

Environmental Assessment and Review Framework

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IND: Proposed Tamil Nadu Urban Flagship Investment Program (TNUFIP)

Prepared by Tamil Nadu Urban Infrastructure Financial Services Limited for Government of Tamil Nadu and Asian Development Bank.

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CURRENCY EQUIVALENTS

(as of 5 January 2017)

Currency Unit	-	Indian rupee (₹)
₹1.00	=	\$0.0158
\$1.00	=	₹63.3750

ABBREVIATIONS

ADB	-	Asian Development Bank
ASI	-	Archaeological Survey of India
CMA	-	Commissioner of Municipal Administration
CMSC	-	Construction Management and Supervision Consultant
CMWSSB	-	Chennai Water Supply and Sewerage Board
CPCB	-	Central Pollution Control Board
CRZ	-	Coastal Regulation Zone
CTE	-	Consent to Establish
CTO	-	Consent to Operate
DPR	-	Detailed Project Report
EAC	-	Expert Appraisal Committee
EAR	-	Environmental Assessment Report
EARF	-	Environmental Assessment and Review Framework
ECSMF	-	Environmental, Climate Change and Social Management Framework
EHS	-	Environment, Health and Safety
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
ESF	-	Environmental and Social Framework
ESMF	-	Environmental and Social Management Framework
ESS	-	Environmental and Social Safeguard
ESZ	-	Eco Sensitive Zone
GOI	-	Government of India
GoTN	-	Government of Tamil Nadu
IEE	-	Initial Environmental Examination
IUCN	-	International Union for Conservation of Nature
MAWS	-	Municipal Administration and Water Supply
MFF	-	Multi-tranche Financing Facility
MoEFCC	-	Ministry of Environment and Forest Climate Change
NEP	-	National Environment Policy
NOC	-	No Objection Certificate
O&M	-	operation and maintenance
PIU	-	Project Implementation Unit
PMU	-	Project Management Unit
REA	-	Rapid Environmental Assessment
RoW	-	right of way
SPS	-	Safeguard Policy Statement
STP	-	sewage treatment plant
TNPCB	-	Tamil Nadu Pollution Control Board
TNUDF	-	Tamil Nadu Urban Development Fund
TNUDP	-	Tamil Nadu Urban Development Project
TNUFIP	-	Tamil Nadu Urban Flagship Investment Program
TNUIFS L	-	Tamil Nadu Urban Infrastructure Financial Services Limited
ULB	-	urban local body

UNFCCC	–	United Nations Framework Convention on Climate Change
UNESCO	–	United Nations Educational, Scientific and Cultural Organization
WTP	–	water treatment plant

NOTE

In this report, "\$" refers to US dollars.

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EXECUTIVE SUMMARY

A. Background

1. The Tamil Nadu Urban Flagship Investment Program (TNUFIP) will advance India's national urban flagship programs to develop priority urban and environmental infrastructure in ten cities located within strategic industrial corridors of Tamil Nadu (the State), including those within the East Coast Economic Corridor (ECEC), to enhance environmental sustainability, climate resilience, and livability. It will also strengthen the capacity of state and local institutions and improve urban governance. TNUFIP is aligned with the following impact: urban livability and climate resilience in cities of economic importance improved. TNUFIP will have the following outcomes: smart and climate resilient urban services delivered in ten cities in priority industrial corridors.
2. **Proposed TNUFIP:** The TNUFIP is structured under three outputs: (i) sewage collection and drainage improved and climate-friendly sewage treatment systems introduced, (ii) access to reliable and smart drinking water services improved, and (iii) Institutional capacity, public awareness, and urban governance strengthened.
3. TNUFIP will be implemented over an 8-year period beginning in 2018, and will be funded by Asian Development Bank (ADB) via its multitranche financing facility (MFF). The executing agency is the Department of Municipal Administration and Water Supply (MAWS) of the State acting through the Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) who will establish a program management unit (PMU). The urban local bodies (ULBs) will be the implementing agencies for projects and will establish program implementing units (PIU). For water and sewerage works in Chennai, the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) will be the implementing agency.
4. Under this MFF Project, projects/components that are likely to have significant adverse environmental impacts that are irreversible, diverse or unprecedented¹ will not be considered for implementation.

B. Purpose and Overview of the Environmental Assessment and Review Framework:

5. As the TNUFIP is funded by ADB's MFF in three separate tranches, and at present subprojects of Tranche 1 are prepared while the subprojects to be implemented under future tranches will be prepared after ADB Board approval of the MFF loan. For MFF projects with potential environmental impacts, ADB Safeguard Policy Statement (SPS) 2009, requires the borrower's agreement with ADB on an environmental assessment and review framework (EARF) before ADB approves the MFF. An EARF clarifies safeguard principles and requirements governing screening and categorization, environmental assessment, and preparation and implementation of safeguard plans of subprojects to be prepared after MFF approval. The purpose of EARF is to ensure that the subprojects implemented under MFF comply with ADB safeguard objectives, principles and requirements.
6. This EARF specifies the requirements that will be followed in screening and categorization, assessment, and planning, including arrangements for meaningful consultation with affected people and other stakeholders and information disclosure requirements.

¹ which, as per the ADB SPS 2009, would be classified as Category A. There may be significant impacts during construction, but they are only temporary disturbance so may not trigger Category A.

7. The EARF ensures that all subprojects, in the entirety of their project cycle, will not deteriorate or interfere with the environmental sensitivity of a project area, but rather improve environmental quality.

C. Assessment of Legal Framework and Institutional Capacity

8. **Country Environmental Safeguard Policies:** There are various other acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. This includes the Environmental Protection Act, 1986, Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, Indian Wildlife (Protection) Act, 1972 amended 1993 and Rules 1995; Wildlife (Protection) Amendment Act, 2002, Forest (Conservation) Rules, 1981 amended 1992 and 2003, Contract Labour (Regulation and Abolition) Act, 1970, The National Green Tribunal (NGT) Act, 2010, Ancient Monuments and Archaeological Sites and Remains Acts, 1958, its Rules, 1959 and notification, 1992, The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996. In addition, several rules and notifications have been issued under the Environmental Protection Act, 1986 like Environmental Impact Assessment (EIA) Notification, 2006, Solid Wastes Management Rules, 2016, Noise Pollution (Regulation and Control) Rules, 2000, Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989, etc.

9. **International Environmental Agreements:** There are various international agreements and conventions related environment and to which India is a party, which include Ramsar Convention on Wetlands of International Importance, 1971, Convention on Protection of the World Culture and Natural Heritage, 1972, UNESCO World Network of Biosphere Reserves (WNBR), Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal, 1989, United Nations Framework Convention for Climate Change (UNFCC) etc. As the sites notified under such agreements and conventions are protected under Government of India legislations, the international requirements will also be looked into by the government regulatory agencies during the clearance/permission process.

10. **ADB'S Safeguard Policy Statement SPS) 2009 requirements:** ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments. The projects are screened for impacts and categorized as A, B, C and FI. Environmental Assessment is carried out to address the impacts. An EMP, which addresses the potential impacts and risks identified by the environmental assessment, shall be prepared. ADB SPS requires an environmental audit, if a subproject involves facilities and/or business activities that already exist or are under construction, to identify past or present concerns related to actual or potential impacts or risks and to identify and plan appropriate measures to address the areas of concern. ADB will post the safeguard documents on its website as well as disclose relevant information in accessible manner in local communities.

11. **Compatibility between Country's and ADB Safeguard Policy:** The ADB environmental safeguard policy principles are encompassed entirely in its SPS 2009. Government of India policies are also comparable to international environmental framework including that of ADB. The government's environmental assessment and clearance process is, in principle, consistent with ADB's environmental assessment process and public disclosure requirements. None of the subproject types (water supply and sanitation) proposed to be implemented under TNUFIP are listed in the EIA Notification, 2006 and therefore it is unlikely that the subprojects will require EIA

study or Environmental Clearance. However, they may require clearances/permission under other legislations if the subproject location is sensitive or notified. Water treatment plants (WTPs) and sewage treatment plants (STPs) require consent to establish and consent to operate from Tamil Nadu Pollution Control Board (TNPCB).

12. The TNUFIP subprojects are unlikely to have significant adverse impacts that are irreversible, diverse or unprecedented, and therefore under ADB SPS they are likely to be categorized as B. As such, no A category subprojects will be considered for funding under this program. It is therefore required that proposed subprojects are subjected to screening, categorization, and if B category is confirmed preparation of initial environmental examinations (IEEs) and environmental management plans (EMPs).

13. The Government of India framework does not prescribe a due diligence or environmental audit to check existing facilities at subproject site(s) to determine whether they could cause, or is causing, environmental risks and impacts. However, ADB SPS principles require an environmental due diligence or audit even in such circumstances.

D. Institutional Capacity in Environmental Safeguards

14. **Executing Agency.** Government of India is the borrower. The executing agency is the Department of MAWS of Government of Tamil Nadu acting through the TNUIFSL. TNUIFSL will establish a Program Management Unit (PMU), comprising dedicated full-time staff from TNUIFSL for overall project, and financial management of TNUFIP. Environmental and Social Safeguards (ESS) managers (one for environment and one for social) are available at TNUIFSL for ensuring implementation of EARF. ESS Managers report to the Head, Projects Division.

15. TNUIFSL is the fund manager of Tamil Nadu Urban Development Fund (TNUDF), a Trust established to fund urban infrastructure projects in Tamil Nadu. The World Bank has had a long partnership with the Government of Tamil Nadu in the area of urban development including Madras Urban Development Project (MUDP) and Tamil Nadu Urban Development Project (TNUDP-II and III). These projects, in addition to creation of infrastructure assets, have influenced reforms in urban sector as well as build new institutions such as the TNUDF. The Bank funded projects have been going hand-in-hand with urban sector reforms in the state where Tamil Nadu has been one of the leading states In India. The proposed TNUFIP is in continuation to these. Throughout implementation of MUDP and TNUDP II and III, TNUIFSL promoted environmentally and socially sustainable urban infrastructures projects besides technical and financial sustainability. The environmental and social safeguards are managed through frameworks such environment and social report (ESR) and Environmental and Social Framework (ESF) for TNUDP-III, and environmental and social management framework (ESMF) developed for Tamil Nadu Urban Sector Development Project. The KfW assisted projects are implemented by adopting environmental, climate change and social management framework (ECSMF).

16. Therefore TNUIFSL already handles the environmental and social safeguards of the projects it funds through these project specific frameworks like ESMF. ESMF is an overall framework to identify, assess and manage environment and social concerns of the projects it funds, and outlines the policies, procedures and guidelines to incorporate the same into project preparation, appraisal, implementation, monitoring and reporting. ESMF in line with the environmental policy requirements of the multilateral agencies.

17. **Implementing Agencies.** The implementing agencies for TNUFIP will be the subproject urban local bodies (ULBs in Ambur, Coimbatore, Cuddalore, Rajapalayam, Thoothikudi, Tiruppur,

Tiruchirappalli, Tirunelveli, and Vellore), , and in the case of Chennai, Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) will be the implementing agency. Project implementation Units (PIUs) will be established in each implementing agency, which will be headed by full-time Project Managers and dedicated full-time support staff of the respective agency. In the case of Coimbatore, Rajapalayam, Cuddalore, and Ambur ULBs, the Tamil Nadu Water and Drainage Board (TWADB) will establish PIUs for implementation support. Consideration of safeguard aspects is currently limited to compliance with government regulations as per the government law, and obtaining necessary clearances. Consequently, at present, there is no institutional set-up within the Implementing agencies to specifically deal with environmental safeguard aspect. Therefore the IA capacity needs to be strengthened with appointment of staff and consultancy support in handling safeguards tasks to ensure EARF compliance in subproject preparation and implementation.

E. Anticipated Environmental Impacts

18. TNUFIP will finance subprojects to provide/improve water supply and sewerage infrastructure including sewage treatment in the selected program cities of Chennai, Coimbatore, Thiruchirappally, Vellore, Tirunelveli and Rajapalayam. Proposed components are as follows:

- (i) **Water supply infrastructure:** source development/augmentation, treatment facilities, transmission mains (raw and clear water), storage and distribution reservoirs, distribution network, bulk meters, and consumer connections with meters
- (ii) **Sewerage and sanitation infrastructure:** sewer network, trunk sewers and sewage treatment plant

19. While there would be numerous positive benefits in terms of improving quality of life of people as well as raising standards of both individual and public health, TNUFIP subprojects may also induce certain negative impacts as creation and operation of water supply and sewerage infrastructure including sewage treatment will involve physical interaction with environment, abstraction of natural resources, and disposal of waste. In water supply schemes, issues related to source sustainability, downstream impacts, ecological flows, and issues related to conflicting uses and users are crucial and needs to be assessed as part of the subproject preparation, to avoid, minimize or mitigate them to acceptable levels. In sewerage and STP schemes, odor nuisance, issues related to discharge to water body and disposal of sludge, and land and groundwater contamination due to overflows, blockages, handling and application of chlorine, etc., may arise which shall be avoided with proper design and operation.

20. Primary construction impacts are due to trenching work in densely populated area and thoroughfares congested with pedestrians, traffic and activities, disturbance to residents (restricted access, interrupted services, noise, dust), businesses, traffic etc., disposal of large quantities of waste soil, and dust pollution due to dry weather conditions, Occupational and community health and safety issues, and other health and hygienic conditions at work sites etc., from construction activity will be considerable.

21. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation which address adverse impacts.

22. The potential impacts that are associated with design, construction and O&M can be mitigated to acceptable levels without difficulty through careful site selection, proper engineering design and good quality construction and operations and maintenance practices. Project will

provide significant benefits to citizens of project cities in Tamil Nadu, and will improve public health and economy.

F. Environmental Assessment and Review Framework Applicability

23. All the TNUFIP subprojects need to go through the process of environmental assessment and obtain approvals / consents, etc., from the government regulatory agencies, to be eligible for funding under the program.

24. **Environment Category:** The scope of TNUFIP includes provision of water supply and sewerage infrastructure including sewage treatment. From the IEEs for tranche 1 subprojects, it is concluded that the project will have only small-scale, localized impacts on the environment. The potential adverse environmental impacts are mainly due to construction, which can be minimized /mitigated by proven measures and environmentally sound engineering and construction practices. Therefore, the tranche 1 of TNUFIP has been classified as environmental category B. The future tranches will seek to replicate the tranche 1 subprojects and are thus expected to be category B due to the low-impact nature of such works. No category A type of works (with significant impacts that are irreversible, diverse or unprecedented) will be considered for implementation in the program.

25. **Exclusion Criteria.** Subprojects that would have significant negative environmental impacts, and fall under Category A shall be strictly avoided or the subproject component(s) causing potential impacts relocated or find suitable alternatives. No Category A projects will be considered for implementation under TNUFIP.

G. Environmental Assessment Process for Subprojects

26. **Screening and Categorization.** Based on the screening conducted using the rapid environmental assessment (REA) checklist, tranches are to be classified into three categories, A, B and C based on the impacts, and the tranche will also be categorized similarly based on the most sensitive subproject in that tranche. Category A subproject which is likely to have significant adverse environmental impacts that are irreversible, diverse or unprecedented and may affect an area larger than the sites or facilities subject to physical works, require EIA, however, will not be implemented under TNUFIP. Category B subproject, likely to have less adverse environmental impacts than those of Category A require an IEE and an EMP. Category C subproject is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications of the subproject need to be reviewed. Under TNUFIP no Category A projects will be implemented and therefore there is no requirement for conducting detailed Environmental Impact Assessment (EIA) studies and preparation of EIA Reports.

1. Preparation of Environmental Assessment Report

27. **IEE Study and Report:** For B category projects, an Initial Environmental Examination (IEE) report is required. IEE describes the studies conducted to identify the potential environmental impacts of a proposed development, and is prepared when impacts are less adverse than those of Category A, and are site-specific, few if any of them are irreversible, and mitigation measures can be designed more readily than for category A projects. Each subproject will require one IEE Report. EMP shall be developed as part of the IEE. The EMP outlines specific mitigation measures, environmental monitoring requirements, and related institutional arrangements, including budget requirements for implementation.

28. All IEEs shall be conducted and EMPs prepared by implementing agencies (PIU) and approved by PMU and ADB prior to invitation of the bids for construction contracts. The bid documents shall include the requirement to incorporate necessary resources to implement the EMP. The IEE and EMP will form part of the contract document, and, if required, will need to be further updated during the construction phase of a subproject.

29. In case subproject requires Environmental Clearance and EIA study consequent to any future changes in the Government of India's EIA Notification, the environmental assessment documents prepared shall, to the extent possible, meet both EARF and government requirements in order to streamline the environmental procedures. It is to be noted that for the purpose of Environmental Clearance, MOEFCC stipulated conduct of EIA study only by an accredited EIA Consultant as per the government Norms.

30. **Environmental Audit of Existing Facilities:** For subprojects involving facilities that already exist or are under construction, an environment audit shall be undertaken, including on-site assessment, to identify past or present concerns related to risks and impacts on the environment. The objective of the compliance audit is to determine whether actions were in accordance with the EARF, SPS and national requirements and to identify and plan appropriate measures to address the areas of concern. Where concerns are identified, a corrective action plan will be prepared. The plan will define necessary remedial actions, the budget for such actions, and the time frame for resolution of concerns. The audit report (including corrective action plan, if any) will be made available to the public in accordance with the information disclosure requirements of the SPS.

31. **Public Consultation, Information Disclosure and Grievance Redress.** Public consultation and information disclosure is mandatory as part of the environmental assessment process for TNUFIP subprojects. PIU shall disclose project related information and relevant safeguards information through public consultation and making relevant documents available in public locations along with contact information.

32. Consultation, participation, and disclosure shall be carried out by the implementing agencies with key stakeholders like project beneficiaries, project affected persons, local NGOs, etc., to inform and receive their feedback, right from the subproject preparation phase, and continue at each stage of the subproject preparation and implementation. Contractor will provide prior public information (in Tamil and English) about the construction work in the area, before the start of work, and place information boards at the work sites.

33. Similarly, a grievance redress mechanism (GRM) to receive, evaluate, and facilitate the resolution of affected person's concerns, complaints, and grievances about the social and environmental performance at project and subproject levels are to be established. GRM should be made operational during the EMP implementation phase. Multi-tier GRM is proposed to address the sub-project grievances in time-bound schedule. Any grievance that remains unresolved by the different levels of GRC will be escalated to the state level steering committee.

34. **Review and Approval of Environmental Assessment Reports:** IEE including EMPs, prepared/updated by consultants/contractors, will be reviewed and approved by TNUIFSL and ADB. Approval of safeguard documents of respective subproject is pre-requisite to initiate the bidding process.

Executing agency is ultimately responsible for identifying, prioritizing, formulating, appraising, approving, and implementing subprojects in accordance with technical, financial, and

economic appraisal criteria, including social and environmental criteria, mutually agreed upon between ADB and the executing agency. PMU will submit all IEEs to ADB for review and disclosure. ADB will review draft final reports (IEEs) of all subprojects.

35. **Monitoring and Reporting:** EA and implementing agencies will be responsible for implementation of EMP. Contractor will implement the EMP tasks that are delegated to contractor under the contract and submit monthly implementation reports to PIU. PIUs will ensure the EMP implementation at individual subproject level and submit quarterly report to PMU. PIUs, will be assisted by experts to ensure EARF and EMP compliance in sub-project implementation. PMU will monitor overall compliance with EARF and EMP, and submit semi-annual report to ADB.

2. Institutional Arrangements and Responsibilities

36. **Safeguard Implementation Arrangement:** TNUIFSL will have overall responsibility for ensuring adoption and compliance of the EARF. Environmental and Social Safeguards (ESS) managers are available in the PMU, TNUIFSL and report to the Head, Projects Division. ESS managers will coordinate and monitor implementation of safeguards in entire MFF.

37. At subproject level, overall responsibility of implementation of environmental safeguards will be with the PIUs, which will be established in each program town. PIUs will be established within the ULBs, except where TWADB is assisting ULBs in project preparation and implementation. In those ULBs, PIUs will be established within TWADB in respective towns. In Chennai, PIU will be established under the CMWSSB. PIU staff will include a Safeguards Officer (environment, involuntary resettlement, gender), who will coordinate monitoring and implementation at subproject level. Expert support to PIUs in safeguards will be provided via a consultant team (Construction Management and Supervision Consultant, CMSC), which will include 3 experts (1 environment, 1 involuntary resettlement, and 1 gender) to assist PIUs to implement and monitor safeguards. In PIUs established in TWADB, to which there is no consultancy support, besides Safeguards Officer, an environmental Expert from TWADB will also be part of PIU to implement and monitor environmental safeguards.

38. Contractor staff will include an Environment, Health and Safety (EHS) supervisor. Safeguards Officer of PIU will play critical role to coordinate, oversee the implementation of safeguard tasks, grievance redress and reporting.

39. **Capacity Development:** Training in ADB Safeguard Policy Statement, 2009, and compliance and reporting procedures from project classification to submission of monitoring reports and corrective actions which are necessary to ensure smooth implementation of EARF through workshops targeting various stakeholders are included in the program.

I. INTRODUCTION

A. Background

1. The Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) is the fund manager of Tamil Nadu Urban Development Fund (TNUDF), a Trust established to fund urban infrastructure projects in Tamil Nadu. The deployment of funds will be on the basis of a management contract. Eligible borrowers include urban local bodies (ULBs), Statutory Boards, Public Undertakings and potential Private Investors.
2. The World Bank has had a long partnership with the Government of Tamil Nadu (GoTN) in the area of urban development starting from the 1980s with Chennai centered MUDP-I and II with the Tamil Nadu Urban Development Project (TNUDP-II and III).
3. These projects, in addition to creation of infrastructure assets, have influenced reforms in urban sector as well as build new institutions such as the TNUDF. These projects have been going hand-in-hand with urban sector reforms in the state where TN has been one of the leading states In India.
4. The MUDP and TNUDP II and III have achieved great milestones in urban development in Tamil Nadu and it has taken path breaking steps in terms of providing financial innovations which have formed basis of policy formation even for the Government of India. The infrastructure projects have also been done with innovations in terms of financial viability, project structuring and sustainability. Now, the urban sector of the State is in a stage where it is mature enough to be catapulted to the next level of urban innovation.
5. While ensuring financial and technological viability, it may be imperative to have environmental sustainability also. With this in view, the objectives of the Tamil Nadu Sustainable Urban Development Project (TNSUDP) would be to build upon the past achievements of TNUDP series of projects and take forward urban reforms and innovative financing mechanisms in the State.
6. The TNUDF throughout the implementation of MUDP and TNUDP II and III, promoted Environmentally and Socially sustainable urban infrastructures projects besides technical and financial sustainability. The environmental and social safeguards are managed through frameworks such Environment and Social Report (ESR) and Environmental and Social Framework (ESF) for TNUDP-III, and Environmental and Social Management Framework (ESMF) developed for TNSUDP. The KfW assisted projects are implemented by adopting Environmental, Climate Change and Social Management Framework (ECSMF). In continuation, Environmental Assessment and Review Framework (EARF) has been formulated specifically for the proposed Tamil Nadu Urban Flagship Investment Program (TNUFIP).

B. Proposed Tamil Nadu Urban Flagship Investment Program

7. The Tamil Nadu Urban Flagship Investment Program (TNUFIP) will advance India's national urban flagship programs to develop priority urban and environmental infrastructure in ten cities located within strategic industrial corridors of Tamil Nadu (the State), including those within the East Coast Economic Corridor (ECEC), to enhance environmental sustainability, climate resilience, and livability. It will also strengthen the capacity of state and local institutions and improve urban governance.

8. TNUFIP will be implemented over an 8-year period beginning in 2018, and will be funded by Asian Development Bank (ADB) via its multitranche financing facility (MFF). The executing agency is the Department of Municipal Administration and Water Supply (MAWS) of the State acting through the Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) who will establish a program management unit (PMU). The urban local bodies (ULBs) will be the implementing agencies for projects and will establish program implementing units (PIU). For water and sewerage works in Chennai, the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) will be the implementing agency.

9. TNUFIP is aligned with the following impact: urban livability and climate resilience in cities of economic importance improved. TNUFIP will have the following outcomes: smart and climate resilient urban services delivered in ten cities in priority industrial corridors. The TNUFIP is structured under following three outputs:

- (i) **Output 1: Sewage collection and treatment, and drainage systems with climate-resilient designs in at least 8 cities developed.** This will include: (i) new (187 million liters per day [MLD]) and rehabilitated (155 MLD) sewage treatment capacity developed with solar power for operations installed on a pilot basis; (ii) reuse of treated wastewater for industrial purposes in selected areas; (iii) new sewage collection pipelines (2,810 kilometers [km]) constructed with 100% household connections made (426,600 household connections); (iv) 173 new sewage pumping stations of 6,390 kilowatts (KW) capacity added; (v) 20 community water and sanitation committees formed with female participation; and (vi) climate resilient drainage and flood management systems established (250 km tertiary and 50 km primary and secondary). For Output 1, ADB introduced innovative approaches from urban sector experience including: (i) 100% service connections installed as part of water supply and sewerage contracts to ensure immediate use of new facilities;^[1] (ii) piloting India's first solar-powered sewage treatment plant, and scaling up the recycling of treated wastewater for industrial reuse; (iii) embedding O&M into STP contracts to ensure high-quality O&M; and (iv) achieving high project readiness to reduce implementation delays. Moreover, the TNUFIP will integrate climate modelling findings from an ADB funded technical assistance into the engineering designs of future subprojects to strengthen climate change resilience.
- (ii) **Output 2: Water supply systems in at least 4 cities improved with smart features.** This will include: (i) smart water supply distribution systems (1,520 km pipelines) established within 110 new district metered areas (DMAs) to reduce NRW and provide regular water supply with 100% household connections (171,000 household connections); (ii) new transmission mains (120 km); (iii) 30 pump stations of 1,530 KW capacity; and (iv) new water storage reservoirs (40 reservoirs totaling 70 million liters). TNUFIP will scale up smart water pilots in Chennai under TA-9048 to reduce NRW and optimize operational efficiency through the latest technologies in smart metering and digital diagnostic tools.
- (iii) **Output 3: Institutional capacity, public awareness, and urban governance strengthened.** This will include: (i) establishing a new state-level Urban Data and Governance Improvement Cell in the CMA; (ii) establishing a new Project Design and Management Center in CMA; (iii) introducing and implementing a state-wide performance-based urban governance improvement program for all 135 cities in Tamil Nadu to improve revenue, financial management, administration, service

delivery, gender mainstreaming, wastewater reuse, and fecal sludge management; and (iv) implementing public awareness campaigns in areas of water conservation, sanitation, and hygiene in project cities. TNUFIP will intensify capacity building of key urban institutions and continue the good practice of incentivizing urban governance improvement. Project design consultants (PDC) will be recruited to prepare new projects in subsequent tranches meeting ADB requirements.

10. Scope of Project 1. Tranche 1 is representative of MFF investments and will support 6 cities (Chennai, Coimbatore, Rajapalayam, Tiruchirappalli, Tirunelveli, and Vellore). Outputs of tranche 1 include:

- (i) **Output 1: Sewage collection and treatment, and drainage systems with climate-resilient designs in 6 cities developed.** This includes: (i) 5 new STPs of 165 MLD treatment capacity including one STP with 2 megawatts (MW) solar photovoltaic (PV) installation for operations; (ii) 1 rehabilitated STP of 37 MLD capacity; (iii) 8,000 cubic meter (m^3) per day of treated wastewater reused; (iv) 1,864 km of new sewage collection pipelines with 100% household connections; (v) 124 new pump/lift stations of 4,473 KW capacity; and (vi) 297,547 new household sewer connections. The breakdown by city is as follows: (i) new sewage collection system and 32 MLD STP in Tirunelveli with treated wastewater supplied for industrial reuse;¹ (ii) new sewage collection system and 30.53 MLD STP with 2 MW solar PV installation in Coimbatore; (iii) new sewage collection system and 30 MLD STP and one rehabilitated 37 MLD STP in Tiruchirappalli; (iv) new sewage collection system and 50 MLD STP in Vellore; (v) new sewage collection system in four areas of Chennai; (vi) new sewage collection and 21.85 MLD STP in Rajapalayam, and (v) 12 community water-sanitation committees formed.
- (ii) **Output 2: Water supply systems in 1 city improved with smart features.** This will support 4 areas of Chennai with the following: (i) 275.6 km of distribution pipes in 20 newly established district metered areas to manage and reduce NRW connected to computerized control and data acquisition systems; (ii) 30,800 household metered connections; (iii) 11 km of new transmission pipes; (iv) 9 new storage reservoirs (4 underground and 5 overhead) of 11 million liters capacity; and (v) 5 pump stations of 231 KW capacity.
- (iii) **Output 3: Institutional capacity, public awareness, and urban governance strengthened.** This will include: (i) establishing a new state-level Urban Data and Governance Improvement Cell in the CMA; (ii) establishing a new Project Design and Management Center in the CMA; (iii) introducing and implementing a state-wide performance-based urban governance improvement program for all 135 cities under CMA to improve financial management (audited accounts), municipal revenues (taxes, user fees), administration (filling vacancies), and gender mainstreaming (gender action plan implementation); and (iv) implementing public awareness campaigns in areas of water conservation, sanitation, and hygiene. Output 3 will be supported by governance improvement and awareness consultants.

¹ Tirunelveli city signed a purchase agreement for treated effluent from the STP with an adjoining industrial park.

11. Tranche 1 is representative of MFF investments and will support subprojects in 6 cities (Chennai, Coimbatore, Rajapalayam, Tiruchirappalli, Tirunelveli, and Vellore).

12. The focus of the TNUFIP will be on provision of water supply, sewerage, and STP, and a series of subprojects will be implemented under the program to improve water supply, sewerage, and STP in program cities. The anticipated subprojects / works packages under tranche 1, 2 and 3 of TNUFIP are shown in Table 1. Under this MFF Project, projects/components with likely significant adverse environmental impacts that are irreversible, diverse and unprecedented² will not be considered for implementation.

