriate institutional mechanism as per the requirements of EMP.

The above referred activity shall be applicable for Generic EMPs as well as specific EMPs developed as an outcome of detailed EAs

The consultant shall prepare a detailed EMP covering the measures to mitigate and/or minimize the negative impacts, including the implementation arrangement and a monitoring plan for the same with site specific requirements. EMP shall cover the following details:

- Management/Mitigatory / Enhancement measures:
  (i) For each of the significant negative impact, the consultant should recommend measures to eliminate or mitigate the impact. In case any impact is non-mitigable, the cost of damage shall be estimated and adequate compensatory measures shall be recommended.

(ii) Consultants shall recommend enhancement measures for incorporation in the design for attaining energy efficiency, reuse of treated water, control of water leakage, energy generation etc.

(iii) The cost (capital and recurring) of all the mitigation measures and the responsible parties for implementation should be clearly identified and shall be translated in to BOQ items. Wherever possible the measures should be drafted as contract clauses, which can be incorporated in construction/operational phase agreements

(iv) The mitigatory measures should necessarily contain conceptual designs wherever necessary. The consultants should also specify neighbourhood committees to supervise effective implementation of the proposed mitigatory measures.

- Landscape plan: Wherever necessary, the Landscaping plan should be prepared considering the project area as a whole and shall meet project specific requirements. Considering the nature of the project area, the EA should provide a conceptual landscape plan for all the project components while considering the special environmental and social needs.
- Budget Estimates: The EMP budget estimates shall be prepared for each of the project component and the shall be integrated with the overall project cost estimates and the relevant costs shall be included in the BOQ provisions
- Monitoring Plan: The Consultant should specify the types of monitoring needed for potential environmental impacts during construction and operation. As in the case of the mitigation plan, requirements should be specific as to what is to be monitored, how and by whom along with reporting formats and recommendations if any Cost estimates are necessary and where monitoring reports are to be prepared, the recipient responsible for review and any corrective action should be identified. The monitoring plan should be supplemented with a detailed schedule of implementation of EMP measures.

- Institutional Arrangement to Manage Environment Impacts Effectively: The consultants shall identify institutional/organizational needs to implement the recommendations of the project EA and to propose steps to strengthen or expand, if required. This may extend to new agency functions, inter-sectoral arrangements, management procedures and training, staffing, operation and maintenance, training and budgeting.

6.0 Public Disclosure

The consultants are to provide support and assistance to the Client in meeting the disclosure requirements, which at the minimum shall meet the EFA's policy on public disclosure. The consultants will prepare a plan for in-country disclosure, specifying the timing and locations; translate the key documents, such as the EA Summary in local language; draft the newspaper announcements for disclosure; and help the client to place all the EA reports in the client's website.

The consultants shall prepare an Executive Summary of the draft EA Report in both English and Tamil for public disclosure. In addition, for E1 projects, the consultants shall provide for the initial consultation a summary of the proposed project's objectives, description, and potential impacts; a summary of the EA's conclusions for consultation after the draft EA report is prepared,.

7.0 Inputs to be provided by the Client

The client shall make available all relevant documents, reports in connection to the project area/study area and facilitate procurement of data to the consultants.

8.0 Outputs and Estimated Time Schedule

The study shall be completed within a period of **** months from date of contract and the schedule of deliverables shall be as specified below.

- Inception Report — within ** month of date of award of contract. Includes Initial Site Assessment
- Interim Report — within *** months of date of award of contract. Includes baseline parameters, environmental profile and analysis of level of impacts, stakeholders' consultation.
- Draft Report — within *** months of date of award of contract Includes detailed EA and/or site specific EMP Climate Assessment and Adaptation&Mitigation measures and Social Assessment.
- Final report — within *** months of date of award of contract

10.0. Procedure for review of reports.

The review committee will review the reports and offer its comments, decisions/ suggestions. The comments or views on the various reports shall be given to the consultants within 7 days of review of the respective reports/documents/designs. Commensurate to this, a revised report shall be prepared, which will be reviewed in the next review meeting.

11.0. List of key professional positions whose CV and experience would be evaluated:

S. No.	***Key Professional***	***No. of Persons***	***Experience***
1.	Project Manager	1	A post graduate in Environmental Engineering/Environmental Science / Environmental Planning / Public Health Engineering with about 5 years experience in preparation of Detailed Environmental, and Social Impact Assessment Reports for infrastructure projects.
2.	Project Engineer	1	A graduate in Civil Engineering with about 5 years experience in the field mentioned above

GUIDANCE FOR APPLICABLE ENVIRONMENTAL LEGISLATIONS

Project	**Applicable Legislations**	**Obligations[1]**	**Responsibility[1]**
I) Water Supply & Sewerage			
A. Water Supply			
1. Water Supply Augmentation		Approval from Water Resources Organisation /Public Works Department	ULB/Implementing Agency
2. Water Supply Distribution Lines			
3. Water Tankers			
4. Overhead Tanks			
5. Water Treatment Plants	Water (P&CP) Act, 1974 Hazardous Chemicals Rules, 1989 Hazardous Waste Rules 2008	1 Secure the following from TNPCB • Consent to Establish • Consent to Operate 2 Permission for handling chemicals from authority.	ULB / Project Implementing Agency ULB / Operating Agency
6. Upgradation of Head Works		Ensure that the water of the Tanks / water bodies is as per the act and augment ground water level	ULB / Project Implementing Agency
7. Generators	Air Act,1981& Noise Rules as per EPAct,1986	Ensure Air and Noise quality is within the stipulated limits of TNPCB	ULB / Project Implementing Agency ULB / Operating Agency
8. River Intake Works		Approval from Public Works Department	Implementing Agency

Project	Applicable Legislations	Obligations[1]	Responsibility[1]
B. Stormwater Drainage			
1. Open drains		Ensure that the other pollutants (Liquid and solid) are diverted and that the receiving waterbody is not affected	Implementing Agency
2. Closed / Underground drains		Ensure that the other pollutants (Liquid and solid) are diverted and that the receiving waterbody is not affected	Implementing Agency
C. Sewerage / Sanitation			
1.Only Sewer Net Work			
2.Sewerage Network and Pumping Stations	Air Act, 1981& Noise Rules as per EP Act,1986	Ensure Air and Noise quality is within the stipulated limits of TNPCB	Implementing Agency / operating agency
3.Sewerage Network, Pumping Station and Treatment Plant	Water (P&C) Act, 1974 Hazardous Waste Rules 2008 Air (P&CP) Act, 1981& Noise Rules as per EP Act,1986	1. Secure the following from TNPCB for treatment plant • Consent to Establish • Consent to Operate, and 2. Ensure Air and Noise quality is within the stipulated limits of TNPCB	ULB / Project Implementing Agency ULB / Operating Agency Contractor during construction and ULB / operating agency during operation
4.Public conveniences			
5.Pay & use latrines			
6.Septic tanks			
II)Solid Waste			

Project	Applicable Legislations	Obligations[1]	Responsibility[1]
Management			
A. Landfill Sites	MSW Rules, 2000* Air (P&C) Act 1981, Water (P&CP) Act 1974 and EPA EIA Notification, 2006 as amended in 2009	Obtain Environmental Clearance from SEIAA Ensure Air, water(surface and ground) and Noise Quality is within stipulated limits of SPCBs/CPCB	ULB / Project Implementing Agency ULB / Operating Agency
B. Compost Yard	MSW Rules, 2000* Air (P&CP) Act 1981, Water (P&CP) Act 1974 and EP Act 1986	Secure NOC/ authorisation from TNPCB Ensure Air, water(surface and ground) and Noise Quality is within stipulated limits of SPCBs/CPCB	ULB / Project Implementing Agency ULB / Operating Agency
C. Vehicles	Vehicle emission norms	Ensure that the vehicles conform to the emission norms	ULB / Project Implementing Agency
III) Transportation			
A. Roads			
1. Widening of roads	Water (P&CP) Act, 1974, Air (P&CP) Act 1981, Forest Act, CRZ Notification and EPA EIA Notification, 2006 as amended in 2009	1. Consent from TNPCB, 2. Permission for tree cutting 3. Environmental Clearance from MOEF	ULB / Project Implementing Agency
2. New roads			
3 Improvement of surface			
4. Traffic islands			
5. Road divider			

Project	Applicable Legislations	Obligations[1]	Responsibility[1]
6. Foot paths			
B. Street Furniture			
1. Traffic signals			
2. Street lights			
3. Sign boards			
C. Road Structures			
1. Subways			
- Pedestrian			
- Cycle			
- Fast moving			
2. ROBs	Air (P&CP) Act 1981, Noise Rules Fly Ash Notification	1. Ensure water, air and Noise quality is within the stipulated limits of TNPCB. 2. Use flyash in construction as per the notification.	
3. Culverts			
4. Small Bridges			
D. Terminals / Shelter			
1. Bus Shelters			
2. Bus Terminals/Stands	Water (P&CP) Act, 1974 Air (P&CP) Act, 1981& Noise Rules as per EP Act,1986 EIA Notification as amended in 2009	Environmental clearance from SEIAA(> 20,000sq.m) Secure Consent from TNPCB	Contractor during construction and ULB / operating agency during operation
3. Truck Terminals	Water (P&CP) Act, 1974 Air (P&CP) Act, 1981& Noise	Ensure water, air and Noise quality is within the stipulated	Contractor during construction and ULB / operating agency during

Project	Applicable Legislations	Obligations[1]	Responsibility[1]
	Rules as per EP Act,1986	limits of TNPCB	operation
4. Workshops	Water (P&CP) Act, 1974 Air Act, 1981& Noise Rules as per EP Act,1986	Ensure water, air and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation
5. Parking Complexes	Air (P&CP) Act, 1981& Noise Rules as per EP Act,1986	Ensure air and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation
E. Fleet Expansion	Water (P&CP) Act, 1974 Air (P&CP) Act, 1981& Noise Rules as per EP Act,1986 Vehicular Exhaust standards	Ensure vehicular exhaust and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation
F. Construction & Maintenance equipment	None		
G. Inland Water Ways / Lakes / Water Bodies	Water (P&CP) Act,1974&EP Act,1986	Ensure water, air and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation
IV. Commercial Complexes			
A. Shopping /Office complexes < 1,50,000 Sq.m	Water (P&CP) Act, 1974 EIA Notification 2006 as amended in 2009	Obtain environmental clearance from SEIAA (>20,000 sq.m)	
B. Shopping /Office complexes > 1,50,000 Sq.m	Water (P&CP) Act, 1974 EIA Notification 2006 as amended in 2009	Obtain environmental clearance from SEIAA	ULB or Project Implementing Agency
C. Vegetable/Fish markets	Water Act, 1974	Ensure water, Noise quality is within the stipulated limits of TNPCB	ULB or Project Implementing Agency

Project	Applicable Legislations	Obligations[1]	Responsibility[1]
D. Slaughter houses	Prevention of Cruelty to Animals Act (PETA) of 1960 Prevention of Cruelty to Animals(Slaughter Houses) Rules, 2001 Water (P&CP) Act, 1974	Secure consent to establish and operate from TNPCB	ULB or Project Implementing Agency
E. Marriage halls	Water (P&CP) Act, 1974	Secure consent to establish and operate from TNPCB	ULB or Project Implementing Agency
F. Lodge / Dormitory	Water (P&CP) Act., 1974	Secure consent to establish and operate from TNPCB	ULB or Project Implementing Agency
G. Municipal Community complexes (< 1,50,000 Sq.m)	EIA Notification 2006 as amended in 2009 Water (P&CP) Act., 1974 Air (P&CP) Act., 1981	Obtain environmental clearance from SEIAA (> 20,000 sq.m)	ULB or Project Implementing Agency
H. Municipal Community complexes > 1,50,000 Sq.m	Water (P&CP) Act, 1974 EIA Notification 2006 as amended in 2009	Obtain environmental clearance from SEIAA	ULB or Project Implementing Agency
V.Non Comm./Community Amenities			
A. Parks	-	-	-
B. Playgrounds	-	-	-
C. Maternity and Child Centers	-	-	-
D. Educational institution/Reading Room	-	-	-

Project	Applicable Legislations	Obligations[1]	Responsibility[1]
E. Burial Grounds	-	-	-
F. Electric Crematorium	Water (P&CP) Act., 1974, and Air (P&CP) Act, 1981	Secure consent to establish and operate from TNPCB	ULB
VI. Integrated Area Development			
A. Housing (Sites & Services)	Water (P&C) Act,1974, Air (P&CP) Act, 1981 &EP Act 1986 EIA notification, 2006 amended in 2009	Obtain environmental clearance from SEIAA (>20,000 sq.m)	ULB or Project Implementing Agency
B. Guided Urban Development	Water Act,1974&EP Act1986	Secure consent to establish and operate from TNPCB	ULB or Project Implementing Agency
C. TRAMP	EP Act,1986 Water (P&C) Act,1974, Air (P&CP) Act, 1981 &EP Act 1986	Secure consent to establish and operate from TNPCB	ULB or Project Implementing Agency
1. For Category E1 or E 2 projects, the obligations and responsibilities as identified in the EAR or generic EMP shall be adhered to, by the respective agencies 2. The Operational policies / guidelines of the External Funding Agencies mentioned in sections 2.31 to 2.36 are applicable to all the projects in addition to the above regulations/ legislations. * - New Rules would be applicable upon notification.			

SAMPLE ENVIRONMENTAL MANAGEMENT PLAN FOR E 2 CATEGORY PROJECTS

1. These EMPs are for reference purpose and is expected to be used as guidance documents. Project specific issues need to be adequately addressed while developing project specific EMPs.
2. The enhancement opportunities in suggested in the framework shall also to be considered in finalising the project specific EMP.

1. ENVIRONMENTAL MANAGEMENT PLAN – WATER SUPPLY PROJECTS

Sl.no	Potential Negative Impacts	Mitigation Measures	Time frame	Responsible agencies
	PRE-CONSTRUCTION STAGE			
1	Clearances	All clearance required for Environmental aspects during construction shall be ensured and made available before start of work.	Before construction	ULB / PIA / Concerned Departments & agency / Contractor
2	Tree Cutting	i) Try to save the trees by changing the alignment ii) Provide adequate protection to the trees to be retained with tree guards (e.g. Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars) as required. ii) Identify the number of trees that will be affected with girth size & species type along the sewer mains, pumping / lifting station sites and sewerage treatment plant site. The details to be indicated in a strip map plan. iii) Trees shall be removed from the construction sites before commencement of construction with prior permission from the concerned department. iv) Undertake afforestation in nearby areas. v) Compensatory plantation by way of Re-plantation of at least twice the	Pre-construction & construction phase	Contractor / PIA

		number of trees cut should be carried out in the project area.		
3	Utility Relocation	i) Identify the common utilities to be affected such as: telephone cables, electric cables, electric poles, water pipelines, public water taps, etc ii) Affected utilities shall be relocated with prior approval of the concerned agencies before construction starts.	Pre-construction & construction phase	PIA / Concerned departments
4	Baseline parameters	Adequate measures shall be taken and checked to control the Baseline parameters of Air, Water and Noise pollution. Base line parameters shall be recorded and ensured conformance till the completion of the project.	Pre-construction, construction and post-construction phase	Prospective contractor / PIA
5	Planning of temporary Traffic arrangements	i) Temporary diversion will be provided with the approval of the engineer. Detailed traffic control plans will be prepared and submitted to the engineers for approval, one week prior to commencement of works. ii) The traffic control plans shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of wok each day, SIGNAGES, safety measures for transport of hazardous materials and arrangement of flagmen.	Pre-construction & construction phase	Prospective contractor / PIA
6	Disposal of waste water.	i) The waste water quality shall comply with the standards of TNPCB to let out into the stream / nullah /open land /irrigation purposes, and necessary permission to be obtained from the concerned department. ii) Ensure efficient working condition of treatment plant.	Pre-construction & construction phase	PIA
7	Storage of materials	The contractor shall identify the site for temporary use of land for construction sites /storage of construction materials, etc.	Pre-construction & construction phase	Prospective contractor / PIA
8	Construction of labour camps	Contractor shall follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp. The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction. The construction will commence only upon the written approval of the Engineer.	During the construction	Prospective contractor

		The contractor shall maintain necessary living accommodation and ancillary facilities in functional and hygienic manner and as approved by the Engineer. All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. The sewage system for the camp must be planned. Adequate health care is to be provided for the work force. The layout of the construction camp and details of the facilities provided should be prepared and shall be approved by the engineer.		

CONSTRUCTION & OPERATION PHASE MITIGATION MESURES

No.	Systems / Impacts	Action to be taken	Responsible agencies	Time frame for implementation
1	**Water Head Works**			
1.1	Change of stream course due to diversion channels to construct intake structures	No appreciable change to the stream course shall occur due to diversion channel and intake structures shall be constructed accordingly.	PIA / Prospective contractor	Design, construction and operation
1.2	Disposal of construction debris and excavated materials.	A suitable site should be identified for safe disposal, in relatively low lying areas, away from the water bodies etc., and got approved by the Engineer.	PIA / Prospective contractor	Pre-construction and operation.
1.3	Disposal of oil and grease	A suitable site should be identified for safe disposal / without contaminating the source, in relatively low lying areas, away from the water bodies etc., as approved by the Engineer & as per specific procedures.	PIA / Prospective contractor	Pre-construction and operation.
1.4	Down stream users (impacts arising due to coffer dams,	Ensure that the stream is not obstructed, affecting the down stream users due to coffer dams, etc.	PIA / Prospective contractor	Design, construction and operation

	etc.)			
1.5	Water quality in the source / water bodies	Establish the baseline water quality prior to initiation of construction and to be periodically monitored and report sent to the Engineer.	PIA / Prospective contractor	Pre-construction and Construction
1.6	Restoring river bed / water source	Ensure the restoring of river bed to its natural shape free from any debris or construction junk material that may obstruct the flow.	Prospective contractor	construction and operation
1.7	Safety measures	i) Barricading of construction site / manholes at all times in a day with adequate signage. ii) Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil. iii) The contractor shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc to workers and staff.	Prospective contractor	construction and operation
2.	**Construction of Transmission Mains**			
2.1	Shifting of common utilities	Ensure community consensus and minimum impact to common utilities like telephone cable, electric cables, electric poles, water taps and etc., Proper clearance to be obtained from the concerned authorities and sent to the PIA before commencement of works.	Pre-construction & construction phase	Concerned departments / PIA
2.2	Compensatory plantation of trees	Compensatory plantation of atleast twice the number trees felled should be done in line with competent authority guidelines	Prospective contractor	Pre-construction and Construction
2.3	Disposal of construction debris and excavated materials.	The contractor shall identify the sites for debris disposal and should be finalized prior to start of the earthworks; taking into account the following (a) The dumping does not impact natural drainage courses (b) no endangered / rare flora is impacted by such dumping (c) Settlement area located at least 1.0 km away from the site.	PIA / Prospective contractor	Pre-construction and operation.