Table 1: Subprojects and Components Proposed under TNUFIP³⁴

Subproject	Main Components	Infrastructure (New or Refurbished)
Water Supply	Source development	Intake works (for surface water sources) Tube wells
	Treatment works	Water treatment plant
		Chlorination unit
	Water Transmission	Raw Water Transmission mains
		Clear water Transmission mains
	Water Storage	Ground level reservoirs
		Overhead tanks
	Water Distribution	Distribution mains and network
		Bulk valves and flow meters
		House connections
		Household meters
Sewerage and Sanitation	Sewer Network	Sewer network
		Tertiary piped network
		Household connections
	Sewage Transfer	Trunk sewer
	Sewage Treatment Facility	Sewage treatment plant Outfall for treated effluent

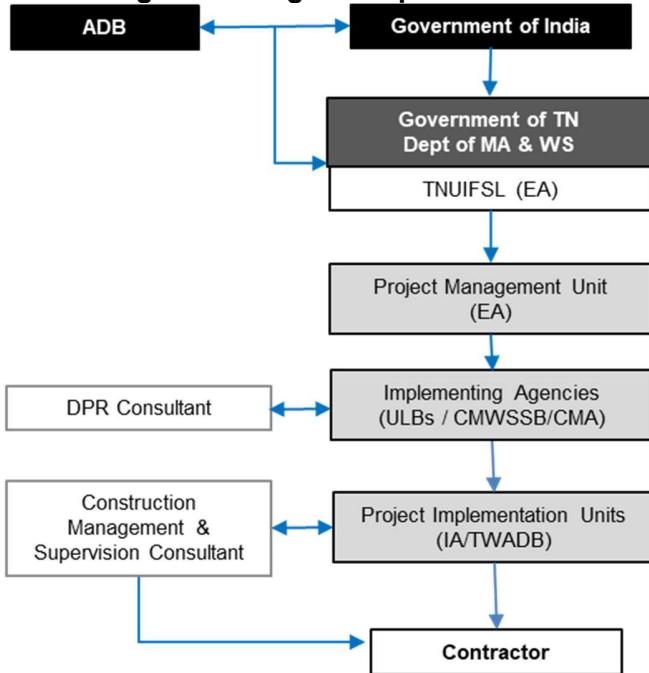
13. **Implementation Arrangements.** The Municipal and Water Supply Department (MAWS) acting through TNUIFSL will be the executing agency. A program steering committee, headed by Principal Secretary, MAWS, Government of Tamil Nadu will provide overall guidance and strategic directions to the program. A program management unit (PMU) for TNUFIP, headed by the Managing Director, TNUIFSL acting as Program Director will be established within TNUIFSL for overall management, planning, implementing, monitoring, reporting, and coordinating TNUFIP. The Commissionerate of Municipal Administration (CMA) will act as the Deputy Program Director in the PMU. The project ULBs, represented by respective Municipal Commissioners, will be the implementing agencies for works in cities/towns and will establish program implementing units (PIUs) headed by a municipal engineer as full-time Project Manager. PIUs will comprise of dedicated staff responsible for overseeing implementation of projects on a day-to-day basis. The PIUs will be supported by a contract management and supervision consultant (CMSC) recruited by TNUIFSL. ULBs under the program with less project implementation experience may utilize implementation support from the Tamil Nadu Water and Drainage Board (TWAD) to strengthen implementation capacity.³ In such cases, TWAD will establish a PIU and the ULB will appoint

² which, as per the ADB SPS 2009, would be classified as Category A.

³ These include Rajapalayam (Tranche 1), Coimbatore (Tranche 1), Ambur (Tranche 2), and Cuddalore (Tranche 3).

counterpart staff to coordinate implementation activities. For sewerage and water supply works in Chennai, CMWSSB, represented by its Managing Director, will be the implementing agency and establish a PIU headed by a superintending engineer as full-time Project Manager. For the institutional capacity, public awareness, and urban governance component, CMA acting through its Commissioner, will establish a PIU and appoint a governance improvement and awareness consultant (GIAC) responsible for supporting these activities.

Figure 1: Program Implementation Arrangement (indicative only)



ADB – Asian Development Bank; CMA = Commissionerate of Municipal Administration, CMWSSB = Chennai Metro Water Supply & Sewerage Board; DPR = Detailed Project Report; EA – Executing Agency; GoTN – Government of Tamil Nadu; IA – Implementing Agency; MA & WS = Municipal Administration & Water Supply; TNUIFSL = Tamil Nadu Urban Infrastructure Financial Services Limited; TWADB = Tamil Nadu Water and Drainage Board; ULB = Urban Local Body

C. Purpose and Overview of the Environmental Assessment and Review Framework

14. For the eight tranche 1 subprojects⁵ in Chennai, Coimbatore, Tirunelveli, Trichy, Vellore, and Rajapalayam, safeguard due diligence studies have been conducted as part of the project preparation during the loan processing prior to approval. For subprojects of tranches 2 and 3, technical feasibility and detailed studies, including safeguard due diligence, will be conducted after the ADB Board's approval of loan. This EARF applies to entire MFF Project. The environment assessments documents will be required to be formulated and approved before any bidding for physical activities start.

15. The EARF aims to provide guidance on safeguard screening, assessment, institutional arrangements, and processes to be followed for components of the project, where design takes place after Board approval. The subproject selection will be in accordance with the environmental project selection criteria as outlined in this EARF. The executing agency will agree with ADB on screening and categorization, environmental assessment, preparation and implementation, monitoring, and updating existing safeguard plans for the subprojects to facilitate compliance with the requirements specified in ADB Safeguard Policy Statement (SPS), 2009 and government acts, rules and regulations.

16. This EARF (i) describes the project and its components, (ii) explains the general anticipated environmental impacts and mitigation measures for the tranches which will be

⁵ IEEs were prepared for (i) Underground sewerage system subproject covering Kuruchi and Kuniamuthur Areas of Coimbatore Municipal Corporation, (ii) Underground sewerage system subproject covering western part of municipal area in Tirunelveli Municipal Corporation. **List of all tranche 1 subprojects to be included**

financed under the project after ADB Board approval, (iii) specifies the requirements that will be followed in relation to screening and categorization, assessment, and planning, including arrangements for meaningful consultation with affected people and other stakeholders and information disclosure requirements, (iv) assesses the capability of the executing and implementing agencies to implement national laws and ADB's requirements, and identifies needs for capacity building, (v) specifies implementation procedures, institutional arrangements, and capacity development requirements, and (vi) specifies monitoring and reporting requirements.

17. The EARF ensures that all subprojects, in the entirety of their project cycle, will not deteriorate or interfere with the environmental sensitivity of a project area, but rather improve environmental quality.

18. The initial environmental examination (IEE) reports prepared for all tranche 1 subprojects during the preparation concluded that these subprojects will have only small-scale, localized impacts on the environment which can be readily mitigated. The potential adverse environmental impacts are mainly related to the construction period, which can be minimized by the mitigating measures and environmentally sound engineering and construction practices. Therefore, the tranche has been classified into environmental category B. It is likely that future tranches will seek to replicate the first tranche and are thus expected to be category B. No category A-type works (having significant adverse impacts that are irreversible, diverse or unprecedented) will be considered for funding in TNUFIP. The IEEs outlined mitigation measures for potential negative environmental impacts, and monitoring plans for both construction and operation and maintenance phases, and it is expected that the EARF will support the integration of these measures and practices in the project design.

II. ASSESSMENT OF LEGAL FRAMEWORK AND INSTITUTIONAL CAPACITY

A. Country Environmental Safeguard Policies

19. Environmental Assessment Notification, 2006. Issued under the Environment (Protection) Act, 1986, the Environmental Impact Assessment (EIA) Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts.

20. Category 'A' projects require Environmental Clearance (EC) from the national Ministry of Environment, Forest and Climate Change (MOEFCC). The proponent is required to provide preliminary details of the project in the form of a Notification, after which an Expert Appraisal Committee (EAC) of the MOEFCC prepares comprehensive Terms of Reference (TOR) for the EIA study, which are finalized within 60 days. On completion of the study and review of the report by the EAC, MOEFCC considers the recommendation of the EAC and provides the EC if appropriate.

21. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorizes the project as either B1 (requiring EIA study) or B2 (no EIA study), and prepares TOR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the Environmental Clearance based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part

within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries. At present, water supply projects proposed under TNUFIP do not fall under the ambit of the EIA Notification, 2006, and therefore EC is not required.

22. Other Environmental Regulations. Besides EIA Notification 2006, there are various other acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. Table 2 presents salient features of these regulations, both at central and state level, and their applicability to TNUFIP projects.

Table 2: Applicable National/State Environmental Legislations and Specific Requirements for the Project

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
A	National Level			
1.	National Environment Policy (NEP), 2006.	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by central, state and local government. The dominant theme of this policy is to promote betterment of livelihoods without compromising or degrading the environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.	Not applicable	-TNUFIP should adhere to NEP principle of "enhancing and conservation of environmental resources and abatement of pollution".
2.	Water (Prevention and Control of Pollution) Act, 1974, amended 1988 and its Rules, 1975.	Water (Prevention and Control of Pollution) Act was established to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, by Central and State Boards and for conferring on and assigning powers and functions. Some important provisions of the Act are: <ul style="list-style-type: none"> • No persons shall cause or permit any poisonous, noxious or polluting matter determined in accordance with standards as may be laid down by the State Pollution Control Board 	Tamil Nadu Pollution Control Board (TNPCB)	- Applicable for the construction and operation of the water treatment plant (WTP) and sewage treatment plant (STP); <ul style="list-style-type: none"> - Consent to establish (CTE) and consent to operate (CTO) from TNPCB; Compliance to conditions and disposal standards stipulated in CTE and CTO.

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		<p>to enter into any stream or well or sewer or on land</p> <ul style="list-style-type: none"> • No person shall cause or permit to enter into any stream any other matter which may tend, either directly or in combination with similar matters, to impede the proper flow of the water of the stream in a manner leading or likely to lead to a substantial aggravation of pollution due to other causes or of its consequences • No person shall, without the prior consent of the State Pollution Control Board: establish any industry, operation or process, or any treatment and disposal system which is likely to discharge sewage or effluent into stream, well, sewer or on land; setting up of industry or process that generates wastewater requires CPCB's consent to establish and consent to operate after the establishment. 		
3.	Air (Prevention and Control of Pollution) Act, 1981, amended 1987 and its Rules, 1982.	<p>An agreement for the preservation of the natural resources which included air and water preservation was finalized at the United Nations Conference on the Human Environment held in Stockholm in June 1972, in which India participated. Following this the Air (Prevention and Control of Pollution) Act was enacted to achieve prevention, control and abatement of air pollution activities by assigning regulatory powers to Central and State boards for all such functions.</p>	TNPCB	<ul style="list-style-type: none"> - Applicable for equipment and machinery's potential to emit air pollution (including diesel generators and vehicles); - CTE and CTP from TNPCB; - Compliance to conditions and emissions standards stipulated in the CTE and CTO.

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		Establishes ambient air quality standards		
4.	Environmental (Protection) Act, 1986 amended 1991 and the following rules/notifications:	Following the United Nations Conference on the Human Environment held at Stockholm in June 1972, an Act to provide for the protection and improvement of environment and for matters connected therewith was framed in India. This would cover the protection and improvement of environment and the prevention of hazards to human beings, other living creatures, plants and property.	TNPCB	-
a.	Environmental Impact Assessment (EIA) Notification, 2006	Issued under the Environmental Protection (EP) Act, 1986, the EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment. Environmental Clearance (EC) is required for specified activities/projects. Projects are categorized as A or B. Environmental clearance process comprise of a maximum of four stages: Stage (1) screening (2) scoping (3) public consultation (4) appraisal	Ministry of Environment Forest and Climate Change	TNUFIP subprojects are not included in the list of projects requiring EC, therefore EIA and EC are not required
b.	Environment (Protection) Rules, 1986 including amendments.	These rules specify: - Standards for emissions or discharge of environmental pollutants - Prohibitions and restrictions on the location of industries - Procedure for taking samples and submission of samples for analysis, - Prohibition and restriction on the handling of hazardous	TNPCB	- STPs should be designed and operated with appropriate wastewater and sludge treatment and disposal facilities; - compliance with emission and disposal

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		substances in different areas - Submission of environmental reports - The Central government may notify emission and effluent standards; the state governments (in case of Tamil Nadu, the TNPCB) can notify more stringent standards for their states, but can't be relaxed		standards during construction.
c.	Municipal Solid Wastes Management Rules, 2016	Rules to manage municipal solid waste generated; provides rules for segregation, storage, collection, processing and disposal.	TNPCB	Solid waste generated at proposed facilities shall be managed and disposed in accordance with the Rules
d.	Construction and Demolition Waste Management Rules, 2016	Rules to manage construction and waste resulting from construction, remodeling, repair and demolition of any civil structure. Rules define C and D waste as waste comprising of building materials, debris resulting from construction, re-modeling, repair and demolition of any civil structure.	TNPCB	Construction and demolition waste generated from the project construction shall be managed and disposed as per the rules
e.	Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2009	- Rules defines and classifies hazardous waste, and procedures for handling and storage - Requires Pollution Control Board's consent for handling hazardous waste - provides procedures for recycling, reprocessing or reuse, import and export of HW - Rules for development of treatment, storage, disposal facility (TSDF) for hazardous wastes; TSDF shall be developed following guidelines issued by CPCB	CPCB and TNPCB	- Applies to disposal of hazardous waste -sludge generated from WTP/STP needs to be checked for classification as hazardous waste; in unlikely case of classification as hazardous waste, sludge treatment and disposal should comply with the Rules
f.	Noise Pollution	The increasing noise level in	TNPCB	- Compliance

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
	(Regulation and Control) Rules, 2000.	<p>public places from various sources have delirious effects on humans and thereby it is considered necessary to regulate and control noise generating sources to maintain ambient air quality standards through a set of rules.</p> <p>The ambient air quality standards are achieved through enforcement of noise pollution control measures and restrictions on the use sound producing instruments. In case of any violation in silence zone area, complaints to be made to authority and power to prohibit continuance of music sound or noise also falls under within these rules</p>		with noise standards. -
g.	Notification of Eco Sensitive Zones (ESZ):	Eco sensitive zones are of significant ecological importance, and to conserve and protect the natural resources and living beings, several zones are declared in the country as eco sensitive zones by notifications. Besides for specific reasons, buffer areas around protected areas (national park, wildlife sanctuaries etc.,) are also declared as ESZ in this notification.	Forest Department, GoTN and MoEFCC	<ul style="list-style-type: none"> - Restriction of activities (including construction, tree cutting, etc.) in the notified zones -Any project activity located in ESZs will require prior permission from ESZ monitoring committee
h	Wetland (Conservation and Management) Rules, 2017	<ul style="list-style-type: none"> -For the protection of wetlands and restriction of certain activities within wetlands, provides a regulatory mechanism -Applies to protected wetlands notified under the rules (which include Ramsar sites; wetlands in ESZs / United Nations Educational, Scientific and Cultural Organization (UNESCO) 	Central Wetlands Regulatory Authority	<ul style="list-style-type: none"> Point Calimere wetland in Tamil Nadu's Nagapattinam District is a Ramsar notified wetland -projects located in or near this wetland will attract the rules -this also applies

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		<p>sites, high altitudes, etc.)</p> <ul style="list-style-type: none"> - Rules prohibit: reclamation of wetlands, expansion/ setting new industries, hazardous waste storage, disposal., discharge of untreated effluent, permanent construction within 50 m HFL, etc., -Activities such as the following are regulated: water withdrawal/diversion, treated effluent discharge, dredging, repair of existing infrastructure, buildings and construction 		to any wetland notified under the Rules
I	Coastal Regulation Zone Notification, 2011	<p>This supersedes the CRZ Notification issued in 1991; to ensure livelihood security to the fisher communities and other local communities, living in the coastal areas, to conserve and protect coastal stretches, its unique environment, promote sustainable development considering natural hazards, sea level rise due to global warming</p> <p>Declares coastal stretches as Coastal Regulation Zone (CRZ) and restricts new construction, and industrial activities.</p> <p>Tamil Nadu has a coastline of 1,074 km. CRZ (landward side) include the following: (i) land area from High Tide Line (HTL) to 500 m on the landward side on the sea front: (ii) land area between HTL to 100 m or width of creek whichever is less on the landward side along the tidal influenced water bodies connected to sea and; (iii) land area between HTL and LTL. Notification defines CRZ in I, II, III, IV Categories</p>	Tamil Nadu State Coastal Zone Management Authority (TNSCZMA)/ MOEFCC	<ul style="list-style-type: none"> -Applies to all activities in the CRZ as defined by the Notification -Groundwater abstraction in the CRZ is restricted -All project activities falling in the CRZ requires clearance from the TNSCZMA/ MOEFCC; clearance requires conduct of rapid EIA study by an accredited consultant

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		based on the environmental sensitivity and existing development.		
j	Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989	<p>-Defines hazardous chemicals</p> <ul style="list-style-type: none"> - stipulates rules, procedures to manufacture, storage and import of hazardous chemicals -chlorine, which will be used for WTP for disinfection is a hazardous chemical as per the rule -requires permission, authorization from various agencies if the total storage exceeds specified quantity; requires emergency management plan 	TNPCB and Directorate of Industrial Safety and Health	<p>-proposed treatment plants that requires storage of more than 10 tons chlorine will fall under this</p>
6.	Indian Forest Act, 1927	The Indian Forest Act 1927 was enacted to consolidate the law relating to forests, the transit of forest-produce and the duty leviable. Applies reserved forests, village forests, and protected forests. This act also concerns lands not being the property of government. Provides penalties and procedures with regard to all property, cattle trespasses and powers of Forest officers; declaration of forest areas (reserved, protected and village forests), and regulation of activities within the forests	MoEFCC TN Forest Department	<ul style="list-style-type: none"> - Applicable to subprojects located in the forest lands as defined under the Act
7.	Forest (Conservation) Act, 1980, amendment 1988	<p>Act provides for conservation of forests</p> <p>Restricts the dereservation of forests or use of forest lands for non-forest purpose</p> <p>Non-forest purpose means breaking up or clearing of any forest land</p>	MoEFCC TN Forest Department	<ul style="list-style-type: none"> - Restricts use of forest lands for non-forest purposes - Applicable to subprojects located in forests; requires prior permission to take up the works

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
a.	Forest (Conservation) Rules, 1981 amended 1992 and 2003.	Rules for conversion / use of forest lands for non-forest purposes	MoEFCC TN Forest Department	- Applicable to subprojects located in forest lands; - Prior permission for the use of forest land for program is required from TNFD/MOEFCC
b.	Guidelines for diversion of forest lands for non-forest purpose.	<ul style="list-style-type: none"> - Provides operational guidelines under the above rules for conversion / use of forest lands for non-forest purposes: approval of MOEFCC for any acquisition of forest land; - Application for the use of forest land to be made to the Forest Department, GoTN; - Project proponent to identify non-forest land which is to be transferred to Forest Department for taking up afforestation program; - Net present value of the forest land to be used, cost of afforestation, tree cutting, etc. to be paid to Forest Department - In Tamil Nadu, 20.26% of total geographical area of the state is under forests (Appendix 1). 	MoEFCC TN Forest Department	Guidelines to be followed if any subprojects require conversion of forest land for project (non-forest) purpose
5.	Indian Wildlife (Protection) Act, 1972 amended 1993 and Rules 1995; Wildlife (Protection) Amendment Act, 2002	An Act to provide for the comprehensive protection of wild animals, birds and plants. This would cover matters concerning Appointment of forest authorities, hunting of wild animals, protection of specified plants, conservation of national parks and sanctuaries, trade commerce in relation to plants and animals and prevention of any offences. Wildlife protected areas are	National Board of Wildlife / State wildlife boards	<ul style="list-style-type: none"> - Applicable to subprojects located in protected areas - Permission from the Chief Wildlife Warden/ State Wildlife Board/ National Board of Wildlife; and the Supreme Court of India

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		<p>notified under this act.</p> <p>- In Tamil Nadu State, there are 5 National Parks, 15 Wildlife Sanctuaries (including four tiger reserves), 15 Bird Sanctuaries, and two Conservation Reserves. Besides, there are 3 biosphere reserves in Tamil Nadu (Appendix 2).</p>		
8	The National Green Tribunal (NGT) Act, 2010	<p>NGT provides an effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith. NGT has jurisdiction over matters related to Water Act, 1974; Water Cess Act, 1977; Forest (Conservation) Act, 1980; Air Act, 1981; Environment (Protection) Act, 1986; Public Liability Insurance Act, 1991; and Biodiversity Act, 2002. Consequently, no other court will have jurisdiction over the matters related to environment falling under the above referred Acts. Being a dedicated tribunal for environmental matters with the necessary expertise to handle environmental disputes, NGT provides speedy justice (within 6 months). Chennai is one of the five places of sitting of the Tribunal (Southern Zonal Bench is located in Chennai). If not satisfied with the NGT decision, aggrieved party can</p>	NGT	<p>Stakeholders / affected persons may approach NGT to resolve project induced environmental issues</p>

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		approach the Supreme Court within the specified period of time. Matters relating to the Wildlife (Protection) Act, 1972 do not fall under the jurisdiction of NGT.		
8.	Ancient Monuments and Archaeological Sites and Remains Acts, 1958, its Rules, 1959 and notification, 1992. Ancient Monuments and Archeological Sites and Remains (Amendment and Validation) Act, 2010	Act for better and effective preservation of the archaeological wealth of the country, on par with constitutional provisions This Act provides for the preservation of ancient and historical monuments and archaeological sites and remains of national importance, for the regulation of archaeological excavations and for the protection of sculptures, carvings and other like objects. - Notifies 100m around the monument as prohibited area and 100 to 300m as regulated area for construction works; - No excavation/construction work is allowed within 100m of boundary of the protected monument; - Requires prior permission of ASI for taking works within 100-300m of the boundary of protected monuments	Archaeological Survey of India (ASI)	- Applicable to subprojects located in proximity of the protected monuments/sites; - There are 413 centrally protected monuments in 27 districts of Tamil Nadu; most (153 no,s) are in Kanchipuram District followed by Pudukottai District (109 no, s) (See Appendix 3)
10.	Contract Labour (Regulation and Abolition) Act, 1970;	The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is	Chief Labour Commissioner, Government of Tamil Nadu	- Applicable to all construction works under TNUFIP - IA to obtain a Certificate of Registration as the principle employer;

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.		
11..	The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996.	<p>All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay Cess at rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government</p> <ul style="list-style-type: none"> - Cess should be paid at a notified rate; -The employer has to obtain a registration certificate from the Registering Officer 	Chief Labour Commissioner, Government of Tamil Nadu	<ul style="list-style-type: none"> - Applicable to any building or other construction work employing 10 or more workers; - provide safety measures at the construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc.
12.	The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979	The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as	Chief Labour Commissioner, Government of Tamil Nadu	<ul style="list-style-type: none"> - Contractor shall register with Labour Department if Inter-state migrant workmen are engaged - Adequate and appropriate amenities and facilities to be provided to workers - housing, medical

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		housing, medical aid, traveling expenses from home up to the establishment and back, etc.,		aid, traveling expenses
13.	The Child Labour (Prohibition and Regulation) Act, 1986.	The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labor is prohibited in Building and Construction Industry.	As above	- No child labor shall be employed
14.	Minimum Wages Act, 1948.	The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.	As above	- All construction workers should be paid not less than the prescribed minimum wage.
15.	Workmen Compensation Act, 1923.	The Act provides for compensation in case of injury by accident arising out of and during the course of employment.	As above	- Compensation for workers in case of injury by accident.
16.	Equal Remuneration Act, 1979.	The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.	As above	- Equal wages for work of equal nature to male and female workers.
B	State Level			
1	Tamil Nadu State Groundwater (Development and Management) Act, 2003:	- To protect groundwater resources and provide safeguards against hazards of its over exploitation, and to ensure its planned development and proper management -Tamil Nadu Groundwater Authority established under the act	Tamil Nadu Ground Water Authority	-groundwater abstraction in notified areas will attract the provisions of this act

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		<p>-Notifies areas for development, regulation and control of groundwater</p> <p>-Prohibits sinking of wells and groundwater transport in notified areas without prior permission of authority; -all wells to be registered</p>		
2	Chennai Metropolitan Area Ground Water (Regulation) Act, 1987 and Chennai Metropolitan Area Ground water (Regulation) Amendment Act, 2002	<p>-To regulate and control the extraction and the use of groundwater in any form and to conserve ground water in Chennai and surrounding areas, and to regulate and control transport of groundwater</p> <p>-Prior permission is required to sink wells</p> <p>-No extraction or use of groundwater other than domestic purpose; permission/license required to use for any other purpose or for transport of groundwater</p> <p>-Groundwater extraction without pumps or with less than 0.5 horse power exempted</p> <p>-Act prohibits use of groundwater in certain cases (for non-potable use in industry when alternate source is available; swimming pools; gardening purpose)</p> <p>-Mandatory provision of rainwater harvesting structures in public and private buildings</p> <p>-Prohibits use of water bodies (public or private) for any other purpose</p>	Chennai Metropolitan	<p>-Groundwater abstraction, if any, proposed in the project shall comply with this</p> <p>-Comply with mandatory requirement of water harvesting structures in proposed facilities</p>
3	Tamil Nadu Hill Areas (Preservation of Trees) Act, 1955 and Amendment Act, 1979, and	<p>- To regulated cutting of trees and cultivation of land in hill areas of Tamil Nadu.</p> <p>- prior permission required for cutting of any (public or private)</p>	Constituted Committee of concerned district	Project implementation in specified area that require tree cutting will attract provisions of this

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
	Tamil Nadu Preservation of Private Forest Act, 1949	<p>- prior permission is required to fell any trees in the areas of private forest</p> <p>-Committee constituted under the chairmanship of District Collector concerned provides the permission after examining each case</p>		Act
4	Tamil Nadu State Action Plan for Climate Change	<p>The climate change action plan identifies and deals with the following focus areas: Sustainable Agriculture (and allied sectors), Water Resources, Forest and Bio-Diversity, Coastal Area Management, Energy Efficiency, Renewable Energy and Solar Mission, Sustainable Habitat and Knowledge Management. The Action plan proposes various strategies – focus area wise, for climate change adoption:</p> <p><u>Water resources:</u> -Sustainable water resource managed through an integrated approach leading to conservation, improvement in water use efficiency, controlling water pollution, minimization of wastage, and ensure equitable distribution of water -Strategies focus on 3 physiographic zone: hills, coastal area and plains -water transfers from surplus to deficit areas, groundwater conservation, restoration of water bodies, water efficiency, desalination etc., -policy interventions include: pricing and regulation, rain water harvesting, etc.,</p> <p><u>Energy efficiency:</u> -Energy efficiency and energy conservation</p>	Various agencies	<p>-Integrate climate change concerns and proposed adoption interventions of the Action Plan in the TNUFIP subprojects</p>

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		-promotion of non-conventional energy (wind, solar etc.,)		
5	State Water Policy, 1994:	<ul style="list-style-type: none"> -Policy redrafted as per the National Water Policy 2002 -Policy applies to all the water resources in the State -Policy stresses on efficient water management, conservation and reuse -One of the goals of policy is to provide adequate water for domestic uses and industry 	Government of Tamil Nadu – Water Resource Department	Comply with policy provisions in implementation of TNUFIP
	Tamil Nadu Water (prevention and control of pollution) Rules, 1983	<ul style="list-style-type: none"> Empowers the TNPCB to- -appoint consulting engineers, if and when required for specific purposes -prescribe consent fee - Issue notice to industries for collection of waste/wastewater samples for analysis -make it mandatory for industries to report any accidents/hazards 	TNPCB	TNUFIP projects (WTP and STP) to comply with provisions as required
6	Tamil Nadu Air (prevention and control of pollution) Rules, 1983	<ul style="list-style-type: none"> Empowers the TNPCB to- -appoint consulting engineers, if and when required for specific purposes -prescribe consent fee - Issue notice to industries for collection of waste/wastewater samples for analysis -make it mandatory for industries to report any accidents/hazards 	TNPCB	TNUFIP projects (WTP, STP, generator sets) to comply with provisions as required
7	Tamil Nadu Ancient and Historical Monuments and Archaeological Sites and Remains Act, 1966.	<ul style="list-style-type: none"> - empowers government to declare monument and areas to be protected in Tamil Nadu -preservation of protected monument -prohibit or restrict construction activities within the protected and regulated areas -prohibits / restricts felling of trees 	Tamil Nadu Archeology Department	TNUFIP projects located in notified monuments or areas under the act will attract the provisions, and will require permission

Ref.	Legislation	Policy Description	Regulator	Applicability to TNUFIP
		-		
8	Tamil Nadu and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and Rules, 2006	<ul style="list-style-type: none"> - regulate the employment and conditions of service of building and other construction workers and to provide for their safety, health and welfare measures. - Provide various benefits for the registered workers 	Chief Labour Commissioner, Government of Tamil Nadu	-To be complied in project implementation

B. International Environmental Agreements

23. Following Table 3 provides the list of various international agreements and conventions related environment and to which India is a party. Salient features and applicability to TNUFIP is also provided. Any subprojects if located in or near the sites notified under the Ramsar convention, World Heritage Sites, Biosphere reserves, will need to comply to the provisions and/or respective site management plans drawn up as per the convention guidelines. As these sites also enjoy protected sites under Gol legislations, the international requirements will also be looked into by the government regulatory agencies during the clearance/permission process. On climate change conventions, TNUFIP will be designed, constructed and operated with minimal greenhouse gas emissions via energy efficient design and infrastructure be built as climate resilient as far as possible through application of climate risk and vulnerability assessment (CRVA).

Table 3: International Agreements and Applicability to TNUFIP

International Agreement	Salient Features	Applicability to TNUFIP and Specific Requirements
Ramsar Convention on Wetlands of International Importance, 1971.	Known as Ramsar Convention, it is an intergovernmental treaty for the conservation and sustainable utilization of wetlands, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. It provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Ramsar Convention is the only global environmental treaty that deals with a particular ecosystem. There are 26 wetlands in India which are designated as wetlands of international importance under this	<ul style="list-style-type: none"> - Point Calimere wetland in Nagapattinam District is a Ramsar notified wetland (wetland of international importance) - any of the activities to be undertaken in the proximity of Ramsar wetlands shall follow the guidelines of the convention (The Ramsar Convention Handbooks for the wise use of wetlands, 4th ed. (2010), (http://www.ramsar.org/cda/en/amsar-pubs-handbooks/main/ramsar/1-30-33_4000_0)
Convention on Protection of the World	Adopted by UNESCO in 1972. Signatory country pledges to conserve the cultural and natural sites within its borders that are	<ul style="list-style-type: none"> - there 4 world heritage sites in Tamil Nadu (2 located fully in Tamil Nadu and rest 2 partly in

International Agreement	Salient Features	Applicability to TNUFIP and Specific Requirements
Culture and Natural Heritage, 1972	<p>recognized by the Convention as being of exceptional and universal value. In return, the international community helps to protect these treasures. India is a signatory to the convention. To define these significant sites the Convention has established the World Heritage List. There are 35 (27 cultural, 7 natural and 1 mixed) World Heritage Sites in India.</p>	<p>Tamil Nadu and partly in other neighboring states)</p> <ul style="list-style-type: none"> -Implementation of any developmental activities in World Heritage sites shall comply with the comprehensive management plan of such site
UNESCO World Network of Biosphere Reserves (WNBR)	<p>UNESCO has introduced the designation 'Biosphere Reserve' for natural areas to minimize conflict between development and conservation, and established this network under the Man and Biosphere (MAB) Program, which currently composed of 669 biosphere reserves in 120 countries, including 16 transboundary sites. It works to foster the harmonious integration of people and nature for sustainable development through participatory dialogue, knowledge sharing, poverty reduction, human well-being improvements, respect for cultural values and by improving society's ability to cope with climate change. It promotes collaboration and represents a unique tool for international cooperation and the promotion of best practices. There are 18 biosphere reserves in India, of which 8 are designated by UNESCO in WNBR. There are 3 biosphere reserves in Tamil Nadu.</p>	<ul style="list-style-type: none"> -Following three Biosphere Reserve (BR) in Tamil Nadu are part of World Network of BRs -Nilgiri BR, spread in 3 states of Tamil Nadu, Kerala and Karnataka and consists of core and buffer zones -Gulf of Mannar BR – located at south eastern tip of India and covers an area of 10,500 km² of ocean, 21 islands and the adjoining coastline. -Agasthyamalai BR is spread in states of Tamil Nadu and Kerala -Projects within BR will be dealt within the ambit of forest, wildlife laws etc., as applicable; and activities shall comply with the Biosphere Management Plan
Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal, 1989	<p>Convention to protect human health and the environment against the adverse effects of hazardous wastes. This aims at (i) reduction of hazardous waste generation, promotion of environmentally sound management (ii) restriction of transboundary movements, and (iii) a regulatory system for transboundary movements.</p>	<p>No trans boundary movement of hazardous wastes anticipated in the subproject</p>
UN Convention to Combat Desertification (CCD)	<p>Signed in 1994 and entered into force in 1996, this convention aims to combat the desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements. As an impact of this treaty, the year 2006 was declared as "International Year of Deserts and Desertification" to spread awareness about the</p>	<p>Not relevant to TNUFIP</p>

International Agreement	Salient Features	Applicability to TNUFIP and Specific Requirements
	desert areas of the world and especially the problem of desertification.	
The Convention on Biological Diversity	Commonly referred to as the Biodiversity Treaty, 1992, defines biodiversity as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems." Parties to the Biodiversity Treaty "affirm sovereign rights over the biological resources found within their countries, while accepting responsibility for conserving biological diversity and using biological resources in a sustainable manner"	Not applicable; no biodiversity impacts anticipated in TNUFIP
International Union for Conservation of Nature (IUCN) and Natural Resources	The IUCN Red List of Threatened Species (also known as the IUCN Red List or Red Data List), founded in 1963, is a comprehensive inventory of the global conservation status of plant and animal species. The IUCN is an authority on the conservation status of species. A series of Regional Red Lists are produced by countries or organizations, which assess the risk of extinction to species within a political management unit. The aim is to convey the urgency of conservation issues to the public and policy makers, as well as help the international community to try to reduce species extinction.	Not applicable; TNUFIP confined to urban areas, and there are no red list species
Convention on Migratory Species of Wild Animals (CMS)	CMS was adopted in 1979 and entered into force on 1 November 1983. CMS, also known as the Bonn Convention, recognizes that states must be the protectors of migratory species that live within or pass through their national jurisdictions, and aims to conserve terrestrial, marine and avian migratory species throughout their ranges. CMS Parties strive towards strictly protecting these species, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them.	No impacts envisaged on migratory birds or wetlands that support migratory birds; if any TNUFIP components are located near lakes/wetlands that attract migratory birds, project activities shall be conducted in a manner that will not affect those places or species
Convention on International Trade in Endangered Species of Wild Fauna	It is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES were first formed, in the 1960s. Levels of exploitation of some animal and plant species are high and the trade in them, together with other factors, such as habitat loss, is capable of heavily	Not relevant to TNUFIP

International Agreement	Salient Features	Applicability to TNUFIP and Specific Requirements
and Flora (CITES)	depleting their populations and even bringing some species close to extinction. Because the trade in wild animals and plants crosses borders between countries, the effort to regulate it requires international cooperation to safeguard certain species from over-exploitation.	
United Nations Framework Convention for Climate Change	The UNFCCC objective is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. India signed the UNFCCC in 1992 and ratified in 1993. The framework set no binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. Instead, the framework outlines how specific international treaties (called "protocols" or "Agreements") may be negotiated to set binding limits on greenhouse gases. The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal agency for climate change issues in India.	Climate change affects to be considered in TNUFIP design and implementation
Paris Agreement	The Paris Agreement to the UNFCCC deals with greenhouse gases (GHGs) emissions mitigation, adaptation and finance starting in the year 2020. The contribution that each individual country should make in order to achieve the worldwide goal are determined by all countries individually and called "nationally determined contributions" (NDCs). India signed convention in April 2016 and ratified in October 2016.	Design TNUFIP projects with minimal GHG emissions

C. ADB's Safeguard Policy Statement (SPS) 2009 Requirements

24. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments.

25. **Screening and categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

- (i) **Category A.** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
- (ii) **Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These

impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.

- (iii) **Category C.** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.
- (iv) **Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a Financial Intermediary (FI).

26. Environmental Assessment and Environmental Management Plan (EMP). Depending on the significance of project impacts and risks, a full-scale environmental impact assessment (EIA) will be required for category A projects. An initial environmental examination (IEE) will be required for category B projects. A desk review is required for Category C projects. EIA will be a comprehensive assessment while an IEE, with its narrower scope, is conducted for projects with limited impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures (category B). An EMP, which addresses the potential impacts and risks identified by the environmental assessment, shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks.

27. Environmental Audit of Existing Facilities. ADB SPS requires an environmental audit, if a subproject involves facilities and/or business activities that already exist or are under construction, including an on-site assessment to identify past or present concerns related to impacts or risks on the environment. The objective of this compliance audit is to determine whether actions were in accordance with ADB's safeguard principles and requirements for borrowers/clients, and to identify and plan appropriate measures to address areas of concern.

28. Public Disclosure. Executing agency and implementing agencies will provide relevant environmental information, including information from draft and final EIA and IEEs, environmental monitoring reports, and corrective action plans if any, in a timely manner, in an accessible place and in a form and language understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods shall be used. ADB will post the safeguard documents on its website as well as disclose relevant information in accessible manner in local communities:

- (i) For environmental category A projects, draft EIA report at least 120 days before Board consideration;
- (ii) Final or updated EIA and/or IEE upon receipt;
- (iii) Corrective action plans, and
- (iv) Environmental monitoring reports submitted by the executing agency during project implementation upon receipt.

29. Application of International Standards for Pollution Prevention and Control. ADB SPS requires that, during the design, construction, and operation of the ADB funded/supported projects, the project agencies will have to apply pollution prevention and control technologies and practices that are consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines for Water and Sanitation.⁶ These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations

⁶ IFC World Bank Group. 2007. [Environmental, Health and Safety Guidelines for Water and Sanitation](#).

differ from these levels and measures, the project shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the project agencies shall provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS. Appendix 4 provides internationally recognized standards for ambient air quality, and ambient noise quality.

D. Compatibility between Country's and ADB Safeguard Policy

30. The ADB environmental safeguard policy principles are encompassed entirely in its Safeguards Policy Statement 2009. Government of India has different but robust environmental legislative framework, embedded in various Acts, Policies, Rules and Regulations. While the ADB SPS is in line with the multilateral development financing institutions, GoI policies are also comparable to international environmental framework including that of ADB. The government's environmental regulatory framework derived from Constitutional Provisions; the National Environmental Policy, 2006 is a comprehensive policy document, addresses all relevant aspects of environmental protection and conservation, environmental sustainability and enforcement. The Environmental (Protection) Act, 1986 and its Rules, Notification, Standards, etc., have created robust regulatory framework. Besides, there are parallel and complementing legislations dealing with specific aspects like forest, wildlife, pollution control, archeological conservation, etc.

31. The Government of India's environmental assessment and clearance process is, in principle, consistent with ADB's environmental assessment process and public disclosure requirements. Environmental impact assessments (EIAs) for development projects under Category 'A' and 'B1' projects are similar to ADB's screening, categorization, assessment, and clearance/approval systems. The difference between both the requirements is that while the ADB "environmental safeguards are triggered if a project is likely to have potential environmental risks and impacts", the GoI EIA Notification clearly defines the projects/activities and their environmental categories (A/B1/B2) that require environmental assessment. The project/activities included are on the nature, scale and location, and cover activities that are likely to have adverse environmental impacts. The ADB SPS requires the review of environmental assessment requirement for every tranche separately and assigns classification (A/B/C) based on most sensitive subproject. Consequently, except the projects with no or very minimal physical construction activities, all the subprojects will be classified as B or A under SPS, and therefore requires environmental assessment.

32. None of the subprojects proposed to be implemented under TNUFIP are listed in the EIA Notification, 2006 and therefore do not require EIA study or Environmental Clearance. However, may require clearances / permission under other legislations if the subproject location is sensitive or notified. Such as if a subproject is located in forest lands or near protected monuments, it will require approvals as per those regulations. WTPs and STPs require consent to establish and consent to operate from TNPCB.

33. TNUFIP subprojects are unlikely to have significant adverse impacts that irreversible, diverse or unprecedented, and therefore under ADB SPS they are likely to be categorized as B. Due to construction in urban areas, there may be significant adverse impacts during construction, however, these will be temporary and will not be irreversible, diverse or unprecedented. As such, no A category subprojects will be considered for funding under this program. It is therefore required that proposed subprojects are subjected to screening, categorization, and preparation of IEEs and EMPs.

34. The Government of India framework does not prescribe a due diligence or environmental audit to check existing facilities at subproject site(s) to determine whether they could cause, or is causing, environmental risks and impacts. However, ADB's SPS principles require an environmental due diligence or audit even in such circumstances. If the subproject does not foresee any major expansion except refurbishment of existing buildings and facilities, the due diligence or environmental audit constitutes the environmental assessment for the subproject.

35. Comparative requirements of Government and ADB for the TNUFIP subprojects are given in Appendix 5.

E. Institutional Capacity in Environmental Safeguards

36. **Executing Agency.** The MAWS Department acting through TNUIFSL will be the executing agency. TNUIFSL will establish a Program Management Unit (PMU), comprising dedicated full-time staff from TNUIFSL for overall project and financial management of TNUFIP. Safeguards will be managed by Environmental and Social Safeguards Managers of TNUIFSL.

37. **Implementing Agencies.** The implementing agencies (IAs) for TNUFIP will be the project ULBs, TWAD Board, and in the case of Chennai, CMWSSB will be the IA. PIUs will be established in the IAs which will be headed by full-time Project Managers and dedicated full-time support staff of the respective agency.

38. TNUIFSL, a Public Limited Company set up in 1996, is a Public-Private Partnership in urban sector promoted by Government of Tamil Nadu with equity participation from banks and financial institutions⁷. The objectives⁸ of the Company are: to carry on the business activities in respect of management of trust funds and other funds and to acts managers, consultants, advisors, administrators, attorneys, agents, or representatives of or for any funds; and, to act as consultants, financial advisors and investments advisors and to render such consultancy, financial and investment advisory services. TNUIFSL is managed by Board of Directors with Chairperson being the Principal Secretary to Government, Municipal Administration and Water Supply Department, GoTN. Managing Director, a senior implementing agencies officer appointed by GoTN, heads the company. Currently, TNUIFSL is managing several urban sector funds and externally aided projects⁹.

39. Since its inception, TNUIFSL duly considered environmental and social aspects in all projects funded or managed by it, and integrated the safeguard concerns into project development cycle. Initially, it has implemented projects by applying the ESR. Subsequently, for the World Bank funded Third Tamil Nadu Urban Development Project (TNUDP III), TNUIFSL established ESF, and formally adopted ESF for its operations through a Government Order (GO)¹⁰ in 2006. This framework was updated and adopted by a GO in 2015 as Environmental and Social Management Framework (ESMF) for the World Bank funded Tamil Nadu Sustainable Urban Development Project (TNSUDP). For KfW funded projects, TNUIFSL adopted Environmental, Climate Change and Social Management Framework (ECSMF) in compliance with the KfW's

⁷ ICICI Bank, Housing Development Finance Corporation (HDFC) Limited and IL & FS Financial Services Limited

⁸ <http://www.tnuifsl.com/aboutus.asp>

⁹ Funds: Tamil Nadu Urban Development Fund (TNUDF), Project Development Grant Fund (PDGF), Project Sustainability Grant Fund (PSGF), Chennai Mega City Development Fund (CMCDF), Tamil Nadu Urban Road Infrastructure Fund (TURIF), Water and Sanitation Pooled Fund (WSPF); Projects: Tamil Nadu Sustainable Urban Development Project (TNSUDP, World Bank funded), Sustainable Municipal Infrastructure Financing - Tamil Nadu (SMIF – TN, KfW funded) Programs, Tamil Nadu Urban Infrastructure Project (TNUIP, JICA funded).

¹⁰ Government Order Ms. No. 115 dated 06.10.2006 of MAWS Department.

Sustainability Guidelines to also integrate climate change aspects in project implementation. ECSMF was updated in 2013, but adopted by TNUIFSL through a GO in 2016. ESMF is applied for all projects funded by the World Bank; salient features are discussed below.

40. ESMF is an overall framework to identify, assess and manage environment and social concerns of the funded projects, and outlines the policies, procedures and guidelines to incorporate the same into project preparation, appraisal, implementation, monitoring and reporting. All borrowers are responsible for ESMF compliance. ESMF is integrated into project cycle and includes project categorization, preparation of environmental and social reports, implementation and monitoring. TNUIFSL also undertakes annual audits to check the compliance with ESMF.

41. The ESMF process includes the following. This is presented here to provide a background of existing safeguards management system followed at TNUIFSL, and this will not be followed in implementation of TNUFIP:

- (i) Project screening
 - a. Project categorization based on the screening checklist and ESMF indicted project category¹¹ (E1, E2, E3) (refer Table 4);
 - b. Determination of level of assessment required: Environmental Assessment Report (EAR) for E1 – EAR to be prepared or reviewed by independent consultants; Project specific environmental assessment and EMP for E2; and generic EMP for E3¹²;
 - c. Borrower responsibility to prepare the EAR or EMP as required along with the detailed project reports with the assistance of consultants (for E1, EAR to be prepared or reviewed by independent consultant); TNUIFSL Environmental and Social Safeguard (ESS) managers advise borrowers on the terms of reference for environment and social studies;
 - d. If TNUIFSL is requested to provide support in project development, TNUIFSL appoints Design consultants, who along with DPR also conduct environmental and social studies; ESS managers will include scope of work and terms of reference for such studies based on the project category.

Table 4: Environmental and Social Management Framework Guidelines for Environmental Categorization of Projects^a

Project	Environment Category ^b
Water Supply	
Water supply augmentation without new source	E-2
Water supply augmentation with new source/head works/intake works/channels	E-1
Water supply distribution lines	E-2

¹¹ ESMF cover all urban infrastructure projects that are likely to be funded TNUIFSL ESMF also provides indicative categorization for urban sector projects based on potential impacts;

- E1 = Projects wherein TNUIFSL foresees major environmental impacts, requiring EAR or likely to affect sensitive environmental components (which are broadly defined in the ESMF) or projects which require environmental clearance as per the EIA Notification, 2006; similar to World Bank Category A project;
- E2 = Projects with moderate environmental issues; less adverse than those of E1;
- E3 = Projects with no environmental issues; environmentally benign projects.

¹² Generic EMPs of various urban infrastructure projects are provided in the ESMF; E3 projects, as per the ESMF include, small components like overhead tanks.

Project	Environment Category ^b
Water tankers	E-3
Overhead tanks	E-3
Water treatment plants	E-1
Upgradation of existing Head works	E-3
Generators	E-3
River Intake Works	E-1
Sewerage/Sanitation	
Only Sewer Net Work (linked to existing STP)	E-2
Sewerage Network and Pumping Stations (linked to existing STP)	E-2
Sewerage Network, Pumping Station and Treatment Plant	E-1
Public conveniences	E-2
Pay and use latrines	E-2
Septic tanks	E-2
Tertiary treatment plants and reverse osmosis plants	E-1

- (ii) Project appraisal.
 - a. Review and approval of project and EAR and EMP;
 - b. Ensuring including environmental aspects in DPR including budget
 - c. ESS managers conduct field reconnaissance surveys during the appraisal
 - d. Regulatory requirement review
 - e. Detailed environmental and social appraisal note is prepared, which also include recommendations on the conditions to be imposed for monitoring and linking with disbursement
- (iii) Loan Sanction
 - a. Approval of EAR, EMP is must prior to loan sanction
 - b. For E1 projects, TNUIFSL ensures prior to loan sanction that any comments and suggestions of respective external funding agency are included in the EARs
 - c. Environmental and social commitments of the borrowers are included in the loan agreement as covenants
- (iv) Loan disbursal / project implementation
 - a. Loan will be disbursed only after confirmation that borrower included EMP in the works contract
 - b. TNUIFSL ensures that borrower has adequate internal arrangements to monitor EMP implementation
 - c. TNUIFSL oversees implementation compliance via progress reports including social and environmental compliance reports submitted by borrowers; ESMF specifies quarterly field visits to ensure compliance during implementation; non-compliance, if any, noticed through reports or visits, will be referred to borrowed for corrective actions
- (v) Compliance audit
 - a. TNUIFSL undertakes E and S annual audit through an audit (consultant) agency to review the compliance of projects with the ESMF. Audit includes all E1 and selected (sample) E2 projects. Audit issues will be considered in future projects.

42. Public Consultation and Information Disclosure. ESMF requires conduct of public consultation at various stages of project preparation, and appropriately including the concerns,

feedback in the project. For E1 projects, ESMF requires minimum of 2 stage consultations, once at screening stage, and the second after preparing the draft EAR and EMP. No specific requirement is indicated for E2 and E3 projects in the ESMF, however, discussion with TNUIFSL indicate that, E2 projects require consultation at least once during the project preparation. No consultation requirement is specified for project implementation phase. ESMF mandates public disclosure of documents in local language at the offices of the project agencies and on websites. Annual audit reports are also disclosed.

43. Grievance Redress Mechanism. ESMF also requires establishment of a grievance redress committee (GRC) at the project level with three members¹³ (preferably at least one women member) to receive and resolve complaints from project affected persons. GRC shall be established prior to invitation of bids. If unresolved at GRC, the complainant may approach concerned jurisdictional agency (District Collectorate/Commissionerate of Municipal Administration/Corporation of Chennai etc.). GRC records to be maintained and disclosed.

44. Existing Institutional Arrangements at TNUIFSL to Implement ESMF. TNUIFSL has three wings for its operations: Projects, Consultancy and Finance, and has professional staff in several disciplines, including two qualified and experienced Environmental and Social Safeguards (ESS) managers (one for environment and one for social) for implementation of ESMF. ESS Managers report to the Head, Projects Division and are responsible for implementation of ESMF. Tasks include: approval of project category, review and approval of environment and social reports, environmental management plans, environmental budget in project costing, monitoring of compliance during implementation, guide the borrowers and capacity development. ESS Managers conduct sites visits during the appraisal stage, and also during the implementation phase to ensure the compliance.

45. Borrowers. As per the ESMF, it is the responsibility of borrowers to comply with ESMF requirements, and follow the laid down process to conduct necessary studies, prepare reports, EMPs, integrate the same in project implementation, and ensure compliance during implementation, monitoring and reporting. Borrowers also need to conduct public consultation, information disclosure, duly include feedback in the reports, and establish and maintain grievance redress system. Currently, the borrowers of TNUIFSL (ULBs, government utility and other agencies), due to lack of internal resources and expertise to handle environmental aspects, appoint consultants to handle these tasks to comply with ESMF. These documents are normally prepared by the design consultant, whose scope of work, terms of reference and team composition, is finalized in consultation with the TNUIFSL. If the DPR is prepared internally by borrower, an Environment and Social Consultant is appointed separately to conduct safeguard studies, and TNUIFSL provides necessary support in this. In a number of cases, on borrower's request, TNUIFSL provides project development support to borrowers. In such cases, TNUIFSL appoints consultants to conduct project preparatory studies (feasibility and detailed engineering) and prepare detailed project reports, including preparation of social and environmental assessment reports, environmental management plans in compliance with ESMF.

46. Institutional Capacity to Handle Safeguards. ESMF, as presented above, is in line with the environmental policy requirements of multilateral agencies (World Bank), and the TNUIFSL has two Environment and Social Safeguards (ESS) Managers (one for environment and another for social) to ensure environment and social safeguards compliance in its day-to-day operations. As a result, TNUIFSL has been successfully implementing projects in due compliance with ESMF.

¹³ 1. Representative from IA (GRC convener), 2. Elected representative, and 3. A person who is publicly known in the area.

TNUIFSL as whole and the ESS Managers in specific, have gained a long and rich experience in safeguards, have necessary qualification and expertise, well versed with country's environmental regulatory framework and procedures, and are also well aware of safeguard policies of multilateral agencies like the World Bank and bilateral agencies like JICA and KfW. Therefore, it can be concluded that, TNUIFSL, with the current institutional set up, is well equipped to implement the TNUFIP in compliance with the EARF and ADB SPS, which are also similar to that of other multilateral agencies, though there may be differences in specific requirements, processes and approvals. A training program in ADB safeguard policy to the ESS managers and other key staff in TNUIFSL will be needed.

47. Implementing Agencies. The urban local bodies of Ambur, Coimbatore, Cuddalore, Rajapalayam, Thoothikudi, Tiruchirappalli, Tirunelveli, Tiruppur, and Vellore are the implementing agencies of the TNUFIP in the respective cities, while in Chennai, CMWSSB is the implementing agency. At these IAs, capacity to deal with environmental assessment studies and the preparation of an EIA or IEE is limited. Consideration of safeguard aspects is generally limited to compliance with government regulations as per the government law, and obtaining necessary clearances, like consent from TNPCB for WTPs and STPs. Consequently, at present, there is no institutional set-up within the Implementing agencies to specifically deal with environmental safeguard aspect. The existing technical staff of implementing agencies include civil and environmental engineers, and scientists/chemists engaged in water quality testing laboratories. As presented above, to comply with ESMF, implementing agencies normally engage consultants, and therefore consultancy support to implementing agencies is necessary for implementation of TNUFIP. Having implemented several TNUIFSL funded/managed projects, most of the implementing agencies have understanding of safeguard requirements of multilateral agencies. A training program to the key staff of implementing agencies in ADB safeguard policy is necessary.

48. Tamil Nadu Pollution Control Board (TNPCB) is the main state-level regulatory agency responsible for environment protection and pollution control in Tamil Nadu. Headquartered in Chennai, with 5 zonal offices, 36 district offices, and 15 well equipped environmental laboratories (5 advanced and 10 district level labs) to cover entire state, TNPCB regulates pollution control and environmental protection related activities in Tamil Nadu. The involvement of the TNPCB in monitoring of the environmental safeguards of TNUFIP activities is limited, and mainly include issuance of consent, and monitoring of compliance of WTPs and STPs. Nevertheless, TNPCB mandate covers overall pollution control and TNPCB deals with public complaints related to pollution and environmental degradation due to any activity.

49. Forest, Wildlife and Coastal Regulations. Robust implementation and enforcement system exists for protected areas, and for use of forest lands for non-forest purposes (e.g., for locating project components in forests). The process is cumbersome and time consuming that rightly discourages the location of projects in forestlands unless it is unavoidable. In TNUFIP, there may cases where linear components like raw water mains may have to transverse through forest lands. Forest clearance is issued by Ministry of Environment, Forest and Climate Change (MoEFCC). Area less than 40 hectares is cleared by regional office of the MoEFCC at Chennai, while the rest are cleared by MoEFCC at Delhi. Conversion of forest lands that are part of protected areas (PAs) - National Parks/Sanctuaries and Tiger Reserve areas (notified under Indian Wildlife (Protection) Act, 1972) is not permitted. In exceptional case, the State Government requires consent and approval of the National Board for Wildlife and the Supreme Court. No project facilities will be located in the protected areas. Eco-sensitive zones (ESZ) are notified around the PAs to act as transitions zone by regulating and managing the activities around the PAs. However, in Tamil Nadu, ESZs are not notified yet. General guideline is that ESZ shall be about 10 km around a PA, however, it is flexible and depending on the site-specific condition it

can vary. Therefore, any work within ESZ or 10 km (if ESZ not notified) from the boundary of protected area shall be implemented only after consultation with the respective authorities of the protected area. Coastal stretches are notified as Coastal Regulation Zone (CRZ - I, II, III and IV) restricting new construction, and industrial activities. All activities in the CRZ will require permission of the Tamil Nadu State Coastal Zone Management Authority (TNSCZMA). For projects which do not require EIA study and EC as per the EIA Notification, 2006, will require Rapid Environmental Impact Assessment Study (conducted by an accredited consultant according to EIA Notification 2006) for obtaining CRZ clearance.

50. Monuments and Archeological Sites Regulations. Robust regulations, and implementation and enforcement system exists in India for protected monuments.

III. ANTICIPATED ENVIRONMENTAL IMPACTS

51. TNUFIP will finance subprojects to provide/improve water supply and sewerage infrastructure, including sewage treatment, in the program cities of Ambur, Chennai, Coimbatore, Cuddalore, Rajapalayam, Thoothikudi, Tiruchirappalli, Tirunelveli, Tiruppur, and Vellore. Proposed components will differ in composition because the cities have different needs, but subprojects in a particular sector generally contain the same basic elements. These are as follows:

- (i) Water supply infrastructure: source development/augmentation, treatment facilities, transmission mains (raw and clear water), storage and distribution reservoirs, distribution network, bulk meters, and consumer connections with meters.
- (ii) Sewerage and sanitation infrastructure: sewer network, trunk sewers and sewage treatment plant, and outfall sewers.

52. An environmental impact is defined as any change to the environment, whether adverse or beneficial; resulting from activities, products or services. To ensure subproject sustainability, acceptability, and to enhance efficiency, it is required that environmental impacts are identified and assessed as part of the planning and design process, and that actions are taken to avoid those impacts, and if cannot be avoided, reduced and mitigated to acceptable levels. Given the nature of subprojects, while there would be numerous positive benefits in terms of improving quality of life of people as well as raising standards of both individual and public health, TNUFIP subprojects may also induce certain negative impacts as creation and operation of water supply and sewerage infrastructure including sewage treatment will involve physical interaction with environment, abstraction of natural resources, and disposal of waste.

53. During the TNUFIP preparation, draft IEEs have been prepared for all Tranche 1 subprojects¹⁴ and concluded that these subprojects are unlikely to have any significant adverse impacts that are irreversible, diverse or unprecedented. IEEs for subprojects of subsequent tranches will be prepared during the implementation. Drawing from the environmental assessment of the Tranche 1 subprojects and based on broad range of issues listed in the ADB rapid environmental assessment (REA) checklists that determine project environmental category, Table 5 provides a summary of potential negative environmental impacts which may arise due to TNUFIP implementation and general measures to mitigate those impacts to acceptable levels. These are indicative impacts, and will need to be further explored during the subproject preparation and detailed design. World Bank Group's Environment, Health and Safety Guidelines for Water and Sanitation may also be referred in identifying scope of impacts. No category 'A'

¹⁴ see footnote 5 for the list of Tranche 1 subprojects.

type of works are anticipated. Subprojects with likely significant adverse impacts, that are irreversible, diverse or unprecedented (categorized as A) will not be funded under TNUFIP.

54. Impacts Due to Location and Design. Almost all of the design impacts can generally be mitigated while there can be significant impacts if the components are located in, or abstract from, or discharge to ecologically-sensitive areas (in or near wildlife sanctuaries, national parks, forest areas, wetlands, etc.),¹⁵ or in or near physical cultural resources (including protected monuments/sites or world heritage sites)¹⁶. TNUFIP will not undertake activities within such sensitive areas and will exclude projects which will cause significant environment impacts¹⁷ (such as construction of dams and reservoirs). Most of the facilities (WTP, STP, pumping stations, reservoirs etc.,) will be located in government owned vacant or unused lands. Most of the pipelines and sewers will be laid along the public roads in urban areas. Few pipelines (e.g., raw water main) and sewers (trunk or outfall), may need to be laid outside the urban area, but sensitive areas like forests will mostly be avoided. Tree cutting will be minimized. Locating components obstructing/encroaching natural drainage channels, ponds etc., will significantly impact natural drainage pattern and may lead to water logging and flooding, and related public health issues. Consideration of these potential issues and proper siting, design and operation of subprojects is necessary to avoid these.

55. The main design impacts of water supply system in general are due to abstraction of water and quality of raw water. Tranche 1 subproject in Chennai utilizes the existing source and treatment facility, and do not involve creation of a new or augmentation of any existing source. Issues related to source sustainability, downstream impacts, ecological flows, and issues related to conflicting uses and users are crucial and needs to be assessed as part of the project preparation, to avoid, mitigate or minimize them to acceptable levels. Health and safety risks due to handling and application of chlorine also need to be considered in location and design of Raw water quality needs to be carefully analyzed, and appropriate design (including source protection measures) and monitoring measures shall be put in place to ensure that water supply to consumers always meet the drinking water standards specified by Bureau of Indian Standards (Appendix 7).