		(d) Should be located in non residential areas located in the down wind side (e) located at least 100m from the designated forest land. (f) avoid disposal on productive land. (g) should be located with the consensus of the local community , in consultation with the engineer and shall be approved by the highways department Minimize the construction debris by balancing the cut and fill requirements.		
2.4	Protection of top soil	The top soil to be protected and compacted after completion of work, where the pipelines run, including open lands and agricultural lands.	PIA / Prospective contractor	Construction and operation
2.5	Laying of pipeline	Adequate precautions should be taken while laying the water supply mains to avoid the possibility of cross connection with sewer lines.	During construction	Prospective contractor
2.6	Traffic diversion	Before taking up of construction activity, a Traffic Control Plan shall be devised and implemented to the satisfaction of the Engineer. Construction shall be taken phase –wise so that sections are available for traffic. Temporary diversion will be provided with the approval of the engineer. The Detailed traffic control plans prepared and submitted to the engineers for approval one week prior to commencement of works shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of wok each day, SIGNAGES, safety measures for transport of hazardous materials and arrangement of flagmen. The arrangement for the temporary diversion of the land shall ensure to minimize the environmental impacts, like loss of vegetation, productive lands etc., prior to the finalization of diversion and detours.	During pre-construction and construction	Prospective contractor / PIA

		Special consideration will be given to the preparation of the traffic control plan for safety of pedestrians and workers at night. The contractor will ensure that the diversion / detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. He shall inform local community of changes to traffic routes, conditions and pedestrians access arrangements. This plan will be periodically reviewed with respect to site conditions. The temporary traffic detour will be kept free of dust by frequent application of water.		
2.7	Temporary flooding due to excavation.	Proper drainage arrangements to be made, to avoid the overflowing of existing drains due to excavation during the laying of sewer mains.	During construction	Prospective contractor / PIA
2.8	Using of modern machineries	Using of modern machineries such as JCBs, backhoes etc, shall be used to minimize the construction period, it will reduce the construction period impacts to the near by residents.	During construction	Prospective contractor
2.9	Prevention of accidents	Prevention of accidents involving human beings, animals or vehicles falling or accidents due to open trenches/manholes during construction period. This needs to be ensured with proper signages and barricading.	PIA / Prospective contractor	Construction and operation
2.10	Barricading site	The construction site should be barricaded at all time in a day with adequate marking, flags, reflectors etc. for safety of general traffic movement and pedestrians.	Prospective contractor	During construction
2.11	Dust Pollution near settlements	i) All earth work will be protected in manner acceptable to the engineer to minimize generation of dust. Area under construction shall be covered & equipped will dust collector. ii) Construction material shall be covered or stored in such a manner so as to avoid being affected by wind direction. iii) Unpaved haul roads near / passing through residential and commercial areas to be watered thrice a day. iv) Trucks carrying construction material to be adequately covered to avoid the dust pollution and to avoid the material spillage	Prospective contractor	During construction

2.12	Protection of residential / sensitive receptors.	i) Noisy construction operations in residential and sensitive areas should be done only between 7.30 am and 6.00 pm. ii) Preventive maintenance of construction equipment and vehicles to meet emission standards and to keep them with low noise. iii) Provision of enclosing generators and concrete mixers at site. iv) Sound barriers in inhabited areas shall be installed during the construction phase. v) Adequate barricading / other measures to protect dust pollution near sensitive receptors like schools and hospital etc to be ensured.	During construction	Prospective contractor / PIA
2.13	Vehicular noise pollution at residential / sensitive receptors.	i) Idling of temporary trucks or other equipment should not be permitted during periods of loading / unloading or when they are not in active use. The practice must be ensured especially near residential / commercial / sensitive areas. ii) Stationary construction equipment will be kept at least 500m away from sensitive receptors. iii) All possible and practical measures to control noise emissions during drilling shall be employed. The PIA may direct to take adequate controls measures depending on site conditions.	During construction	Prospective contractor / PIA
2.14	Noise from vehicles, plants and equipments	i) Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced. ii) Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Engineer to keep noise levels at the minimum.	During construction	Prospective contractor / PIA
2.15	Storage of construction materials	Site for storage of pipes and construction materials to be identified, without affecting the traffic and other common utilities.	Prospective contractor	During construction
2.16	Storage of	i) A suitable site should be identified for the safe storage and handling	Prospective	During

	chemicals and other hazardous materials	of chemicals and other hazardous materials with proper display of requirements and marking as protected area. ii) Providing specific appliances for safe working of personnel in critical areas like chlorination plant shall be ensured.	contractor / respective operating agency	construction and operation
2.17	Labour camp & facilities	Setting up of labour camps needs to be done as per the procedures. Adequate potable water facilities, sanitation and drainage etc., in conformity with the Indian labour laws shall be ensured. The contractor shall also guarantee the following: i) The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction. ii) The construction will commence only upon the written approval of the Engineer. iii) The Contractor shall construct and maintain all labour accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing. iv) Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities. v) The sewage system for the camp shall be designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place. Ensure adequate water supply is to be provided in all toilets and urinals.	Pre-construction and construction	Perspective contractor / PIA
2.18	Waste Disposal	i) The contractor shall provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Engineer. ii) Unless otherwise arranged by local sanitary authority, arrangements for disposal of night soils (human excreta) suitably approved by the local medical health or municipal authorities or as directed by Engineer will have to be provided by the contractor.	During Construction	Prospective contractor

2.19	Clearing of construction camps and restoration	i) Contractor to prepare site restoration plans, the plan is to be implemented by the contractor prior to demobilization. ii) On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.	After completion of the project	Prospective contractor
2.20	Pollution from Construction Wastes	The Contractor shall take all precautionary measures to prevent the wastewater generated during construction (e.g. during the testing of pipeline) from entering into streams, water bodies or the irrigation system. All waste arising from the project is to be disposed off in the manner that is acceptable by the Engineer. The engineer shall certify that all liquid wastes disposed off from the sites meet the discharge standard.	During Construction and post-construction	Prospective contractor / PIA
2.21	Pollution from Fuel and Lubricants	i) The contractor shall ensure that all construction vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites will be located at least 500 m from rivers and irrigation canal/ponds. ii) All location and lay-out plans of such sites shall be submitted by the Contractor prior to their establishment and will be approved by the Engineer. iii) Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. iv) Contractor shall arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to Engineer) and approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with MoEF and state PCB guidelines. v) Engineer will certify that all arrangements comply with the guidelines of PCB/ MoEF or any other relevant laws.	construction and operation	PIA / Prospective contractor

2.22	Safety Aspects	i) Adequate precautions shall be taken to prevent the accidents and from the machineries. All machines used shall confirm to the relevant Indian standards Code and shall be regularly inspected by the PIA. ii) Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil. iii) Protective footwear and protective goggles to all workers employed on mixing of materials like cement, concrete etc. iii)Welder's protective eye-shields shall be provided to workers who are engaged in welding works. iv) Earplugs shall be provided to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation. v) The contractor shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc to workers and staffs. The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract. The contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to. The contractor shall not employ any person below the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.	During construction	Prospective contractor
2.23	Risk from Electrical Equipment(s)	The Contractor shall take all required precautions to prevent danger from electrical equipment and ensure that - i) No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. ii) All necessary fencing and lights will be provided to protect the public in construction zones. All machines to be used in the construction will conform to the	During construction	Prospective contractor

		relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer.		
2.24	First Aid	The contractor shall arrange for: i) A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone ii) Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital	During construction	Prospective contractor
3.	**Water Treatment Plant / Booster stations**			
3.1	Tree cutting	Try to save the trees by changing the alignment and provide adequate protection to the trees with tree guards as required. Such as Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars, etc	Pre-construction and Construction	PIA / Prospective contractor
3.2	Compensatory plantation of trees	Compensatory plantation of atleast twice the number of trees felled should be done in line with competent authority guidelines.	Pre-construction and Construction	Prospective contractor / PIA
3.3	Protection of top soil & Environmental enhancing	The top soil to be protected and compacted after completion of work. Top soil from the WTP area should be stored in stock piles and that can be used for gardening purposes at WTP site which will be an environmental enhancing measure.	TWAD / Prospective contractor	During construction
3.4	Disposal of construction debris and excavated materials.	A suitable site should be identified for safe disposal, in relatively low lying areas, away from the water bodies, residential and agricultural fields etc., and got approved by the Engineer. Care should be taken that dumped material does not affect natural drainage system.	PIA / Prospective contractor	During construction
3.5	Pollution from Fuel and Lubricants	i) The contractor shall ensure that all construction vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites will be located at least 500 m from rivers and irrigation canal/ponds.	Construction and operation.	Prospective contractor / PIA

		ii) All location and lay-out plans of such sites shall be submitted by the Contractor prior to their establishment and will be approved by the Engineer. iii) Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. iv) Contractor will arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to Engineer) and approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with MoEF and state PCB guidelines. v) Engineer will certify that all arrangements comply with the guidelines of PCB/ MoEF or any other relevant laws.		
3.6	Pollution from Construction Wastes	The Contractor shall take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation system. All waste arising from the project is to be disposed off in the manner that is acceptable by the Engineer.	During Construction	Prospective contractor / PIA
3.7	Storage of chemicals and other hazardous materials	i) A suitable site should be identified / consruct for the safe storage and handling of chemicals and other hazardous materials with proper display of requirements and marking as protected area. ii) Providing specific appliances for safe working of personnel in critical areas like chlorination plant shall be ensured.	Prospective contractor / respective operating agency	During construction and operation
3.8	Disposal of sludge	A suitable site should be identified for the safe disposal of sludge generated at the WTP site and got approved by the Engineer. Prepare a sludge disposal plan and adheres to the same.	PIA / TWAD / Prospective contractor	Pre-construction / construction and operation stage.
3.9	Informatory Signs and Hoardings	The contractor shall provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required or as suggested by the Engineer.	During construction	Prospective contractor / PIA

3.10	Risk from Electrical Equipments	The Contractor shall take all required precautions to prevent danger from electrical equipment and ensure that - i) No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. ii) All necessary fencing and lights will be provided to protect the public in construction zones. All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer.	During construction	Prospective contractor
3.11	Labour camp & facilities	Setting up of labour camps needs to be done as per the procedures. Adequate potable water facilities, sanitation and drainage etc., in conformity with the Indian labour laws shall be ensured. The contractor shall also guarantee the following: i) The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction. ii) The construction will commence only upon the written approval of the Engineer. iii) The Contractor shall construct and maintain all labour accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing. iv) Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities. v) The sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place. Ensure adequate water supply is to be provided in all toilets and urinals.	During Pre-construction and construction	Perspective contractor / PIA
3.12	Safety Aspects	i) Adequate precautions shall be taken to prevent the accidents and from the machineries. All machines used shall confirm to the relevant Indian standards Code and shall be regularly inspected by the PIA.	During construction	Prospective contractor

		ii) Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil. iii) Protective footwear and protective goggles to all workers employed on mixing of materials like cement, concrete etc. iii) Welder's protective eye-shields shall be provided to workers who are engaged in welding works. iv) Earplugs shall be provided to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation. v) The contractor shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc to workers and staffs. The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract. The contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to. The contractor will not employ any person below the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.		
3.13	First Aid	The contractor shall arrange for : i) A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone ii) Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital	During construction	Prospective contractor
4	**Distribution Network and OHTs**			

4.1	Shifting of community utilities	Ensure community consensus and minimum impact to community utilities like telephone cable, electric cables and electric poles, water taps. Proper clearance to be obtained from the concerned authorities and sent to the PIA before commencement of works.	Prospective contractor	Pre-construction and Construction
4.2	Laying of distribution pipelines	i) Traffic regulation: Adequate actions to direct and regulate traffic shall be taken in consultation with PIA, Dept. of Police to prevent jamming of roads during construction. While planning alternative routes, care to be taken to minimize congestion and negative impacts at sensitive receptors such as Schools & hospitals. ii) Adequate precautions should be taken while laying the water distribution lines to avoid possibility of cross connection with the sewer lines.	Prospective contractor	During construction
4.3	Using of modern machineries	Using of modern machineries such as JCBs, backhoes etc, shall be used to minimize the construction period.	Prospective contractor	During construction
4.4	Disposal of construction debris and excavated materials.	i) A suitable site should be identified for safe disposal, in relatively low lying areas, away from the water bodies, residential and agricultural fields etc., and got approved by the Engineer. ii) Care should be taken that dumped material does not affect natural drainage system. iii) Minimize the construction debris by balancing the cut and fill requirements. iv) All vehicles delivering material to the site shall be covered to avoid material spillage.	Prospective contractor	During construction
4.5	Dust Pollution near settlements	i) Unpaved haul roads near / passing through residential and commercial areas to be watered thrice a day. ii) Trucks carrying construction material to be adequately covered to avoid the dust pollution and to avoid the material spillage	Prospective contractor	During construction
4.6	Vehicular noise pollution at residential / sensitive receptors.	i) Idling of temporary trucks or other equipment should not be permitted during periods of loading / unloading or when they are not in active use. The practice must be ensured especially near residential / commercial / sensitive areas. ii) Construction activity induced noise level shall be mitigated at the	Prospective contractor	During construction

		residential and sensitive receptors. The Contractor shall employ mitigation measures as directed by the PIA. iii) Stationary construction equipment will be kept at least 500m away from sensitive receptors. iv) All possible and practical measures to control noise emissions during drilling shall be employed. The PIA may direct to take adequate controls measures depending on site conditions.		
4.7	Protection of residential / sensitive receptors.	i) Noisy construction operations in residential and sensitive areas should be restricted between 7.30 am and 6.00 pm. ii) Preventive maintenance of construction equipment and vehicles to meet emission standards and to keep them with low noise. iii) Provision of enclosing generators and concrete mixers at site. iv) Sound barriers in inhabited areas shall be installed during the construction phase. v) Adequate barricading / other measures to protect dust pollution near sensitive receptors like schools and hospital etc to be ensured.	Prospective contractor	During construction
4.8	Barricading site	The construction site should be barricaded at all time in a day with adequate marking, flags, reflectors etc. for safety of general traffic movement and pedestrians	Prospective contractor	During construction
4.9	Safety Aspects	i) Adequate precautions shall be taken to prevent the accidents and from the machineries. All machines used shall confirm to the relevant Indian standards Code and shall be regularly inspected by the PIA. ii) Provide temporary crossing / bridges wherever necessary to facilitate normal life and business iii) Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil. iv) The contractor shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc to workers and staffs. v) A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone vi) Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital	Prospective contractor	During construction

5.0	**Environmental enhancement and special issues:**		**Implementing Agency**	**Location**
5.1	Flora and Chance found Fauna	The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. If any wild animal is found near the construction site at any point of time, the contractor will immediately upon discovery thereof acquaint the Engineer and carry out the Engineer's instructions for dealing with the same. The Engineer will report to the near by forest office (range office or divisional office) and will take appropriate steps/ measures, if required in consultation with the forest officials.	Prospective contractor	Project area
5.2	Chance Found Archaeological Property	All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation. The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the SC's instructions for dealing with the same, waiting which all work shall be stopped. The Engineer will seek direction from the Archaeological Survey of India (ASI) before instructing the Contractor to recommence the work in the site.	Prospective contractor	Project area
5.3	Monitoring of environment	The contractor shall undertake seasonal monitoring of air, water, noise and soil quality through an approved monitoring agency. The	Prospective contractor	Corridor of Impact

	parameters	parameter to be monitored, frequency and duration of monitoring plan shall be prepared		
5.4	Sensitive Areas	The sensitive areas like Schools, hospitals to be provided with suitable noise barriers and safety measures, prior to the start of work in order to minimize the dust and noise impacts due to vehicle movement during construction and their effectiveness to be checked during operation phase.	Prospective contractor	Corridor of Impact
5.5	Clearing of construction of camps and restoration	Contractor to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.	Prospective contractor	All construction workers camps
5.6	Tree Protection, Tree Planting,	• Giving due protection to the trees that fall in the shoulders /corridor of impact shall be the prime focus during Construction/post construction • Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars, use of plate compactors near trees may also be considered where necessary • Re-plantation of at least twice the number of trees cut should be carried out along the project road. Since the major portion of the project road may pass through open lands, planting of trees along the entire stretch of the road is recommended as an enhancement measure. • Growth and survival of trees planted shall be ensured and monitoring done at least for a period of 3 years .Survival status shall be reported on monthly basis to Engineer in-charge.	Concerned agency/Contractor / PIA	All tree plantation / greenery areas of the project

Sl.no	Activity/ Issue	Management Measures	Responsible agencies	Monitoring agencies
	OPERATION PHASE			
1	Flooding of the downstream areas; soil erosion; water logging of low-lying areas etc.	Ensure proper technical design of the storage reservoir to minimize seepage and chances of possible failure of the structure.	Contractor / PIA	ULB/TNPCB
2	Increase moisture content in soil, which affects the structures/foundation of buildings in nearby areas.	o Ensure proper site selection. Ensure proper design, construction and operation of the structure and system to minimize seepage and appropriate implementation techniques. In case of failure of nearby building structures / foundations, monetary compensation shall be provided	Design Consultant, Contractor and PIA	ULB
3	Wastage of water due to leakage or indiscriminate use	o Ensure leak control system in the design and monitoring. o Increase awareness on water conservation and explore options like metering.	Design Consultant, Contractor and PIA	ULB
4	Generation of additional quantity of wastewater leading to contamination of surface/sub-surface sources, if not adequately	o Provide sewerage system with sufficient treatment capacity to suffice to increased water supply levels o Plan and cost for adequate centralized/decentralized sewage disposal and treatment, and sanitation facilities.	Contractor and PIA	ULB

	treated.			
	Safety hazards from chlorination process, accidents in handling chlorine cylinders and operation of plants	o Install chlorine leak detectors; require protection and emergency response equipment for operators. o Provide safety equipments to operating staff and training in handling the plant and chlorine cylinder	Contractor and PIA	ULB
	Soil and water contamination sludge disposal	o Use only approved, appropriate disposal sites	ULB/ PIA	TNPCB
	High energy demand for pumping operation.	o Use of energy efficient pumps o Periodical maintenance	Design Consultant/ PIA	

Environmental Monitoring Plan

To monitor the extent of environmental impact of the proposed /implemented project, the contractor has to periodically monitor the ambient environmental quality along the proposed project area. The monitoring requirement for the different environmental components is presented in table below

Environmental Monitoring Plan

Air Quality Monitoring	
Project stage	Pre Construction , Construction & operation period (as agreed)
Parameter	SPM, RPM, SO_2, NO_x, CO and Pb
Sampling Method	Use method specified by CPCB for analysis
Standards	Ambient Air Quality Standards, CPCB, 1994, Air (Prevention and Control of Pollution) Act,1981
Frequency	Once before start of work & once every season of the year during construction period (except monsoon) & upto 18 months (operation Period)
Duration	Continuous 24 hours / or for 1 full working day
Location	Sensitive locations, especially in the downwind direction along the pipe laying work, pumping / lifting station locations, WTP site.
Measures	Wherever air pollution parameters increase above specified standards, additional measures as decided by the engineer shall be adopted
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing agency
Water quality Monitoring	
Project stage	Pre Construction, Construction & Operation period (as agreed)
Parameter	• pH, BOD, COD, DO, TDS, Pb, Oil & Grease and Detergents for Surface water. • Water pH, TDS, Total hardness, Sulphate, Fluorides, Chloride, Fe, Pb for groundwater. In addition to parameters (E.coli) determining drinking water quality.
Sampling Method	Grab sample collected from source and analysis as per Standard Methods for Examination of water and Waste water.
Standards	Indian standards for Inland Surface Water (IS; 2296, 1982) and for Drinking water (IS; 10500,1991)
Frequency	Seasonal during the construction period and upto 18 months during operation or as agreed
Duration	Grab sampling
Location	Locations representing water quality at •source & surface water quality in the vicinity •transmission lines •storage points, •distribution at representative locations including tail end.
Measures	At locations of variation in water quality/increased pollution, remedial measures to be adopted /all inflow channels shall be checked for pollution loads and channels delivering higher pollution load to the source shall be terminated from feeding the water source.
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing agency
Noise Level Monitoring	
Project stage	Pre Construction , Construction & operation period (as agreed)

Parameter	Noise levels on dB (A) scale.
Special guidance	• Free field at 1 m from the equipments whose noise level are being determined. • Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement
Standards	National Ambient Air Quality Standards in respect of Noise, Noise Pollution (Regulation and Control) Rules, 2000
Frequency	Once every season (except monsoon) for each year of construction
Duration	Reading to be taken at 15 seconds interval for 15 minutes every hour and then averaged
Location	• Wherever the contractor decides to locate the equipment yard. • At sensitive receptors such as school, hospitals etc
Measures	In case of noise levels causing disturbance to the sensitive receptors, management measures as suggested in the EMP shall be carried out.
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing agency
Soil Quality Monitoring	
Project stage	Pre Construction, Construction & Operation (as agreed)
Parameter	Monitoring of Pb, SAR and Oil & Grease
Sampling Method	• Sample of soil collected to be acidified and analysed using absorption spectrophotometer
Standards	Threshold for each contaminated set by IRIS database of USEPA until national standards are promulgated
Frequency	• During the pre monsoon post monsoon seasons each year for the entire construction and operation phase
Duration	Grab sampling
Location	• At pumping / lifting station, WTP locations, OHT/distribution points etc
Measures	At location of increased in pollution levels, source shall be identified and shall be diverted.
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing agency

Apart form the above mentioned monitoring requirements, any major accidents /spillage to be monitored will be decided by the engineer and should be carried out by the contractor through approved monitoring agencies and supervised by the Implementing agency at their own cost.