56. Facilities like sewage wet wells, pumping stations normally need to be located within or close to the serving area. Siting of facilities is of utmost importance, and given the land constraints in urban areas, a combination of siting, buffer zones, design and operational measures should be put in place. STPs are mostly located outside the cities, however, future development prospects need to be considered. Selection of technology and design and operation measures, for all facilities, shall be commensurate with the potential risk, including health and safety risk due to application and handling of chlorine, to the surrounding community and environment. Issues related to odor is best mitigated by establishing a cordon sanitaire around the facilities. Treatment process selected should be adoptable to local conditions and capacity of implementing agency to operate and maintain. Issues related to power supply interruptions, which may affect the process and create insanitary conditions, shall be addressed in the design and necessary provisions shall be made. Nuisance, and land and groundwater contamination due to overflows, blockages etc., shall be avoided with proper design and operation. Training to staff, provision of appropriate O&M appurtenances, consumables, preventive, emergency and periodic maintenance shall be built into

¹⁵ Tamil Nadu is blessed with rich natural resources. Forests cover about 20.26% of the state. Protected area includes 5 national parks, 15 wildlife sanctuaries, 15 bird sanctuaries and 3 biosphere reserves in the state (Appendix 2).

¹⁶ There are 413 protected monuments including a world heritage site (Appendix 3).

¹⁷ Project classified as Category A as per ADB SPS, 2009.

the projects. Measures should be put in place to avoid any events that upset the system and treatment process (e.g., mixing of industrial wastewater).

57. **Impacts Due to Construction.** Most of the negative impacts of urban water supply and sewerage infrastructures, including STP, is due to construction. Primary construction impacts are due to invasive nature of trenching work for linear infrastructure (water pipes and sewers), which will be buried in or along the roads, some parts of which are in densely populated area and thoroughfares are congested with pedestrians, traffic and activities. Impacts mainly arise from the disturbance to residents (restricted access, interrupted services, noise, dust), businesses, traffic etc., by the construction work, and from the need to dispose of large quantities of waste soil. Due to dry weather conditions, dust pollution from construction activity will be considerable.

58. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Mitigation measures i.e. control of air, dust pollution, checking of water and noise pollution, and protection of sociocultural environment can address adverse impacts. Other measures, such as preparation and implementation of traffic management plans during pipe-laying, in coordination with the local police and the public, will minimize the impacts significantly. Occupational and community health and safety issues, and other health and hygienic conditions at work sites, are the potential issues. Sewers require deep excavations at many places, and given mostly narrow roads, this invariably involve risk to adjacent buildings. Limiting the sewer depth to the extent possible with appropriate hydraulic design, proper protection of trenches with shoring, and structural stability survey of nearby buildings and providing necessary protection if need be, will mitigate this impact.

59. Construction of the area facilities (tanks, pumping stations, STP, WTPs etc.) is not expected to have major adverse impacts if properly sited. The larger facilities, like WTP, STPs, will be built outside the cities on vacant lands, and smaller facilities like pumping stations and reservoirs, the construction work will be confined to selected sites, and will not interfere with the surrounding land use, except for transport of material and machinery. Due to presence of Asbestos Cement (AC) pipes in the existing water supply system, there is a risk of workers and the public being exposed to carcinogenic dust if AC pipes are encountered during excavation. No new AC pipes are proposed in the subprojects, and existing AC pipes in the ground will be not be touched, and they will be left as it is in the ground.

60. **Impacts Due to Operation and Maintenance.** Anticipated impacts of water supply and sewerage projects during operation and maintenance will be related to operation of WTP, STP, handling and application of chlorine, operation of sewage pumping and lifting stations, leak/block detection, and repair and maintenance activities.

61. Most of the proposed water infrastructure facilities will work with routine maintenance, which should not affect the environment during the operation phase. In case of pumping facilities, energy efficiency design, and following standard operating procedures will optimize the energy use. Application and handling of chlorine gas will involve certain risks, and appropriate measures for safe application including safety measures and equipment, PPEs, awareness programs and mock drills will need to be included. Depending on proximity of population emergency response plan may need to involve the local community (per SPS requirements). It is best to locate the plants so that population is outside impacted area. Thus, considering the design and operational procedures that will be considered in implementation, it is unlikely that there will be any significant negative impacts due to operation of water supply system. Water abstraction or source related issues will occur in operation, and if these are properly considered in the project preparation phase, as discussed above in design phase impacts, the impacts will be negligible. Routine

repairs and maintenance works will be very small in scale, to be conducted manually by small teams and works will be very short in duration thus will not cause significant physical impacts.

62. Operation of sewage pumping, and treatment facilities may have certain adverse impacts if the facility is not appropriately located, designed and/or operated. Inadequate treatment of sewage/sludge may adversely affect the receiving waters, pollute land and groundwater resources, emit bad odors, and may have impacts on worker and public health. Location of sewage pumping stations and treatment plants will also play a major role, which need to be offset by site planning, appropriate technology, effective design and operational procedures. Inadequate treatment may also result from lack of resources (such as electricity, skilled operating persons etc.). Following measures will avoid negative impacts of the STPs:

- (i) located away from inhabited areas
- (ii) located where there is an appropriate channel (with sufficient assimilative capacity to accept discharge without deteriorating its original water quality, no drinking water abstraction points, fishing and bathing activities etc.,) for disposal of treated effluent
- (iii) designed to treat the sewage to notified disposal standards of MOEFCC (Appendix 6)
- (iv) designed with appropriate sludge treatment and disposal facility
- (v) designed with appropriate technology to suit local conditions
- (vi) operated as per the standard operating procedures

63. Therefore, TNUFIP subprojects are unlikely to cause significant adverse impacts that are irreversible, diverse or unprecedented, provided project sites are carefully selected and components are designed, constructed and operated with due consideration to potential negative impacts. Project will provide significant benefits to citizens of project cities in Tamil Nadu, and will improve public health and economy. The potential impacts that are associated with design, construction and O&M can be mitigated to acceptable levels without difficulty through proper engineering design and good quality construction and operations and maintenance practices.

Table 5: Potential Environmental Impacts and Mitigation Measures

Anticipated Impacts	General Mitigation Measures
Design Period	
Loss or damage to ecologically-sensitive areas	<ul style="list-style-type: none"> • Avoid locating components in or near ecologically-sensitive (protected) areas
Impairment of physical cultural resources (PCRs)	<ul style="list-style-type: none"> • Avoid locating components in or near physical cultural resources. If cannot be avoided, consult with Archaeological Survey of India (ASI) (for ASI-protected PCRs) or State Archaeological Department (for state-protected PCRs) • Develop "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered
Social conflicts arising from displacement of communities	<ul style="list-style-type: none"> • Avoid land acquisition to maximum extent possible. For potential involuntary resettlement impacts, prepare a Land and Social Mitigation Plan
Disturbance of services due to shifting of utilities (electric poles, wires, water pipes, etc.)	<ul style="list-style-type: none"> • Ensure all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultation and disclosures

Anticipated Impacts	General Mitigation Measures
Water Supply Projects	
Pollution of source water from upstream anthropogenic activities and soil erosion runoff	<ul style="list-style-type: none"> Conduct extensive sanitary survey to avoid locating new water supply sources downstream of pollution sources (sewage and/or drainage outfall, catchment of area of extensive agricultural activities/nutrient runoff, waste dumpsites, pit latrines, or sewerage treatment plant discharge point)
Impacts due to excessive/unsustainable groundwater extraction (land subsidence, degradation of water quality, etc.)	<ul style="list-style-type: none"> Conduct groundwater tests to estimate the sustainable yield Utilize existing dams/reservoirs as water source subject to technical and economic feasibility Modify extraction rates and locations as necessary to prevent unacceptable adverse current and future impacts, considering realistic future increases in demand.
Impacts due to excessive/unsustainable surface water withdrawal	<ul style="list-style-type: none"> Evaluate potential adverse effects of surface water withdrawal on the downstream ecosystems and use appropriate environmental flow assessment to determine acceptable withdrawal rates. Impacts on aquatic life due to impingement and entrapment in open surface water intakes
Risk of pollution of source water due to inadequate protection of intake works or wells	<ul style="list-style-type: none"> Develop water source protection plan. It is important to involve water regulating authorities, TNPCB, property owners, farmers, industry, businesses, community groups, and public health officials. Locate new facilities at sites where there is low risk of flooding or other hazards that might impair functioning of, or present a risk of damage to water treatment plants, tanks/reservoirs, or their environs.
Health impacts due to unsatisfactory water supply	<ul style="list-style-type: none"> Follow design criteria in the Ministry of Urban Development (MoUD's) Central Public Health and Environmental Engineering Organization (CPHEEO) Manual on Water Supply and Treatment
Social conflicts from abstraction of raw water for water supply from other water uses of same surface/groundwater sources	<ul style="list-style-type: none"> Avoid sources with such conflicts; if unavoidable Water Resource Review Committee to initiate dialogue and resolve issues before investments
Health risks (carcinogenic dusts) due to replacement of asbestos cement pipes	<ul style="list-style-type: none"> Avoid any repairs or new connections to/from existing asbestos cement pipes
Sewerage projects	
Nuisance (noise, smell, and influx of insects, rodents, etc.) to neighboring areas due to location of sewerage facilities	<ul style="list-style-type: none"> Avoid locating facilities (sewage treatment plants, sewage sumps and wet wells) near densely populated neighborhoods and installations with potentially sensitive receptors, such as hospitals and schools. If not possible, include buffer zone/greenbelt around the facility Include effective site-specific design and operation and maintenance measures Locate facilities downwind from potential receptors, if possible.
Impairment of downstream water quality due to inadequate sewage	<ul style="list-style-type: none"> Avoid locating sewage disposal facilities upstream of water sources. Required distance shall be determined based on the self-

Anticipated Impacts	General Mitigation Measures
treatment or release of untreated sewage	<p>cleansing capacity of the receiving water body taking into consideration water flow and effluent quantity.</p> <ul style="list-style-type: none"> • Follow MoUD's CPHEEO Manual on Sewerage and Sewage Treatment
Overflows and flooding of neighboring properties with raw sewage	<ul style="list-style-type: none"> • Locate facilities at sites where there is low risk of flooding or other hazards that might impair functioning of, or present a risk of damage to water treatment plants, tanks/reservoirs, or their environs.
Inadequate sludge management (handling, treatment and disposal)	<ul style="list-style-type: none"> • Prepare sludge management plan and ensure its effective implementation • Sludge shall be properly dried, composted prior to its use as manure/compost; exposure to higher temperatures during the composting is important mechanism of pathogen destruction and render the sludge free of pathogens (fecal coliforms, salmonella, helminths, etc.,) • Standards provided in Appendix 6 shall be complied.
Construction Period	
Noise and vibration from construction activities	<ul style="list-style-type: none"> • Schedule noisy or otherwise invasive activities during periods of the day which will result in least disturbance • Use of high noise generating equipment shall be stopped during night time. • In unavoidable case of night works (due to local rules) provide prior information to public on work schedule, noisy activities and need to conduct the works at work. Use best construction methods to minimize noise to possible extent. • Vehicle horns should not be used unless it is necessary • All vehicles and equipment to be used in construction shall be fitted with exhaust silencers. • Use silent-type generators (if required) • If it is not practicable to reduce noise levels to or below noise exposure limits, post warning signs in the noise hazard areas. • Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly • Comply with ambient noise standards notified by MOEFCC (Appendix 7)
Increased dust from construction activities	<ul style="list-style-type: none"> • Use dust control methods, such as covers, water suppression, or increased moisture content for open materials storage piles • Use of water suppression for control of loose materials on paved or unpaved road surfaces. Ensure unpaved surfaces used for haulage of materials within settlements are dust-free
Increase in vehicle-related pollutants	<ul style="list-style-type: none"> • Use modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times.
Continuing soil erosion/silt runoff in or near construction sites	<ul style="list-style-type: none"> • Measures to minimize soil erosion/silt runoff to be incorporated when conducting earthworks during monsoon season

Anticipated Impacts	General Mitigation Measures
Water and land chemical contamination from fuels and lubricants	<ul style="list-style-type: none"> Place storage areas for fuels and lubricants away from any drainage leading to water bodies
Water and land contamination from solid and liquid wastes	<ul style="list-style-type: none"> Prioritize re-use of excess spoils and materials in construction activities. Take all precautions to prevent entering of wastes into streams, watercourses, or irrigation systems Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas
Increased road traffic in the town due to construction activities	<ul style="list-style-type: none"> Prepare traffic management plan and ensure sufficient financial provisions for road restoration
Road blocking/closure due to excavation works	<ul style="list-style-type: none"> Ensure effective advance communications with the affected residents Prepare traffic management plan For affected livelihood, prepare a resettlement plan
Social conflicts between construction workers from other areas and community workers	<ul style="list-style-type: none"> Employ labor force from local communities to maximum extent possible Restrict activities and movement of staff only within designated construction areas.
Safety risks due to deep excavation (workers and public)	<ul style="list-style-type: none"> Prepare health and safety plan Prepare community awareness plan. Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. Provide sign boards
For water supply projects, health risks from damaging existing asbestos cement pipe	<ul style="list-style-type: none"> Avoid asbestos cement pipes Prepare asbestos management plan Stop work immediately to allow further investigation if asbestos cement pipes have been damaged
O&M Period	
Water supply projects	
Health impacts due to unsatisfactory raw water supply	<ul style="list-style-type: none"> Conduct water quality monitoring at water treatment plant and at strategic points in the distribution system Ensure standard water quality (Appendix 7) surveillance procedures and protocols as a key obligation of the Contractor with third party checks Follow MoUD's CPHEEO Manual on Operation and Maintenance of Water Supply Systems
Health and safety hazards to workers from the handling of chlorine and other chemicals used in treatment and public safety risks from accidental leakage of chlorine gas	<ul style="list-style-type: none"> Prevent, minimize, and control potential impacts associated with the storage, handling and use of disinfection chemicals Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent disruptions in supply Ensure that all site personnel have a basic level of Health and Safety training and protective equipment

Anticipated Impacts	General Mitigation Measures
Generation of wastewater and sludge from water treatment process	<ul style="list-style-type: none"> • Wastewater generated from backwash and other facilities in WTP shall be reused; if not reused in the process, this will need to be treated prior to its disposal • Sludge may contain chemicals, and therefore need to be tested prior to its disposal; suitable disposal method (land fill or on land) to be selected based on the quality testing
Environmental and safety risks due to pipe repairs (workers and public)	<ul style="list-style-type: none"> • If flushing of pipes is required during maintenance works, it should be properly collected and transferred to treatment facilities • Provide sign boards and barricades
Sewerage projects	
Inadequate sludge management (handling, treatment and disposal)	<ul style="list-style-type: none"> • Treat wastewater and sludge used for land application in a manner consistent with WHO Guidelines for the Safe Use of Wastewater, Excreta and Grey water¹⁸ and applicable national requirements
Disposal of industrial wastewater into sewers	<ul style="list-style-type: none"> • Such disposal can affect the sewage quality, may lead to inadequate treatment of sewage before disposal • No industrial wastewater shall be allowed to dispose into sewers; awareness and monitoring system shall be established
Odor nuisance to surrounding community from wet wells and pumping stations	<ul style="list-style-type: none"> • design to avoid odour; Odour sources can be covered and extracted to odor treatment system during design stage • Review the operational procedures adopted and identify the cause behind odors; if odor is due to non-compliance with O&M procedures or malfunction of system etc., implement the corrective measures immediately • If the O&M is as intended and odor issues persists, provide specific odor control measures at the site
Health and safety hazards to workers involved in sewerage operation and maintenance due to hazardous working conditions, use of chemicals, confined spaces, explosion due to gas build up	<ul style="list-style-type: none"> • Ensure that all site personnel have a basic level of Health and Safety training and availability of Health and Safety protective equipment

IV. PROCESS TO BE FOLLOWED FOR TNUFIP SUBPROJECTS

A. Environment Category

64. The scope of TNUFIP includes provision of water supply and sewerage infrastructure including sewage treatment. As part of the program preparation, environmental assessment for all tranche 1 subprojects in the program cities¹⁹ was conducted and initial environmental

¹⁸ http://apps.who.int/iris/bitstream/10665/78265/1/9241546824_eng.pdf.

¹⁹ Sewerage projects in Coimbatore, Tirunelveli, Tiruchirappalli, Vellore, Chennai and Rajapalayam.

examination reports (IEEs) with environmental management plans (EMPs) were prepared in accordance with requirements of ADB SPS 2009. The IEEs concluded that the project will have only small-scale, localized impacts on the environment. The potential adverse environmental impacts are mainly due to construction, which can be minimized / mitigated by proven measures and environmentally sound engineering and construction practices. Therefore, tranche 1 of TNUFIP has been classified as environmental category B. The subprojects of future tranches will seek to replicate the tranche 1 subprojects and are thus expected to be category B. No category A type of works (with potential significant adverse impacts that are irreversible, diverse or unprecedented) will be considered for implementation in the program.

B. Project Selection Guidelines

1. Exclusion Criteria

65. The following criteria will be used for excluding sites / activities which might have significant negative environmental impacts. No Category A projects will be considered for implementation under TNUFIP. Subprojects that would directly affect environmentally protected areas, core zones of biosphere reserves, highly valued cultural property and fall under Category A shall be strictly avoided or the subproject component(s) causing potential impacts relocated or find suitable alternatives.

Table 6: Exclusion Criteria

Subprojects/components to be excluded from TNUFIP	
I	Projects that are located in the following eco sensitive areas excluded from TNUFIP
A	<p>All New projects/components located within or abstract from or discharge to:</p> <ul style="list-style-type: none"> • Wildlife / bird sanctuaries • National parks • Tiger reserves • Elephant reserves • Conservation reserves • Core Zone of Biosphere reserves • Centrally protected monuments • Critical habitat (as defined in ADB SPS)
B	<p>Rehabilitation works of existing projects/facilities located in the eco sensitive areas (wildlife sanctuaries, national parks, tiger reserves, elephant reserves etc.,), shall be excluded if the following criteria is not met:</p> <p>(i) Proposed rehabilitation works will be confined to the existing footprint, and within the right of way of existing infrastructure</p> <p>(ii) Proposed rehabilitation works will not require any new clearance/permissions. A written confirmation to that effect from the local office of the respective protected area regulatory agency shall be obtained.</p>
II	Projects with significant adverse impacts
	Projects likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, and may affect an area larger than the sites or facilities subject to physical works (i.e. Category A projects as per ADB SPS 2009) will be excluded from TNUFIP
III	<p>ADB Prohibited Investment Activities List (PIAL)</p> <p>The following do not qualify for Asian Development Bank financing:</p>

	<ul style="list-style-type: none"> • production or activities involving harmful or exploitative forms of forced labor¹ or child labor; • production of or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements or subject to international phaseouts or bans, such as (a) pharmaceuticals, pesticides, and herbicides, (b) ozone-depleting substances, (c) polychlorinated biphenyls and other hazardous chemicals, (d) wildlife or wildlife products regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora, and (e) transboundary trade in waste or waste products; production of or trade in weapons and munitions, including paramilitary materials; production of or trade in alcoholic beverages, excluding beer and wine;¹⁰ production of or trade in tobacco; gambling, casinos, and equivalent enterprises;¹⁰ • production of or trade in radioactive materials,¹¹ including nuclear reactors and components thereof; production of, trade in, or use of unbonded asbestos fibers;¹² • commercial logging operations or the purchase of logging equipment for use in primary tropical moist forests or old-growth forests; and • marine and coastal fishing practices, such as large-scale pelagic drift net fishing and fine mesh net fishing, harmful to vulnerable and protected species in large numbers and damaging to marine biodiversity and habitats.
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2. Environmental Guidelines for Project Selection

66. The following guidelines (Table 7), to be followed during the identification and finalization of subprojects, provide further guidance to avoid or minimize adverse impacts.

Table 7: Environment Criterion for Project Selection

	Guidelines
A	All Projects
1	Do not locate projects / components in eco sensitive areas (national parks, wildlife sanctuaries, tiger reserves, centrally protected monuments, critical habitats etc.,)
2	Facilities shall not be sited in locations with social conflicts
3	Avoid locations that will result in destruction/disturbance to historical and cultural places/values
4	Reflect inputs from public consultation in site selection
5	Project / component must comply with all requirements of relevant national and state laws
6	The project components shall not be located within 300 m of ASI protected monuments/sites to the extent possible. However, in case of no alternative options, permissions as required from NMA, ASI as applicable, shall be obtained prior to start of work.
7	Avoid location of projects / components in forest areas
8	Locate facility such that there is no disturbance/obstruction to natural drainage; avoid locating facilities, located in lakes, ponds, flood plains etc. Avoid all sites that may pose risk of flooding.
9	Avoid land acquisition and involuntary resettlement by <ul style="list-style-type: none"> • Using vacant government land where possible

	Guidelines
	<ul style="list-style-type: none"> • Minimize the land acquisition by all possible measures in design, site or alignment changes etc., • Take all possible measures such as design with minimal land and selection of site or alignment to avoid resettlement impacts, etc.,
B.	Water supply projects
1	Select sustainable water source – assess water availability and also abstraction should not lead to significant reduction in quantity and quality of overall water source
2	Augmentation of water supply from an existing groundwater source or development of new source should be supported by groundwater studies establishing water availability and sustainability, and also quality
3	Do not use water sources that may be polluted by upstream users; ensure adequate distance from upstream disposal point and the project intake (exact distance depend on the flow, disposal source, dilution capacity etc., but in no case an intake should located within 2 km downstream of any disposal point, to the extent possible)
4	Avoid water-use conflicts by not abstracting water that is used for other purposes (e.g., irrigation)
5	As far as possible, locate all new facilities/buildings at sites where there is no risk of flooding
6	As far as possible, locate pumping stations at least 50 m away from any premises used by people (house, shops)
7	As far as possible, locate pipelines within road right of way (RoW) as far as possible, to reduce the acquisition of new land.
8	Ensure sufficient access to water treatment plant, pumping stations, and reservoirs/tanks for operations and maintenance activities.
9	Do not use pipes that are manufactured from asbestos concrete; existing AC pipes, if any, should be left untouched in the ground
10	Ensure efficient water treatment process; avoid wastage of backwash water by recirculation
11	Ensure sludge management facilities are included in the water treatment plant
C.	Sewerage projects
1.	As far as possible, locate Sewage Treatment Plants (STP) 500 m away from inhabited areas
2.	As far as possible, locate STPs in areas with least development potential
3.	STPs should not be located in areas prone for flooding
4.	STPs should be located where there is proper means of treated water disposal/reuse
5.	Ensure that adequate land is available in the selected STP sites for safe sludge management prior to its reuse or disposal - adequate land for storing, composting the dewatered / dried sludge prior to its disposal/reuse
6.	No STP discharge point be located upstream of any water intake (exact distance depends on the flow, disposal source, dilution capacity etc., but in no case, should be located within 2 km upstream of any intake)
7	Ensure that treatment process and technology selected is simple and suitable to local conditions; consider availability of resources for O&M (trained manpower, power supply, spare parts, chemicals, etc.,) in facility design
8.	Locate sewage pumping stations at least 50 m from houses, sensitive buildings like schools, hospitals, religious places etc.,

	Guidelines
	<p>In case of non-availability of suitable sites due to land and technical design constraints in already developed areas, where 50 m buffer is not available, following procedures shall be adopted and documented in order to finalize sites for implementation of project:</p> <ul style="list-style-type: none"> (i) Conduct alternate site analysis, justify the selected site (ii) Develop odor mitigation measures to prevent and control odor/air emissions – design measures, and operational practices that are feasible and practical in local conditions and include in DPR (iii) Develop layout plan with maximum buffer to nearby houses (iv) Provide a peripheral green buffer (at least 3 rows of trees within the pumping station compound) (v) Public information – consult local community, inform about the need, process adopted to select sites, its suitability, and measures adopted for odor prevention and control
9.	As far as possible, minimize the sewer depth by appropriate designs; avoid deep trench excavations in inhabited areas; in unavoidable conditions ensure safety of houses, structures by suitable safety measures

C. Environmental Assessment Process for Subprojects

1. Screening and Categorization

67. As soon as sufficient information on a subproject is available, screening is to be conducted using the ADB's rapid environmental assessment (REA) checklist (Appendix 8) to determine the subproject environmental category. Requirements as per the government regulations (clearances, approvals, consent etc.,) shall also be identified at this stage, including the requirement for environmental clearance as per the EIA Notification, 2006.

68. Based on the screening, subprojects are to be classified into one of the following categories.

- (i) Category A. The subproject is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, and may affect an area larger than the sites or facilities subject to physical works. This category of subprojects will not be implemented under TNUFIP.
- (ii) Category B. The subproject is likely to have less adverse environmental impacts than those classified as Category A. Such impacts are site-specific, mostly reversible, and, in most cases, it is possible to come up with mitigation measures more readily than in Category A projects. An IEE and an EMP are required for Category B projects.
- (iii) Category C. The subproject is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications of the subproject need to be reviewed.

69. Under TNUFIP no Category A projects will be implemented and therefore there is no requirement for conducting detailed Environmental Impact Assessment (EIA) studies and preparation of EIA Reports.

70. **Tranche Category.:** Under the MFF project loan modality, each tranche is categorized as A/B/C according to the most sensitive subproject of that tranche. EA/IA will screen and categorize

each subproject, and then propose category for overall tranche based on its most sensitive subproject. EA will submit the category form to ADB. Concurrence of Chief compliance officer (CCO) of ADB is necessary before categorization for tranche is agreed.

2. Preparation of Environmental Assessment Report

71. IEE Study and Report: For B category projects, an Initial Environmental Examination (IEE) report is required. IEE describes the studies conducted to identify the potential environmental impacts of a proposed development, and is prepared when impacts are unlikely to be highly significant and can be mitigated relatively easily. While both the EIA and IEE fulfill the same purpose, EIA is a more detailed study and comprehensive document, because of greater severity of potential impacts. add the process: implementing agencies with consultant support will prepare IEE for each subproject, EA will review and approve, then submit to ADB with the periodic financing request (PFR) for tranche approval. ADB might require changes to the IEEs to ensure they meet SPS requirements, which need to be attended by IA and EA and IEE report finalized.

72. TNUFIP will improve infrastructure through the implementation of a series of subprojects, each providing improvements in a sector (water supply or sewerage) in a particular city. Each subproject will require one IEE Report.

73. Outline and content of an IEE Report is given in Appendix 9. The IEEs prepared during the Project Preparatory Technical Assistance (PPTA) for tranche 1 subprojects can be used as model documents for subprojects of future tranches.

74. Pollution prevention for conservation of resources, particularly technology for management of sludge, chlorine safety, occupational and community health and safety, shall be addressed in the IEEs. All the potential impacts in Section III should be addressed in the IEE which needs to be based on up to date quantified baseline information and quantitative assessment where relevant. During the design, construction, and operation of the project, the EA and implementing agencies shall apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, EA and implementing agencies will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, EA and implementing agencies will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS. The IEEs shall also reflect meaningful consultation and disclosure process with a provision for grievance redress mechanism.

75. Environmental Management Plan: EMP shall be developed as part of the IEE. The EMP outlines specific mitigation measures, environmental monitoring requirements, and related institutional arrangements, including budget requirements for implementation. Where impacts and risks cannot be avoided or prevented, mitigation measures and actions will be identified so that the subproject is designed, constructed, and operated in compliance with applicable laws and regulations and meets the requirements specified in the SPS. The level of detail and complexity of the EMP and the priority of the identified measures and actions shall be commensurate with the subproject's impacts and risks. Key considerations include mitigation of potential adverse impacts to the level of "no significant harm to third parties," the "polluter pays" principle, the precautionary approach, and adaptive management.

76. If some residual impacts are likely to remain significant after mitigation²⁰, the EMP will also include appropriate compensatory measures (offset) that aim to ensure that the project does not cause significant net degradation to the environment. Such measures may relate, for instance, to conservation of habitat and biodiversity, preservation of ambient conditions, and greenhouse gas emissions. Monetary compensation in lieu of offset is acceptable in exceptional circumstances, provided that the compensation is used to provide environmental benefits of the same nature and is commensurate with the project's residual impact.

77. All IEEs shall be conducted and EMPs prepared and approved by PMU and ADB prior to invitation of the bids for construction contracts. The bid documents shall include the requirement to incorporate necessary resources to implement the EMP. The IEE and EMP will form part of the contract document, and, if required, will need to be further updated during the construction phase of a subproject.

78. In case subproject requires Environmental Clearance and EIA study as per the Government of India's EIA Notification, the environmental assessment documents prepared shall, to the extent possible, meet both EARF and Government of India requirements in order to streamline the environmental procedures. It is to be noted that for the purpose of Environmental Clearance, MOEFCC stipulated conduct of EIA study only by an accredited EIA Consultant as per the government Norms. Environmental Clearance if required must be obtained before submission of the tranche PFR to ADB.

3. Environmental Audit of Existing Facilities

79. For subprojects involving facilities that already exist or are under construction, an environment audit shall be undertaken, including on-site assessment, to identify past or present concerns related to impacts on the environment. The objective of the compliance audit is to determine whether actions were in accordance with the EARF, and to identify and plan appropriate measures to address areas of concern. Where areas of concerns are identified, a corrective action plan will be prepared. The plan will define necessary remedial actions, the budget for such actions, and the time frame for resolution of the concerns. The audit report (including corrective action plan, if any) will be made available to the public in accordance with the information disclosure requirements of the EARF.

4. Public Consultation, Information Disclosure and Grievance Redress

80. Public consultation and information disclosure is mandatory as part of the environmental assessment process for ADB and TNUFIP subprojects. The adequacy of the public consultation and disclosure during the environmental assessment process will be one of the criteria used to determine the project compliance with ADB safeguard policies. Similarly, a grievance redress mechanism (GRM) to receive, evaluate, and facilitate the resolution of affected person's concerns, complaints, and grievances about the social and environmental performance at project level is to be established and detailed out in the IEE Report. GRM should be made operational during the EMP implementation phase. GRM also includes at Project level that sites with the executing agency.