FORMATS FOR REPORTING:

Formats for reporting / monitoring the progress / parameters achieved will be finalized in consultation with the successful bidder.

Environmental Compliance Report

The contractor shall submit a monthly progress report as per the reporting format approved by the engineer, on the status of the implementation of the EMP, and get it duly approved by the engineer for its compliance and for proceeding with the work. The Engineer and the Environmental and Social Safeguard (ESS) Manager, who will have access and authority to monitor the status based on the same and for which necessary facilities shall be made by the contractor.

ADDITIONAL MEASURES TO BE INCLUDED IN THE CURRENT CONSTRUCTION CONTRACT/BIDDING DOCUMENTS

1. Measures to protect water source from construction related impacts
    a. Change of stream course due to diversion channels to construct intake structures
    b. Safe disposal of construction debris
    c. Ensuring stream is not obstructed affecting the down stream users (impacts arising due to coffer dams, etc.)
    d. Establishing the baseline water quality prior to initiation of construction
    e. Monitoring of water quality
    f. Safe disposal of oil and grease without contaminating the source
    g. Restoring river bed to its natural shape without any debris or construction junk material obstructing the flow
    h. Safety measures
2. Transmission Mains:
    a. Prevention of accidents involving human beings animals or vehicles falling or accidents due to open trenches/manholes during construction period. This needs to be ensured with proper signages
    b. Traffic diversion and traffic management measures during construction activities along the highways or road stretches
    c. Debris disposal of earth in excess after completion of transmission mains
    d. Sourcing of water without affecting the community sources for construction purposes
    e. Protection of topsoil where the pipelines run in open land/agricultural lands
    f. Shifting of community utilities
    g. Safety aspects
    h. Dust pollution control near settlements
3. Construction related impacts at Water Treatment Plant site
    a. Debris Management
    b. Oil and grease Management
    c. Protection of topsoil (preserve for gardening purposes at WTP)
    d. Measures to mitigate construction camp site if required
    e. Safety aspects
4. Distribution network
    a. Traffic management measures during construction period
    b. Minimize construction period by mechanization (such as JCBs and backhoes, etc)
    c. Post construction restoration (cut and cover) ensuring clear roadway
    d. Debris disposal in the sites identified by the contractor approved by engineer
    e. Protection of sensitive land uses from noise impacts by limiting the works to day time and ensure noise mitigation measures
    f. Control of vehicular noise pollution
    g. Dust pollution control

All the EMP measures shall be integrated in the bidding documents providing necessary Bills of Quantities where ever necessary and feasible

2. ENVIRONMENTAL MANAGEMENT PLAN FOR UGSS PROJECTS.

Activity	Potential Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
A. Design and Development Phase				
Land Acquisition **	Loss of tree cover	o undertake afforestation in nearby areas	PIA	ULB
Treated Water Disposal into nearby stream ***	Pollution of stream water and other water bodies receiving STP discharges due to reduction in efficiency or non working of STP	o Ensure efficient working condition. – Choice of treatment process, construction technique, equipment and skilled operation and supervision critical to maintain effluent quality compliance. o The treated water quality shall comply with the standards laid down by the state pollution control board for disposal onto the land, water body or for irrigation use.	ULB / PIA	TNPCB
Sludge Disposal***	Disposal of sludge leading to contamination of land and water.	o Providing adequate and safe sludge disposal facilities	Design Consultant, ULB / Project Implementing Agency	TNPCB
Provision for Accidental leakages / bursts **	Flooding of the nearby areas with untreated sewage in event of accidental leakages or bursts	o The Design Consultants should design for bypass arrangements, to discharge untreated sewage.	Design Consultants and PIA	ULB
	Low lying areas in the site, which can get flooded during monsoons	o Provide proper drainage arrangements so that the water does not stagnate on the site	Contractor and PIA	PMC/ ULB
Location of STP*	Nuisance hazards to	o Careful planning and design of STP with	Design Consultant,	ULB/ TNPCB

Activity	Potential Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
	neighboring areas.	adequate buffer zones. Future growth of the surrounding areas shall be considered. o Select appropriate location away from sensitive locations such as waterbodies, schools and hospitals. o Provide sufficient buffer areas o Obtain public consensus for locating STPs. o Verify the guidelines of regulatory authorities for locating treatment facilities	PIA and ULB	
Developing sewage pumping station	Noise and odour nuisance to surrounding areas.	o Select appropriate location away from sensitive locations such as schools and hospitals. o Provide sufficient buffer areas o Follow standard codes for selection pumps and other apparatus. Use less noise making and easy to operate equipment.	Design Consultant/ ULB	ULB

Environmental Management Plan for UGSS projects.

Pre Construction Phase Impacts

Sl.no	Potential Negative Impacts	Mitigation Measures	Time frame	Responsible agencies
	PRE-CONSTRUCTION STAGE			
1	Clearances	All clearance required for Environmental aspects during construction shall be ensured and made available before start of work.	Before construction	ULB / PIA / Concerned Departments &

				agency / Contractor
2	Tree Cutting	i) Try to save the trees by changing the alignment ii) Provide adequate protection to the trees to be retained with tree guards (e.g. Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars) as required. ii) Identify the number of trees that will be affected with girth size & species type along the sewer mains, pumping / lifting station sites and sewerage treatment plant site. The details to be indicated in a strip map plan. iii) Trees shall be removed from the construction sites before commencement of construction with prior permission from the concerned department. iv) Undertake afforestation in nearby areas. v) Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be carried out in the project area.	Pre-construction & construction phase	Contractor / PIA
3	Utility Relocation	i) Identify the common utilities to be affected such as: telephone cables, electric cables, electric poles, water pipelines, public water taps, etc ii) Affected utilities shall be relocated with prior approval of the concerned agencies before construction starts.	Pre-construction & construction phase	PIA / Concerned departments
4	Baseline parameters	Adequate measures shall be taken and checked to control the Baseline parameters of Air, Water and Noise pollution. Base line parameters shall be recorded and ensured conformance till the completion of the project.	Pre-construction, construction and post-construction phase	Prospective contractor / PIA
5	Planning of temporary Traffic arrangements	i) Temporary diversion will be provided with the approval of the engineer. Detailed traffic control plans will be prepared and submitted to the engineers for approval, one week prior to commencement of works. ii) The traffic control plans shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of wok each day, SIGNAGES, safety measures for transport of hazardous materials and arrangement of	Pre-construction & construction phase	Prospective contractor / PIA

		flagmen.		
6	Disposal of treated waste water.	i) The treated water quality shall comply with the standards of TNPCB to let out into the stream / nullah /open land /irrigation purposes, and necessary permission to be obtained from the concerned department. ii) Ensure efficient working condition of treatment plant.	Pre-construction & construction phase	PIA
7	Storage of materials	The contractor shall identify the site for temporary use of land for construction sites /storage of construction materials, etc.	Pre-construction & construction phase	Prospective contractor / PIA
8	Construction of labour camps	Contractor shall follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp. The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction. The construction will commence only upon the written approval of the Engineer. The contractor shall maintain necessary living accommodation and ancillary facilities in functional and hygienic manner and as approved by the Engineer. All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. The sewage system for the camp must be planned. Adequate health care is to be provided for the work force. The layout of the construction camp and details of the facilities provided should be prepared and shall be approved by the engineer.	During the construction	Prospective contractor

Sl.no	Activities	Management Measures	Time frame	Responsible agencies
	CONSTRUCTION STAGE			
1.	**Construction of Sewer Mains**			

1.1	Shifting of common utilities	Ensure community consensus and minimum impact to common utilities like telephone cable, electric cables, electric poles, water taps and etc., Proper clearance to be obtained from the concerned authorities and sent to the PIA before commencement of works.	Pre-construction & construction phase	Concerned departments / PIA
1.2	Compensatory plantation of trees	Compensatory plantation of atleast twice the number of trees felled should be done in line with competent authority guidelines.	Pre-construction and Construction	Prospective contractor / PIA
1.3	Disposal of construction debris and excavated materials.	The contractor shall identify the sites for debris disposal and should be finalized prior to start of the earthworks; taking into account the following (a) The dumping does not impact natural drainage courses (b) no endangered / rare flora is impacted by such dumping (c) Settlement area located at least 1.0 km away from the site. (d) Should be located in non residential areas located in the down wind side (e) located at least 100m from the designated forest land. (f) avoid disposal on productive land. (g) should be located with the consensus of the local community , in consultation with the engineer and shall be approved by the highways department Minimize the construction debris by balancing the cut and fill requirements.	Pre-construction and Construction	Prospective contractor / PIA
1.4	Planning for Temporary Traffic Diversions	Before taking up of construction activity, a Traffic Control Plan shall be devised and implemented to the satisfaction of the Engineer. Construction shall be taken phase –wise so that sections are available for traffic.		PIA / Contractor

		Temporary diversion will be provided with the approval of the engineer. The Detailed traffic control plans prepared and submitted to the engineers for approval one week prior to commencement of works shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of wok each day, SIGNAGES, safety measures for transport of hazardous materials and arrangement of flagmen. The arrangement for the temporary diversion of the road shall ensure to minimize the environmental impacts, like loss of vegetation, productive lands etc., prior to the finalization of diversion and detours. Special consideration will be given to the preparation of the traffic control plan for safety of pedestrians and workers at night. The contractor will ensure that the diversion / detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. He shall inform local community of changes to traffic routes, conditions and pedestrians access arrangements. This plan will be periodically reviewed with respect to site conditions. The temporary traffic detour will be kept free of dust by frequent application of water.		
1.5	Protection of top soil	The top soil to be protected and compacted after completion of work, where the pipelines run, including open lands and agricultural lands.	During construction	Prospective contractor
1.6	Laying of sewer system	Adequate precautions should be taken while laying the sewer lines to avoid the possibility of cross connection with water supply lines.	During construction	Prospective contractor
1.7	Flooding in the low lying areas	Low lying areas in the project site can get flooded during monsoon period, to prevent the situation proper drainage arrangements has to be planned.	During construction	Prospective contractor / PIA
1.8	Temporary flooding due to	Proper drainage arrangements to be made, to avoid the overflowing of existing drains due to excavation during the laying of sewer mains.	During construction	Prospective contractor / PIA

	excavation.			
1.9	Temporary water supply interruptions	i) Establish coordination with the concerned department to avoid or minimize the interruption of regular supply of drinking water to the residents. ii) Proper alternative arrangements to be planned when interruption of drinking water supply to the near by residents.	Pre-construction and Construction	Prospective contractor / PIA
1.10	Using of modern machineries	Using of modern machineries such as JCBs, backhoes etc, shall be used to minimize the construction period, it will reduce the construction period impacts to the near by residents.	During construction	Prospective contractor
1.11	Traffic diversion	i) Temporary traffic arrangements to be planned during construction. This plan shall be periodically reviewed with respect to site condition. ii) Detail traffic control plans will be prepared and submitted to the engineers / police department for approval, before commencement of works. The traffic control plans shall contains details of temporary diversion, details of road closings, details of arrangements for construction under traffic and details of traffic arrangement after cessation of wok each day. iii) Special consideration will be given to the preparation of the traffic control plan for safety of pedestrians and the sensitive receptors like schools and hospitals. iv) This plan will be periodically reviewed with respect to site conditions.	During pre-construction and construction	Prospective contractor / PIA
1.12	Prevention of accidents	Prevention of accidents involving human beings, animals or vehicles falling or accidents due to open trenches/manholes during construction period. This needs to be ensured with proper barricading, signage boards and lighting etc.	During construction	Prospective contractor
1.13	Barricading site	The construction site should be barricaded at all time in a day with	During	Prospective

		adequate marking, flags, reflectors etc. for safety of general traffic movement and pedestrians.	construction	contractor
1.14	Dust Pollution near settlements	i) All earth work will be protected in manner acceptable to the engineer to minimize generation of dust. Area under construction shall be covered & equipped with dust collector. ii) Construction material shall be covered or stored in such a manner so as to avoid being affected by wind direction. iii) Unpaved haul roads near / passing through residential and commercial areas to be watered thrice a day. iv) Trucks carrying construction material to be adequately covered to avoid the dust pollution and to avoid the material spillage.	During construction	Prospective contractor
1.15	Protection of residential / sensitive receptors.	i) Noisy construction operations in residential and sensitive areas should be done only between 7.30 am and 6.00 pm. ii) Preventive maintenance of construction equipment and vehicles to meet emission standards and to keep them with low noise. iii) Provision of enclosing generators and concrete mixers at site. iv) Sound barriers in inhabited areas shall be installed during the construction phase. v) Adequate barricading / other measures to protect dust pollution near sensitive receptors like schools and hospital etc to be ensured.	During construction	Prospective contractor / PIA
1.16	Vehicular noise pollution at residential / sensitive receptors.	i) Idling of temporary trucks or other equipment should not be permitted during periods of loading / unloading or when they are not in active use. The practice must be ensured especially near residential / commercial / sensitive areas. ii) Stationary construction equipment will be kept at least 500m away from sensitive receptors. iii) All possible and practical measures to control noise emissions during drilling shall be employed. The PIA may direct to take adequate controls measures depending on site conditions.	During construction	Prospective contractor / PIA

1.17	Noise from vehicles, plants and equipments	iv) Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced. v) Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Engineer to keep noise levels at the minimum.	During construction	Prospective contractor / PIA
1.18	Storage of construction materials	Site for storage of pipes and construction materials to be identified, without affecting the traffic and other common utilities.	During construction	Prospective contractor
1.19	Labour camp & facilities	Setting up of labour camps needs to be done as per the procedures. Adequate potable water facilities, sanitation and drainage etc., in conformity with the Indian labour laws shall be ensured. The contractor shall also guarantee the following: i) The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction. ii) The construction will commence only upon the written approval of the Engineer. iii) The Contractor shall construct and maintain all labour accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing. iv) Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities. v) The sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place. Ensure adequate water supply is to be provided in all toilets and urinals.	Pre-construction and construction	Perspective contractor / PIA

1.20	Waste Disposal	i) The contractor shall provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Engineer. ii) Unless otherwise arranged by local sanitary authority, arrangements for disposal of night soils (human excreta) suitably approved by the local medical health or municipal authorities or as directed by Engineer will have to be provided by the contractor.	During Construction	Prospective contractor
1.21	Clearing of construction camps and restoration	i) Contractor to prepare site restoration plans, the plan is to be implemented by the contractor prior to demobilization. ii) On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.	After completion of the project	Prospective contractor
1.22	Pollution from Fuel and Lubricants	i) The contractor shall ensure that all construction vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites shall be located away from rivers and irrigation canal/ponds. ii) Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. iii) Contractor shall arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to Engineer) and approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with MoEF and state PCB guidelines. iv) Engineer will certify that all arrangements comply with the guidelines of PCB/ MoEF or any other relevant laws.	construction and operation	PIA / Prospective contractor
1.23	Pollution	The Contractor shall take all precautionary measures to prevent	During	Prospective

	from Construction Wastes	the wastewater generated during construction (e.g. during the testing of pipeline) from entering into streams, water bodies or the irrigation system. All waste arising from the project is to be disposed off in the manner that is acceptable by the Engineer. The engineer shall certify that all liquid wastes disposed off from the sites meet the discharge standard.	Construction and post-construction	contractor / PIA
1.24	Risk from Electrical Equipment(s)	The Contractor shall take all required precautions to prevent danger from electrical equipment and ensure that - i) No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. ii) All necessary fencing and lights will be provided to protect the public in construction zones. All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer.	During construction	Prospective contractor
1.25	Safety Aspects	i) Adequate precautions shall be taken to prevent the accidents and from the machineries. All machines used shall confirm to the relevant Indian standards Code and shall be regularly inspected by the PIA. ii) Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil. iii) Protective footwear and protective goggles to all workers employed on mixing of materials like cement, concrete etc. iii)Welder's protective eye-shields shall be provided to workers who are engaged in welding works. iv) Earplugs shall be provided to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation. v) The contractor shall supply all necessary safety appliances such as	During construction	Prospective contractor

		safety goggles, helmets, safety belts, ear plugs, mask etc to workers and staffs. The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract. The contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to. The contractor shall not employ any person below the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.		
1.26	First Aid	The contractor shall arrange for: i) A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone ii) Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital	During construction	Prospective contractor

Sl.no	**Activities**	**Management Measures**	**Time frame**	**Responsible agencies**
	CONSTRUCTION STAGE			
2.	**Construction of Pumping / Lifting stations**			
2.1	Tree cutting	i) Try to save the trees by changing the alignment and provide adequate protection to the trees with tree guards as required. Such as Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars, etc ii) Compensatory plantation of atleast twice the number trees felled	Pre-construction and Construction	PIA / Prospective contractor

		should be done in line with competent authority guidelines		
2.2	Storage of construction materials	Site for storage of construction materials to be identified, without affecting the near by the residents, traffic and other common utilities.	During construction	Prospective contractor
2.3	Barricading site	The construction site should be barricaded at all time in a day with adequate marking, flags, reflectors etc. for safety of pedestrians	During construction	Prospective contractor
2.4	Protection of residential / sensitive receptors.	i) Noisy construction operations in residential and sensitive areas should be done in between 7.30 am and 6.00 pm. ii) Preventive maintenance of construction equipment and vehicles to meet emission standards and to keep them with low noise. iii) Idling of delivery of vehicles will not be allowed at construction site. iv) Provision of enclosing generators and concrete mixers at site. v) Sound barriers in inhabited areas shall be installed during the construction phase. vi) Adequate barricading / other measures to protect dust pollution near sensitive receptors like schools and hospital etc to be ensured.	During construction	Prospective contractor
2.5	Disposal of silt / sludge	A suitable site should be identified for safe disposal of silt / sludge generated at the pumping / lifting station sites, which should be away from the water bodies, residential & sensitive areas, agricultural areas and etc., and got approved by the Engineer.	During construction and operation	PIA / Prospective contractor / TWAD
2.6	Noise level	i) Noise screening by trees plantation scheme proposed as noise barriers. ii) Adequacy of measures shall be checked to control noise pollution. iii) Using of less noise generating machineries like submersible pumps at PS / LS sites to reduce the noise level. iv) Increase the height of compound wall of the PS/LS site. v) Collection well to be kept closed during the construction and operation period to avoid the accidents.	During construction	Prospective contractor