²⁰ Subprojects with these kinds of impacts will most likely be categorized as A, and therefore such subprojects are not anticipated in TNUFIP.

81. The process of public consultation and information disclosure, which is to be carried through the project preparation and implementation, is presented in detailed the following Section V.

5. Review and Approval of Environmental Assessment Reports

82. IEE including EMPs, prepared/updated by consultants/contractors, will be reviewed and approved by TNUIFSL and ADB as part of PFR. Approval of safeguard documents of respective subproject is pre-requisite to initiate the bidding process.

83. Executing agency is primarily responsible for identifying, prioritizing, formulating, appraising, approving, and implementing subprojects in accordance with technical, financial, and economic appraisal criteria, including social and environmental criteria, mutually agreed upon between ADB and the borrower/executing agency. PMU will submit all IEEs to ADB for review and disclosure. ADB will review draft final reports (IEEs) of all subprojects.

84. For subproject processing, the steps to be followed are shown in Table 9. It is the ultimate responsibility of the TNUIFSL and its PMU to ensure subprojects are consistent with the legal framework, whether national, state, or local. Compliance is required in all stages of the project, including design, construction, and operation and maintenance.

D. Monitoring and Reporting

85. Monitoring and reporting on overall EARF compliance, subproject selection guidelines and exclusion criteria, IEEs of future tranches, and on implementation of subproject-wise EMPs are the key tasks in safeguard implementation in TNUFIP. Contractor will implement EMP and submit monthly implementation reports to PIU. PIUs will ensure the EMP implementation at individual subproject level and submit quarterly report to PMU. PIUs, will be assisted by experts to ensure EARF compliance in sub-project implementation. PMU will monitor overall compliance with ADB SPS 2009, and submit monitoring reports to ADB – semi-annual during pre-construction/construction phase and annual during operation phase. Monitoring reports are required for all the subprojects, and therefore a consolidated monitoring report, which contain the monitoring reports of all the subprojects with requisite level of detail, can be submitted to ADB. Monitoring and reporting requirements are detailed in Section VII.

Table 8: Implementation Procedure for Environmental Assessment and Review Framework

Project Stage	EARF Procedure: Primary responsibility of preparation of IEE reports and EMPs, implementation of EMPs: implementing agency/Project Implementation Unit (PIU) Review, monitoring, reporting, overall compliance responsibility: Project Management Unit (PMU)/TNUIFSL Oversee and approval: ADB
Subproject identification	Follow environmental subproject selection guidelines and exclusion criteria of EARF in project formulation and site identification
Feasibility/preliminary design	Prepare Rapid Environmental Assessment (REA) checklist Categorize the subproject (A/B/C) Identify government regulatory requirements

	<p>(clearances/approvals/consents etc.,)</p> <p>Check latest amendments to Environmental Impact Assessment (EIA) Notification 2006 for EIA and Environmental Clearance requirement of subproject</p> <p>Categorization (A/B/C): PMU to review the REA checklists and reconfirm the categorization</p> <p>A' category projects not eligible for TNUFIP funding; PMU to advise on changes required in project to reclassify</p> <p><u>ADB will categorization of each tranche</u></p>
Detailed design	<p>Preparation of Initial Environmental Examination (IEE)</p> <p>Updating of IEEs based on detailed design (Update required If IEE is prepared prior to detailed design or if there are any changes in subproject after approval of IEE). All updated IEEs to be approved by ADB and disclosed.</p> <p>For projects involving facilities and/or business activities that already exist or are under construction, undertake an environment and/or social compliance audit, including on-site assessment, to identify past or present concerns related to impacts on the environment. Where non-compliance is identified, a Corrective Action Plan* shall be prepared, and agreed on by ADB and TNUFSL, and implemented accordingly</p> <p>Obtain all necessary environmental clearances, consents, and no-objection certificates (NOCs) as per the legal framework prior to bid invitation^a to the extent possible.</p> <p>Public consultation will be carried out in a manner commensurate with the impacts of affected communities. The consultation process and its results are to be documented and reflected in the IEE.</p> <p>Disclosure: For category B: Disclosure on PMU and PIU's website of the draft IEE, final IEE; updated IEEs and corrective action plans; and environmental monitoring reports. Disclosure on ADB's website of the final IEE; updated IEEs and corrective action plans; and environmental monitoring reports. In addition, environmental information will be in an accessible place and in a form or language understandable to affected person and other stakeholders. For illiterate people, other suitable communication methods will be used.</p> <p>Mitigation measures specified in IEE study incorporated in project design</p> <p>Identify and incorporate environmental mitigation and monitoring measures (including the EMP) into bid/contract documents</p>
Appraisal	<p>Environmental Management Plan (EMP) and other environmental covenants are incorporated into the loan/project/tranche agreement, and project administration memorandum (PAM)</p> <p>Approval of IEE prior to invitation of bid</p> <p>All clearances are in place prior to invitation of bid / award of contracts / start of work as applicable, to the extent possible</p>

	Grievance Redress Mechanism (GRM), including an overall project level at EA, established prior to award of contract
Approval	ADB will review draft final reports of all IEEs
Bid invitation	Approval of IEE by ADB must prior to approval of respective tranche
Contract award	Implementation of EMP, including monitoring plans based on IEE findings to be incorporated into civil works contracts. Ensure applications are submitted for all statutory clearances prior to award of contract and ensure clearances and no objection letters are obtained prior to the commencement of works.
Implementation	Organize workshops/training on EMP implementation to contractors and supervising staff. Implementation of EMP including monitoring plan by contractors and submission of monthly reporting to PIU, Ensuring EMP implementation and submission of Quarterly reporting by PIU to PMU including corrective action plan where non-compliance is identified Conduct public consultation and awareness programs, as required Overall compliance monitoring and Submission of semi-annual monitoring report by PMU to ADB, All the sites are cleaned up and restored as required prior to issuance of work completion certification to the contractor.
Operation	All the operational stage regulatory clearances and approvals, as required, are in place prior to start of operation; and Implement operational stage EMP. Submission of monitoring reports during operation until ADB project closure

Note: The plan will define necessary remedial actions, the budget for such actions, and the period for resolution of noncompliance. The audit report (including corrective action plan, if any) will be made available to the public in accordance with the information disclosure requirements of Safeguard Requirements 1–3.

^a This is to ensure that project is not delayed or withheld for the want of permissions and clearance after the bid is invited; however, this may be relaxed in certain cases where contractor input is required to obtain permission/approval (e.g., DBO contracts where design is conducted by contractor); once the project is bid, there shall be no uncertainty in its timely implementation for the want of clearances, which are beyond the control of project agencies.

V. CONSULTATION, INFORMATION DISCLOSURE, AND GRIEVANCE REDRESS MECHANISM

A. Public Consultation

86. Consultation, participation, and disclosure will ensure that information is provided and feedback on proposed subproject design is sought early, right from the subproject preparation phase, so that the views/preferences of stakeholders including potential beneficiaries and affected person can be adequately considered, and continue at each stage of the subproject preparation, processing, and implementation. Meaningful stakeholder consultation and participation is part of the project preparation and implementation strategy.

87. The key stakeholders to be consulted during project preparation and implementation include:

- (i) project beneficiaries, and project affected persons;
- (ii) elected representatives, community leaders, and representatives of community-based organizations; business and industrial associations, etc.;
- (iii) relevant local NGOs;
- (iv) local government and relevant government agencies, including the authorities responsible for land acquisition, protection and conservation of forests and environment, archaeological sites, religious sites, and other relevant government departments (regulatory, administration and infrastructure services related);
- (v) residents, shopkeepers, business people, farmers, fisheries (owners and workers) who live and work alongside the roads where pipes will be laid and near sites where facilities will be built; custodians, and users of socially and culturally important buildings; and
- (vi) Vulnerable groups, women groups etc.

88. A variety of approaches can be adopted, and stakeholders should be consulted throughout the program implementation. At minimum the following consultation activities (Table 10) should be conducted. This is indicative and project agencies can also adopt more effective methods and approaches, which are locally appropriate. Consultations shall be conducted in an atmosphere which is conducive to the development of the subprojects and beneficial to the affected persons and other stakeholders. The implementing agency will ensure that the consultations are free of coercion and intimidation, gender-inclusive, and tailored to the needs of disadvantaged and vulnerable groups. All the consultation events shall be documented, including gender segregated participants list, and record findings. The IEEs should reflect the feedback and concerns of consultations.

Table 9: Proposed Public Consultation Activities

Project Stage	Consultation Activities	Remarks
Subproject preparation	<p>Household level consultations through sample questionnaire surveys on service levels, needs, priorities for project preparation</p> <p>Document events, including male and female participation, record findings in IEE along with how the subproject responds to them</p>	Initial stages of project preparation
	Focus group discussions with people residing/working near the project sites	During the visits to project sites

Project Stage	Consultation Activities	Remarks
	A subproject level consultation workshop with all key stakeholders (at city level)	Once the draft IEE report is prepared
	Consultations with Affected persons: Affected persons shall be consulted to ensure: <ul style="list-style-type: none"> • incorporate their views/concerns on compensation/resettlement assistance • inclusion of vulnerable groups in project benefits; • identify assistance required by affected persons during rehabilitation, if any; and • Avoid potential conflicts for smooth project implementation. It will also provide adequate opportunities for consultation and participation to all stakeholders and inclusion of the poor, vulnerable, marginalized, and affected persons in the project process • Affected persons will also include persons who are affected by environmental disturbance etc. Consultation will also be needed with such affected persons 	At various stages, especially during, the preparation and implementation of resettlement plan
Subproject Implementation	Continue consultations with stakeholders throughout project implementation as required ²¹ . Following processes may be considered: <ul style="list-style-type: none"> • Focus group discussions with the people residing/working near the project sites • Focus group discussions with the construction workers and construction supervision staff (contractor, consultants and PIU) • Focus discussions with commuters and general public along the roads where works are implemented • Consultations shall be documented appropriately (photographs, feedback etc.,) and reported via Environmental Monitoring Reports 	During the EMP monitoring at work sites

89. Implementing agencies will be responsible to conduct meaningful consultations and the proceedings and outcomes of these consultations shall be recorded. TNUIFSL/PMU on its part as executing agency will oversee consultation process to ensure compliance. In the IEEs, summarize the manner in which consultations were conducted, key topics discussed, and the decisions arrived at. These decisions shall be incorporated into the IEEs and EMPs. Photographic records and signatures of participants shall be recorded in the IEE report.

90. Outline for preparation of minutes of stakeholder consultation meetings is given at Appendix 10.

²¹ In the event of any non-compliance noticed on site or in monitoring reports or in case of any public complaints related to EMP implementation or unanticipated impacts or new impacts surface during implementation.

B. Information Disclosure

91. Print Media: Project related information shall be disclosed through public consultation and making relevant documents available in public locations. A concise summary of project and draft IEE report (in Tamil and English), providing all necessary details of proposals, implementation arrangements, subproject locations, likely issues and mitigation and monitoring measures and grievance redress mechanism, shall be made available to the stakeholders at consultation meetings. This should also provide contact information of program agency. This summary shall also be displayed at the notice boards of PIU.

92. PIUs shall provide relevant safeguards information in a timely manner, in an accessible place and in a form and languages understandable to affected person and other stakeholders. For illiterate people, other suitable communication methods will be used.

93. Contractor will provide prior public information (in Tamil and English) about the construction work in the area, once 7 days prior to the start of work and again a day before the start of work (a sample public information template is provided in Appendix 11). At the work sites, public information boards will also be provided to disseminate project related information.

94. In the course of project implementation, relevant information about any major changes to project scope will be shared with beneficiaries, affected persons, vulnerable groups, and other stakeholders.

95. Web Disclosure: At minimum, the following documents shall be made available at the offices of project agencies – TNUIFSL/PMU, implementing agencies, PIUs for public reference, and shall also be uploaded on respective websites. After disclosure the links will be shared with ADB for disclosure.

- (i) Summary of project and draft IEE (in Tamil and English);
- (ii) Draft IEE Report (in English);
- (iii) Final IEE Report (in English);
- (iv) Updated/amended IEE (in English), if any;
- (v) Corrective action plan prepared during project implementation (English);
- (vi) Semi-annual Environmental Monitoring Reports (English).

96. The following documents will be submitted to ADB by PMU for disclosure on ADB website.

- (i) For category B projects²²
 - a. final IEE;
 - b. a new or updated IEE and corrective action plan prepared during project implementation, if any; and
 - c. environmental monitoring reports.

C. Grievance Redress Mechanism

97. A common grievance redress mechanism (GRM) will be in place to redress social, environmental or any other project related grievances. The GRM described below has been developed in consultation with stakeholders. Public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated. The

²² Category A subprojects will not be considered for funding under TNUFIP.

campaign will ensure that the poor, vulnerable and others are made aware of grievance redress procedures and entitlements per project entitlement matrix, and PMU and concerned PIUs will ensure that their grievances are addressed.

98. Affected persons will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes or through telephone, by e-mail, by post, or by writing in complaints register in ULB or PIU or implementing agency offices. PIU Safeguards officer will have the responsibility for timely grievance redress on safeguards and gender issues and for registration of grievances, related disclosure, and communication with the aggrieved party.

99. GRM provides an accessible, inclusive, gender-sensitive and culturally appropriate platform for receiving and facilitating resolution of affected persons' grievances related to the project. A two-tier grievance redress mechanism is conceived, one, at project level and another, beyond project level. For the project level GRM, a grievance redress committee (GRC) will be established in PIUs; Safeguards officer, supported by the social, gender and environmental safeguards specialist of Construction Management and Supervision Consultant will be responsible for creating awareness among affected communities and help them through the process of grievance redress, recording and registering grievances of non-literate affected persons.

100. GRM aims to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. All grievances – major or minor, will be registered. Documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. PIU will also be responsible for follow-through for each grievance, periodic information dissemination to complainants on the status of their grievance and recording their feedback (satisfaction/dissatisfaction and suggestions).

101. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor, and supervision personnel of the Construction Management and Supervision Consultant and PIU will resolve the issue on site, and any issue that is not resolved at this level will be dealt at PIU head level for immediate resolution. Should the PIU fail to resolve any grievance within the stipulated time period, the unresolved grievances will be taken up at ULB level. In the event that certain grievances cannot be resolved even at ULB level, particularly in matters related to land purchase/acquisition, payment of compensation, environmental pollution etc., they will be referred to the district level GRC headed by the District Collector. Any issue which requires higher than district level inter-departmental coordination or grievance redress, will be referred to the state level Steering Committee.

102. GRC will meet every month (if there are pending, registered grievances), determine the merit of each grievance, and resolve grievances within specified time upon receiving the complaint-failing which the grievance will be addressed by the state-level Steering Committee (SC). The SC will resolve escalated/unresolved grievances received.

103. **Composition of Grievance Redress Committee.** GRC will be headed by the District Collector, and members include PIU head, Safeguards Officer of PIU, representative of TNPCB, one elected representative / prominent citizen from the area, and a representative of affected community. GRC must have a women member.

104. State level steering committee will include Commissioner of Municipal Administration as chair, member include managing directors of TNUIFSL, Chennai Metro Water Supply and Sewerage Board (CMWSSB), Tamil Nadu Water and Drainage Board (TWADB) and others as applicable.

105. Areas of Jurisdiction. The areas of jurisdiction of the GRC, headed by the District Collector will be (i) all locations or sites within the district where subproject facilities are proposed, or (ii) their areas of influence within the District. The Steering Committee (SC) will have jurisdictional authority across the state (i.e., areas of influence of subproject facilities beyond district boundaries, if any).

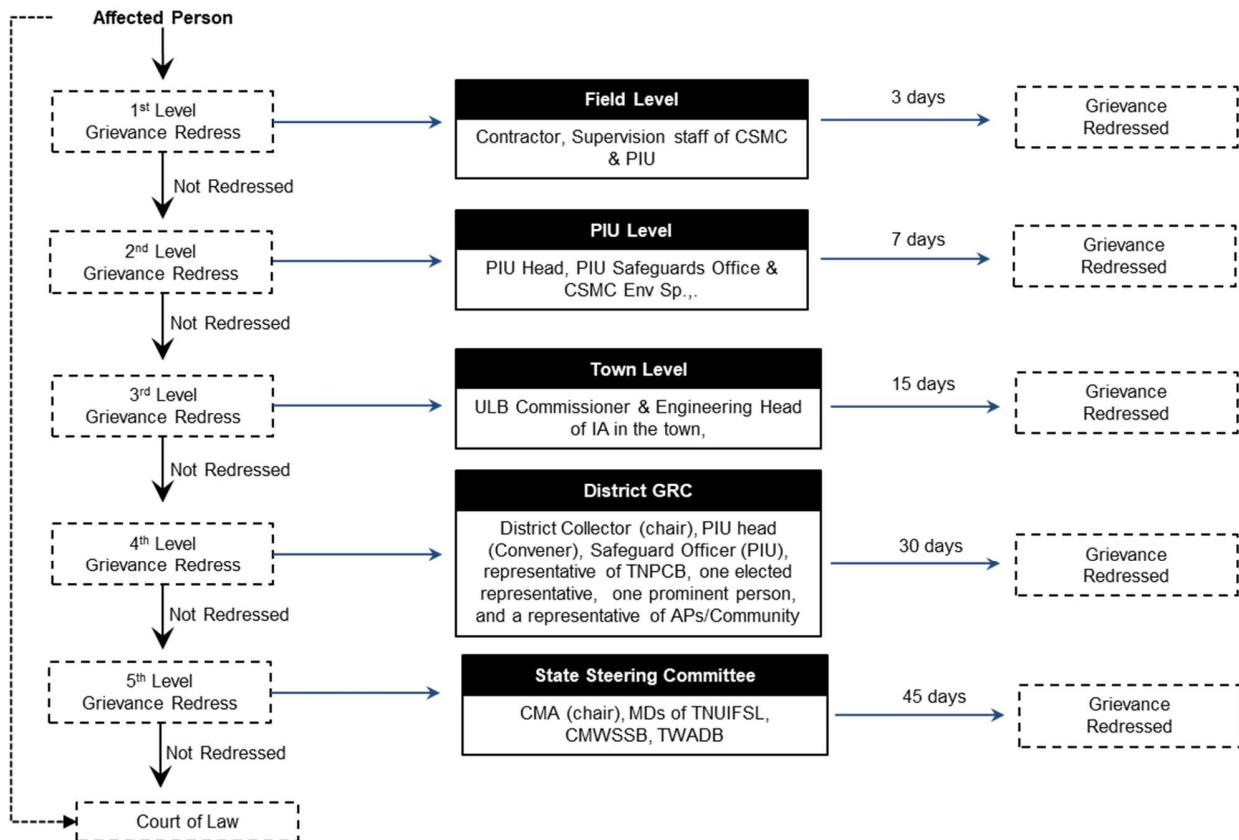
106. The multi-tier GRM for the project is outlined in Figure 2 below (), each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required. The GRC will continue to function throughout the project duration. The implementing agencies/ULBs shall issue notifications to establish the respective PIU level grievance redress cells, with details of composition, process of grievance redress to be followed, and time limit for grievance redress at each level.

- (i) **1st level grievance:** The contractor and CMSC supervision personnel and PIU supervision personnel can immediately resolve issues on-site in consultation with each other, and will be required to do so within 3 days of receipt of a complaint/grievance.
- (ii) **2nd level grievance:** All grievances that cannot be redressed within 3 days at field/ward level will be brought to the notice of Safeguards Officer (SO) of PIU. PIU will resolve the grievance within 7 days of receipt of compliance/grievance in discussion with the CMSC and the Contractor. PIU SO will be supported by the CMSC ES at this stage.
- (iii) **3rd level grievance:** All the grievances that are not addressed by PIU within 7 days of receipt will be brought to the notice of the Town Level Committee (TLC), of which ULB Commissioner will be the Chairperson, and will be assisted by the concerned city level engineers. TLC will meet twice a month and determine the merit of each grievance brought to the committee. The PIU SO will be responsible to see through the process of redressal of each grievance. The TLC will resolve the grievance within 15 days of receiving the complaint at TLC.
- (iv) **4th level grievance:** All grievances that are not addressed by the TLC within 15 days, and which require the District Collector's intervention, will be escalated to the district level Grievance Redress Committee (GRC), chaired by the District Collector. The district level GRC will have the District Collector as chair, PIU head as Conveyer, and Safeguard Officers of the PIU, representative of TNPCB, one elected representative, one prominent person/member of the community, and a representative of APs/community as members. At least one member of the GRC will be a woman. The GRC will resolve the grievance within 30 days of registration with it.
- (v) **5th level grievance:** Any grievance that remains unresolved by the GRC will be escalated to the state level steering committee.

107. The project GRM notwithstanding, an aggrieved person will have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. In case of grievance related to land acquisition, resettlement and rehabilitation, the APs will have to approach a legal body/court specially proposed under LARR, 2013; Land Acquisition, Rehabilitation and

Resettlement Authority (LARRA). In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB India Resident Mission (INRM). The complaint can be submitted in any of the official languages of ADB's DMCs. The ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the project GRM.

Figure 2: Proposed TNUFIP Grievance Redress Mechanism



108. **Recordkeeping.** Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were effected and final outcome will be kept by PIU (with the support of CMSC) and submitted to PMU.

109. **Information Dissemination Methods of the Grievance Redress Mechanism.** The PIU, assisted by experts will be responsible for information dissemination to affected persons and general public in the project area on grievance redress mechanism. Public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated. The campaign will ensure that the poor, vulnerable and others are made aware of grievance redress procedures and agreed entitlements including, contact details officials/members of GRC, whom to contact, and when, where/ how to register grievance, various stages of grievance redress process, time likely to be taken for redress of minor and major grievances, etc. Grievances received and responses provided will be documented and reported back to the affected persons. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PIU, offices, ULB notice boards and on the web, as well as reported in the semi-annual environmental and social monitoring reports to be submitted to ADB. A Sample Grievance Registration Form has been attached in Appendix 12.

110. Periodic review and documentation of lessons learned. The PMU will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the PIU's ability to prevent and address grievances.

Costs. All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the respective PIU.

VI. INSTITUTIONAL ARRANGEMENTS AND RESPONSIBILITIES

A. Implementation Arrangements

111. The Municipal and Water Supply Department (MAWS) acting through TNUIFSL will be the executing agency. A program steering committee, headed by Principal Secretary, MAWS, GOTN, will provide overall guidance and strategic directions to the program. A program management unit (PMU) for TNUFIP, headed by the Managing Director, TNUIFSL acting as Program Director will be established within TNUIFSL for overall management, planning, implementing, monitoring, reporting, and coordinating TNUFIP. The CMA will act as the Deputy Program Director in the PMU. The project ULBs, represented by respective Municipal Commissioners, will be the implementing agencies for works in cities/towns and will establish program implementing units (PIUs) headed by a municipal engineer as full-time Project Manager. PIUs will comprise of dedicated staff responsible for overseeing implementation of projects on a day-to-day basis. The PIUs will be supported by a contract management and supervision consultant (CMSC) recruited by TNUIFSL. ULBs under the program with less project implementation experience may utilize implementation support from the Tamil Nadu Water and Drainage Board (TWAD) to strengthen implementation capacity. In such cases, TWAD will establish a PIU and the ULB will appoint counterpart staff to coordinate implementation activities. For sewerage and water supply works in Chennai, CMWSSB, represented by its Managing Director, will be the implementing agency and establish a PIU headed by a superintending engineer as full-time Project Manager. For the institutional capacity, public awareness, and urban governance component, CMA acting through its Commissioner, will establish a PIU and appoint a governance improvement and awareness consultant (GIAC) responsible for supporting these activities.

112. The PMU staff will be mostly drawn from TNUIFSL, CMA, and municipal services, and, if required, will also be seconded from the other government departments such as TWAD, on deputation. The PIU staff will be drawn from the engineering units of the participating ULBs and augmented from the same government departments mentioned above as required. The CMSC will assist the PIUs implement, manage, and monitor works of TNUFIP. TNUIFSL will recruit a project design consultant (PDC) to prepare projects in consultation with ULBs for subsequent tranches. With the help of PMU, PIUs will design infrastructure, manage procurement processes, supervise construction, assure technical quality of designs and construction, and provide support on capacity building, governance improvement, and awareness building. The implementing agencies will procure contractors and manage construction and commissioning activities.

113. A Program Steering Committee, headed by Principal Secretary, MAWS, and Members comprises of:

- (i) Managing Director, TNUIFSL (Convener);
- (ii) Commissioner of Municipal Administration;
- (iii) Managing Director, CMWSSB;
- (iv) Managing Director, TWAD; and
- (v) Managing Director, Tamil Nadu Urban Finance and Infrastructure Development Corporation (TUFIDCO).

B. Safeguard Implementation Arrangement

114. Environmental and Social Safeguards (ESS) managers in TNUIFSL will have overall responsibility of monitoring safeguard compliance with ADB SPS 2009. ESS Managers report to the Head, Projects Division.

115. At PIU level, staff and consultants will assist PIU in implementation and monitoring of safeguard activities at PIU level. PIU established in ULBs/CMWSSB: ULB/CMWSSB Safeguards Officer (environment, involuntary resettlement, and gender) will coordinate monitoring and implementation on behalf of the ULB/CMWSSB. Construction Management and Supervision Consultant (CMSC) will be appointed to assist each PIU. In each CMSC, 3 experts (1 environment, 1 involuntary resettlement, and 1 gender) will monitor implementation of safeguards. In PIUs established at TWADB, no CMSC will be recruited, and therefore besides the Safeguards Officer in PIU, an Environmental Expert from TWADB will also be recruited to assist PIU in implementation and monitoring of environmental safeguards at PIU level.

116. Contractor staff will include an Environment, Health and Safety (EHS) supervisor. SO/PIU will play critical role to coordinate, oversee the implementation of safeguard tasks, grievance redress and reporting.

117. Key safeguard tasks and responsibilities at PMU and PIU level are as follows:

1. Program Management Unit

- (i) Ensure subprojects conforms to exclusion criteria and project selection guidelines as stipulated in the EARF;
- (ii) Review and approve subproject environmental category;
- (iii) Review and Approve IEEs; ensure that updated IEEs/EMPs reflect final project designs;
- (iv) Check whether all clearances/approvals are obtained timely as required;
- (v) Ensure that EMPs are included in bidding documents and civil works contracts
- (vi) Review and Approve Quarterly Environmental monitoring reports submitted by PIUs;
- (vii) Prepare semi-annual monitoring reports and submit to ADB;
- (viii) Monitor grievances redress process and ensure timely redress;
- (ix) Periodical review of safeguards related loan covenants, and the compliance in program implementation;
- (x) Organize periodic capacity building and training programs for program agencies in safeguards.

2. Project Implementation Unit (assisted by experts)

- (i) Identify/select projects/components in compliance with the project exclusion criteria and selection guidelines stipulated in EARF
- (ii) Prepare environmental screening checklists and submit to PMU for categorization; update checklist and category as and when required to reflect project changes, and report to PMU.
- (iii) Work closely with design teams to include environmental considerations in project location, design and technical specifications.
- (iv) Identify and obtain statutory clearance/permissions/approvals required for subproject.

- (v) Include standards/conditions, if any, stipulated in regulatory clearances, consents in the project design.
- (vi) Prepare IEE including project-specific EMPs for each subproject and submit to PMU for approval.
- (vii) Update IEE and EMP to reflect any changes in subproject during detail design / implementation; IEE shall reflect the final project design; IEE shall also be updated in case of any unanticipated impacts,
- (viii) Conduct public consultation in compliance with the EARF; reflect inputs from public consultation in IEEs, EMPs, and project design
- (ix) Disclose relevant information on safeguards to stakeholders, affected people etc.,
- (x) Ensure all EMP measures related project design and location and included in the detailed designs.
- (xi) Integrate EMP into the bid and contract documents (for DBO contracts, include full IEE including EMP in bids).
- (xii) Ensure that all design-related measures are integrated into project designs (by CMSC or Contractor, as the case may be) before approval.
- (xiii) Advise contractor in updating the EMP as per the final design, prior to start of construction.
- (xiv) Ensure that all necessary clearances/permission (including those required by Contractor) are in place prior to start of construction.
- (xv) Monitor implementation of EMP; ensure Contractors including subcontractor's, if any, comply with the measures set forth in the EMP; prepare corrective action plan if monitoring identifies any issues
- (xvi) Establish grievance redress system (GRS); coordinate grievance redress process, registration, records, information dissemination, etc., and ensure timely actions by all parties.
- (xvii) Grievance redress, advise the contractor on appropriate actions on grievances, ensure timely resolution and proper documentation
- (xviii) Identify, if any, non-compliance or unanticipated impacts; initiate corrective actions, report to PMU.
- (xix) Review and approve monthly monitoring reports submitted by Contractor; consolidate and prepare quarterly Environmental Monitoring Reports (EMR) and submit to PMU.
- (xx) Conduct training and capacity building activities (workshops, hands-on trainings, visits etc.) to PIU, CMSC, contractors etc., in EMP implementation.