Sl.no	**Activities**	**Management Measures**	**Time frame for**	**Responsible**

			implementation	**agencies**
3.	**CONSTRUCTION STAGE**			
	Construction of Sewerage Treatment Plant			
3.1	Compensatory plantation of trees	Compensatory plantation of atleast twice the number of trees felled should be done in line with competent authority guidelines.	Pre-construction and Construction	Prospective contractor / PIA
3.2	Protection of top soil & Environmental enhancing	The top soil to be protected and compacted after completion of work. Top soil from the STP area should be stored in stock piles and that can be used for gardening purposes at WTP site which will be an environmental enhancing measure.	During construction	Prospective contractor / PIA
3.3	Disposal of construction debris and excavated materials.	A suitable site should be identified for safe disposal, in relatively low lying areas, away from the water bodies, residential and agricultural fields etc., and got approved by the Engineer. Care should be taken that dumped material does not affect natural drainage system.	During construction	Prospective contractor / PIA
3.4	Pollution from Fuel and Lubricants	i) The contractor shall ensure that all construction vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites will be located at least 500 m from rivers and irrigation canal/ponds. ii) All location and lay-out plans of such sites shall be submitted by the Contractor prior to their establishment and will be approved by the Engineer. iii) Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. iv) Contractor will arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to Engineer) and approved by the Engineer. All spills	Construction and operation.	Prospective contractor / PIA

		and collected petroleum products will be disposed off in accordance with MoEF and state PCB guidelines. v) Engineer will certify that all arrangements comply with the guidelines of PCB/ MoEF or any other relevant laws.		
3.5	Contamination of ground water quality	i) Groundwater quality may get contaminated due to leaching of waste water. So, the treated water quality shall comply with the standards laid down by the PCB for disposal onto land, water body or for irrigation use. ii) Regular monitoring is required for the treated sewage quality and also the ground water quality in the near by areas and ensures compliance with PCB standards.	During construction and operation	Prospective contractor / PIA
3.6	Water Pollution from Construction Wastes	The Contractor shall take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation system. All waste arising from the project is to be disposed off in the manner that is acceptable by the Engineer.	During Construction	Prospective contractor / PIA
3.7	Impact of surrounding areas	To avoid the problems of foul smell polluted air, insects, noise pollution and other problems buffer zones to be provided in the form of green belt around the STP site, this has to be strictly ensured.	During Construction	Perspective contractor / PIA
3.8	Informatory Signs and Hoardings	The contractor shall provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required or as suggested by the Engineer.	During construction	Prospective contractor / PIA
3.9	Risk from Electrical Equipment(s)	The Contractor shall take all required precautions to prevent danger from electrical equipment and ensure that - i) No material shall be stacked or placed as to cause danger or inconvenience to any person or the public. ii) All necessary fencing and lights will be provided to protect the public in construction zones. All machines to be used in the construction will conform to the	During construction	Prospective contractor

		relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer.		
3.10	Disposal of treated waste water.	i) The treated water quality shall comply with the standards of TNPCB before let out into the stream / nullah /open land /irrigation purposes, and necessary permission to be obtained from the concerned department. ii) Ensure efficient working condition of treatment plant. iii) Prevent the pollution of stream water and other water bodies receiving STP discharge.	Pre-construction / construction and operation stage.	PIA / Prospective contractor
3.11	Disposal of sludge	A suitable site should be identified for the safe disposal of sludge generated at the STP site and got approved by the Engineer. Prepare a sludge disposal plan and adheres to the same.	Pre-construction, construction and operation.	Prospective contractor / PIA
3.12	Labour camp & facilities	Setting up of labour camps needs to be done as per the procedures. Adequate potable water facilities, sanitation and drainage etc., in conformity with the Indian labour laws shall be ensured. The contractor shall also guarantee the following: i) The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction. ii) The construction will commence only upon the written approval of the Engineer. iii) The Contractor shall construct and maintain all labour accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing. iv) Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities.	During Pre-construction and construction	Prospective contractor / PIA

		v) The sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place. Ensure adequate water supply is to be provided in all toilets and urinals.		
3.13	Safety Aspects	i) Adequate precautions shall be taken to prevent the accidents and from the machineries. All machines used shall confirm to the relevant Indian standards Code and shall be regularly inspected by the PIA. ii) Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil. iii) Protective footwear and protective goggles to all workers employed on mixing of materials like cement, concrete etc. iii) Welder's protective eye-shields shall be provided to workers who are engaged in welding works. iv) Earplugs shall be provided to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation. v) The contractor shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc to workers and staffs. The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract. The contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to. The contractor will not employ any person below the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.	During construction	Prospective contractor

3.14	First Aid	The contractor shall arrange for : i) A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone ii) Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital	During construction	Prospective contractor

4.0	**Environmental enhancement and special issues**		**Location**	**Responsibility**
4.1	Flora and Chance found Fauna	The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. If any wild animal is found near the construction site at any point of time, the contractor will immediately upon discovery thereof acquaint the Engineer and carry out the Engineer's instructions for dealing with the same. The Engineer will report to the near by forest office (range office or divisional office) and will take appropriate steps/ measures, if required in consultation with the forest officials.	Project area	Prospective contractor/ IA
4.2	Chance Found Archae-ological Property	All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation. The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the SC's	Project area	Prospective contractor/ IA

		instructions for dealing with the same, waiting which all work shall be stopped. The Engineer will seek direction from the Archaeological Survey of India (ASI) before instructing the Contractor to recommence the work in the site.		
4.3	Monito-ring of environ-ment parameters	The contractor shall undertake seasonal monitoring of air, water, noise and soil quality through an approved monitoring agency. The parameter to be monitored, frequency and duration of monitoring plan shall be prepared	Project area	Prospective contractor/ IA
4.4	Sensitive Areas	The sensitive areas like Schools, hospitals to be provided with suitable noise barriers and safety measures, prior to the start of work in order to minimize the dust and noise impacts due to vehicle movement during construction and their effectiveness to be checked during operation phase .	Project area	Prospective contractor/ IA
4.5	Clearing of construction of camps and restoration	Contractor to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.	Corridor of Impact	Prospective contractor/ IA
4.6	Tree Protec-tion, Tree Planting,	• Giving due protection to the trees that fall in the shoulders /corridor of impact shall be the prime focus during Construction/post construction • Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars, use of plate compactors near trees may also be considered where necessary • Re-plantation of at least twice the number of trees cut should be carried out along the project road. Since the major portion of the project road may pass through open lands, planting of trees along the entire stretch of the road is recommended as an enhancement	Corridor of Impact	Prospective contractor/ IA

		measure. • Growth and survival of trees planted shall be ensured and monitoring done at least for a period of 3 years .Survival status shall be reported on monthly basis to Engineer incharge.		

C. Operation Phase				
Collection and Pumping	High energy demand for pumping operation.	• Provide energy efficient pumpsets • Periodical maintainenance of the pumpsets	Design Consultant/ PIA	
Treatment and Disposal	Impairment of receiving water quality in surface/sub-surface source due to inadequate /inefficient treatment. Contamination groundwater supplies due to leaching and impact on soil and agriculture	• Monitor the treated sewage/effluent quality and ensure compliance with PCB standards for effluent disposal into surface water bodies, on land or for the agricultural use. • The treated water quality shall comply with the standards laid down by the state pollution control board for disposal onto the land, water body or for irrigation use.	Operator/ PIA/ ULB	TNPCB
Treatment and Disposal	Problems arising due to bad odour, insects, polluted air, noise pollution, etc.	• Provide buffer zones in the form of green belt around the STP; to be ensured during the design and development phase itself.	Operator/ PIA/ ULB	TNPCB
	Indiscriminate disposal of sludge leading to contamination of land and soil.	• Prepares plan for safe disposal of sludge and adhere to the same.	Operator/ PIA/ ULB	TNPCB
	Health and safety of workers due to the release of toxic gases and hazardous material.	• Ensure safe operation and maintenance practices are followed, and plans for emergencies are in place.	Operator/ PIA/ ULB	ULB
	Reduced land values in nearby areas and aesthetics affected.	• Adequate buffer zones during development and construction phase should mitigate the effect considerably.	ULB	ULB

Environmental Monitoring Plan

To monitor the extent of environmental impact of the proposed project, the contractor has to periodically monitor the ambient environmental quality along the proposed project area. The monitoring requirement for the different environmental components is presented in table below

Environmental Monitoring Plan

Air Quality Monitoring	
Project stage	Pre Construction , & Construction period (as agreed)
Parameter	SPM, RPM, SO_2, NO_x, CO and Pb
Sampling Method	Use method specified by CPCB for analysis
Standards	Air (Prevention and Control of Pollution) Rules, CPCB, 1994
Frequency	Once before start of work & once every season of the year during construction period (except monsoon) & upto 18 months (operation Period)
Duration	Continuous 24 hours / or for 1 full working day
Location	Sensitive locations along the pipe laying work, pumping / lifting station locations, STP site.
Measures	Wherever air pollution parameters increase above specified standards, additional measures as decided by the engineer shall be adopted
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing agency
Water quality Monitoring	
Project stage	Pre Construction, Construction & Operation period
Parameter	• pH, BOD, COD, DO, TDS, Pb, Oil & Grease and Detergents for Surface water. • Water pH, TDS, Total hardness, Sulphate, Fluorides,Chloride, Fe, Pb for groundwater.
Sampling Method	Grab sample collected from source and analysis as per Standard Methods for Examination of water and Waste water
Standards	Indian standards for Inland Surface Water (IS; 2296, 1982) and for Drinking water (IS; 10500,1991)
Frequency	Seasonal during construction
Duration	Grab sampling
Location	•Locations to represent residential, agricultural, surface water quality and vicinity of the project site.
Measures	At locations of increased in water pollution, all inflow channels shall be checked for pollution loads and channel delivering higher pollution loads and channel delivering higher pollution load shall be terminated from disposal into the water source and other methods of disposal shall be adopted
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing agency

Noise Level Monitoring	
Project stage	Pre Construction , Construction & operation period (as agreed)
Parameter	Noise level on dB (A) scale noise levels on dB (A) scale
Special guidance	• Free field at 1 m from the equipments whose noise level are being determined. • Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement
Standards	MoEF Noise Rulers, 2000
Frequency	Once every seasons (except monsoon) during construction
Duration	Reading to be taken at 15 seconds interval for 15 minutes every hour and then averaged
Location	• Near locations of noise generation. • Nearby sensitive receptors such as school, hospitals etc
Measures	Incase of noise levels causing disturbance to the sensitive receptors, management measures as suggested in the EMP shall be carried out.
Implementation	Contractor during construction and IA during operation, through approved monitoring agencies
Supervision	Implementing agency
Soil Quality Monitoring	
Project stage	Pre Construction, Construction & Operation
Parameter	Monitoring of Pb, SAR and Oil & Grease
Sampling Method	• Sample of soil collected to be acidified and analysed using absorption spectrophotometer
Standards	Threshold for each contaminated set by IRIS database of USEPA until national standards are promulgated
Frequency	• During the pre monsoon post monsoon seasons each year for the entire construction period
Duration	Grab sampling
Location	• At productive agriculture lands or sites near pumping / lifting station locations and STP site.
Measures	At location of increased in pollution levels, source shall be identified and shall be diverted from future disposal
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing agency

Apart form the above mentioned monitoring requirements, parameters to be monitored to prevent any accidents /spillage during construction will be decided by the engineer and should be carried out by the contractor through approved monitoring agencies and supervised by the Implementing agency at their own cost.

FORMATS FOR REPORTING:

Formats for reporting / monitoring the progress / parameters achieved will be finalized in consultation with the successful bidder.

Environmental Compliance Report

The contractor shall submit a monthly progress report as per the reporting format approved by the engineer, on the status of the implementation of the EMP, and get it duly approved by the engineer for

its compliance and for proceeding with the work. The Engineer and the Environmental and Social Safeguard (ESS) Manager, who will have access and authority to monitor the status based on the same and for which necessary facilities shall be made by the contractor**.**

3. GENERIC ENVIRONMENTAL MANAGEMENT PLAN FOR ROAD PROJECTS

All projects shall be implemented in line with the prevailing National, State, local legislations and the World Bank's operational policies.
To ensure the implementation of the environmental and social safeguards, an Environmental Management Plan for this sub project is presented below for adoption as guidelines during different stages of Project Implementation.
The Environmental Management Plan (EMP) is designed to identify and address the requirement of successfully mitigating the likely adverse environmental impacts of the proposed project.
It also identifies the post project monitoring requirements needed for the successful implementation of the suggested mitigation measures.
These are the minimum requirements and the contractor shall be responsible to familiarize with the requirements and implementation of the mitigation measures as applicable for the sub project and typical conditions thereof.

Table EMP- 1: Detailed Environmental Management plan

Sl.no	Activities	Management /Mitigation Measures	Location	Responsibility
		1.0 PRE-CONSTRUCTION		
1.1	Project route, Land Acquisi-tion, R&R	Ensure that the Right of way / alignment options for the sub-project are decided taking into account effective utilization of land and resources, and avoiding any adverse environmental impacts. The acquisition of land and private properties as per requirements will be carried out in accordance with the Resettlement Action Plan and Entitlement Framework for the project All R&R activities are to be completed before the construction activities start, on any sub-section of the project. Specific Environmental Management Plan (EMP) for the resettlement Site will be prepared in consultation with the community. Plans will include specific actions in relation to health ,hygiene and plantation	Corridor of Impact	ULB/PIA

1.2	Clearances	All clearance required for Environmental aspects during construction shall be ensured and made available before start of work. Some of the statutory requirements that are to be complied with by the contractor before and during the execution of the proposed improvement work are listed in Table EMP-2.		ULB/PIA Department / Concerned agency/Contractor
1.3	Tree Protection, Tree Cutting	• Retaining the existing trees and giving due protection to them , if they fall in the shoulders shall be the prime focus during design and pre- construction/Construction. • This will also include planning for the provision of tree guards for the existing trees on the slope / embankment of the proposed road (refer BOQ), with retro reflective studs on them to facilitate better visibility during night time. Where the tree guards are necessary, care should be taken to ensure that they do not impede natural movement or restrict growth. • Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars, use of plate compactors near trees may also be considered where necessary • Where the trees that fall within Corridor of Impact have been identified for inevitable removal (trees as mentioned in BOQ), the trees will be removed from the corridor of impact and construction site before commencement of construction (with prior intimation to the Forest Department, if needed). ***Prior permission will be obtained from the District Collector.*** • The site should be cleared off the cut trees immediately to ensure smooth flow of traffic	Corridor of Impact	ULB/PIA Concerned agency/Contractor
1.4	Tree Planting,	• Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be planned along the project road. Where major portion of the project road pass through open lands, planting of trees along the entire stretch of the road is recommended as an enhancement measure), which would also serve as a mechanism to delineate ROW and prevent future encroachments / squatters into the right of way, wherever possible. (Quantum of trees as mentioned in BOQ) • Wherever identified, planting of bushes (in the median), and other relevant stabilizing / preservational measures shall be planned	Corridor of Impact	ULB/PIA / Concerned agency/Contractor

1.5	Environmental Parameters	Base line parameters of **Air, Water and Noise** shall be measured / established before commencement of work(Refer Table EMP-3) and NOC, where required from State Pollution Control Board shall be obtained. Adequate measures to control Air / Noise / Water / Soil Pollution shall be planned. Provision of MoRTH 111 shall apply	Corridor of Impact	ULB/PIA / Concerned agency/Contractor
1.6	Noise pollution management	For sensitive receptors like schools, hospitals ,as may be found en route, mitigation measures are to be planned which may include: Noise barriers including raising the compound walls, landscaping, etc (refer BOQ for details pertaining to the project)	Corridor of Impact	ULB/PIA / Concerned agency/Contractor
1.7	Utility Relocation	o All utilities lost due to the project will be relocated with prior approval of the concerned agencies before construction starts, on any sub-section of the project road (Shifting of electrical poles, telephone poles and water mains / taps, etc. along the project road as mentioned in BOQ) o Prior information to affected people o Provisions such as foot over bridge with hand rails in the residential areas	Corridor of Impact	ULB/PIA / Concerned agency/Contractor
1.8	Replacement of common amenities	All affected common amenities such as community sources of water, bus shelters, cultural properties, etc., will be relocated wherever necessary. The relocation site identification will be in accordance with the choice of the community and completed before construction starts.(Relocation details as mentioned in BOQ). Refer MoRTH 110.	Corridor of Impact	ULB/PIA

1.9	Planning Tempor-ary traffic diversion and Pedestri-an safety	Temporary diversion will be provided with the approval of the engineer. Detailed traffic control plans will be prepared and submitted to the engineers for approval, one week prior to commencement of works. The engineer will asses the environmental impacts associated with such plans with regard to the loss of vegetation, productive lands and the arrangement for the temporary diversion of the land prior to the finalization of diversion and detours. The traffic control plans shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of wok each day, SIGNAGES, safety measures for transport of hazardous materials and arrangement of flagmen. Special consideration will be given to the preparation of the traffic control plan for safety of pedestrians and workers at night. The mitigation measures should refer the traffic management measures as per SP 55 of IRC Codes . Provision of MORTH 112 shall apply.	Corridor of Impact and the diversion route	ULB/PIA / Contractor / local authrity
1.10	Crushers, Hot Mix plant & Batching Plants	Specification of crushers, Hot Mix plants and batching plants will comply with the requirement of the relevant current emission control legislations and should be included in the contract document. Hot Mix plants and batching plants will be sufficiently away from habitation, agriculture operations or industrial establishments. Such plants will be located at least 1000m away from the nearest habitation, preferably in the downwind direction.	Along the project corridor at the location of constructio n site	PIA./ Contractor
1.11	Other construc-tion vehicles, equipme nt and machine-ry	-The discharge standards promulgated under the Environmental Protection Act, 1986 will be strictly adhered . -All vehicles, equipments and machinery to be procured for construction will conform to the relevant bureau of Indian standard (BIS) norms. -Noise limit for construction equipment to be procured such as compactors, rollers, front loaders, concrete mixers, cranes (movable), vibrators and saws will not exceed 75 dB(A), measured at one meter from the edge of the equipment in free field, as specified in the Environmental (Protection) Rules, 1986.The Contractor shall maintain a record of PUC for all vehicles and machinery used during the contract period.	Corridor of Impact	PIA / Contractor

1.12	Identification and selection of Borrow areas	• Arrangement for locating the source of supply of materials for embankment and sub-grade as well as compliance to environmental requirements, as applicable, will be the sole responsibility of the contractor. • Location identified by the contractor shall be reported to the engineer and engineer shall in turn report to the State Highways. • Planning of haul roads for accessing borrows materials should be routed to avoid agriculture areas. • In addition to testing for the quality of borrow materials by the Highways department, the environmental personal of the department will be required to inspect every borrow area location prior to approval. Locations finalized by the contractor shall be reported to the Environmental Expert of Executing authority who will in turn report to PIU. Format for reporting will be as per the Reporting Format for Borrow Area and will include a reference map • The Contractor will not start borrowing earth from select borrow area until the formal agreement is signed between land owner/panchayat and contractor and a copy is submitted to the Highways department and the PIU. .	At all borrow area locations suggested for the project.	PIA / Contractor
1.13	Identification and selection of Quarries	The contractor will identify materials from existing licensed quarries with the suitable materials for construction. Apart from approval of the quality of the quarry materials, the engineer's representative will verify the legal status of the quarry operation, as to whether approval under Tamilnadu Minor Mineral Concession Rule, 1959 (corrected up to 31.3.2001) is obtained.	All quarries recommended to be used in the project	PIA / Contractor

1.14	Water	• The contractors shall consult the local people before finalizing the locations.The contractor will source the requirement of water preferentially from surface water bodies, such as rivers and tank in the project area. Boring of any tube wells will be prohibited. To avoid disruption / disturbance to other water users, the contractor will extract water from fixed locations. • Only at locations where surface water sources are not available, the contractors can contemplate extraction of groundwater. Consent from the engineer that no surface water resource is available in the immediate area for the project is a pre – requisite prior to extraction of groundwater. The contractor will need to comply with the requirements of the State Groundwater Department and seek their approval for doing so. • The use of surface water by the contractor shall be allowed only after written permission/consent of the community/panchayat/owner indicating the quantum of water allowed to be drawn. In case of Irrigation sources, consent shall be obtained by the competent authority and any such use shall be informed to the local community in advance	All the locations where surface (or) groundwater is utilized for the construction purpose	PIA / Contractor
1.15	Sand	The contractor will identify sand quarries with requisite approvals for the extraction of sand under Tamilnadu Minor Minerals Concession Rules, 1959 (Corrected upto 31.3.2001or latest) for use in the project.	Riverbeds identified for sand extraction	PIA / Contractor
1.16	Arrangement for tempo-rary land arrangement	The contractor as per prevalent rules will carry out negotiation with the land owners for obtaining their consent for temporary use of lands for construction sites / Hot mix plants / traffic detours / borrow areas etc. The engineer will be required to ensure that the clearing up of the site prior to handling over to the owner (after construction or completion of the activity) is included in the contract.	Areas temporarily acquired for construction	Contractor
1.17	Labour requirements	The contractor will use unskilled labour drawn from local communities to avoid any additional stress on the existing infrastructure facilities in the project area. Strict adherence to avoid child labour for any form of work should be followed at the construction site and camp sites.	Around project corridor	Contractor

1.18	Orienta-tion	Organize orientation sessions and regular training sessions during all stages of the project for Implementing Agency and Contractors This shall include on-site training (general as well as in the specific context of a sub-project). These sessions shall involve all staff of Environmental Cells, field level implementation staff of Highways Department and Contractors.		PIA
		2.0 CONSTRUCTION CAMPS:		
2.1	Location of Construc-tion labour camps: Accomo-dation	• The contractor will provide, erect and maintain necessary (temporary) living accommodation and ancillary facilities during the progress of work for labour to standards and scales approved by the engineer- • Contractor will follow all relevant provisions of the Factories Act, 1948 and the Building &other Construction Workers (Regulation of Employment and Conditions of Service)Act, 1996 for construction & maintenance of labor camp. • Construction camps will not be proposed within 1000m from the nearest habitation to avoid conflicts and stress over the infrastructure facilities, with the local community. The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction. The construction will commence only upon the written approval of the Engineer.	Along the project corridor at the location of construc-tion labour camps	Contractor

2.2	Potable Water	The Contractor will construct and maintain all labour accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing. The Contractor will provide potable water facilities within the precincts of every workplace in an accessible place, as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. The contractor will also guarantee the following: • Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities. • If any water storage tank is provided that will be kept such that the bottom of the tank is at least 1mt. from the surrounding ground level. • If water is drawn from any existing well, which is within 30mt. proximity of any toilet, drain or other source of pollution, the well will be disinfected before water is used for drinking. • All such wells will be entirely covered and provided with a trap door, which will be dust proof and waterproof. • A reliable pump will be fitted to each covered well. The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once in a month. • Testing of water will be done every month as per parameters prescribed in IS 10500:1991. Compliance to EMP will be reported to Engineer every week. Engineer will be required to inspect the labour camp periodically, to ensure compliance of the EMP.	construc-tion labour camps	Contractor

2.3	Sanita-tion and Sewage System	The contractor will ensure that - • the sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place • separate toilets/bathrooms, wherever required, screened from those from men (marked in vernacular) are to be provided for women • adequate water supply is to be provided in all toilets and urinals • all toilets in workplaces are with dry-earth system (receptacles) which are to be cleaned and kept in a strict sanitary condition • night soil is to be disposed off by putting layer of it at the bottom of a permanent tank prepared for the purpose and covered with 15 cm. layer of waste or refuse and then covered with a layer of earth for a fortnight. Adequate health care is to be provided for the work force during the entire phase.	construc-tion labour camps	Contractor
2.4	Waste Disposal	The contractor will provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Engineer.Unless otherwise arranged by local sanitary authority, arrangements for disposal of night soils (human excreta) suitably approved by the local medical health or municipal authorities or as directed by Engineer will have to be provided by the contractor.	construc-tion labour camps	Contractor
2.5	Stock-yards	Location for stockyards for construction materials will be identified at least 1000 m from water course and separated and sufficiently away from the labour camps. Separate enclosures shall be planned for storing construction materials containing fine particles such that sediment-laden water does not drain into nearby storm water drain & underground sewerage pipes. (MORTH 306)	Along the project corridor	Contractor

2.6	Fuel storage and refueling areas	The contractor will ensure that all construction vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites are located at least 500 m from rivers and irrigation canal/ponds All location and lay-out plans of such sites will be submitted by the Contractor prior to their establishment and will be approved by the Engineer. In all fuel storage and refueling areas, if located on agriculture land or areas supporting vegetation, the topsoil will be stripped, stockpiled and returned after completion of such storage and refueling activities. Fuel storage will be provided with bunds. The plan for the construction camp site should also include the process of collection and disposal of spent oil and grease. The collection and disposal methods for the spent oil and grease submitted as part of the construction camp plan should be duly approved by the engineer.	All along the project corridor	PIA / Contractor
	3.0 CONSTRUCTION STAGE:: (a) PREPARATORY WORKS			
3.1	Clearan-ce and Grubbing	Vegetation will be removed from the RoW before the commencement of construction and will be carried out such that the damage or disruption to flora is minimal. Only ground cover / shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from the engineer. The contractors, under any circumstances will not damage trees (in addition to those already identified and felled with prior permission from the forest department).	Corridor of the Impact	Contractor
3.2	Dismantling of Culverts	The culverts will be dismantled carefully and the resulting materials so removed without causing any damage to the part of the structure retained and other properties and structures nearby. All necessary measures will be taken especially while working close to cross drainage channels to prevent earth work, stonework, materials and appendages as well as the method of operation from impending cross – drainage at rivers, streams, water canal and existing irrigation and drainage system.	At location where bridge works and culverts are proposed	Contractor

3.3	Generation of Debris from dismantling of pavement structures and non bituminous waste disposal.	**REUSE OF DEBRIS:** Debris generated shall be suitably reused in the proposed construction, subject to the suitability of the materials with the approval of the engineer. Contractor shall utilize at least 30% of debris generated for road construction purposes including • sub grade of the existing pavement shall be used as embankment fill material. • The existing base and sub –base material shall be recycled as sub-base of the road or access roads. • The existing bituminous surface debris may be considered for the paving of cross roads,access roads and paving works in construction camps,traffic diversion roads, haulage routes etc., (Feasibility or otherwise of these measures will be decided on case to case basis and approved by Engineer) **DISPOSAL**: Unutilized debris materials shall be suitably disposed off by the contractor; either through filling up of borrow areas created for the project or at pre-designed dump locations, subject to the approval of the engineer. Debris generated from other construction activities shall be disposed such that it doesn't contaminate water bodies in the project area. **Location of disposal sites**: The contractor shall identify the sites for debris disposal and should be finalized prior to start of the earthworks; taking into account the following (a) The dumping does not impact natural drainage courses (b) no endangered / rare flora is impacted by such dumping (c) Settlement are located at least 1.0 km away from the site. (d) Should be located in non residential areas located in the down wind side (e) located at least 100m from the designated forest land. (f) avoid disposal on productive land. (g) should be located with the consensus of the local community , in consultation with the engineer and shall be approved by the highways department	Throughout project corridor	PIA / Contractor

3.4	Bituminous wastes disposal	The disposal of residual bituminous wastes will be done by the contractor at secure land fill sites, with the required approval for the same from the concerned government agencies. Location of disposal sites should be finalized prior to start of the earthworks and shall be approved by the engineer of the highways department conforming to the following (a) The dumping does not impact natural drainage courses (b) no endangered / rare flora is impacted by such dumping (c) Settlement are located at least 1.0 km away from the site. (d) Site should be located with the consensus of the local community. (e) should be located in non residential areas located in the down wind side. (f) located at least 100m from the designated forest land. (g) avoid disposal on productive land. Incase of non-availability of secured landfill, the contractor shall dispose at locations approved by engineer for disposal of residual bituminous wastes, the disposal will be carried out over a 60 mm thick layer of rammed clay so as to eliminate the possibility of leaching of wastes into the ground water. The contractor will ensure that the surface area of such disposal pits is covered with a layer of soil.	Throughout project corridor	Contractor
3.5	Stock-yards	Stockyards for construction materials shall be constructed at the approved location, and separated and sufficiently away from the labour camps. Separate enclosures shall be planned for storing construction materials containing fire particles such that sediment-laden water doest not drain into nearby storm water drain & underground sewerage pipes. (MORTH 306)	Along the project corridor	Contractor

3.6	Borrow areas	The area should be located with applicable consent / clearances from the local community, panchayats / local bodies and as per TN Minor mineral concession rules. No borrow area will be opened without permission of the engineer. Material soil shall be taken from either waste /openland. (i) Borrow pits will not be dug continuously in a stretch. (ii) The location, shape and size of the designated borrow areas will be as approved by the engineer and in accordance to the IRC recommended practice for borrow pits for road embankments (IRC 10:1961). Low lying, productive and forest lands should be avoided with depth of cutting not to exceed 2m and should be away from toe of embankment, road formation, river banks, etc. **In the case of borrow areas identified and used specifically for this project, the contractor should submit a borrow area restoration plan and get it approved by the engineer.** The unpaved surface used for the haulage of borrow materials will be maintained dust free by the contractor. Since dust rising is the only impact along the haul roads sprinkling of water will be carried out for a minimum of twice a day or as required, along such roads during their period of use.	All along the project corridor, all access roads, sites temporarily acquired and all borrow areas	PIA / Contractor

3.7	Planning for Temporary Traffic Diversions	Before taking up of construction on any section of the existing lanes of the highway, a Traffic Control Plan will be devised and implemented to the satisfaction of the Engineer. Construction shall be taken phase –wise so that sections are available for traffic. Temporary diversion will be provided with the approval of the engineer.. The Detailed traffic control plans prepared and submitted to the engineers for approval, one week prior to commencement of works shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of wok each day, SIGNAGES, safety measures for transport of hazardous materials and arrangement of flagmen. The mitigation measures should refer the traffic management measures as per SP 55 of IRC Codes & MORTH 111 (111.9, 111.11 & 111. 12). The arrangement for the temporary diversion of the land shall ensure to minimize the environmental impacts, like loss of vegetation, productive lands etc., prior to the finalization of diversion and detours. Special consideration will be given to the preparation of the traffic control plan for safety of pedestrians and workers at night. The contractor will ensure that the diversion / detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. He shall inform local community of changes to traffic routes, conditions and pedestrians access arrangements. This plan will be periodically reviewed with respect to site conditions. The temporary traffic detour will be kept free of dust by frequent application of water. The bituminous surface debris from the project may be considered for the paving of cross roads, access roads and paving works in traffic diversion roads, haulage routes etc.,	Throughout the project corridor	PIA / Contractor
3.8	Informa-torySigns/Hoard-ings	The contractor will provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required or as suggested by the Engineer.	All construction sites	Contractor / PIA

		CONSTRUCTION STAGE: **(b) EXECUTION OF WORKS:**		
3.9	Stripping, stocking and preservation of top soil	(i) The topsoil from borrow areas, areas of cutting and areas to be permanently covered will be stripped to a specified depth of 150 mm and stored in stockpiles. At least 10% of the temporarily acquired area will be earmarked for storing topsoil. (ii) The stockpile will be designed such that the slope does doesn't exceed 1:2 (vertical to horizontal), and the height of the pile is to be restricted to 2m. (iii) Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur. (iv) The stockpiles will be covered with gunny bags or tarpaulin. (v) It will be ensured by the contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles. Such stockpiled topsoil will be returned to cover the disturbed area and cut slopes. The contractor shall maintain record of topsoil stocks and location. The stockpiled topsoil shall be utilized for: (i) top dressing of the road embankment and fill slopes (ii) plantations in the median and sides of main carriageway (iii) covering all disturbed areas including borrow areas (not those in barren areas) (iv) agricultural fields acquired temporarily for construction works. The contractor shall prepare a **utilization plan** and report topsoil use to engineer on regular basis. Refer MORTH 201.4	Throughout project corridor	Contractor /PIA
3.10	Quarries	The quarry operations will be undertaken within the rules and regulations in force. All possible & practical measures to control noise emissions during drilling/excavations shall be employed.	All along the project corridor and all haul roads	Contractor

3.11	Excavations	All excavations will be done in such a manner that the suitable materials available from excavation are satisfactorily utilized. The excavation shall conform to the lines, grades, side slopes and levels shown in the drawing or as directed by the engineer. While planning or execution the contractor shall take all adequate precautions against soil erosion, water pollution etc and take appropriate drainage measures to keep the site free of water, through use of mulches, grasses, slope drains and other devices. The contractor shall take adequate protective measures to see that excavation operations do not affect or damage adjoining structures and water bodies.	All along the project corridor	Contractor
3.12	Earth fill	Embankment and other fill areas, unless other wise permitted by the engineer, be constructed evenly over their full width and the contractor will control and direct movement of construction vehicles and machinery over them.	Along earth fill areas	Contractor
3.13	Water Extraction	Water extraction/ Procurement of water is to be carried out as per provisions given and the contractor will minimize wastage of water during construction	All water bodies recommended to be used in the project	PIA/ Contractor.
3.14	Water Pollution from Construction Wastes	The Contractor will take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation system. Contractor will avoid construction works close to the streams or water bodies during monsoon. All waste arising from the project is to be disposed off in the manner that is acceptable to the State Pollution Control Board or as directed by Engineer. The Engineer will certify that all liquid wastes disposed off from the sites meet the discharge standards.	All along the project corridor	Contractor

3.15	Silting, contamination of water bodies	Silt fencing will be provided around stockpiles at the construction sites close to water bodies. The fencing needs to be provided prior to commencement of earthworks and continue till the stabilization of the embankment slope, on the particular section of the road. Construction materials containing fine particles will be stored in an enclosure such that sediments – laden water does not drain into nearby watercourses. All discharges standards promulgated under environmental Protection Act, 1986, will be adhered to. All liquid wastes generated from the site will be disposed off as acceptable to the engineer.	Water bodies close to the project corridor	Contractor
3.16	Cutting/ Filling near surface water bodies	Earth works shall be undertaken such that the existing embankments of water bodies are not disturbed. In case of cutting of embankments, the same shall be reconstructed with appropriate slope protection measures and adequate erosion control measures.	Surface water bodies whose embankment are being cut	Contractor
3.17	Drainage requirement at construction site	In addition to the drainage requirement, the contractor will take all desired measured as directed by the engineer such measures to prevent temporary or permanent flooding of the site or any adjacent area.	All along the project corridor	Contractor

3.18	Pollution from Fuel and Lubricants/ Contamination of soil	Contractor will ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. Oil interceptors will be provided for vehicle parking, wash down and refueling areas as per the design provided. In all, fuel storage and refueling areas, if located on agricultural land or areas supporting vegetation, the top soil will be stripped, stockpiled and returned after cessation of such storage. Contractor will arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to Engineer) and approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with MoEF and state PCB guidelines. Engineerwill certify that all arrangements comply with the guidelines of PCB/ MoEF or any other relevant laws.	All along the project corridor	Contractor

3.19	Noise Pollu-tion: Noise from Vehicles, Plants and Equipments	The Contractor will confirm the following: • All plants and equipment used in construction (including the and PIU, NHAI aggregate crushing plant) shall strictly conform to the MoEF/CPCB noise standards. • All vehicles and equipment used in construction will be fitted with exhaust silencers. • Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced. • Limits for construction equipment used in the project such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws shall not exceed 75 dB (A) (measured at one meter from the edge of equipment in the free field), as specified in the Environment (Protection) rules, 1986. • Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Engineer to keep noise levels at the minimum. • Idling of temporary trucks or other equipment shall not be permitted during periods of unloading or when they are not in active use. (MORTH: 201.2) At the construction sites within 150 m of the nearest habitation, noisy construction work such as crushing, concrete mixing, batching will be stopped during the night time between 9.00 pm to 6.00 am. No noisy construction activities will be permitted around educational institutes/health centers (silence zones) up to a distance of 100 m from the sensitive receptors i.e., school, health centers and hospitals between 9.00 am to 6.0 pm. Contractor will provide noise barriers (Design of Noise Barrier Provided) to the suggested locations of select schools/ health centers. List of locations for noise barriers is given in specific EMP. Monitoring shall be carried out at the construction sites as per the monitoring schedule and results will be submitted to Engineer. Engineer will be required to inspect regularly to ensure the compliance of EMP. (Refer MORTH 111.3)	All along the project corridor	Contractor

3.20	Opera-tion of construc-tion equip-ment and vehicles	Notwithstanding any other condition of contract, noise level from any item of plants must comply with the relevant legislation for levels of noise emission. The contractor will ensure that the AAQ concentration at these construction sites are within the acceptable limits of industrial uses in case of hot mix plants and crushers and residential uses around construction camps.	All constructio n equipment and vehicles	Contractor
3.21	Transpor -ting construc-tion materials	All vehicles delivering materials to the site will be covered to avoid spillage of materials. All existing highway and roads used by vehicles of the contractor, or any of his sub – contractor or suppliers of materials and similarly roads which are part of the work will be kept clean and clear of dust/ mud or other extraneous materials dropped by such vehicles. The fall height shall be kept low so that least amount of dust is airborne, during unloading of materials. The unloading of materials at construction sites close to settlement will be restricted to daytime.	All along the project corridor and all haul roads	Contractor
3.22	Dust	All earth work will be protected in manner acceptable to the engineer to minimize generation of dust. Area under construction shall be covered & equipped will dust collector. Construction material shall be covered or stored in such a manner so as to avoid being affected by wind direction. The contractor will take every precaution to reduce the level of dust along construction sites involving earthworks, by frequent application of water	All along the project corridor	Contractor
CONSTRUCTION STAGE: **(c) Safety Measures and Workmen**				

3.23	Pre-cautionary / Safety Measures during Construction	All relevant provisions of the Factories Act, 1948 and the building and other construction workers (regulation of Employment and Conditions of services) Act, 1996 will be adhered to. Adequate safety measures for workers during handling of materials at site will be taken up (section 2.1.6) The contractor has to comply with all regulation regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and exit.	All construction sites	Contractor
3.23	Barrica-ding site	The construction site shall be barricaded at all times in a day with adequate markings, flags, reflectors etc. for safety of general traffic movement, workers and pedestrians.	- do-	-do-
3.24	Material Handling at site	All workers employed on mixing asphaltic material, cement, lime mortars, concrete etc., will be provided with protective footwear and protective goggles.	All construction sites	Contractor

3.25	Personal Safety Measures for Labour	Contractor will provide all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staff. • Protective footwear and protective goggles to all workers employed on mixing asphalt materials, cement, lime mortars, concrete etc. • Welder's protective eye-shields to workers who are engaged in welding works • Protective goggles and clothing to workers engaged in Factories Act, 1948 stone breaking activities and workers will be seated at sufficiently safe intervals • Earplugs to workers exposed to loud noise and workers working in	All construction sites	Contractor