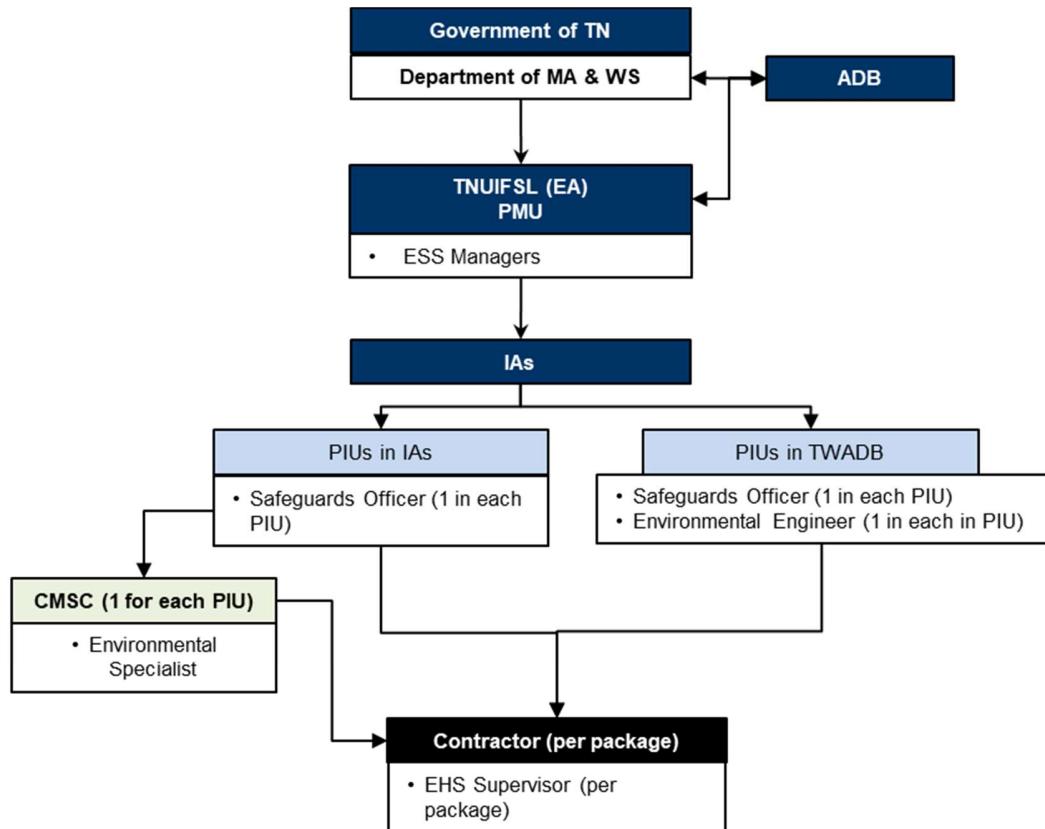
118. Civil works contracts and contractors. EMPs are to be included in bidding and contract documents. The contractor will be required to appoint an EHS supervisor to implement EMP. EHS Supervisor will update the EMP, and submit for approval of PIU, and will also assist the design consultants, for DBO Contracts, in updating the IEE as required to reflect the final design. Contractors will carry out all environmental mitigation and monitoring measures outlined in EMP and their contracts. If the contracts is procured through build-operate framework, contractor will also responsible for operation phase EMP implementation during the contract O&M period, after which it will be taken over by the respective implementing agency. For subprojects operated and maintained by implementing agencies themselves, implementing agencies will be responsible for implementation of operation phase EMP. Following are the key safeguard tasks of contractor:

- (i) Submit site specific EMP to PIUs;
- (ii) Conduct orientation and daily briefing sessions to workers on environment, health and safety;

- (iii) Ensure that appropriate worker facilities are provided at the work place and labor camps as per the contractual provisions;
- (iv) Register and maintain records of all work-related accidents, and undertake remedial actions to mitigate/minimize recurrence;
- (v) Implement EMP measures and report to PIU/PMU if any new impacts are surfaced; seek guidance from as required in EMP implementation;
- (vi) Conduct environmental monitoring (air, noise etc.) as per the monitoring plan
- (vii) Ensure conduct of water quality surveillance program;
- (viii) Prepare monthly EMP monitoring reports and submit to PIU;
- (ix) Address any public compliance and grievances effectively and in timely manner.

119. The PMU will ensure that bidding and contract documents include specific provisions requiring contractors to comply with: (i) all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; construction site should not hire any child below 18 years of age; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste including no discrimination against pregnant women and (c) prohibition of forced labor; and with (ii) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees.

120. ADB will review and approve categorization of individual subprojects and tranches, IEEs including EMPs, semi-annual monitoring reports, corrective action plans, updated IEEs in case of change in project design or in case of any unanticipated impacts. IEEs of all subprojects of a tranche shall be reviewed and approve by ADB prior to approval of tranche PFR by ADB.

Figure 3: Safeguard Implementation Arrangements

ADB – Asian Development Bank; CMSC = Construction Management and Supervision Consultant, EA – Executing Agency; EHS – Environment, Health & Safety; ESS= Environment & Social Safeguards IA – Implementing Agency; PIU – Project Implementation Unit; MA & WS = Municipal Administration & Water Supply, PMU - Project Management Unit; TN = Tamil Nadu; TNUIFSL = TN Urban Infrastructure Financial Services Limited; TWADB – Tamil Nadu Water and Drainage Board

Table 10: Institutional Roles and Responsibilities

Activity	Reference in Environmental Assessment Review Framework	Responsibility	ADB Role
Preliminary Design and Detailed Design			
Refer to subproject selection guidelines - Include design and location considerations to avoid potential environmental impacts	Section IV C Table 6: Exclusion Criteria Table 7: Environment Guidelines for Project Selection	PMU/ PIU	Oversee
Conduct categorization	Appendix 8: REA Checklist	PIU	Review and approval of subproject and tranche category

Activity	Reference in Environmental Assessment Review Framework	Responsibility	ADB Role
Conduct environmental assessment and prepare IEE Report	Appendix 9: Outline of IEE Report	PIU	Review and approval of IEE reports
Formulate mitigation measures for potential environmental impacts which cannot be avoided thru design and change of location/s	Appendix 13, 14 and 15: Suggested Mitigation Measures for Potential Environmental Impacts	PIU	Review and approval of IEE reports
Conduct meaningful consultations with stakeholders and affected person	Appendix 10: Outline of Minutes of Consultation Meeting; Suggested Topics to be Discussed, Record-Keeping, Attendance Sheet	PIU	Oversee / Review and approval of IEEs
File application for required environmental consents/permits and Include measures to comply with conditions of consents and permits	Table 2: Applicable National/State Environmental Legislations and Specific Requirements for the Project	PIU	Oversee/ compliance monitoring prior to subproject / tranche approvals and through semi-annual EMRs
Bid process			
Bid evaluation	Assist in Bid Evaluation to ensure contractor shall (a) comply with the mitigation measures set forth in the EMP and any corrective or preventative actions set forth in a EMR that the PMU and PIU will prepare from time to time to monitor implementation, (b) make available a budget for all environmental measures, (c) provide PIU with a written notice of any unanticipated environmental impacts that arise during construction, implementation or operation of the subproject that were not considered in the EMP	PIU	Oversee

Activity	Reference in Environmental Assessment Review Framework	Responsibility	ADB Role
Establish grievance redress mechanism (GRM) and ensure members of the GRM committees have capacity to address program-related issues/complaints	Section V C	PIU	Oversee compliance monitoring through IEEs and semi-annual EMRs
Construction			
Submit site-specific EMP, Health and Safety plan, traffic management plan and list of areas for work camps, storage and disposal areas to PIU prior to start of construction	Refer to respective IEE and EMP Reports	Contractor and implementing agency	Oversee Site specific EMPs to be submitted to ADB for disclosure
Implement site-specific EMP	-same as above-		Oversee compliance monitoring through semi-annual EMRs, and period visits to work sites
Strictly comply with Health and Safety plan	--same as above-		-same as above-
Coordinate with local body for implementation of traffic management plan	--same as above-		Oversee
Submit environmental monitoring reports	Appendix 16: Sample Construction Site Checklist for EMP Monitoring Appendix 17: Semi-annual Environmental Monitoring Report Template	Contractor and implementing agency	Review and approval; Request for corrective actions in case of any concerns
Operation			
Prior to commissioning, file application for required environmental consents/permits	For Consent to Operate WTP and STP		Oversee

Activity	Reference in Environmental Assessment Review Framework	Responsibility	ADB Role
Implement site-specific EMP throughout operation	Refer to respective IEE and EMP Reports		Oversee Review and approval of EMRs
Submit environmental monitoring reports up to closure of ADB project			

C. Institutional Capacity and Development

121. TNUIFSL is responsible for following the EARF in implementation of TNUFIP and ensuring compliance throughout. While the implementing agencies are directly responsible for preparing initial environmental examination (IEE) reports, environmental management plans (EMP), implementation of EMP, etc., TNUIFSL will have overall responsibility of implementation, compliance monitoring, adoption and, reviewing and approving report, monitoring of safeguards issues, providing support and guidance to implementing agencies as required. Implementing agencies will be supported by CMSC implementing the subprojects, including handling all safeguard tasks.

122. At PIU level, a Safeguards Officer will be appointed in each PIU, who will coordinate safeguard tasks at PIU level. As expert support is available to PIU via CMSC, the role of Safeguards Officer will be limited to coordination, overseeing the implementation of safeguard tasks, grievance redress and reporting.

123. During the operation phase, considering the nature of projects, the impacts are likely to be not significant, and it involves routine operation and maintenance following the operation manuals or standard operating procedures. If the project is implemented, and operated and maintained as intended there are unlikely to be any issues during the operation. Facilities like sewage pumping stations and STPs, needs to be monitored properly to avoid any nuisance or reduced efficiency that may affect surrounding community and receiving environment. Implementing agencies are responsible for addressing any negative issues immediately.

124. Capacity Development. To implement EARF successfully, implementing and executing agencies need to have a sustained capacity to manage and monitor environmental safeguards. TNUIFSL with its existing set up, has already mainstreamed the safeguards, and therefore has adequate capacity to implement the EARF. However, at implementing agencies level, there is no internal institutional arrangement to deal with the safeguard tasks. Implementing agencies are also assisted by specialist consultants to handle these tasks. TNUIFSL also conducts periodic training programs for implementing agencies in implementation of ESMF.

125. However, although TNUIFSL has implemented several multilateral funded projects, TNUFIP will be first project funded by ADB. Therefore, training in ADB Safeguard Policy Statement, 2009, and compliance and reporting procedures from project classification to submission of monitoring reports and corrective actions is necessary to ensure smooth implementation of EARF. Implementing agencies will also require such trainings in order to understand the compliance requirements and to strengthen their role in preparation of IEEs, implementation of mitigation measures and subsequent monitoring. Trainings and awareness workshops are included in the program.

126. PMU will be responsible for training at overall project level. External experts as required will be engaged. Typical modules would be as follows: (i) Introduction to ADB Safeguard Policy Statement, 2009 (ii) sensitization to EARF and differences with the ESMF; (iii) introduction to environment and environmental considerations in urban sector projects; (iv) preparation and review of IEEs and integration into the project detailed design; (v) requirements for public consultation, disclosure and grievance redress, and (vi) monitoring and reporting system. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. CMSC Environmental Specialist will conduct regular trainings at PIU level to PIU, CMSC and contract staff. Contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. An outline training program is presented in Table 11.

Table 11: Training Program for Environmental Management

Description	Contents	Schedule	Participants/Venue
Pre-construction stage			
Orientation workshop	Module 1 – Orientation - ADB Safeguard Policy Statement 2009 Module 2 – Orientation - Environmental Assessment and Review Framework of TNUFIP Module 3 – Environmental Assessment Process - identification of impacts and mitigation measures, preparation of Initial Environmental Examination (IEE) report, formulation of EMP, implementation, and monitoring requirements -Public consultation and information disclosure -Grievance redress mechanism - Review of environmental assessment report to comply with EARF requirements - Incorporation of EMP into the project design and contracts -reporting	1 day yearly once for every tranche and as and when required	Project Management Unit (PMU), Project Implementation Units (PIUs), All staff and consultants involved in the project
Construction stage			
Orientation program/ workshop for contractors and supervisory staff	- Roles and responsibilities of officials/contractors/consultants towards protection of environment - Environmental issues during construction - Implementation of EMP - Monitoring of EMP implementation - Reporting requirements	1 day yearly once	PIU, Contract Management and Supervision Consultant (CMSC), Contractor staff

Description	Contents	Schedule	Participants/Venue
Experiences and best practices sharing	- Experiences on EMP implementation – issues and challenges - Best practices followed		
Operation stage			
Orientation program/ workshop for operating staff / engineers	- Environmental issues during operation - Implementation of operation phase EMP - Monitoring of EMP implementation - Reporting requirements	1 day Prior to start of operation	implementing agency, Contractor, CMSC

D. Staffing and Budget

127. Costs required for implementing the EARF will cover the following activities:

- (i) conducting environmental assessments of new subprojects, preparing and submitting reports, and public consultation and disclosure;
- (ii) application for government regulatory consents, approvals; and
- (iii) implementation of EMP;
- (iv) Capacity building.

128. For budgeting purposes, it is assumed that all new subprojects will be classified by ADB as category B (requiring IEE).

129. Preparation of IEE requires an experienced environmental specialist for conducting the following activities: (i) site visit to assess environmental conditions and potential impacts of the scheme; (ii) liaison with agencies to obtain any environmental/social data that might be available locally (e.g. population figures, designated sites, etc.); (iii) consultation with the local community to inform them about the scheme and identify their views and concerns; (iv) assessment of impacts and development of mitigation; and (v) baseline data collection, desk study and report preparation. Experts will assist the PIU for ensuring compliance to safeguards during project implementation. Preparation and review of documents will be as follows:

- (i) PIUs will conduct environmental assessment and prepare IEEs, and update IEEs if required;
- (ii) PMU/TNUIFSL will review, finalize and approve the IEEs and further submit to ADB;
- (iii) Public consultation and disclosure will be conducted by respective PIUs.

130. The infrastructure proposed under each subproject will take typically about 2 years to build. Environmental monitoring during construction will also be straightforward, and will involve periodic site observations and interviews with workers and others, plus checks of reports and other documents. This will be conducted by CMSC, monitored by PIU. PMU ESS Managers will oversee these activities.

131. The cost of mitigation measures and surveys during construction will be incorporated into the contractor's costs, which will be binding on contractor for implementation. The surveys will be conducted by the contractors. EMP will be included in the contracts.

132. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of the Contractor for during operation phase of contract. EHS supervisor of the contractor will be responsible for operation phase mitigation measures. All monitoring during the operation and maintenance phase will be conducted by government regulatory agencies like TNPCB as per their mandate. Additional monitoring to be conducted (e.g., odor monitoring at sewage pumping stations) will be the responsibility of implementing agency, and these are shown as part of costs for implementation of EMP.

133. The indicative costs of EARF implementation are shown in Table 12.

Table 12: Indicative Cost of Environmental Assessment and Review Framework Implementation

Component	Description	Input	Cost Per Unit (₹)	Total Costs (₹)	Source of Funds
A. Full Time Staff					
PMU / TNUIFSL	ESS Manager	Full time	-	-	TNUIFSL staff
At each PIU	Safeguards Officer	Full time charge to Assistant Engineer	-	-	Implementing Agency
B. Consultants / staff – in Each PIU					
With each CMSC	Environmental Specialist	6 months / year in each PIU	Per PIU	-	PIU costs
With each contractor	EHS supervisor	Full time input in each package	per contract package	-	Contractor's cost
C. Regulatory, Consultation and Monitoring Costs					
Legislation, permits, and agreements, implementation of EMP measures etc.,	Consent fee for WTPs/STPs, measures etc.,	Lump sum	1,000,000 per subproject	-	PIU costs
Environmental monitoring	During construction	Lump sum	per package	-	As per contract agreement
Capacity development in environmental safeguards	Awareness and training programs - venue and other arrangements	Training workshops to all program agencies	Lump sum	1,000,000	PMU costs - part of incremental administration

VII. MONITORING AND REPORTING

134. Monitoring and reporting on overall EARF compliance, subproject selection guidelines and exclusion criteria and on implementation of subproject-wise EMPs are the key tasks in safeguard implementation in TNUFIP.

135. PMU will monitor overall compliance with ADB SPS 2009, and each PIU will ensure the EMP implementation at individual subproject level. Monitoring activities will correspond with the subproject's risks and impacts. PIUs, will be assisted by experts to ensure EARF compliance in sub-project implementation.

136. Contractor will submit monthly implementation reports to PIU. PIU will consolidate and prepare quarterly reports on implementation and monitoring to PMU, and take follow-up actions, if necessary. Based on the monthly, quarterly and supplemented by periodic monitoring and review visits, PMU will prepare semi-annual environmental monitoring reports (EMR) during preconstruction and construction phases and submit to ADB. During operation, the reporting will continue at the minimum on annual basis. Monitoring reports are required for all the subprojects, and therefore a consolidated monitoring report, which contain the monitoring reports of all the subprojects with requisite level of detail, can be submitted to ADB. The suggested monitoring report format is in Appendix 17. Subproject budgets will reflect the costs of monitoring and reporting requirements. Monitoring reports will be posted in a location accessible to the public. Disclosure requirement indicated in Section V B shall be followed. The monitoring needs to continue throughout operation to project closure, especially for STP and WTP, and also to check quality of water supplied in the improved systems. Supplied water quality will be monitored to ensure that the water quality is within the acceptable guidelines. Surveillance monitoring for water sources is also proposed in the EMP. In sewerage, regular monitoring is proposed for raw and treated wastewater and sludge at the STP, and odor (H₂S) monitoring at sewage pumping stations and STP.

137. ADB will review project performance commitments as agreed in the legal documents such as loan and project agreements, project administration manuals, etc. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system. ADB will monitor projects on an ongoing basis until a project completion report is issued. ADB will carry out the following monitoring actions to supervise project implementation:

- (i) conduct periodic site visits for projects with adverse environmental or social impacts;
- (ii) conduct supervision missions with detailed review by ADB's safeguard specialists/officers or consultants for projects with significant adverse social or environmental impacts;
- (iii) review the periodic monitoring reports submitted by TNUIFSL to ensure that adverse impacts and risks are mitigated, as planned and agreed with ADB;
- (iv) work with TNUIFSL and implementing agencies to rectify to the extent possible any failures to comply with their safeguard commitments, as covenanted in the legal agreements, and exercise remedies to reestablish compliance as appropriate; and
- (v) prepare a project completion report that assesses whether the objective and desired outcomes of the safeguard plans have been achieved, taking into account the baseline conditions and the results of monitoring.

138. ADB's monitoring and supervision activities are carried out on an on-going basis until a Project Completion Report (PCR) is issued. ADB issues a PCR within 1-2 years after the project is physically completed and in operation.

Appendix 1: FOREST COVERAGE IN TAMIL NADU

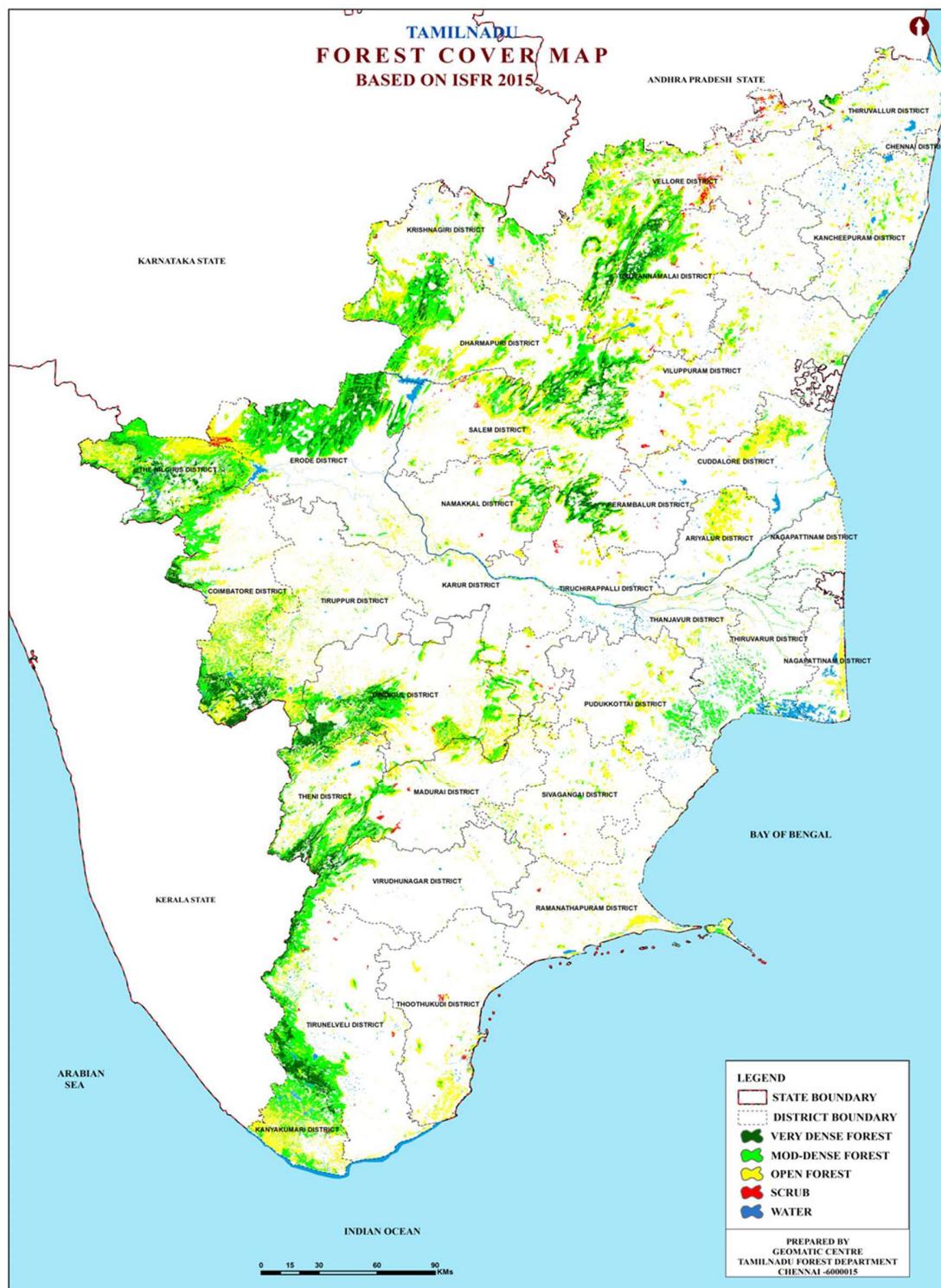
District-wise forest area

	District	Geographical Area (km²)	Forest Area (km²)	% age of FA to Total GA
1	Ariyalur	1,947	329	16.90
2	Chennai	144	13	9.03
3	Coimbatore (H)	7,469	2,627	35.17
4	Cuddalore	3,706	417	11.25
5	Dharmapuri (T)	9,622	3,280	34.09
6	Dindigul (Anna)	5,580	1,662	29.78
7	Erode (Periyar)	8,209	2,421	29.49
8	Kancheepuram	4,474	296	6.62
9	Kanniyakumara(H)	1,684	950	56.41
10	Karur	2,901	121	4.17
11	Madurai (H)	4,277	774	18.10
12	Nagapattinam	2,140	198	9.25
13	Namakkal (T)	3,413	574	16.82
14	Perambalur (T)	1,748	129	7.38
15	Pudukkottai	4,651	333	7.16
16	Ramanathapuram	4,232	225	5.32
17	SalemT	5,235	1,435	27.41
18	Sivaganga	4,086	366	8.96
19	Thanjavur	3,415	436	12.77
20	The Nilgiris (H)	2,549	1,853	72.70
21	Theni	2,764	1,127	40.77
22	Thiruvallur	3,413	247	7.24
23	Thiruvarur	2,716	59	2.17
24	Tiruchirapalli (T)	4,511	448	9.93
25	Tirunelveli (H)	6,810	1,308	19.21
26	Tiruvannamalai (T)	6,191	1,299	20.98
27	Toothukudi	4,621	239	5.17
28	Vellore	6,077	1,857	30.56
29	Villupuram	7,190	853	11.86
30	Virudhnagar	4,283	469	10.95
	Total	130,058	26,345	20.26

(H) = Hill district; (T) = Tribal District

Source: Forest Department, Government of Tamil Nadu.

Forest Cover Map of Tamil Nadu



Source: India State of Forest Report, 2015, Forest Survey of India, Forest Department, GoTN

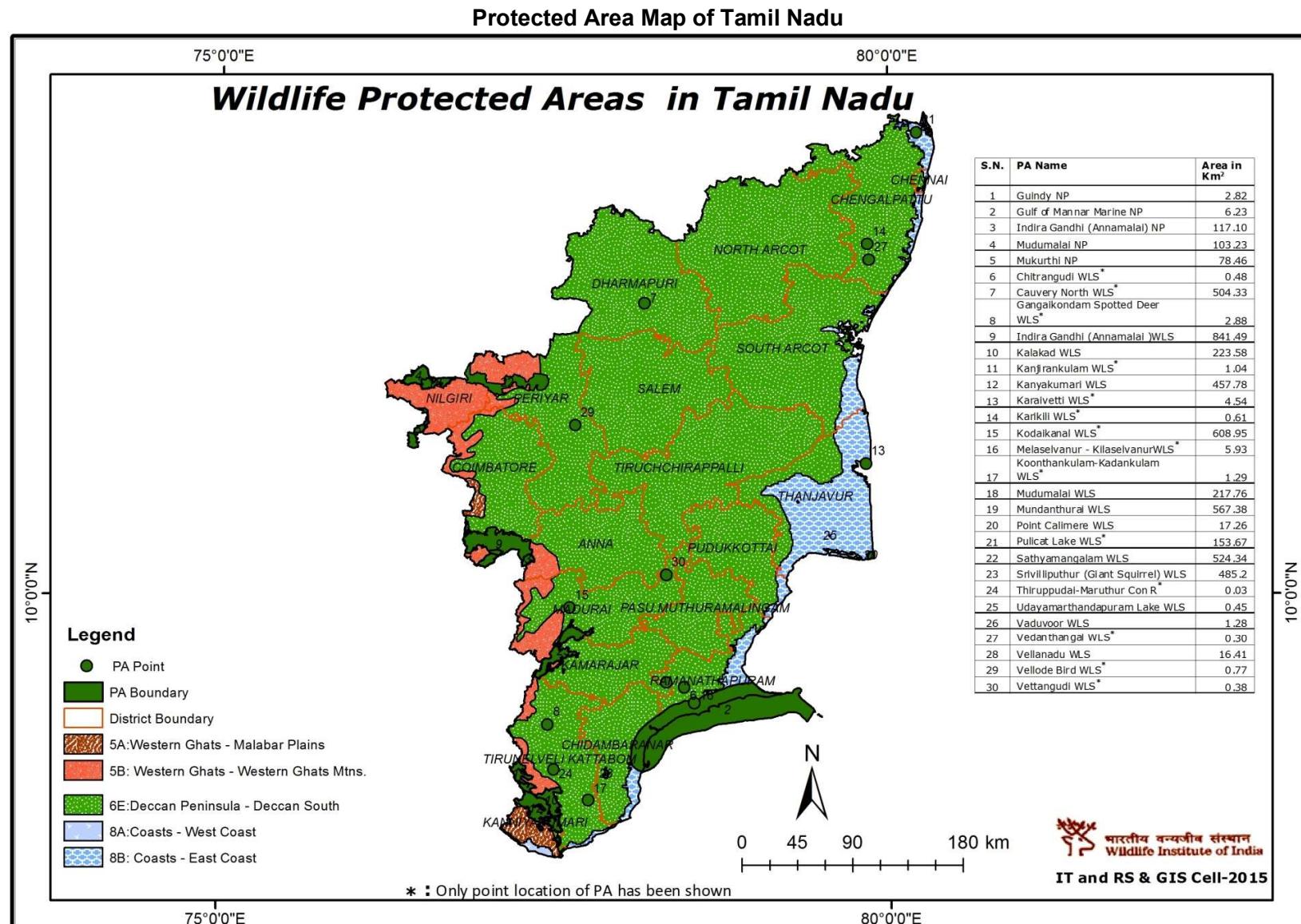
Appendix 2: PROTECTED AREAS IN TAMIL NADU (WILDLIFE/BIRD SANCTUARIES, NATIONAL PARKS and BIOSPHERE RESERVES)

A. National parks and Wildlife Sanctuaries

S. No.	Name of the Protected Areas	Area (ha)	Location District(s)	Year of Notification
A.	National Parks (NP)			
1	Guindy National Park	270.57	Chennai	1978
2	Gulf of Mannar Marine Park	52,602.00	Ramanathapuram and Tuticorin	1986
3	Indira Gandhi National Park	11,710.00	Coimbatore	1989
4	Mukurthi National Park	7,846.00	Nilgiris	2001
5	Mudumalai National Park	10,323.00	Nilgiris	2005
B	Wildlife Sanctuaries (WLS)			
1	Mudumalai Wildlife Sanctuary	21,776.00	Nilgiris	1940
2	Mundanthurai Wildlife Sanctuary (R.F. 35228.38 + R.L.22979.20)	58,207.58	Tirunelveli	1962
3	Point Calimere Wildlife Sanctuary	1,728.81	Nagapattinam	1967
4	Indira Gandhi Wildlife Sanctuary	84,149.00	Coimbatore	1976
5	Kalakad Wildlife Sanctuary	22,358.00	Tirunelveli	1976
6	Vallanadu Black Buck Sanctuary	1,641.00	Tuticorin	1987
7	Grizzled Giant Squirrel Wildlife Sanctuary	48,520.00	Virudhunagar	1988
8	Kanyakumari Wildlife Sanctuary	40,239.55	Kanyakumari	2007
9	Sathyamangalam Wildlife Sanctuary	141,160.94	Erode	2008, 2011
10	Megamalai Wildlife Sanctuary	26,910.81	Theni and Madurai	2009
11	Point Calimere Wildlife Sanctuary Block A and Block B	12,407.27	Thanjavur, Tiruvarur, Nagapattinam	2013
12	Kodaikanal Wildlife Sanctuary	60,895.482	Dindigul and Theni	2013
13	Gangaikondan Spotted Deer Sanctuary	288.40	Tirunelveli	2013
14	Cauvery North Wildlife Sanctuary	50,433.48	Dharmapuri, Krishnagiri	2014
15	Nellai Wildlife Sanctuary	35,673.33	Tirunelveli	2015
C.	Bird Sanctuaries			
1	Vettangudi birds Sanctuary	38.40	Sivagangai	1977
2	Pulicat Lake Birds Sanctuary	15367	Tiruvallur	1980
3	Karikili Birds Sanctuary	61.21	Kancheepuram	1989
4	Kanjirankulam Birds Sanctuary	104.00	Ramanathapuram	1989
5	Chitrangudi Birds Sanctuary	47.63	Ramanathapuram	1989
6	Koonthankulam-Kadankulam Birds Sanctuary	129.00	Tirunelveli	1994
7	Vellode Birds Sanctuary	77.18	Erode	1997
8	Vedanthangal Birds Sanctuary	30.00	Kancheepuram	1998
9	Udayamarthandpuram Birds Sanctuary	45.28	Tiruvarur	1998
10	Melaselvanur-Kilaselvanur Birds Sanctuary	593.08	Ramanathapuram	1998
11	Vaduvoor birds Sanctuary	128.10	Tiruvarur	1999

12	Karaivetti Birds Sanctuary	453.71	Ariyalur	2000
13	Theerthangal Bird Sanctury	29.29	Ramanathapuram	2010
14	Sakkarakottai Tank Birds Sanctuary	230.49	Ramanathapuram	2012
15	Oussudu Lake Birds Sanctuary	331.785	Villupuram	2015
D.	Conservation Reserves			
1	Thiruppudaimaruthur Birds Conservation Reserve	2.84	Tirunelveli	2005
2	Suchindrum-Theroor –Managudi Conservation Reserve	484.77	Kanniyakumari	2015
E.	Biosphere Reserves			
1	Nilgiris Biosphere Reserve	2,53,800	Tamil Nadu, Kerala and Karnataka states	1986
2	Gulf of Mannar Biosphere Reserve	10,50,000	Indian part of Gulf of Mannar between India and Sri Lanka	1989
3	Agasthiyarmalai Biosphere Reserve	1,67,236	Tamil Nadu and Kerala	2001

Source: Forest Department, GoTN.