3.26	First Aid	The contractor will arrange for - • a readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone • availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital Equipment and trained nursing staff at construction camp.	All construction sites	Contractor
3.27	Traffic and Safety	The contractor will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as proposed in the Traffic Control Plan/Drawings and as required by the Engineer for the information and protection of traffic approaching or passing through the section of any existing cross roads. The contractor will ensure that all signs, barricades, pavement markings are provided as per the MoRTH specifications.	All along the project corridor and all haul roads	Contractor
3.28	Pedestrian Safety	Pedestrian Safety shall be ensured. Pedestrian circulation shall be demarcated prior to start & unsafe areas shall be cordoned off (MORTH 112.2)		
3.29	Risk from Electrical Equipment(s)	The Contractor will take all required precautions to prevent danger from electrical equipment and ensure that - • No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. • All necessary fencing and lights will be provided to protect the public in construction zones. All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer.	All construction equipment	Contractor

3.0 CONSTRUCTION:
(d) Environmental enhancement and special issues:

3.30	Enhancement measures	Enhancement of all incidental spaces shall be planned and carried out prior to completion of construction, along the project road. Some of the enhancement measures to be considered along the project roads include Avenue tree plantation along the entire stretch of the road, rain water harvesting, Landscaping at junctions to improve aesthetics etc.	At suitable locations along the project road.	PIA/ Contractor
3.31	Road side Plantation Strategy	The contractor will do the plantation at median and/or turfing at embankment slopes as per the tree plantation strategy prepared for the project. Minimum 80 percent survival rate of the saplings will be acceptable otherwise the contractor will replace dead plants at his own cost. The contractor will maintain the plantation till they handover the project site to Highways Department. The Engineer will inspect regularly the survival rate of the plants and compliance of tree plantation guidelines.	At locations identified along the project road.	Contractor
3.32	Flora and Chance found Fauna	The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. If any wild animal is found near the construction site at any point of time, the contractor will immediately upon discovery thereof acquaint the Engineer and carry out the Engineer's instructions for dealing with the same. The Engineer will report to the near by forest office (range office or divisional office) and will take appropriate steps/ measures, if required in consultation with the forest officials.	Along the project road.	Contractor

3.33	Chance Found Archae-ological Property	All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation. The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the SC's instructions for dealing with the same, waiting which all work shall be stopped. The Engineer will seek direction from the Archaeological Survey of India (ASI) before instructing the Contractor to recommence the work in the site.	Along the project road.	Contractor
3.34	Monitoring of environment parameters	The contractor will undertake seasonal monitoring of air, water, noise and soil quality through an approved monitoring agency. The parameter to be monitored, frequency and duration of monitoring plan shall be prepared (Refer Table 5.2).	Corridor of Impact	Contractor
3.35	Sensitive Areas	The sensitive areas like Schools, hospitals to be provided with suitable noise barriers and safety measures(refer BOQ) prior to the start of work in order to minimize the dust and noise impacts due to vehicle movement during construction and their effectiveness to be checked during operation phase .	location at 0/700	Contractor
3.36	Clearing of construction of camps and restoration	Contractor to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer. Residual topsoil will be distributed on adjoining / proximate barren / rocky areas as identified by the engineer in a layer of thickness of 75 mm – 150 mm.	All construction workers camps	Contractor
3.37	Redevelopment of borrow areas	Redevelopment of borrow areas will be taken up in accordance with the Borrow area Restoration plan approved by the engineer.	All borrow areas of the project	Contractor

3.38	Tree Protection, Tree Planting,	• Giving due protection to the trees that fall in the shoulders /corridor of impact shall be the prime focus during Construction/post construction • This will also include the provision of tree guards for the existing trees on the slope / embankment of the proposed road (refer BOQ), with retro reflective studs on them to facilitate better visibility during night time. Where the tree guards are necessary, care should be taken to ensure that they do not impede natural movement or restrict growth. • Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars, use of plate compactors near trees may also be considered where necessary • Re-plantation of at least twice the number of trees cut should be carried out along the project road. Since the major portion of the project road may pass through open lands, planting of trees along the entire stretch of the road is recommended as an enhancement measure(as mentioned in BOQ), which would also serve as a mechanism to delineate ROW and prevent future encroachments / squatters into the right of way, wherever possible. Growth and survival of trees planted shall be ensured and monitoring done at least for a period of 3 years. Survival status shall be reported on monthly basis to Engineer of PIA	All tree plantation / greenery areas of the project	Concerned agency/Contractor / PIA
	4.0 Operation Phase			
4.1	Increased noise and air pollution from increased traffic volume.	Plant suitable trees or noise barriers at sensitive receptors.	ULB / Traffic Police / RTO	ULB in co-ordination with TNPCB

4.2	Safety of residents and pedestrian road users.	• Provide pedestrian crossing wherever necessary.	ULB / Traffic Police / RTO	Police Department in co-ordination with RTO and ULB

2. Environmental clearances required

Apart from the clearance for overall projects works, the following are some of the statutory requirements that are to be complied with by the contractor before and during the execution of the proposed improvement work.

Table EMP 2

Environmental clearance required during construction

Sl.no	Construction activity	Statutory authority	Statute under which Clearance is Required	Responsibility	
				Implementation	Supervision
1.	Tree Cutting	Department of Forest and District Collector	Clearances from the authorities as per the Tamil Nadu Timber Transit Rules,1968 or latest.	PIA	ULB/PIA
2	Hot mix plants, Crushers and Batching plants	Tamilnadu State Pollution Control Board	Consent to establish and consent to operate under Air (P & CP) Act, 1981	Contractor	PIA
3	Discharges from construction activities	Tamilnadu State Pollution Control Board	Consent to establish and consent to operate under Water (P&CP) Act, 1974	Contractor	PIA
4	Storage, handling and transport of hazardous materials	Tamilnadu State Pollution Control Board	Hazardous Wastes (Management and Handling) Rules. 1989 Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989	Contractor	PIA
5	Sand mining, quarries and borrow areas	Department of Geology and mining, Govt of Tamilnadu	Tamilnadu Minor Mineral Concession Rules, 1959 (corrected up to 31.3.2001)	Contractor	PIA
6	Groundwater extraction	Public Works Department (Groundwater)	Tamilnadu Groundwater Development and Management Act 2000	Contractor	PIA
7	Disposal of bituminous wastes	Tamilnadu State Pollution Control Board	Hazardous Wastes (Management and Handling) Rules. 1989	Contractor	PIA
8	Temporary traffic diversion measures		MoRTH 112 SP 55of IRC codes	Contractor	PIA

3. Environmental Monitoring Plan

To monitor the extent of environmental impact of the proposed project, the contractor has to periodically monitor the ambient environmental quality along the proposed road. The monitoring requirement for the different environmental components is presented in table below

Table EMP 3 Environmental Monitoring Plan

Air Quality Monitoring	
Project stage	Pre Construction , Construction & operation period (as agreed)
Parameter	SPM, RPM, SO_2, NO_x, CO and Pb
Sampling Method	High volume air sampler to be located 50 m from the plant in the downwind direction. Use method specified by CPCB for analysis
Standards	Air (Prevention and Control of Pollution) Rules, CPCB, 1994
Frequency	Once before start of work & once every season of the year during construction period (except monsoon) & upto 18 months (operation Period)
Duration	Continuous 24 hours / or for 1 full working day
Location	Wherever the contractor decides to locate the hot mix plant and sensitive locations along the road stretch.
Measures	Wherever air pollution parameters increase above specified standards, additional measures as decided by the engineer shall be adopted
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing Agency
Water quality Monitoring	
Project stage	Pre Construction & Construction
Parameter	• pH, BOD, COD, DO, TDS, Pb, Oil & Grease and Detergents for Surface water. • Water pH, TDS, Total hardness, Sulphate, Fluorides,Chloride, Fe, Pb for groundwater.
Sampling Method	Grab sample collected from source and analysis as per Standard Methods for Examination of water and Waste water
Standards	Indian standards for Inland Surface Water (IS; 2296, 1982) and for Drinking water (IS; 10500,1991)
Frequency	Seasonal during the construction period
Duration	Grab sampling
Location	•At minimum 4 locations to represent residential, agricultural, surface water quality and vicinity of the construction site.
Measures	At locations of increased in water pollution, all inflow channels shall be checked for pollution loads and channel delivering higher pollution loads and channel delivering higher pollution load shall be terminated from disposal into the water source and other methods of disposal shall be adopted
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing Agency

Noise Level Monitoring	
Project stage	Pre Construction , Construction & operation period (as agreed)
Parameter	Noise level on dB (A) scale noise levels on dB (A) scale
Special guidance	• Free field at 1 m from the equipments whose noise level are being determined. • Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement

Standards	MoEF Noise Rulers, 2000
Frequency	Once every seasons (except monsoon) for each year of construction
Duration	Reading to be taken at 15 seconds interval for 15 minutes every hour and then averaged
Location	• Wherever the contractor decides to locate the equipment yard. • At sensitive location such as school, dispensary etc
Measures	Incase of noise levels causing disturbance to the sensitive receptors, management measures as suggested in the EMP shall be carried out.
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing Agency
Soil Quality Monitoring	
Project stage	Pre Construction & Construction
Parameter	Monitoring of Pb, SAR and Oil & Grease
Sampling Method	• Sample of soil collected to be acidified and analysed using absorption spectrophotometer
Standards	Threshold for each contaminated set by IRIS database of USEPA until national standards are promulgated
Frequency	• During the pre monsoon post monsoon seasons each year for the entire construction period
Duration	Grab sampling
Location	• At productive agriculture lands abutting traffic detours and traffic diversions and major intersections
Measures	At location of increased in pollution levels, source shall be identified and shall be diverted from future disposal
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing Agency

Apart form the above mentioned monitoring requirements, any major accidents /spillage during storage, handling, and transport to be monitored will be decided by the engineer and should be carried out by the contractor through approved monitoring agencies and supervised by the Implementing Agency at their own cost.

4. FORMATS FOR REPORTING AND PENALTY MEASURES:

Formats for reporting / monitoring the progress / parameters achieved and specific penalty measures as may be required to achieve / implement the EMP , will be finalized in consultation with the successful bidder .

5 Greenbelt Development Plan

The right of way shall be defined during the proposed improvement works and hence it is suggested to develop a greenbelt along the existing road stretch. The greenbelt development will have following objectives.

- Restoration of green cover lost due to road widening
- Attenuation of air and noise pollution
- Creation of aesthetic environment
- Prevent or restrict encroachments within the ROW in future

The selection of trees and plants for greenbelt should be those which could grow in hot and humid climate and survive in sandy to silty clay soil. Plant species should be native in nature and should be able to grow under the existing agro climatic conditions. Plant species would need minimum level of maintenance. The plants and trees should be selected in consultation with the forest department and neighborhood residents may be organized as societies to maintain these green belts with incentives.

6 Environmental Compliance Report

The contractor shall submit a monthly progress report as per the reporting format approved by the engineer, on the status of the implementation of the EMP, and get it duly approved by the engineer for its compliance and for proceeding with the work. The Engineer and the Environmental and Social Safeguard (ESS) Manager, who will have access and authority to monitor the status based on the same and for which necessary facilities shall be made by the contractor**.**

4. SAMPLE ENVIRONMENTAL MANAGEMENT PLAN FOR SOLID WASTE MANAGEMENT AND DISPOSAL

Activity	Potential Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
A. Development and Design Phase				
Land acquisition	Loss of tree cover.	• Undertake afforestation programs to compensate to loss of tree cover	ULB	ULB
	Encroachment into sensitive areas such as forests, wildlife habitations etc especially in case of laying transmission mains	• Ensure proper Site. In case of encroachments, ensure minimum disturbance and destruction. Obtain permission from respective authorities such as Department of Ecology, Environment and Forests	ULB	TNPCB
Design and Development	Nuisance hazards to neighbouring areas.	• Ensure proper design and adequate buffer zones to comply with MSW Rules, 2000.	Design Consultant/ PIA/ ULB	ULB
	Contamination of groundwater due to leaching.	• Ensure appropriate design provisions are made for liners, leachate collection and treatment facilities to prevent percolation of leachate.	Design Consultant/PIA	ULB
	Reduced land values in nearby areas and impacts aesthetics affected.	• Adequate buffer zones during development shall be provided to mitigate the affect considerably.	Design Consultant/ ULB	ULB

B. Construction Phase				
Excavation activities	Noise and dust due to vehicle movement and other activities.	o Construction of pucca roads and provision of green cover; use of less noise generating equipment for all activities; and provision for personal protective equipment, ear muffs, etc. for landfill/compost construction employees. o Approach road shall be constructed before starting the work, to reduce the dust and vehicular pollution	Contractor and PIA	PMC & ULB
	Safety hazards to labour.	o Adequate safety precautions such helmets, safety shoes, gloves, etc. should be provided to the labour.	Contractor and PIA	PMC & ULB
C Operation Phase				
Disposal of solid waste	Nuisance due to odour and influx of insects, rodents, flying birds.	o Provide adequate buffer zone around the landfill site with thick vegetative cover. o Waste shall be dumped at the designated place and shall not allow the waste to accumulate near the waste reception area.	Operator/ PIA	ULB and TNPCB
	Emission of toxic gases from landfill site.	o Provision of landfill gas management system.	Operator/ PIA	ULB and TNPCB
	Health and safety of workers due to the release of toxic gases and hazardous materials during the operation of the facility.	Proper and timely compaction of waste and provision of protective material to landfill employees.	Operator/ PIA	ULB and TNPCB
	Contamination of groundwater	o Proper maintenance of leachate collection facilities shall be done. Leachete shall be treated to the standards of TNPCB before disposal.	Operator/ PIA	ULB and TNPCB
	Public health and safety hazards to workers from odor, smoke from fire and diseases transmitted by flies, rodents, etc.	o Ensure proper compaction and regular covering of waste, and provide adequate buffer from the nearby areas by means of green cover.	Operator/ PIA	ULB

5. SAMPLE ENVIRONMENTAL MANAGEMENT PLAN FOR STORM WATER DRAINAGE PROJECTS

Sl.no	Potential Impact	Mitigation Measures	Responsible agencies
	DESIGN PHASE		
(i)	Flood management	• Adopt suitable Storm Return Intervals, higher rainfall intensity and future land use pattern. • Consider boundary condition at disposal point to handle High Flood Level • Consider provisions like flap gates to prevent reverse flow into the drains from the canals	
(ii)	Ground water rechage	Provide recharging structure and rain water harvesting features in the design to ensure ground water recharge.	
(iii)	Silt / Sediment in drain	Provide facilities like silt trap for control of sediments from entering the drains and at cross drainage confluence points.	
(iv)	Social Impacts	Consider alternatives to minimize the impacts on nearby residents and structures.	
1.0	**PRE-CONSTRUCTION AND CONSTRUCTION PHASE**		
1.1	Clearances	All clearance required from other departments and Environmental aspects shall be ensured and made available before start of work.	IA
1.2	Tree Cutting	i) Provide adequate protection to the trees to be retained with tree guards (e.g. Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars) as required. ii) Take adequate care to determine to root protection zone and minimise root loss. iii) Trees shall be removed from the construction sites before commencement of construction iv) Undertake afforestation in nearby areas.	Prospective contractor / IA
1.3	Utility Relocation	i) Identify the common utilities that would be affected such as: telephone cables, electric cables, electric poles, water pipelines, public water taps, etc. ii) Affected utilities shall be relocated with prior approval of the concerned agencies before construction starts. iii) Where ever the entry and exit to houses/ establishments are affected due to construction activities, alternate temporary arrangement for crossing over shall be provided.	IA / Concerned departments/ Contractor

1.4	Baseline parameters	i) Base line parameters shall be recorded and ensured conformance till the completion of the project. ii) The contractor shall undertake periodical monitoring of air, water, noise and soil quality through an approved monitoring agency. The parameter to be monitored, frequency and duration of monitoring plan shall be prepared. iii) Adequate measures shall be taken and checked to control any pollution and report be sent to the Engineer.	Prospective contractor / IA
1.5	Planning of temporary Traffic arrangements	i) Temporary diversion will be provided with the approval of the engineer. Detailed traffic control plans will be prepared and submitted to the engineers for approval, one week prior to commencement of works. ii) The traffic control plans shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of wok each day, SIGNAGES, safety measures for transport of hazardous materials and arrangement of flagmen.	Prospective contractor / IA
1.6	Temporary flooding during construction activity.	i) Desilting activity shall be scheduled during non-flooding season. ii) Proper drainage arrangements to be made, to avoid the overflowing of existing drains due to construction activity.	Prospective contractor / IA
1.7	Prevention of accidents	i) Prevention of accidents involving human beings, animals or vehicles falling or accidents during construction period. This needs to be ensured with proper barricading, signage boards and lighting etc. ii) The project engineer of IA will plan and direct the contractor to execute the work progressively so that the length of the open excavated trench is minimised in order to reduce possible accidents	Prospective contractor / IA
1.8	Barricading site	The construction area should be barricaded at all time in a day with adequate marking, flags, reflectors etc. for safety of general traffic movement and pedestrians.	Contractor
1.9	Drainage flow	i) Alternate arrangement like diversion of the drainage be ensured to allow the natural flow. ii) It shall be ensured that none of the construction activities affect the natural flow of the drainage.	Prospective contractor / IA

1.10	Storage of materials	i) No construction materials should be stored on the road, on top of or beside drains and footpaths, or on any other public area as this may restrict public access to these utilities. ii) The contractor shall identify the site for temporary use of land for construction sites /storage of construction materials, etc. iii) Site for storage of construction materials to be identified without affecting the traffic and other common utilities, and the quality of the construction materials. iv) Construction materials should only be stored and prepared on the site if they do not obstruct the road or any surrounding public utility. Construction materials should only be transported to the worksite as and when required for construction	Prospective contractor / IA
1.11	Using of modern machineries	i) Using of modern machineries such as JCBs, backhoes etc, shall be used to minimize the construction period, it will reduce the construction period impacts to the near by residents.	Contractor
1.12	Dust Pollution near settlements	i) All earth work will be protected in manner acceptable to the engineer to minimize generation of dust. Area under construction shall be covered & equipped will dust collector. ii) Construction material shall be covered or stored in such a manner so as to avoid being affected by wind direction. iii) Unpaved haul roads near / passing through residential and commercial areas to be watered thrice a day. iv) Trucks carrying construction material to be adequately covered to avoid the dust pollution and to avoid the material spillage. v) Sprinkling of water to be done at regular intervals at places of work to protect the nearby inhabitants and road users.	Contractor
1.13	Protection of residential / sensitive receptors.	i) Noisy construction operations in residential and sensitive areas should be done only between 7.30 am and 6.00 pm. ii) Preventive maintenance of construction equipment and vehicles to meet emission standards and to keep them with low noise. iii) Provision of enclosing generators and concrete mixers at site. iv) Sound barriers shall be installed during the construction phase to protect the inhabited areas from the noise from construction activities. v) Adequate barricading and safety measures to protect dust pollution and noise impacts on sensitive receptors like schools and hospital etc due to vehicle movement to be ensured prior to the start of work and their effectiveness to be checked during construction and operation	Contractor

		phase.	
1.14	Vehicular noise pollution at residential / sensitive receptors.	i) Idling of temporary trucks or other equipment should not be permitted during periods of loading / unloading or when they are not in active use. The practice must be ensured especially near residential / commercial / sensitive areas. ii) Stationary construction equipment will be kept at least 500m away from sensitive receptors. iii) All possible and practical measures to control noise emissions during drilling shall be employed. The IA may direct to take adequate controls measures depending on site conditions.	Contractor
1.15	Noise from vehicles, plants and equipments	i) Use of less noise generating equipment, provide personal protective equipment's such as ear plugs/muffs and other safety measures to labourers. In addition the concrete mixture to be used for construction works will be prepared in a location away from the locality to minimize the noise generated from the machinery. ii) Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced. iii) Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Engineer to keep noise levels at the minimum.	Contractor
1.16	Labour camp & facilities	Setting up of labour camps needs to be done as per the procedures. Adequate potable water facilities, sanitation and drainage etc., in conformity with the Indian labour laws shall be ensured. The contractor shall also guarantee the following: i) The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction. ii) The construction will commence only upon the written approval of the Engineer. iii) The Contractor shall construct and maintain all labour accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing. iv) Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities. v) The sewage system for the camp shall be designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place. Ensure adequate water supply is to be provided in all toilets and urinals. vi) The contractor shall provide garbage bins in the camps and ensure that these are regularly	Contractor

		emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Engineer. vii) Unless otherwise arranged by local sanitary authority, arrangements for disposal of night soils (human excreta) suitably approved by the local medical health or municipal authorities or as directed by Engineer will have to be provided by the contractor.	
1.17	Pollution from Construction Wastes	All waste arising from the project is to be disposed off in the manner that is acceptable by the Engineer. The engineer shall certify that all liquid wastes disposed off from the sites meet the discharge standard.	Contractor
1.18	Pollution from Fuel and Lubricants	i) The contractor shall ensure that all construction vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites will be located at least 500 m from sensitive receptors. ii) All location and lay-out plans of such sites shall be submitted by the Contractor prior to their establishment and will be approved by the Engineer. iii) Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. iv) Contractor shall arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to Engineer) and approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with MoEF and state PCB guidelines. v) Engineer will certify that all arrangements comply with the guidelines of PCB/ MoEF or any other relevant laws.	Contractor
1.19	Flora and Chance found Fauna	The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. If any wild animal is found near the construction site at any point of time, the contractor will immediately upon discovery thereof acquaint the Engineer and carry out the Engineer's instructions for dealing with the same. The Engineer will report to the near by forest office (range office or divisional office) and will take appropriate steps/ measures, if required in consultation with the forest officials.	Prospective contractor / IA

1.20	Chance Found Archaeological Property	All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation. The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the SC's instructions for dealing with the same, waiting which all work shall be stopped. The Engineer will seek direction from the Archaeological Survey of India (ASI) before instructing the Contractor to recommence the work in the site.	Prospective contractor / IA
1.21	Disposal of oil and grease	A suitable site should be identified for safe disposal / without contaminating the source, in relatively low lying areas, away from the water bodies etc., as approved by the Engineer & as per specific procedures.	Prospective contractor / IA
1.22	Safety Aspects	i) Adequate precautions shall be taken to prevent the accidents and from the machineries. All machines used shall confirm to the relevant Indian standards Code and shall be regularly inspected by the IA. ii) Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil. iii) Protective footwear and protective goggles to all workers employed on mixing of materials like cement, concrete etc. iv) Welder's protective eye-shields shall be provided to workers who are engaged in welding works. v) Earplugs shall be provided to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation. vi) The contractor shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc to workers and staffs. vii) The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract. viii) The contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to. ix) The contractor shall not employ any person below the age of 14 years for any work and no	Contractor

		woman will be employed on the work of painting with products containing lead in any form.	
1.23	Risk from Electrical Equipment(s)	The Contractor shall take all required precautions to prevent danger from electrical equipment and ensure that - i) No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. ii) All necessary fencing and lights will be provided to protect the public in construction zones. iii) All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer.	Contractor
1.24	First Aid	The contractor shall arrange for: i) A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone ii) Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital	Contractor
1.25	Informatory Signs and Hoardings	The contractor shall provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required or as suggested by the Engineer.	Prospective contractor / IA
1.26	Disposal of desilted / excavated material, construction and other waste.	(a) The dumping does not impact natural drainage courses (b) No endangered / rare flora is impacted by such dumping (c) Settlement area located at least 1.0 km away from the site. (d) Should be located in non residential areas located in the down wind side (e) located at least 100m from the designated forest land. (f) avoid disposal on productive land. (g) should be located with the consensus of the local community, in consultation with the engineer (h) All vehicles delivering material to the site shall be covered to avoid material spillage.	Prospective contractor / IA
1.27	Clearing of construction	i) Contractor to prepare site restoration plans, the plan is to be implemented by the contractor prior to demobilization.	Prospective contractor

	camps and restoration	ii) On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.	

2.0	**OPERATION PHASE**		
Sl.no	**Potential Impact**	**Mitigation Measures**	**Responsible agencies**
2.1	Maintenance	i) It shall be ensured by the IA that drains are not clogged. The following practices should be adopted in maintaining storm water drains: ii) Drains shall be regularly inspected and cleaned especially prior to monsoons. iii) All damaged or missing drain covers should be replaced immediately iv) Rubbish and silt that has been removed from the drainage system should not be left alongside the drain and shall be immediately disposed in pre-identified site with necessary precautions	IA
2.2	Impairment of receiving water quality due to mixing of waste water	i) Avoid mixing of wastewater from household, commercial, industrial and other establishments. ii) Provision for connecting domestic liquid waste to sewerage system is to be made during drain construction to avoid mixing of wastewater. iii) Periodical monitoring shall be carried out and sources of wastes/ effluent etc are to be identified by the IA. iv) IA may initiate action to ensure proper linking of such connections to other waste disposal systems and it shall be ensured that the drains carry only the rainwater. v) In case of any industrial effluent identified, necessary action be taken in co-ordination with the TNPCB.	IA
2.3	Nuisance due to clogging of drains, formation of mosquito breeding	i) Ensure timely desilting of drains ii) Create awareness among the people not to throw garbage and other waste into the drains	IA

	grounds etc.,		
2.4	Disposal of stormwater	i) Mixing of wastewater from households, commercial, industrial and other establishments will be avoided through improved sewerage system in the project area through periodical monitoring of water quality. ii) Possibility of reusing the stormwater for secondary uses with minimum treatment shall be explored and implemented.	IA
2.5	Tree Planting & Protection	i) Plantation of trees shall be carried out along the streets of Manapakkam, Mugalivakkam, Ramapuram, Padikuppam, Nolumbur and Ambattur etc or any other place possible like parks in the nearby areas. ii) Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars, use of plate compactors near trees may also be considered where necessary. iii) Growth and survival of trees planted shall be ensured and monitoring done at least for a period of 3 years. Survival status shall be monitored on monthly basis by Engineer in-charge.	IA
2.6	Flood management	Flood management system may be developed with forecasting and warning to protect areas prone to flooding and action be taken as necessary, like bailing out of water, relocation of residents to other locations etc.	IA
2.7	Solid waste Management	i) Provide additional bins in critical locations ii) Ensure frequent collection and disposal of waste iii) Carryout periodical awareness programmes to educate the public / stakeholders	IA

Environmental Monitoring Plan

To monitor the extent of environmental impact of the proposed /implemented project, the contractor has to periodically monitor the ambient environmental quality along the proposed project area. The monitoring requirement for the different environmental components is presented in table below

Environmental Monitoring Plan

Air Quality Monitoring	
Project stage	Construction
Parameter	SPM, RPM, SO_2, NO_x, CO and Pb
Sampling Method	Use method specified by CPCB for analysis
Standards	Ambient Air Quality Standards, CPCB, 1994, Air (Prevention and Control of Pollution) Act,1981
Frequency	Once every season except monsoon during construction period
Duration	As per CPCB guidelines for monitoring
Location	Sensitive locations, especially in the downwind direction along the alignment.
Measures	Wherever air pollution parameters increase above specified standards, additional measures as decided by the engineer shall be adopted
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing Agency
Water quality Monitoring	
Project stage	Construction & Operation period (as agreed)
Parameter	Parameters for Surface water quality standards (IS; 2296) Water pH, TDS, Total hardness, Sulphate, Fluorides, Chloride, Fe, Pb for groundwater.
Sampling Method	Grab sample to be collected and analysis as per Standard Methods for Examination of water and Waste water.
Standards	Indian standards for Inland Surface Water (IS; 2296, 1982) and for Drinking water (IS; 10500,1991)
Frequency	Once every season during construction and during operation period.
Duration	Grab sampling
Location	Locations representing water quality in the drain and ground water quality
Measures	At locations of variation in water quality/increased pollution, remedial measures to be adopted /all inflow channels shall be checked for pollution loads
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing Agency
Noise Level Monitoring	
Project stage	Construction
Parameter	Noise levels on dB (A) scale.
Special guidance	• Free field at 1 m from the equipments whose noise level are being determined. • Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement
Standards	National Ambient Air Quality Standards in respect of Noise, Noise Pollution (Regulation and Control) Rules, 2000
Frequency	Seasonal during construction period.

Duration	Reading to be taken at 15 seconds interval for 15 minutes every hour and then averaged
Location	• Wherever the contractor decides to locate the equipment yard. • At sensitive locations such as school, hospitals etc along the alignment.
Measures	In case of noise levels causing disturbance to the sensitive receptors, management measures as suggested in the EMP shall be carried out.
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing Agency
Soil Quality Monitoring	
Project stage	Construction & Operation (as agreed)
Parameter	Soil quality parameters (Pb, SAR and Oil & Grease, monitoring silt for presence of toxic metals , etc)
Sampling Method	• Sample of soil collected to be acidified and analysed using absorption spectrophotometer
Standards	Threshold for each contaminated set by IRIS database of USEPA until national standards are promulgated
Frequency	• During the pre monsoon post monsoon seasons each year for the entire construction and operation phase
Duration	Grab sampling
Location	• At sample locations in the receiving waterbodies, at the places of dumping silt, excavated earth.
Measures	At location of increased in pollution levels, source shall be identified and measures adopted.
Implementation	Contractor through approved monitoring agencies
Supervision	Implementing Agency

Apart form the above mentioned monitoring requirements, any major accidents /spillage during bulk transport of hazardous materials by the contractor, depending on the type of spillages / accidents, the parameters to be monitored will be decided by the engineer and should be carried out by the contractor through approved monitoring agencies and supervised by the Implementing agency at their own cost.

FORMATS FOR REPORTING:

Formats for reporting / monitoring the progress / parameters achieved will be finalized in consultation with the successful bidder.

Environmental Compliance Report

The contractor shall submit a monthly progress report as per the reporting format approved by the Engineer on the status of the implementation of the EMP and get it duly approved by the Engineer for its compliance and for proceeding with the work. The Engineer and the Environmental and Social Safeguard (ESS) Manager, who will have access and authority to monitor the status based on the same and for which necessary facilities shall be made by the contractor.

Document -6

SOCIAL IMPACT ASSESSMENT REPORT OUTLINE

SIA OUTLINE FOR S-1 and S-2 CATEGORY PROJECTS

The Social Impact Assessment shall be carried out for S-1 & S-2 sub projects. The brief contents of the SIA are as follows:

Executive Summary

- Provide an outline of magnitude of potential impacts, significant findings of census and socio-economic survey and provide a brief account of proposed mitigation measures including the timetable, budget and its sources and institutional arrangements for implementation. (The Executive Summary shall be translated into Tamil).

Introduction about the project

- Brief introduction about the project and its components and its location including maps, figures etc.,
- Need for the project
- Description of project components causing land acquisition and resettlement. Overall estimates of land acquisition and resettlement

Minimizing resettlement

- Describe alternatives considered for minimizing resettlement /describe various design options considered for minimizing the social impact .
- Describe the mechanism to minimize resettlement to the extent possible, during project implementation

Objective and Methodology

- Objectives of the resettlement plan
- Methodology of Study

Census and socio-economic surveys

- Identify all categories of impacts (loss of land and assets; loss of livelihood; impacts on groups and communities)
- Socio economic characteristics of the PAPs
- Magnitude of impact
- Details of vulnerable groups as per the definition of ESMF
- Provision to update information on the PAPs
- Inventory of common property resources to which PAPs have access
- Details of common property resources that will be affected
- Details of community organisation
- Outcome of the consultation to relocate the community assets
- Summarize process for consultations on the results of the census surveys
- Describe need and mechanism to conduct updates, if necessary

Legal framework

- Describe the legal and administrative procedures adopted
- Applicable legislations and policies governing rehabilitation and resettlement
- Describe the applicable legislations and policies governing resettlement and rehabilitation and Land Acquisition including Banks operational policies.
- Screen and confirm the presence/non presence of Tribals in the project area .

Resettlement policies and framework

- Describe the policy and approach in ESMF
- Describe eligibility criteria and cut-off date
- Describe method of valuation used for affected structures, land, trees and other assets
- Describe entitlements category wise
- Provide entitlement matrix
- Describe the mechanism to prevent further encumbrances beyond cut-off date

Resettlement sites

- Does the project need residential / commercial (small businesses) relocation sites? Have these been identified in consultation with the PAPs and Hosts?
- Give layouts and designs of residential sites
- Describe the specific process of showing the sites to the PAPs and obtaining their opinion on them.
- Describe the technical and feasibility studies conducted to determine the suitability of the proposed sites.
- Is the land quality / area adequate for allocation to all of the PAPs eligible for allocation of agricultural land, under land for land option?
- Describe mechanisms for (i) procuring, (ii) developing and (iii) allotting resettlement sites
- Provide detailed description of the arrangements for site development for agriculture, including funding of development costs.
- Provide time table for relocation
- Provide details of services requiring augmentation in host communities and how it would be addressed

Participation and consultation

Prepare a Notice /check list prior to holding consultation, FGDs describing the various options for resettlement, entitlements, time and financial budget estimates.

- Describe the process of consultation/participation in resettlement preparation and planning.
- Describe the various stakeholders.
- Describe the Public Hearings, FGDs, Stakeholder Consultations conducted.
- Describe he plan for disseminating information to project affected persons (PAPs), such as provisions for a booklet to inform PAPs and other stakeholders.
- Describe examples of outcomes of participation and consultation, such as how local beneficiaries' views have influenced the design process, entitlements and support mechanisms, or other issues.
- Have workshops been conducted, or are they planned? Who are the participants, and what are the expected outcomes?
- Describe the mechanism for addressing the concerns of stakeholders.
- Describe the outcome of the consultations, FGDs, public hearings etc and how these are included in the SIA /RAP/ARAP etc.
- Provide details disclosure of the reports with dates and reference links of the websites.

Institutional arrangements

- Identify and discuss the institutions responsible for delivery of each item/activity in the entitlement policy
- Describe the project resettlement unit -- functions and organizational structure of the unit and coordination relationship
- State how coordination issues will be addressed in cases where resettlement is spread over a number of jurisdictions.
- Identify who will coordinate all agencies -- with the necessary mandate.
- State when the project resettlement unit will be staffed and appointment of NGOs, to assist in project implementation, will take place
- Describe plans for training and development of staff in the resettlement unit/local agencies / NGOs.
- Discuss initiatives taken to improve the long term capacity or resettlement institutions

Income restoration

- Briefly spell out three main income restoration strategies for each category of impacts, and describe the institutional, financial and technical aspects
- Describe the process of consultation with project affected persons (PAPs) to finalize strategies for income restoration.
- How do these strategies vary with the area/locality of impact?
- Are the compensation entitlements sufficient to restore income streams for each category of impact? What additional economic rehabilitation measures are necessary?
- Does income restoration require change in livelihoods, development of alternative farmlands, etc, or involve some other activities which require a substantial amount of time for preparation and implementation?
- How are the risks of impoverishment proposed to be addressed?
- Are choices and options built into the entitlements? If so, what is the mechanism for risk and benefit analysis of each option? What is the process of ensuring that PAPs have knowledge about alternatives and can make informed decisions? Is there a mechanism to encourage vulnerable groups among PAPs to choose lower risk options, such as support in kind rather than cash?
- What are the main institutional and other measures taken for the smooth implementation of the resettlement programs?

Implementation schedule

- List and briefly describe the chronological steps in implementation of the resettlement, including identification of agencies responsible for each step of the program
- Prepare a month-wise implementation schedule of activities to be undertaken as part of the resettlement implementation (Gantt chart).
- Describe the linkages between resettlement implementation and initiation of civil works for each of the project components.

Costs and budgets

- Clear statement of financial responsibility and authority.
- Cost should include with the breakup of eligible entitlements as per ESMF.
- Ensure that the cost of resettlement is included in the overall project costs.

- Identify components, if any, to be funded by the Bank.
- Resettlement costs should be a part of annual involvement plans.
- Prepare a cost-wise, item-wise budget estimate for the entire direction of resettlement implementation, including administrative expense, monitoring and evaluation and contingencies.
- List the sources of funds and describe the flow of funds.
- Describe the specific mechanisms to adjust cost estimates by the inflation factor.
- Describe provisions to account for physical and price contingencies.
- The budget should include the provisions for appointment of NGOs/PMC and end term impact assessment study.

Grievance redressal Mechanism

- Describe the step-by-step process for registering and addressing grievances.
- Provide specific details regarding registering complaints, response time, communication modes, etc.
- Describe the mechanism for appeal.
- Describe the provisions to approach civil courts in case other provisions fail.

Monitoring and evaluation

- Describe the internal monitoring process
- Define key monitoring indicators. Provide a list of monitoring indicators which would be used for internal monitoring.
- Describe institutional (including financial) arrangements.
- Describe frequency of reporting and content for internal monitoring.
- Describe process for integrating feedback from internal monitoring into implementation.
- Describe financial arrangements for external monitoring and evaluation, including process for awarding and maintenance of contracts for the duration of resettlement.
- Describe methodology for external monitoring.
- Define key indicators for external monitoring, focusing on outputs and impact.
- Describe frequency of reporting and content for external monitoring.
- Describe process for integrating feedback from external monitoring into implementation.

Annexures to the SIA/RAP/ARAP

1. Questionnaire used for Socio Economic Census Survey
2. List of PAFs including Vulnerable PAFs
3. Entitlement Matrix
4. Detailed list of applicable entitlements for each of the PAF
5. R&R Budget Estimates
6. Key socio economic tables and baseline indicators
7. Project Strip Plan (Chainage wise, node wise, package wise details)
8. Select photographs of the sites and PAFs

SOCIAL MANAGEMENT PLAN
FOR S1 &S-2 CATEGORY PROJECTS

Social Assessment	YES	NO	If Yes, Specify Details	Social Management Measure	Cost
1. Is there loss of dwelling land and structure?			i. Total area of land acquired ii. Total no.of HHs losing their dwelling land and structure	i.No.of HHs (with valid title) to be given developed plots and house ii. No.of HHs to be given cash compensation = iii. No. of squatters to be given developed plots and house = iv. No .of HHs to be given shifting allowance = v. No. of HHs to be given transitional assistance =	
2. Is there loss of agricultural land and structure?			i. Total agricultural area acquired ii. Total no.of HHs losing their land and structure iii. Total no.of tenant / leaseholder / sharecroppers losing their tenancy iv. Total no. of agricultural labourers losing their livelihood	i. No.of HHs (with valid title) to be given alternative land = ii. No.of HHs (with valid title) to be given cash compensation = iii. No. of individuals to be given cash compensation = iv. No. of individual tenants / leaseholder / sharecroppers to be given cash assistance = v. No. of individuals to be given notice for harvesting = vi. No. of individuals to be given cash compensation for non perennial crops = vii. No. of individuals to be paid cash compensation for perennial crops = viii. No. of individuals to be paid cash assistance for loss of agricultural labour =	
3. Is there loss of commercial/ industrial/ Institutional land and structure?			i. No.of HHs (with valid title) losing their land and structure ii. No.of tenants/ leaseholders losing their land and structure iii. No.of squatters / encroachers losing their land and structure iv. No. of employees losing their livelihood	i. No. of units (with valid title) to be given alternative land = ... ii. No. of units (with valid title) to be given cash compensation = iii. No. of units (with valid title) to be given livelihood assistance = iv. No. of tenants to be given livelihood assistance = ... v. No. of tenants to be given shifting assistance = vi. No. of squatters to be given developed plot and built shop = vii. No. of squatters / encroacher to be given cash compensation = viii. No. of squatters to be given shifting assistance = ix. No. of squatters to be given livelihood assistance = ... x. No. of employees to be given livelihood assistance =	
4. Is there loss of access to common resources and or facilities?			i. Specify type of CPR being lost ii. No. of HHs losing their access to CPRs	i. No. of HHs to be provided CPRs ii. No. of HHs to be provided amenities	
5. Are there losses to host communities?			i. Specify the type of losses ii. No. of communities losing their amenities/ services	i. Money to be spent on restoration of losses due to resettlement = ii. Money to be spent on restoration of amenities	
6. Is there any impact on indigenous people?			i. No. of HHs		
7. Is there any induced development?					
1. Was the land acquired /			i. When was this done ?	i. No.of HHs (with valid title) to be given land for land =	

Social Assessment	YES	NO	If Yes, Specify Details	Social Management Measure	Cost
bought / transferred prior to the present ownership of ULBs ?			ii. Total area of land acquired / bought / transferred iii. Usage of land earlier to ULBs possession iv. Amount paid as compensation v. Total no.of HHs from whom it was bought vi. No. of HHs evicted from the land	ii. No.of HHs to be given cash compensation = iii. No of HHs to be given livelihood assistance = iv. No. of squatters to be given developed plots and house / shop = v. No. of squatters / encroachers to be given cash compensation = vi. No .of squatters to be given livelihood assistance =	

TERMS OF REFERENCE FOR ENVIRONMENTAL, AND SOCIAL SAFEGUARD MANAGER

The following terms of reference is suggested for the E&S Manager.