Source: http://wiienvis.nic.in/WriteReadData/UserFiles/image/PAs_Map_Database/images/tamilnadu.jpg

Appendix 3: LIST OF MONUMENTS OF NATIONAL IMPORTANCE IN TAMIL NADU

	Name of Monument/Site	Locality	District
1	Arsenal	Chennai	Chennai
2	Big Warehouse	Chennai	Chennai
3	Chaplian's House	Chennai	Chennai
4	Clive's House	Chennai	Chennai
5	Garrison Engineer's Depot	Chennai	Chennai
6	Guard Room	Chennai	Chennai
7	King's Barrack	Chennai	Chennai
8	Last House On The Left Of 'Snob's Alley'	Chennai	Chennai
9	Nursing Sister's House	Chennai	Chennai
10	Old British Infantry Officer's Mess	Chennai	Chennai
11	Rampart, Gates, Bastion, Raviliions With Vaulted Chambers And Water Cisterns Underneath: Moat And Defence Walls All Round With Glacis To The Extent Of The Existing Barbed Wire Fence.	Chennai	Chennai
12	St. Mary's Church	Chennai	Chennai
13	Wellesley's House	Chennai	Chennai
14	David Yale And Joseph Hynmer's Tomb	Chennai	Chennai
15	Old Town Wall	Tondiarpet	Chennai
16	Muruganathasvami Temple	Tirumurugan-poondi	Coimbatore
17	Nithisvarasvami Temple	Srimushnam	Cuddalore
18	Chennaraya Perumal Temple Together With Adjecent Lands	Adiyamankottai	Dharmapuri
19	Hill Fort	Krishnagiri	Dharmapuri
20	Hill Fort	Rayakkottai	Dharmapuri
21	Fort On Rock	Dindigal	Dindigal
22	Jain Temple	Mettupudur	Erode
23	Sugrisvara Temple And Tank	Sircar Periyapalayam	Erode
24	Iravatañesvara Temple	Big Kanchipuram	Kanchipuram
25	Jvaraharesvara Temple	Big Kanchipuram	Kanchipuram
26	Matangesvara Temple	Kanchipuram	Kanchipuram
27	Muktesvara Temple	Kanchipuram	Kanchipuram
28	Pirvatañesvara Temple	Kanchipuram	Kanchipuram
29	Munkudmisvara Temple	P.V.Kalathur	Kanchipuram
30	Dhenupurisvara Temple	Madambakkam	Kanchipuram
31	Large Siva Temple (Apathsahaesvara Temple)	Tenneri	Kanchipuram
32	Arjuna's Penance	Mamallapuram	Kanchipuram
33	Arjuna's Ratha	Mamallapuram	Kanchipuram
34	Bhima's Ratha	Mamallapuram	Kanchipuram
35	Dharmaraja 'S Ratha	Mamallapuram	Kanchipuram
36	Dharmaraja Rock Cut Throne	Mamallapuram	Kanchipuram
37	Dolostva Mandapa	Mamallapuram	Kanchipuram
38	Draupadi's Bath	Mamallapuram	Kanchipuram
39	Draupathi Ratha	Mamallapuram	Kanchipuram
40	Eight Stone Images On A Masonary Platform Known As The Seven Pidaris	Mamallapuram	Kanchipuram

	Name of Monument/Site	Locality	District
41	Huge Stone Figures Of The Lion, Elephant , And A Bull	Mamallapuram	Kanchipuram
42	Olakkanesvara Temple	Mamallapuram	Kanchipuram
43	Kotikal Mandapa	Mamallapuram	Kanchipuram
44	Krishna's Butter Ball	Mamallapuram	Kanchipuram
45	Krishna Mandapam	Mamallapuram	Kanchipuram
46	Large Unfinished Rock Sculpture Similar to Arjuna's Penance	Mamallapuram	Kanchipuram
47	Mahishamardini Rock Cut Mandapa	Mamallapuram	Kanchipuram
48	Mahishasura Rock Standing in the Sea to the North of Shore Temple	Mamallapuram	Kanchipuram
49	Mukundanayanan Temple	Mamallapuram	Kanchipuram
50	Rock Cut Ganesha Temple	Mamallapuram	Kanchipuram
51	Rock Cut Varaha Temple Containing Varaha And Vamana Incarnation of Vishnu	Mamallapuram	Kanchipuram
52	Rock Cut Sculpture, representing the Group of Elephants, Monkey And Peacock	Mamallapuram	Kanchipuram
53	Rayagopuram(Unfinished)	Mamallapuram	Kanchipuram
54	Sahadeva's Ratha	Mamallapuram	Kanchipuram
55	Shore Temple	Mamallapuram	Kanchipuram
56	Small Monolithic Temple Known as Valayankuttai Ratha	Mamallapuram	Kanchipuram
57	Stone Sculpture Representing the Group of Elephants, Monkeys	Mamallapuram	Kanchipuram
58	Triple Celled Rock-Cut Shrine with Gopi's Churn Infront Of It	Mamallapuram	Kanchipuram
59	Two Rock Cut Temples at North East Corner of The Koneri Pallam Tank	Mamallapuram	Kanchipuram
60	Two Small-Carved Rocks to The South of The Shore Temple.	Mamallapuram	Kanchipuram
61	Two Small Monolithic Temples Known as Pidari Amman Ratha	Mamallapuram	Kanchipuram
62	Unfinished Ratha And Stone Couch	Mamallapuram	Kanchipuram
63	Unfinished Rock Cut Cave Temple North of Krishna Mandapa	Mamallapuram	Kanchipuram
64	Dharmesvara Temple	Manimagalam	Kanchipuram
65	Vaikunta Perumal Temple	Kanchipuram	Kanchipuram
66	Ruined Dutch Fort and Cemetery	Sadras	Kanchipuram
67	Kailasanatha Temple	Salabogam	Kanchipuram
68	Tiger-Headed Rock Cut Temple	Salvankuppam	Kanchipuram
69	Two Inscribed Rocks	Salavankuppam	Kanchipuram
70	Rock Cut Shiva Temple with Three Lingas	Salavankuppam	Kanchipuram
71	Lesser Siva Temple(Kanthalingesvasatemple)	Tenneri(Madavilaam)	Kanchipuram
72	Nityakalyanasvami Temple	Tiruvidanthai	Kanchipuram
73	Orukkal Mandapam	Tirukallikunram	Kanchipuram
74	Venkatesaperumal Temple	Tirumukkudal	Kanchipuram
75	Vaikuntaperumal Temple	Uttiramerur	Kanchipuram
76	Tirupulisvara Temple	Vayalur	Kanchipuram

	Name of Monument/Site	Locality	District
77	Head Sluice Periavoikal Nattuovoikal	Musiri	Karur
78	Korangunatha Temple	Srinivasanallur	Karur
79	Rock(Kulithalai)	Vaigainallur	Karur
80	Alagarmalai Cavern with Panchapandava Beds Midway Between Algarmallai And Kidampatti	Melur	Madurai
81	Jain Statues Rock Inscription and Panchapandava Beds On The Hill	Kalluthu	Madurai
82	Rock Cut Bas Relief and Beds and A Mutilated Jain Stone Image	Karadipatti	Madurai
83	Rock –Cut Bas Relief of Jain Images with Inscription In Samanar Malai	Keelakuilkudy	Madurai
84	Panchapandava Bed, Jain Statues, And Brahmi And Vatteluttu (Malai Inscription on The Panchapandar)	Kilaiyur Kilavalavu	Madurai
85	Rock Cut Beds Under Natural Rock Shelter In Amanarmalai Or Samanar Malai	Melakuilkudy	Madurai
86	Cave In Sitharmalai	Mettupatti	Dindigul
87	Cavern With Panchapandava Beds On The Wester Slope Of The Hills And Similar Beds	Tiruparankunram	Madurai
88	Rock –Cut Cave And Inscription	Tiruparankunram	Madurai
89	Ramapada Mandapam	Kodiakkadu	Nagapattinam
90	Inscribed Stone	Kodiyakarai	Nagapattinam
91	Town Gateway	Tranquebar (Tarangambadi)	Nagapattinam
92	Hill Fort	Namakkal	Namakkal
93	Sri Ranganatha Swamy And Sri Narasimha Swamy Temple	Namakkal	Namakkal
94	Brihadisvara Temple	Gangaikonda Cholapuram	Perumbalur
95	Jain Statue Built Of Granite	Jayankonda Cholapuram	Perumbalur
96	Jain Statue Called Paluppar	Jayankonda Cholapuram	Perumbalur
97	Fort	Ranjankudi	Perumbalur
98	Shamshkhan's Mosque	Vallapuram	Perumbalur
99	Siva Temple	Valikantapuram	Perumbalur
100	Jain Tirthankara Image	Alangudipatti	Pudukkottai
101	Jaina Image	Alathur	Pudukkottai
102	Whole Cave With Two Jain Figures Carved On The Rock Over It And Damaged Inscription	Ammachatram	Pudukkottai
103	Whole Of Minakshi Sundaresvara Temple And The Inscribed Stone In The Front Mandapam	Ammankurichi	Pudukkottai
104	Two Jain Tirthankara Images In A Coconut Plantation	Annavasal	Pudukkottai
105	Siva Temple	Ariyur	Pudukkottai

	Name of Monument/Site	Locality	District
106	Jain Tirthankara Image And Inscribed Stone	Chettipatty	Pudukkottai
107	Ruined Jaina Temple	Chettipatty	Pudukkottai
108	Sarangadesvara (Also Known As Tiruvagnisvara) Temple	Chittur	Pudukkottai
109	Rock-Cut Siva Shrine	Devarmalai	Pudukkottai
110	Kalabhamudaiyar Temple	Irumbanadu	Pudukkottai
111	Siva Temple And Lion Pillar	Irumbanadu	Pudukkottai
112	Soundararaja Perumal Temple	Irumbanadu	Pudukkottai
113	Stone Idols Of Ganesa And Anjaneya	Irumbanadu	Pudukkottai
114	Jain Tirthangara Idol	Kannangarakudi	Pudukkottai
115	Jain Image, Stone Lion And Foundations Of A Jain Temple	Kannangudi	Pudukkottai
116	Balasubrahmanya Temple	Kannanur	Pudukkottai
117	Siva Temple	Kilayur(Kaliyapatti)	Pudukkottai
118	Uttamadanisvara Temple	Kilattaniyam	Pudukkottai
119	Uttamanathaswamy Temple	Kiranur	Pudukkottai
120	Muchukundesvara Temple And The Tank In Front Of It	Kodumbalur	Pudukkottai
121	Muvar Koil With Surrounding Sub-Shrines Stone Enclosures Etc.,	Kodumbalur	Pudukkottai
122	Remains Of Aivar Koil	Kodumbalur	Pudukkottai
123	Remains Of Structural Temples And Antiquities	Kodumbalur	Pudukkottai
124	Amman Shrine	Kudumiyanmalai	Pudukkottai
125	Natural Cavern With Drip Line On The Western Side Of The Kudumiyanmalai	Kudumiyanmalai	Pudukkottai
126	Musical Inscription	Kudumiyanmalai	Pudukkottai
127	Rock-Cut Shrine Called Melakkoil With Mandapa In Front	Kudumiyanmalai	Pudukkottai
128	Sikkanathaswamy Temple	Kudumiyanmalai	Pudukkottai
129	Eight Natural Caverns, Jain Idols And Inscriptions In Kudagumalai, Aladiperumal Paraika	Kulathur	Pudukkottai
130	Ruined Siva Temple	Kulathur	Pudukkottai
131	Rock-Cut Siva Cave-Temple, Hall Of Hundred Pillared Mandapam Or Car Mandapam With Wheels In Front Part Of The Plinth	Kunnandarkoil	Pudukkottai
132	Jain Idols And Remains Of The Jain Temple	Letchumanpatti	Pudukkottai
133	Idols In The Southern Bund Of Teppakulam Or Urani	Madarapatti	Pudukkottai
134	Rock-Cut Siva Temple	Malayadipatti	Pudukkottai
135	Rock-Cut Vishnu Temple	Malayadipatti	Pudukkottai
136	Two Rock-Cut Siva Shrines On The Eastern And Southern Slopes Of The Hill	Malakkoil	Pudukkottai
137	Jain Temple Site	Mangathevanpatti	Pudukkottai
138	Jain Temple	Mangathevanpatti	Pudukkottai
139	Siva And Pillayar Temple	Mangudi	Pudukkottai
140	Jain Tirthankara Ayyanar And Devi Idols	Marudur	Pudukkottai
141	Menandar Pillayar Temple	Melanilaivayal	Pudukkottai

	Name of Monument/Site	Locality	District
142	Jain Tirthankara Idol And Relics Of Old Jain Temple	Melur	Pudukkottai
143	Vishnu Idol	Melur	Pudukkottai
144	(I) Jain Tirthankara Image (II) Remains Of The Temple (III) Ganesa Image (IV) Nandi With Inscriptions	Mailapatti	Pudukkottai
145	Tiruperumanadar Temple	Nangupatti (Madattukkoil)	Pudukkottai
146	Jain Idol, Two Durga Idol, One Vishnu Idol And Inscribed Stone Slab	Nanjur	Pudukkottai
147	Amman Koil (Melaikadambar Koil And The Siva Temple To Its West)	Narthamalai	Pudukkottai
148	Rock-Cut Siva Temple	Narthamalai	Pudukkottai
149	Vijayalayacholisvaram And The Group Of Sub-Shrines Around It	Narttamalai	Pudukkottai
150	Rock-Cut Vishnu Shrine	Narttamalai	Pudukkottai
151	Jain Image And The Inscription To The South Of It On The Summit Of The Sadayaparai	Nathampannai	Pudukkottai
152	Siva (Valamadisvara) Temple	Nirpalani	Pudukkottai
153	Siva Temple	Panangudi	Pudukkottai
154	Vishnu Temple	Panangudi	Pudukkottai
155	Rajendracholisvara Temple	Ponamaravati	Pudukkottai
156	Jaina Thirthankara Image	Puliyur	Pudukkottai
157	Jain Image And The Surrounding Temple Site Locally Called Mottai Pillayar Koil	Puttambur	Pudukkottai
158	Rock-Cut Shrine Of Pushpavanesvara	Puvalakkudi	Pudukkottai
159	Stone Sluice With Nandipottan's Inscription	Rajalipatti	Pudukkottai
160	Stone Idols Of Vishnu And Devi And Siva Temple	Rasipuram	Pudukkottai
161	Jain Mound, Jain Images, Other Idols And Lion Pillars	Sembattur	Pudukkottai
162	Natural Cavern Called Andarmatam	Sembuthi	Pudukkottai
163	Vishnu And Sridevi Idols	Sengirai	Pudukkottai
164	Bhumisvara Temple	Sevalur	Pudukkottai
165	Natural Cavern With Stone Beds And Brahmi And Old Tamil Inscriptions Called Eladipattam	Sittannavasal	Pudukkottai
166	Rock-Cut Jain Temple	Sittannavasal	Pudukkottai
167	Tiruvilangudy Siva Temple	Suriyur	Pudukkottai
168	Siva Temple	Tennangudi	Pudukkottai
169	Jain Tirthankara Image Seated On Apedestal To The East Of The Bund	Tekkatur	Pudukkottai
170	Sanctum Of Siva Temple	Tirukalambur	Pudukkottai
171	Sundaresvara Temple With Sub-Shrines	Tirukkattalai	Pudukkottai
172	Rock-Cut Siva Temple (Satyagirisvara Temple)	Tirumayam	Pudukkottai
173	Rock-Cut Vishnu Temple (Satyagirisvara Temple)	Tirumayam	Pudukkottai
174	Stone And Brick Fort	Tirumayam	Pudukkottai

	Name of Monument/Site	Locality	District
175	Cholisvaramudaiyar Temple	Tiruppur	Pudukkottai
176	Jain Image In Waterspread Of Pudukulam	Tiruppur	Pudukkottai
177	Siva Temple	Thodaiyur	Pudukkottai
178	Jain Tirthankara Image And Inscribed Stone	Valavambatti (valavanpatti)	Pudukkottai
179	Siva Temple (Agatisvara Temple)	Varappur	Pudukkottai
180	Siva Temple On The Western Bund Of Enadikulam	Varpet	Pudukkottai
181	Jain Tirthankara Image	Veerakkudy	Pudukkottai
182	Agastisvara Temple	Vellanur	Pudukkottai
183	Kailasanatha Temple	Vellanur	Pudukkottai
184	Two Lion Pillars In The Vahana Mandapam Of The Subrahmanya Temple	Viralimalai	Pudukkottai
185	Siva Temple	Visalur	Pudukkottai
186	Remains Of Fort With Building Thereon	Attur	Salem
187	Fort And Temple On The Hill	Chinna Kavandanur	Salem
188	Boulder Stone Bed And Brahmi Inscriptions On The Hill And Rock-Cut Temple With Inscription At The Foot Of The Hill	Kunnakudi	Sivaganga
189	Airavatesvara Temple	Chatram Darasuram	Thanjavur
190	Big Cannon (Rajagopao Cannon) In The First Rampart And The Bastions In Ts No 608 Of Ward Iii	Thanjavur	Thanjavur
191	Schwartz (Christ) Church	Thanjavur	Thanjavur
192	Sivaganga Little Fort Enclosing The Big Temple	Thanjavur	Thanjavur
193	Karuppannasvami Tock And Jain Sculpture	Uttamapalayam	Teni
194	Fort Gateway	Tiruchchirappalli	Tiruchchirappalli
195	Rock Fort, 1) Lower Cave; 2) Path Leading To The Site In Front Of The Lower Cave; 3) Path Leading To The Upper Cave; 4) Site In Front Of The Lower Cave; 5) Upper Cave.	Rock Fort, Trichy	Tiruchchirappalli
196	Siva Temple (Erumbisvara Temple)	Tiruverumbur	Tiruchchirappalli
197	Fort And Cemetery	Pulicat	Thiruvallur
198	Svayambunathar Temple	Kilputthur	Thiruvannamalai
199	Rock-Cut Shrine	Kuranganilmuttam	Thiruvannamalai
200	Rock Cut Caves, Sculptures And Inscriptions.	Mamandur	Thiruvannamalai
201	Rock Cut Caves	Narasamangalam	Thiruvannamalai
202	Chandramouliswara Temple	Nattery	Thiruvannamalai
203	Rock Cut Temple And Sculptures	Siyamangalam	Thiruvannamalai
204	Jain Temple	Tirumalai	Thiruvannamalai
205	Natural Cavern Known As Virupakshi Cuha and Skandashram And Path Leading From Ramnasharam.	Tiruvannamali	Thiruvannamalai
206	Adjoining Building To The Masjid And Two Ponds.	Arcot	Vellore
207	The Cannon	Arcot	Vellore

	Name of Monument/Site	Locality	District
208	Delhi Gate	Arcot	Vellore
209	Mashid And Two Ponds In The West Of The Citadel	Arcot	Vellore
210	Ranganatha Temple	Erukampattu	Vellore
211	Monolithic Rock Cut Temple	Mahendravadi	Vellore
212	Choleswara Temple	Melpadi	Vellore
213	Somanatha Temple	Melpadi	Vellore
214	North Eastern Corner Of The Outer Rampart Of The Old Fort At Arcot	Muppaduvetti	Vellore
215	Rock Inscription On The Right Flank Of The Sholinghur Tank	Sholinghur	Vellore
216	Konar Temple	Tirumalpur	Vellore
217	Subramanya Temple	Vallimalai	Vellore
218	Jain Sculpture And Inscription	Vallimalai	Vellore
219	Fort	Vellore	Vellore
220	Old Mosque In The Fort	Vellore	Vellore
221	Jalkanteswara Temple	Vellore	Vellore
222	Rock, Sculptures and Caves	Vilapakkam	Vellore
223	Brahmapurisvara Temple	Brahmadesam	Villupuram
224	Patalisvara Temple	Brahmadesam	Villupuram
225	Rock Cut Pallava Temple	Dalavanur	Villupuram
226	Alagiya Narasimha Perumal Temple	Ennayiram	Villupuram
227	Fortress Comprising Of Hill Fort On The Rajagiri, The Inner And Lower Fort And Lines Of The Fortification Connecting Rajagiri, Krishnagiri And Chakkilidrug (Or) St. George's Mountain Hills.	Gingee	Villupuram
228	Minor And Lower Forts With Structures Like Inner Fort, Venugopala Temple, A Granary, A Gymnasium, Kalyanamahal, Stables, Barracks, Idols Of Kamalakkanni Amman And Hanuman Etc.	Gingee	Villupuram
229	Old Jail Near The Pondy Gate And Two Persian Inscriptions On The Outer Face Of The Two Last Bastions.	Gingee	Villupuram
230	Saad-At-Ullah Khan Mosque With Persian Inscriptions, Inscription In Persian In Pond Gate	Gingee	Villupuram
231	Two Granaries, A Magazine, A Flag Staff, Temples Of Ranganatha And Kamalakkanni Amman, A Big Cannon, A Sacrificial Slab, The Audience Hall On The Rajagiri And The Treasury	Gingee	Villupuram
232	Two Granaries, Well For Storing Of Ghee, Well For Storing Oil, Two Temples And An Audience Hall On The Krishnagiri.	Gingee	Villupuram
233	Venkararamana Temple With Inscription In Tamil, Prisoners Well (Ab)	Gingee	Villupuram
234	Pallava Rock-Cut Shrine	Kilmavilangai	Villupuram

	Name of Monument/Site	Locality	District
235	Rock Cut Shrine	Mandagapattu	Villupuram
236	Outside The Fort-Pattabhirama Temple And 12 Pillared Mandapa	Narasingarayanan Pettai	Villupuram
237	Talagiriswara Temple And A Cave Containing An Image Of Durga And Pallava Inscription	Panamalai	Villupuram
238	Apatsaheyeswara Temple	Sendamangalam	Virudhunagar
239	24 Jain Figure In Two Rows, A Standing Nude Figure, Two Fragments Of A Sitting Figure And Two Inscriptions On Tirunathankunru.	Sirukadambur	Villupuram
240	Vinnamparai Rock Containing Pallava Inscriptions	Thondur	Villupuram
241	Tirumalai Nayaka Palace	Srivilliputtur	Virudhunagar
242	Megalithic cists and cairns (survey no.222)	Agaram	Kanchipuram
243	Megalithic cists and cairns (survey nos. 111 and 116)	Agaram	Kanchipuram
244	Urn burials	Alattur	Kanchipuram
245	Megalithic cists and cairns	Amur	Kanchipuram
246	Megalithic cists and cairns	Anur	Kanchipuram
247	Megalithic cists and cairns	Araiypakkam	Kanchipuram
248	Megalithic cists and cairns	Atcharavakkam	Kanchipuram
249	Megalithic cists and cairns with stone circles	Ayyanjeri	Kanchipuram
250	Megalithic cists and cairns with stone circles	Echchur	Kanchipuram
251	Megalithic cists and cairns with stone circles	Edakunram	Kanchipuram
252	Megalithic cists and cairns with stone circles	Eluchur	Kanchipuram
253	Megalithic cists and cairns with stone circles	Erumaiyur	Kanchipuram
254	Megalithic cists and cairns with stone circles	Gudalur	Kanchipuram
255	Megalithic cists and cairns with stone circles	Guduvancheri (Vallamjeri)	Kanchipuram
256	Megalithic cists and cairns with stone circles	Guduperum Bedu	Kanchipuram
257	Cairns at The Foot Of Perambair Hills.	Kadmalaiaputhur	Kanchipuram
258	Chromlechs	Kadmalaiaputhur	Kanchipuram
259	Group of cairns	Kadapperi	Kanchipuram
260	Megalithic cists and cairns with stone circles	Kalanipakkam	Kanchipuram
261	Megalithic cists and cairns	Kalathur	Kanchipuram
262	Megalithic cists and cairns	Kalvay	Kanchipuram
263	Megalithic cists and cairns	Kanakapattu	Kanchipuram
264	Excavated remains and buddhist vihara and temple , pallananesvaram	Melaiyur	Nagapattinam
265	Megalithic cists and cairns	Kandalur	Kanchipuram
266	Megalithic cists and cairns	Karanaithangal Porinjam Bakkam	Kanchipuram
267	Megalithic cists and cairns	Kattampettur	Kanchipuram
268	Megalithic cists and cairns	Kilampakkam	Kanchipuram
269	Megalithic cists and cairns	Kottamedu	Kanchipuram
270	Megalithic cists and cairns	Kumili	Kanchipuram
271	Megalithic cists and cairns with stone circles on the hill.	Kunnattur	Kanchipuram

	Name of Monument/Site	Locality	District
272	Megalithic cists and cairns	Kunnavakkam	Kanchipuram
273	Megalithic cists and cairns	Kuravanmedu	Kanchipuram
274	Megalithic cists and cairns	Madayathur	Kanchipuram
275	Megalithic cists and cairns	Maganiyam	Kanchipuram
276	Megalithic cists and cairns	Mailai	Kanchipuram
277	Megalithic cists and cairns	Malaipattu	Kanchipuram
278	Megalithic cists and cairns	Malaivaiyavur	Kanchipuram
279	Two Unfinished Excavations Near The Light House	Mamallapuram	Kanchipuram
280	Unfinished Excavations Near Triple Celled Rock Cut Shrine	Mamallapuram	Kanchipuram
281	Unfinished Excavations South Of Draupadi Rath	Mamallapuram	Kanchipuram
282	Megalithic cists and cairns	Mampattu	Kanchipuram
283	Megalithic cists and cairns	Manamai	Kanchipuram
284	Megalithic cists and cairns	Melkottaiyur	Kanchipuram
285	Megalithic cists and cairns	Moosaivakkam	Kanchipuram
286	Megalithic cists and cairns	Naduvakkarai	Kanchipuram
287	Megalithic cists and cairns	Nandambakkam	Kanchipuram
288	Megalithic cists and cairns	Nandivaram	Kanchipuram
289	Group of cairns	Nanmangalam	Kanchipuram
290	Megalithic cists and cairns	Nattam	Kanchipuram
291	Megalithic cists and cairns	Nedungunram	Kanchipuram
292	Megalithic cists and cairns	Nallikuppam	Kanchipuram
293	Megalithic cists and cairns	Olalur	Kanchipuram
294	Megalithic cists and cairns	Ottivakkam	Kanchipuram
295	Megalithic cists and cairns	Ottiyambakkam	Kanchipuram
296	Megalithic cists and cairns	Padur	Kanchipuram
297	Megalithic cists and cairns	Palayasivaram	Kanchipuram
298	Megalithic cists and cairns	Pallavaram	Kanchipuram
299	Megalithic cists and cairns	Palliyagaram	Kanchipuram
300	Megalithic cists and cairns	Paranur	Kanchipuram
301	Megalithic cists and cairns	Perumbakkam	Kanchipuram
302	Megalithic cists and cairns	Perunagar	Kanchipuram
303	Megalithic cists and cairns	Perungalathur	Kanchipuram
304	Megalithic cists and cairns with stone circles	Ponmar	Kanchipuram
305	Megalithic cists and cairns	Porundavakkam	Kanchipuram
306	Megalithic cists and cairns	Pudupakkam	Kanchipuram
307	Megalithic Cists and Cairns Bounded With Stone Circles	Pulippakkam	Kanchipuram
308	Megalithic Cists and Cairns	Pundi	Kanchipuram
309	Megalithic Cists Circumscribed by Stone Circles	Rajakulipettai	Kanchipuram
310	Megalithic Cists and Cairns with Stone Circles	Rayalpattu	Kanchipuram
311	Megalithic Cists and Cairns	Sanur	Kanchipuram
312	Megalithic Cists and Cairns in Virgin State.	Sastirampakkam	Kanchipuram
313	Megalithic Cists and Cairns	Sembakkam	Kanchipuram
314	Group of Cairns and Cists	Sembakkam	Kanchipuram
315	Megalithic Cists and Cairns	Sengunram	Kanchipuram