1. To verify periodically that all sub-projects are in line with the prevailing national, state and local legislation on the one hand, and the World Bank policies on the other.

2. To ensure that ESMF is being fully integrated with the sub-project appraisal cycle within TNUIFSL, by identifying the project category before issuing the Terms of Reference to the design consultants and evaluating the proposals with respect to their completeness and compliance to ESMF.

3. To carry out Site Visits to sub-project implementation sites to monitor as well as provide onsite training as required. Prepare reports on visits / training to document the visit, observations for improvement required, need for follow-up etc.

4. To co-ordinate closely with the external capacity-building consultants for the conduct of training of ULBs, and orientation programmes for the design consultants, project management consultants and contractors.

5. To provide necessary documents to the external auditors for carrying out annual E&S audit.

6. To arrange to conduct analytical studies based on sub-project experience in order to influence policy changes that will lead to better management of environmental and social / R&R issues in the urban sector as a whole.

7. To retain documents, reports and other records pertaining to ESMF.

8. To prepare and submit quarterly progress reports to the GoTN, the World Bank and other agencies as required.

9. To function as a single-point contact on ESMF matters for TNUIFSL and external agencies.

10. To update and maintain ESMF on an ongoing basis.

11. To report to Vice President (Projects) on all matters pertaining to ESMF

TERMS OF REFERENCE FOR ENVIRONMENTAL, AND SOCIAL AUDIT

1 Background:

The Tamil Nadu Urban Development Fund (TNUDF) has been set up to finance various urban infrastructure projects in Tamil Nadu. The eligible borrowers of TNUDF include Urban Local Bodies (ULBs), Statutory Boards and Private Corporate Entities.

TNUDF believes that each of its projects will improve living standards and the environment of urban population in and around project locations. TNUDF is committed to promoting environmentally sound, socially acceptable and commercially viable urban infrastructure projects. TNUDF has reflected its environmental and social commitments through detailed operational procedures stipulated in its Environmental and Social Management Framework (ESMF). All projects financed by TNUDF should be in consonance with its ESMF.

To facilitate the process laid down within its ESMF, Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) intends to appoint consultants to audit projects taken up with External Financial Assistance.

2 Objectives:

- To audit the conformity of environmental and social categorisation of projects with respect to the categorisation prescribed in the ESMF of TNUIFSL.
- To audit the compliance of the environmental, climate and social aspects of approved projects, which are under implementation; and,
- Review and comment on how the recommendations of the previous audit have followed so far.

3. Scope of Work

1. To carryout environmental and social audit with respect to the projects taken up under External Fund by Urban Local Bodies (ULBs) such as UGSS, WSIS, Bus Stations, River Improvement and Road Projects.
2. The various departments involved in the implementation are Commissionerate of Municipal Administration (CMA), Chennai Metropolitan Development Authority (CMDA), Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB), Tamil Nadu Water Supply and Drainage Board (TWADB), Directorate of Town Panchayats). The list of sub-projects to be audited is provided in the Annexure.

4. Outline of the tasks to be carried out:

The selected Consultant will essentially provide services to TNUIFSL as required, for the following tasks.

1. <u>To Audit the Environmental and Social Categorisation of Projects:</u>

The consultants will audit the conformity of environmental and social categorisation of projects approved by the TNUDF with respect to environmental and social categorisation in the ESMF of TNUIFSL .

The consultants will also review the adequacy of screening procedures to identity the possible issues; considerations of incorporating the social and environmental issues identified during the screening process into the engineering designs and action plans.

This audit will cover all the E1 category projects and 25% of the E2 projects, and all those projects involving land acquisition and resettlement & rehabilitation.

2. <u>Auditing the compliance of the Projects:</u>

The consultants will

- Cover the compliance aspects with reference to the agreed ECSM process at different stages of project development as well as the technical content of the EAs/EMPs and RAPs/SMPs. Such an exercise shall include the effectiveness in translating the EMPs into contract conditions and technical specifications.
- Critically review and report the compliance on Bank's recommendations during various supervision missions;
- Undertake field visits to ascertain actual level of compliance in implementing the EMPs and RAPs;
- Audit and confirm that the payment of compensation and assistance has been paid in accordance with ESMF procedures wherever payment of compensation and assistance is involved for the projects affected people,
- Undertake field visits to interact with the beneficiaries on sample basis to assess their levels of satisfaction with the process followed in delivering the entitlements;
- Review the process followed for redressing the grievances filed by the affected people with regard to compensation, R&R assistance or any other related complaints.
- Review and confirm that the disclosure of documents has been carried out in accordance with the established procedures; and,
- Review the internal monitoring followed by TNUIFSL in managing the social and environmental impacts during the implementation of the sub-projects and suggest suitable measures for improving the process as needed.

The consultant will audit the compliance of environmental and social aspects during construction, operation and maintenance of projects approved by TNUIFSL, across all categories and different sub-project locations. The selection of sub-project shall be approved by TNUIFSL before the commencement of the Audit. The audit will be carried out in the presence of the representatives of ULBs / Implementing Agencies.

3. <u>Adequacy of the EMP/SMP</u>

The consultant will audit the adequacy of the EMP/SMP and recommend practicable measures to include/improve the management measures and the agency responsible for carrying out the measures, wherever found

inadequate. The consultant will also document the best practices and possible environmental and social enhancement measures with respect to the audited projects. Apart from documenting the good practices, shall discuss the deviations in following the ESMF and corrective measures (project level and in overall process).

4. Reporting

The consultant shall review the status report submitted by the ULBs / Implementing Agencies on the implementation of EMP / SMP and the process adopted by design consultants in identification and mitigation measures while preparing the DPRs. To report on the adequacy and timely submission of the Quarterly Progress Reports including the process involved in addressing the risk management.

5. Documentation:

The consultant shall document the good practices and lessons learnt with respect to Environmental and Social Safeguards implementation and management in the sub-projects.

6. Audit Report

The findings of the review and audit should be summarized in a tabular form to include compliance, non compliance, best practices and enhancement measures along with the name of the agency responsible for each of the above. This matrix should be provided as an attachment to the main report. In case of non-compliance, the consultants need to undertake a follow up visit after giving sufficient time (depending on the type of corrective measures) for the agency responsible to take corrective actions.

6. Data, services and facilities to be provided by the Client:

A copy of the Environmental and Social Management Framework (ESMF) of the TNUIFSL and Management Information System (MIS), indicating details of the projects sanctioned will be given by client.

The available reports/documents/data will be provided to the consultants.

7.Composition of review committee to monitor consultants' work;

1.Representatives from Borrowers/IAs/CoC/CMA etc, as applicable.
2.Representatives from TNUIFSL
5.Any other (will be nominated, as required)

The consultant would be required to submit __copies of each of the reports besides providing a soft copy of all reports, etc. All the pages in reports shall be printed in duplex mode except for A3 pages.

8. Procedure for review of reports:

The review committee will review the progress of work during each stage of the assignment and as and when required. The decision / suggestion of the review committee will be communicated in the form of minutes, for taking action.

9. Outputs, Payments and Time Schedule

Reports	Duration	Payment
On submission and acceptance of Initial Report on Compliance	Within 3 weeks from the date of award of contract.	15 % of the contract value
On submission and acceptance of Draft Audit Report –	Within 10 weeks from the date of award of contract	55 % of the contract value
On submission and acceptance of Submission of Final Report	Within 12 weeks from the date of award of contract	30 % of the contract value

10.List of key positions, whose CV and experience would be evaluated.

Sl.No	Key Professional	No. of persons	Experience
1.	Environmental Specialist	1	Post Graduate in Environmental or Public Health Engineering Environmental Planning/ Environmental Science with about 7 years of experience in preparation of EIA Reports, carrying out Environmental Audit etc or completed atleast two similar assignments.
2.	Social Development Specialist	1	Post Graduate in any of Social Sciences work with 7 years of experience preferably in social auditing, experience in land acquisition and resettlement issues in development projects or completed atleast two similar assignments.

Necessary support staff as required shall be engaged by the consultant in order to achieve the objective of the assignment.

Annexure: List of Sub-projects to be audited.

GUIDELINES FOR SELECTION OF SITES FOR VARIOUS URBAN INFRASTRUCTURE FACILITIES

- Avoid intake well at fish breeding grounds and other ecologically sensitive locations
- Ensure that the projects site requires minimum or no cutting of trees and other vegetative cover
- Ensure that sites are not in a low-lying or flood prone area
- Conform to the siting guide lines by CPHEEO for water treatment plant and sewage treatment plants.
- Ensure that, no dense habitations or sensitive features such as schools, religious places or institutions are located in the vicinity while establishing the facilities like STPs, pumping / booster stations, lift stations, etc.
- For STPs, Landfills, SWM sites, TNPCB / MOEF siting criteria shall be conformed to.
- Avoid land acquisition in the forest areas, private lands or damage to structures
- Ensure that no existing landuse is affected.
- Ensure that the pipe alignment doesn't pass through ecologically sensitive areas such as forest areas, national parks or sanctuaries, cultural properties, etc.
- Ensure that the alignment doesn't require acquisition of private agriculture lands or properties
- Ensure that the laying and operation of alignment doesn't affect the agriculture lands, farming operations, standing crops and their yield.
- Avoid a site that requires relocation of population (pucca or kutcha houses or slums / squatters or encroaches)
- Avoid selection of waterbody as sites for establishing any project facility.
- Any permanent structure above ground shall be established in a demarcated site with direct access to the site.

PUBLIC CONSULTATION AND CONSENSUS BUILDING PROCESS

Public consultation shall be carried out at various stages of the project preparation. As part of environment and social assessment consultations will be held by appropriate instruments including focus group meetings, stakeholder consultations, etc. Specific consultations will be held around the sites proposed for different facilities to seek the residents support for those sites. The outcome of consultations will be incorporated as appropriate in the designs and mitigation plans. As part of such consultations, the draft Mitigation Plans will also be presented and explained to the people on the content and process of the implementation of the plans. For all the projects prepared by other agencies which are proposed to be funded by TNUIFSL, public consultation shall be carried out with the public and other stakeholders prior to initiating the bidding process and TNUIFSL will monitor whether such consultations are carried out

Public consultation for consensus building is typically a four stage process of:

(1) Awareness generation

(2) Perceptions assessment

(3) Consensus building, and

(4) Agreement finalisation

At the first stage of awareness generation, the affected communities are provided information and made aware of the project activities and their likely impacts. The team responsible for the consultation process may suggest at this stage itself some of the options available to address these impacts.

There are several methods and techniques that can be adopted for public consultations. Some of these include:

(1) Public hearings

(2) Public meetings

(3) Informal small group meetings

(4) General public information meetings

(5) Operating field offices

(6) Local planning visits

(7) Information brochures and pamphlets

(8) Field trips and site visits

(9) Public displays

(10) Model demonstration projects

(11) Material for mass media

(12) Response to public inquiries

(13) Press release inviting comments

(14) Workshops

(15) Advisory committees

(16) Task forces

(17) Employment of community residents

(18) Community interest advocates

(19) Ombudsman or representative

(20) Environmental impact statement review by public

The project team responsible for the consultation process has to determine which technique or a consultation is most appropriate at a particular stage or the consultation and consensus building process

At the second stage, the views and perceptions of the affected communities regarding the project activities, its implications and also the options to address them is carefully assessed and documented. Due to the discussions within and outside the communities, unforeseen impacts, and mitigation options emerges

By this time the opinions of the local communities become quite evident. The opinion leaders also become visible and the areas of agreement and disagreement also start emerging

The next step of consensus building is critical and has to be delicately handled. In most projects it will be found that while most people agree on a majority of the issues, it is the few issues of disagreement that can create maximum problems. Sometimes these few point of disagreement even decides the fate of a project. The team responsible for the consultation process has to very carefully ensure that each of the points of disagreement are resolved in the most amicable manner. Sometimes, if a point of disagreement does not have major implications it may be

useful to just leave it as unresolved and document it. The unresolved issue may also be left to be addressed at a later date when more information, experience and understanding is available

Finally, the consensus built has to be translated into commitments and allocation of responsibilities. These commitments may be recorded in any form of agreements that the concerned stakeholders are comfortable with

PUBLIC CONSULTATION

Purpose	-To discuss and seek opinion / suggestion from the public/ stakeholders / their representatives - To avoid future problems and ensure smooth implementation of the project
Projects	All projects involving site requirement (pumping stations, lift stations, STPs, etc), and resettlement.
Responsibility	To be jointly conducted by **ULBs** (Municipal Commissioner, Executive Engineer, Municipal Chairman, Executive Officer of TP) **and** **PIA** (TWAD officials/ CMWSSB)
Timeline	For Sites – before finalizing the site/ before bidding. For resettlement - prior to the preparation of Resettlement Action Plans
Methodology	
Intimation to public	- Notice (to be published in any National/ vernacular newspaper) - Notice at the Municipal office - Display boards (at important junctions) - Pamphlets (hand distribution)
Information for intimation	- Sub- Project scheme and area of extent - date and venue of the meeting, - last date for receiving objections/suggestions. - Contact person and Venue where project information material will be available
Participants	General Public, Project affected Persons (PAPs), Stakeholders,Local leaders, NGOs etc
Materials to be distributed/ circulated:	A non-technical executive summary may be prepared containing the following: - Brief description of project activities and components involved - Sub-project benefits, area and extent of project activities - Expected impacts from the sub-project/ component - Proposed management measures
Post public consultation action:	- Review of suggestions and opinions from the public - Suitable incorporation either in the design or in the management measures. - Recording the meeting and the proceedings and forward to the O/o CMA / DTP and TNUIFSL in the format provided.

GUIDANCE FORMAT FOR REPORTING ON PUBLIC CONSULTATION

Consultation Stage:

Name of the town :

Project :

Date :

Venue :

Advertisement published in Newspapers :

National :

Vernacular :

Date of Advertisement :

Composition of the Stakeholder consultation Panel:

Number of Stakeholders / Participants :
Discussion during the public hearing :

S.No	Issues raised	Response of the borrower/ULB to the issues	Comments
1)			
2)			
3)			
4)			
5)			

Action taken based on the opinion received during public consultations:

Signature of the Borrower

Enclosures.

1. Scanned copy of the newspaper clippings, attendance

GRIEVANCE REDRESSAL:

Initially any aggrieved PAP will be directed to approach GRC, controlled by the appropriate Commissioner of ULB / or the authorized signatory which is constituted by the PIA. It will consist of a panel of three Members, one of whom shall be the PIA representative from the sub-project. The others will include representative of the residents of the area / local body who are publicly known to be persons of integrity, good judgment and command respect; and a representative of local NGO/CBO. If the grievance of the PAP is not addressed by PIA, subsequently it will refer to District Collector, during the Collectors weekly grievance redress day. If the PAP is still unsatisfied with the decisions taken by the project and the Collector, he would as a last recourse can appeal in the court of law.

The PIA representative of the GRC shall:

- Convene meetings of the committee as necessary at such place or places in the PIA as he considers appropriate; and
- Conduct the proceedings in an informal manner as he considers appropriate with the object to bring an amicable settlement between the parties;

The report of the members shall be recorded in writing and attested copies thereof shall be provided to the parties. All expenses incurred in arranging grievance negotiations and meetings of GRC as well as logistics required, shall be arranged by the borrower.

Tamil Nadu Sustainable Urban Development Project

MODEL FORMAT FOR PREPARATION OF SUB-PROJECT ESMF COMPLIANCE REPORT

(Implementation of Environmental and Social Management measures)

1. The objective of these guide lines is to assist the PMC / ULB or the borrower in preparing the project compliance report, the clearly documents the Environmental and social issues encountered in the sub-project and the compliance of the EAR and SAR recommendations.
2. The sub-project compliance report shall have an exclusive section on Environmental and social / R&R issues of the projects and provide the following information.

Name :	**rsement No :**
ver:	**tant :**
mencement:	**pletion:**
orting:	
e:	**ckage:**
rk/ component:	

al Category:			**ory:**	
e/Phase :	**(Pre- Construction /Construction/Operation)** Please select appropriate phase			
ntal Aspects				
ental Permissions	**Status**	**Rs.) emarks**	**Remarks**	**sibility** C/Other)
nue Department/PWD				
ent measures	**Implemented**			**sibility** C/Other)
ntal screening/ Site evaluation				
sensus status, meetings etc				
cation				
mps				
3 Temporary shelters (construction and clearing/restoration plan/Engineer permission)				
4 Potable water supply				

5 Sanitation and drainage		
6 Electricity/Lighting		
ngements		
• Traffic Diversion Plan		
• Signages		
• Road Cut Plan /resurfacing		
ects		
▪ Accident prevention		
▪ Risk from electric /construction equipments		
▪ First Aid		
▪ Safety appliances		
construction materials		
of environment and sensitive receptors (residential areas, schools, hospitals, etc)		
nment		
construction activities		
missions during construction		
ronment		
n of Flooding in project site due to excavation/low lying areas.		
of treated waste water.		

of contamination of groundwater/ surface water.		
ıains		
1 cross overs with WS		
2 alternate arrangements for temporary supply disruptions		
ronment		
oise		
construction activities		
Environment		
g		
tory plantation		
of existing flora and fauna		
otection		
excavated material/ construction debris		
osal		
bricants – spillage and disposal		
gical Property		
g Plan (to compare with pre project parameters)		

ity		
es encountered		
1. Details of any objections and status		
2. Any incidents and status		

ects				
of Land Acquisition/ alienation / current status ation, Booster Station, Sump, Service Reservoirs, Lift Station, WTP/STP site etc). *Details of change of previously identified site or any new site identified may be provided*		s	fication & Ownership and Current Land use	

ssues encountered (Private Land acquisition, encroachment, squatting etc for the project sites)				
1. Payment of compensation to PAFs				
2. Resettlement requirements				
issue (please specify)				

Municipal Commissioner

Executive Engineer
Implementing Agency/PMC

Borrower

Implementing Agency/PMC