	Name of Monument/Site	Locality	District
316	Megalithic Cists and Cairns intact with Stone Circles.	Settipuniyam	Kanchipuram
317	Megalithic Cists and Cairns	Settupattu	Kanchipuram
318	Megalithic Cairns With Stone Circles and Sarvophagi	Sikkarayapuram	Kanchipuram
319	Megalithic Cists and Cairns	Sirudavur	Kanchipuram
320	Megalithic Cists and Cairns	Sirukunram	Kanchipuram
321	Megalithic Cists and Cairns	Sittalapakkam	Kanchipuram
322	Urn Burial and Megalithic Site	St. Thomas Mount	Kanchipuram
323	Megalithic Cists and Cairns	Tandalam	Kanchipuram
324	Megalithic Cists and Cairns	Tattanur	Kanchipuram
325	Group Of Cairns	Tiruneermalai	Kanchipuram
326	Megalithic Cist	Tiruneermalai	Kanchipuram
327	Megalithic Cists and Cairns	Tirupporur	Kanchipuram
328	Megalithic Cists and Cairns	Tirusulam	Kanchipuram
329	Megalithic Grave Yard	Tiryvadisulam	Kanchipuram
330	Megalithic Cists and Cairns	Unamanjeri	Kanchipuram
331	Dolmen Intact	Uttiramerur	Kanchipuram
332	Megalithic Cists and Cairns	Vadakkuppattu	Kanchipuram
333	Megalithic Cists and Cairns	Vadamangalam	Kanchipuram
334	Megalithic Cists and Cairns	Vaiyavur	Kanchipuram
335	Megalithic Cists	Vandalur	Kanchipuram
336	Megalithic Cists and Cairns With Stone Circles	Vedanarayana Puram	Kanchipuram
337	Megalithic Cists and Cairns	Vembedu	Kanchipuram
338	Megalithic Cists and Cairns	Vengur	Kanchipuram
339	Megalithic Cists and Cairns With Stone Circles	Venkitapuram	Kanchipuram
340	Megalithic Cists and Cairns	Venpakkam Village No.69	Kanchipuram
341	Megalithic Cists and Cairns	Venpakkam Village No.273	Kanchipuram
342	Megalithic Cists and Cairns	Venpakkam Village No.186	Kanchipuram
343	Megalithic Cists and Cairns	Virapuram	Kanchipuram
344	Kambarmedu	Melaiyur	Nagapttinam
345	Megalithic Cists and Cairns	Karai	Perambalur
346	Dolmens and Cairns	Amburapatti	Pudukkottai
347	Prehistoric Burial Site (Known as Kurangapattarai)	Ammachatram	Pudukkottai
348	Prehistoric Burial Site, Stone Circle, and Menhirs	Annavasal	Pudukkottai
349	Dolmens	Chokkanatha Patti	Pudukkottai
350	Dolmens	Kilaiyur	Pudukkottai
351	Prehistoric Burial Site	Melur	Pudukkottai
352	Dolmens	Muttampatti	Pudukkottai
353	Prehistoric Burial Site	Narangiyan Pettai	Pudukkottai

	Name of Monument/Site	Locality	District
354	Prehistoric Dolmens	Perungulur	Pudukkottai
355	Prehistoric Dolmens	Peyal	Pudukkottai
356	Dolmens and Ayanar Images	Poyyamanai And Virudupatti	Pudukkottai
357	Prehistoric Burial Site	Puttambur	Pudukkottai
358	Prehistoric Burial Site	Satyamangalam	Pudukkottai
359	Cairns and Urns	Sendakudy	Pudukkottai
360	Dolmens and Urns	Sengalur	Pudukkottai
361	Dolmens in Annaivasal Vattam	Sittannavasal	Pudukkottai
362	Dolmens (Known As Kurangupattarai)	Tayinipatti	Pudukkottai
363	Prehistoric Burial Site	Thekkattur	Pudukkottai
364	Kalasakkadu Burial Site	Tirukkattalai	Pudukkottai
365	Group of Dolmens	Tiruppur	Pudukkottai
366	Prehistoric Burial Site	Vadugapatti	Pudukkottai
367	Prehistoric Burial Site	Vathanna Kurichi	Pudukkottai
368	Prehistoric Burial Site	Vilapatti	Pudukkottai
369	Megalithic Cists and Cairns	Amirtha Mangalam	Tiruvallur
370	Virgin Group Containing many Burrows.	Attanthangal	Tiruvallur
371	Megalithic Cists	Chedalpakkam	Tiruvallur
372	Megalithic Cists and Cairns	Neyveli	Tiruvallur
373	Urn Burials	Palavakkam	Tiruvallur
374	Megalithic Cists and Cairns	Pammadukulam	Tiruvallur
375	Megalithic Cists and Cairns	Panchali	Tiruvallur
376	Megalithic Cairns with bounding Stone Circles.	Pandur	Tiruvallur
377	Megalithic Cists and Cairns	Pondavakkam	Tiruvallur
378	Megalithic Cists and Cairns	Pottur	Tiruvallur
379	Prehistoric Settlement Site (Megalithic Period)	Pulal	Tiruvallur
380	Cairn Site	Sengarai	Tiruvallur
381	Megalithic Cists and Cairns	Sirukalattur	Kanchipuram
382	Megalithic Cists and Cairns	Siruvadu	Tiruvallur
383	Megalithic Cists and Cairns	Tadipadi	Tiruvallur
384	Megalithic Cists and Cairns with Bounding Stone Circles.	Vanmalli	Tiruvallur
385	Megalithic Cists and Cairns	Virakuppam	Tiruvallur
386	Prehistoric Site	Mottur	Tiruvannamalai
387	Megalithic Cists and Cairns	Nedungal	Tiruvanamalai
388	Megalithic Cists	Tellur	Tiruvanamalai
389	Megalithic Cists	Tetturai	Tiruvanamalai
390	Megalithic Cists	Venkunnam	Tiruvanamalai
391	Prehistoric Site	Adichanallur	Turicorin
392	Prehistoric Site	Kalvoi	Turicorin
393	Prehistoric Site	Karungulam	Turicorin
394	Urn Burial Site	Kadagambattu	Villupuram
395	Megalithic Cairns and Stone Circles	Sengamedu	Villupuram
396	Megalithic Stone Circles	Tiruvakkrai	Villupuram

	Name of Monument/Site	Locality	District
397	Dolmens Near Palamalai	Adukkam	Dindigul
398	Mandapakkadu (Structure With Mound)	Chettipalayam	Coimbatore
399	Prehistoric Site (Known as Pandava Graves)	Kanyampundi	Coimbatore
400	Dolmens Near Machur Reserved Forest	Panaikkadu	Dindigul
401	Dolmens Near Machur	Panaikkadu	Dindigul
402	Dolmens Near Talayar River On Top Of The Hill	Panaikkadu	Dindigul
403	Dolmens	Panaikkadu	Dindigul
404	Vattakkottai fort	Vattakkottai	Kanyakumari
405	Bhagavati Temple and Jaina-bas Relief	Chitral	Kanyakumari
406	Parthasarathi and Krishna Temples	Parthivapuram	Kanyakumari
407	Rock amidst sea where Swami Vivekananda meditated	Kanyakumari	Kanyakumari
408	Rock cut Cave temple	Thirunandikkare	Kanyakumari
409	Bhaktavatsala Temple	Seramadevi	Tirunelveli
410	Valisvara Temple	Tiruvalisvaram	Tirunelveli
411	Two rock cut temples with inscriptions in Varunachimalai	Thirumalapuram	Tirunelveli
412	Ancient Site	Kunnathur	Tirunelveli
413	Group of sculptured dolmens	Banagudisholai	Nilagiri

Source: Archaeological Survey of India.

Appendix 4: INTERNATIONALLY RECOGNIZED ENVIRONMENTAL STANDARDS

Applicable WHO Ambient Air Quality Guidelines

Table 1.1.1: WHO Ambient Air Quality Guidelines ^{7,8}		
	Averaging Period	Guideline value in $\mu\text{g}/\text{m}^3$
Sulfur dioxide (SO₂)	24-hour	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) 50 (guideline)
	10 minute	40 (guideline) 200 (guideline)
Nitrogen dioxide (NO₂)	1-year	40 (guideline)
	1-hour	200 (guideline)
Particulate Matter PM₁₀	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
	24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter PM_{2.5}	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

World Bank Group's Noise Level Guidelines

Table 1.7.1- Noise Level Guidelines ⁵⁴		
	One Hour L _{AEQ} (dBA)	
Receptor	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational ⁵⁵	55	45
Industrial; commercial	70	70

Table 2.3.1. Noise Limits for Various Working Environments		
Location /activity	Equivalent level L _{Aeq,8h}	Maximum L _{Amax,fast}
Heavy industry (no demand for oral communication)	85 dB(A)	110 dB(A)
Light industry (decreasing demand for oral communication)	50-65 dB(A)	110 dB(A)
Open offices, control rooms, service counters or similar	45-50 dB(A)	-
Individual offices (no disturbing noise)	40-45 dB(A)	-
Classrooms, lecture halls	35-40 dB(A)	-
Hospitals	30-35 dB(A)	40 dB(A)

Appendix 5: ADB AND GOVERNMENT REQUIREMENTS FOR TNUFIP IMPLEMENTATION

Subproject	Government Regulatory Requirement	ADB Requirement	Difference between ADB and Government Requirements
(1)	(2)	(3)	(4)
All subprojects of water supply, sewerage and sanitation	EIA Notification, 2006 Not applicable (None are listed activities/projects in Schedule I of EIA Notification, 2006. Do not require Environmental Clearance from MOEFCC. No EIA, public consultation, disclosure required). .	SPS 2009 Classify the project using REA checklist. Categorization (A/B/C). Projects will mostly be classified as B. Category A projects will be excluded from TNUFIP. Preparation of IEE For projects involving facilities and/or business activities that already exist or are under construction, undertake an environment compliance audit. Where non-compliance is identified, a corrective action plan is required. Public consultation in a manner commensurate with the impacts, process and its results are to be documented and reflected in the IEE.	Environmental Assessment: TNUFIP subprojects do not require EIA study as per GoI regulations whereas ADB SPS 2009 requires the process of screening, environmental assessment, public consultation, disclosure, etc., for all projects. <u>To ensure compliance with ADB, all subprojects should go through the environmental assessment process according to ADB SPS 2009</u>
Subprojects with WTP / STP	Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments. Applicable to WTP component – requires CTE and CTO from TNPCB Detailed Project Report to be submitted to TNPCB along with the form (combined form	Disclosure on ADB's website of the final IEE; updated IEEs and corrective action plans; and environmental monitoring reports. Public disclosure (complete IEE) in an accessible place and local language. Mitigation measures specified in IEE incorporated in project design; incorporate mitigation and monitoring measures (including the EMP) into bid/contract documents.	Projects must comply with all statutory requirements as per the regulatory framework at national, state and local level; As per the ADB all projects must comply with the country environmental regulations to be eligible for funding.

Subproject	Government Regulatory Requirement	ADB Requirement	Difference between ADB and Government Requirements
(1)	(2)	(3)	(4)
	<p>for Air and Water Acts) and prescribed fee.</p> <p>CTE. Based on project review and site inspection TNPCB provides CTE before construction, and stipulate the disposal standards to be met</p> <p>CTO. CTO issued prior to start of operation, after confirming compliance with CFE conditions, if any</p> <p>Renewal of CTO. Based on the performance of the WTP and its compliance with the disposal standards CTO is renewed every two/three years.</p> <p>Disposal standards are notified under the Environment (Protection) Act, 1986 and CPCB Environmental Standards. Appendix 6 provides applicable standards.</p>	<p>ADB approval of IEE prior to invitation of bids</p> <p>All necessary government approvals/clearances should be in place prior to award of contracts</p> <p>Implementation of EMP; corrective action plans in case of non-compliance</p> <p>Submission of semi-annual monitoring report and disclosure</p> <p>SPS 2009 covers all the aspects of pollution control</p> <p>SPS also requires that all subproject should comply with county safeguard policies</p> <p>In project implementation, pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines shall be applied. When Government regulations differ from these levels and measures, project shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, provide full and detailed justification-</p>	<p><u>TNUFIP projects shall comply with all environmental regulations and the consents, clearances, approvals, as required for subproject should be obtained.</u></p>
All subprojects.	<p>Noise Pollution (Regulation and Control) Rules, 2000 amended up to 2010</p> <p>Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.</p>		Same above

Subproject	Government Regulatory Requirement	ADB Requirement	Difference between ADB and Government Requirements
(1)	(2)	(3)	(4)
	<p>Appendix 6 provides applicable noise standards.</p> <p>Construction and Demolition Waste Management Rules, 2016</p> <p>Rule 4 and 5 specifies the duties of waste generator, and duties of service provider and their contractors. These are to be followed during the construction</p>		
Subprojects located within 300 m of protected monument	<p>Ancient Monuments and Archaeological Sites and Remains Act, 1958 and Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010</p> <p>Works within 300 m boundary of the monument can be done only with prior permission of ASI. Application in prescribed format to be submitted to ASI for permission.</p>	SPS 2009 requires that all the impacts on archeological, historical and cultural resources shall duly be covered in environmental assessment	-Same as above-
Applicable to subprojects located within core or buffer zone of Protected Areas	<p>Wildlife Protection Act, 1972</p> <p>It is unlikely that any project located within protected area is included in the project</p>	SPS 2009 requires that all impacts related to environmental sensitive areas (forest, protected areas etc.,) and wildlife are duly being covered in the environmental assessment	-Same as above-

Subproject	Government Regulatory Requirement	ADB Requirement	Difference between ADB and Government Requirements
(1)	(2)	(3)	(4)
	Permission from chief wildlife warden/ State Wildlife Board/ National Board of Wildlife		
Subprojects located in forest lands	Forest (Conservation) Act, 1980 amendment 1988 and the rules/notifications Prior permission to use forest land for non-forest (project) purposes	-same as above-	-Same as above-
All subprojects	Labor laws Contractor shall register with the state labor department and comply with the provisions, in terms of minimum wages, equal wages for men and women, no child labor, inter-state labor, working conditions, amenities to be provided etc.	SPS 2009 requires due consideration of occupational health and safety impacts in environmental assessment, and mitigation measures	TNUFIP projects shall comply with all labour laws (central and state),

Appendix 6: ENVIRONMENTAL STANDARDS

Effluent Disposal Standards of STPs applicable to all modes of disposal

	Parameter	Standard	
		Location	Concentration not to exceed
1	pH.	Anywhere in the country	6.5 - 9.0
2	Bio-Chemical Oxygen Demand (BOD)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir, and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep	20
		Areas/regions other than mentioned above	30
3	Total Suspended Solids (TSS)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir, and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep	<50
		Areas/regions other than mentioned above	<100
4	Fecal Coliform (FC) (Most Probable Number per 100 milliliter, MPN/100ml)	Anywhere in the country	<1000

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

Note :

- (i) All values in mg/l except for pH and Fecal Coliform.
- (ii) These standards shall be applicable for discharge into water bodies as well as for land disposal/applications.
- (iii) The standards for Fecal Coliform shall not apply in respect of use of treated effluent for industrial purposes.
- (iv) These Standards shall apply to all STPs to be commissioned on or after the 1st June, 2019 and the old/existing STPs shall achieve these standards within a period of five years from date of publication of this notification in the Official Gazette.
- (v) In case of discharge of treated effluent into sea, it shall be through proper marine outfall and the existing shore discharge shall be converted to marine outfalls, and in cases where the

marine outfall provides a minimum initial dilution of 150 times at the point of discharge and a minimum dilution of 1500 times at a point 100 meters away from discharge point, then, the existing norms shall apply as specified in the general discharge standards.

(vi) Reuse/Recycling of treated effluent shall be encouraged and in cases where part of the treated effluent is reused and recycled involving possibility of human contact, standards as specified above shall apply.

(vii) Central Pollution Control Board/State Pollution Control Boards/Pollution Control Committees may issue more stringent norms taking account to local condition under section 5 of the Environment (Protection) Act, 1986".

Standards for Composting

As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste Management Rules, 2016 (Schedule II A, Standards for Composting) have been adopted here. According to the standards "In order to ensure safe application of compost, the following specifications for compost quality shall be met, namely:-

Parameters	Units	Organic Compost (FCO 2009)	Phosphate Rich Organic Manure (FCO 2013)
Arsenic	mg/kg	10	10
Cadmium	mg/kg	5	5
Chromium		50	50
Copper		300	300
Lead		100	100
Mercury		0.15	0.15
Nickel		50	50
Zinc		1000	1000
C/N ratio		<20	<20:1
PH		6.5 – 7.5	(1:5 solution) maximum 6.7
Moisture, percent by weight, maximum		15.0 – 25.0	25.0
Bulk density (g/cm ³)		<1	Less than 1.6
Total Organic Carbon, per cent by weight, minimum		12	7.9
Total Nitrogen (as N), per cent by weight, minimum	percent by weight	0.8	0.4
Total Phosphate (as P ₂ O ₅) percent by weight, minimum	percent by weight	0.4	10.4
Total Potassium (as K ₂ O), percent by weight, minimum	percent by weight	0.4	-
Colour			
Odour		Absence of foul Odor	

Parameters	Units	Organic Compost (FCO 2009)	Phosphate Rich Organic Manure (FCO 2013)
Particle size		minimum 90% material should pass through 4.0 mm is sieve	minimum 90% material should pass through 4.0 mm is sieve
Conductivity, not more Than	dsm-1	4	8.2
* compost (final product) exceeding the above stated concentration limits shall not be used for food crops. however, it may be utilized for purposes other than growing food crops.			

National Ambient Air Quality Standards

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO ₂), $\mu\text{g}/\text{m}^3$	Annual*	50	20	- Improved West and Gaeke -Ultraviolet fluorescence
		24 hours**	80	80	
2	Nitrogen Dioxide (NO ₂), $\mu\text{g}/\text{m}^3$	Annual*	40	30	- Modified Jacob & Hochheiser (Na- Arsenite) - Chemiluminescence
		24 hours**	80	80	
3	Particulate Matter (size less than $10\mu\text{m}$) or PM ₁₀ $\mu\text{g}/\text{m}^3$	Annual*	60	60	- Gravimetric - TOEM - Beta attenuation
		24 hours**	100	100	
4	Particulate Matter (size less than $2.5\mu\text{m}$) or PM _{2.5} $\mu\text{g}/\text{m}^3$	Annual*	40	40	- Gravimetric - TOEM - Beta attenuation
		24 hours**	60	60	
5	Ozone (O ₃) $\mu\text{g}/\text{m}^3$	8 hours**	100	100	- UV photometric - Chemiluminescence - Chemical Method
		1 hour**	180	180	
6	Lead (Pb) $\mu\text{g}/\text{m}^3$	Annual*	0.50	0.50	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide (CO) mg/m^3	8 hours**	02	02	- Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour**	04	04	
8	Ammonia (NH ₃) $\mu\text{g}/\text{m}^3$	Annual*	100	100	-Chemiluminescence -Indophenol blue method
		24 hours**	400	400	
9	Benzene (C ₆ H ₆) $\mu\text{g}/\text{m}^3$	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m ³	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m ³	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m ³	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

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

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

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

Ambient Noise Standards

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

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

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

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

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

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

Surface Water Quality Classification Criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	<ul style="list-style-type: none"> • Total Coliforms Organism MPN/100ml shall be 50 or less • pH between 6.5 and 8.5 • Dissolved Oxygen 6mg/l or more • Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organized)	B	<ul style="list-style-type: none"> • Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more • Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	<ul style="list-style-type: none"> • Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more • Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	<ul style="list-style-type: none"> • pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more • Free Ammonia (as N) 1.2 mg/l or less

Irrigation, Industrial Cooling, Controlled Waste disposal	E	<ul style="list-style-type: none"> pH between 6.0 to 8.5 Electrical Conductivity at 25°C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
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Source: Central Pollution Control Board

MPN = Most Probable Number

Vehicle Exhaust Emission Norms

1. Passenger Cars

Norms	CO(g/km)	HC+ NOx (g/km)
1991Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35(combined)
Bharat Stage-IV	1.0	0.18(combined)

2. Heavy Diesel Vehicles

Norms	CO (g/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM (g/kmhr)
1991Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15
Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02

Source: Central Pollution Control Board

CO = Carbon Monoxide; g/kmhr = grams per kilometer-hour; HC = Hydrocarbons; NOx = oxides of nitrogen; PM = Particulates Matter

Appendix 7: DRINKING WATER STANDARDS

No.	Substance or characteristic	Requirement Desirable limit	Undesirable effect outside the desirable	Permissible limit in the absence of alternate Source	Remarks
Essential Characteristic					
1.	Color Hazen Units, Max	5	Above 5, consumer acceptance decreases	25	Extended to 25 only if toxic Substance are not suspect in absence of alternate sources
2.	Odor	Unobjectionable	-	-	a) test cold and when heated b) test at several dilutions
3.	Taste	Agreeable	-	-	Test to be conducted only after safety has been established
4.	Turbidity (NTU) Max	5	Above 5, consumer acceptance decreases	10	-
5.	pH value	6.5 to 8.5	Beyond this range the water will affect the mucous membrane and/or water supply system	No relaxation	-
6.	Total Hardness (mg/L) CaCO ₃	300	Encrustation in water supply structure and adverse effects on domestic use	600	-
7.	Iron (mg/L, Fe) Max	0.3	Beyond this limit taste/appearance are affected; has adverse effects on domestic uses and water supply structure and promotes iron bacteria	1.0	-
8.	Chlorides 250 (mg/L, Cl) Max	250	Beyond effects outside the desirable limit	1000	-
9.	Residual free Chlorine (mg/L), Max	0.2	-	-	To be applicable only when water is chlorinated. Tested at customer end. When protection against viral infection is

					required, it should be min. 0.5 mg/L.
Desirable Characteristics					
10 .	Dissolved solids mg/L Max	500	Beyond this, palatability decreases and may cause gastrointestinal irritation.	2000	-
11 .	Calcium (mg/L, Ca) Max.	75	Encrustation in water supply structure and adverse effects on domestic use.	200	-
12 .	Magnesium (mg/L, Mg) Max	30	Encrustation in water supply structure and adverse effects on domestic use.	100	-
13 .	Copper (mg/L, Cu) Max	0.05	Astringent taste dis coloration and corrosion of pipes fittings and utensils will be caused beyond this.	1.5	-
14 .	Manganese (mg/L, Mn) Max	0.1	Beyond this limit taste/appearance are affected, has adverse effect on domestic use and water supply structure	0.3	-
15 .	Sulphate (mg/L, SO ₄) Max.	200	Beyond this causes gastro intestinal irritation when magnesium or sodium are present	400	May be extended upto 400 provided magnesium (as Mg) does not exceed 30
16 .	Nitrate (mg/L, NO ₃) Max.	45	Beyond this methaemoglobinemia takes place.	100	-
17 .	Fluoride (mg/L, F) Max.	1.0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis.	1.5	-
18 .	Phenolic Compounds (mg/L C ₆ H ₅ OH) Max.	0.001	Beyond this, it may cause objectionable taste and odor	0.002	-
19 .	Mercury (mg/L Hg) Max	0.001	Beyond this the water becomes toxic	No Relaxation.	To be tested when pollution is suspected
20	Cadmium (mg/L, Cd) Max	0.01	Beyond this the water becomes toxic	No Relaxation.	To be tested when pollution is suspected

21	Selenium (mg/L, Se) Max	0.01	Beyond this the water becomes toxic.	No Relaxation.	To be tested when pollution is suspected
22	Arsenic (mg/L, As) Max.	0.01	Beyond this the water becomes toxic	No Relaxation	To be tested when pollution is suspected
23	Cyanide	0.05	Beyond this the water becomes toxic	No Relaxation	To be tested when pollution is suspected
24	Lead (mg/L Pb.) Max.	0.05	Beyond this the water becomes toxic	No Relaxation	To be tested when pollution is suspected
25	Zinc (mg/L, Zn) Max.	5	Beyond this limit it can cause astringent taste and an opalescence in water	15	To be tested when pollution is suspected
26	Anionic detergents (mg/L, MBAS) Max	0.2	Beyond this limit it can cause a light froth in water	1.0	To be tested when pollution is suspected
27	Chromium (mg/L, Cr ₆₊)	0.05	May be carcinogenic above this limit	-	-
28	Polynuclear Aromatic Hydrocarbons (mg/l, PAH) Max	-	May be carcinogenic	-	-
29	Mineral oil (mg/L)	0.01	Beyond this limit, undesirable taste and odor after chlorination takes place	0.03	To be tested when pollution is suspected
30	Pesticides (mg/L) max	Absent	Toxic	0.001	-
Radioactive materials					
31	Alpha emitters Bq/L Max	-	-	0.1	-
32	Beta emitters Pci/L Max	-	-	1.0	-
33	Alkalinity (mg/L,) Max	200	Beyond this limit, taste becomes unpleasant	600	-
34	Aluminum (mg/L, Al) Max	0.03	Cumulative effect is reported to cause dementia	0.2	
35	Boron (mg/L) Max	1.0	-	5.0	-

Appendix 8: RAPID ENVIRONMENTAL ASSESSMENT CHECKLIST

Note: Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Tamil Nadu Urban Flagship Investment Program

Subproject: _____

1. Water Supply

SCREENING QUESTIONS	Yes	No	R
A. Project Siting Is the project area...			
▪ Densely populated?			
▪ Heavy with development activities?			
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site			
• Protected Area			
• Wetland			
• Mangrove			
• Estuarine			
• Buffer zone of protected area			
• Special area for protecting biodiversity			
• Bay			
B. Potential Environmental Impacts Will the Project cause...			
▪ Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?			
▪ Impairment of historical/cultural monuments/areas and loss/damage to these sites?			
▪ Hazard of land subsidence caused by excessive ground water pumping?			
▪ Social conflicts arising from displacement of communities?			
▪ Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?			
▪ Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?			
▪ Delivery of unsafe water to distribution system?			
▪ Inadequate protection of intake works or wells, leading to pollution of water supply?			
▪ Over pumping of ground water, leading to salinization and ground subsidence?			
▪ Excessive algal growth in storage reservoir?			
▪ Increase in production of sewage beyond capabilities of community facilities?			

▪ Inadequate disposal of sludge from water treatment plants?			
▪ Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?			
▪ Impairments associated with transmission lines and access roads?			
▪ Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.			
▪ Health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?			
▪ dislocation or involuntary resettlement of people			
▪ Social conflicts between construction workers from other areas and community workers?			
▪ Noise and dust from construction activities?			
▪ Increased road traffic due to interference of construction activities?			
▪ Continuing soil erosion/silt runoff from construction operations?			
▪ Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?			
▪ Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?			
▪ accidental leakage of chlorine gas?			
▪ Excessive abstraction of water affecting downstream water users?			
▪ Competing uses of water?			
▪ increased sewage flow due to increased water supply			
▪ increased volume of silage (wastewater from cooking and washing) and sludge from wastewater treatment plant			
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?			
▪ Social conflicts if workers from other regions or countries are hired?			
▪ Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?			
▪ Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?			
Climate Change and Disaster Risk Questions	Yes	No	Remarks

The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
▪ Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes			
▪ Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., changes in rainfall patterns disrupt reliability of water supply; sea level rise creates salinity intrusion into proposed water supply source)?			
▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?			
▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?			
▪ * Hazards are potentially damaging physical events.			

2. Sewerage

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the project area...			
▪ Densely populated?			
▪ Heavy with development activities?			
▪ Adjacent to or within any environmentally sensitive areas?			
▪ Cultural heritage site			
▪ Protected Area			
▪ Wetland			
▪ Mangrove			
▪ Estuarine			
▪ Buffer zone of protected area			
▪ Special area for protecting biodiversity			
▪ Bay			
B. Potential Environmental Impacts Will the Project cause...			
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?			
▪ interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?			
▪ dislocation or involuntary resettlement of people			
▪ impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?			
▪ overflows and flooding of neighboring properties with raw sewage?			

▪ environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?			
▪ noise and vibration due to blasting and other civil works?			
▪ discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?			
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?			
▪ social conflicts between construction workers from other areas and community workers?			
▪ road blocking and temporary flooding due to land excavation during the rainy season?			
▪ noise and dust from construction activities?			
▪ traffic disturbances due to construction material transport and wastes?			
▪ temporary silt runoff due to construction?			
▪ hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?			
▪ deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?			
▪ contamination of surface and ground waters due to sludge disposal on land?			
▪ health and safety hazards to workers from toxic gases and hazardous materials which maybe contained in sewage flow and exposure to pathogens in sewage and sludge?			
▪ large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?			
▪ social conflicts between construction workers from other areas and community workers?			
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?			
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?			
Climate Change and Disaster Risk Questions			
▪ The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
▪ Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes			
▪ Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., changes in rainfall patterns disrupt			

reliability of water supply; sea level rise creates salinity intrusion into proposed water supply source)?			
▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g.,high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?			
▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?			

Appendix 9: OUTLINE CONTENTS OF INITIAL ENVIRONMENTAL EXAMINATION REPORT

1. Executive Summary

- Describe concisely the critical facts, significant findings, and recommended actions of environmental assessment study as documented in the report.³

2. Description of the Project

- Describe the proposed project; its major components, including any associated facility required by and for the project (for example, access roads, power lines, water supply, quarries and borrow pits, and spoil disposal).
- Include drawings and maps showing the project's layout and components, the project site, and the project's area of influence.

3. Policy, Legal, and Administrative Framework

- Discuss national and local legal and institutional framework within which the environmental assessment is carried out.

4. Description of the Environment (Baseline Data)

- Describes relevant physical, biological, and socioeconomic conditions within the study area.

5. Anticipated Environmental Impacts and Mitigation Measures

- Identify, predict and assesses the project's likely positive and negative direct and indirect impacts to physical, biological, socioeconomic and impacts on livelihoods and physical cultural resources in the project's area of influence
- Examine alternatives to the proposed project site, technology, design and operation. Also state the basis for selecting the particular project design, location etc.
- Identify mitigation measures to avoid, reduce, mitigate, or compensate for adverse environmental impacts (in that order of priority)

6. Information Disclosure, Consultation, and Grievance Redress Mechanism

- Summarize the consultation and disclosure activities undertaken during project preparation
- Summarize comments and concerns received from affected person and other stakeholders and how these comments have been addressed in project
- Describes the planned information disclosure and consultation activities during the implementation.
- Describe the grievance redress framework – process, responsibilities and timelines.

8. Environmental Management Plan

- Summarize stage wise (design, construction and operation) environmental impacts and detail mitigation and management measures (Table 1)
- Describe monitoring measures (Table 2)

- Describe implementation arrangements and responsibilities for EMP implementation

Table A8-1: Summary Environmental Impacts and Mitigation Measures

Project stage	Potential Environmental Impacts	Proposed Mitigation Measures	Performance standard	Institutional Responsibility		Cost estimates
				Implementation	Monitoring	
Pre-construction phase						
Construction phase						
Operation and maintenance phase						

Table A8-2: Environmental Monitoring Plan

Project stage	Mitigation measure	Parameters to be monitored	Performance standard	Location	Measurements	Frequency	Responsibilities	Cost
Pre-construction phase								
Construction phase								
Operation and maintenance phase								

9. Conclusion and Recommendation

- Provide the conclusions drawn from the assessment and provide recommendations.

Appendix 10: PROCEEDINGS OF SUB PROJECT LEVEL STAKEHOLDER CONSULTATION MEETING

Subproject _____ Venue and date _____

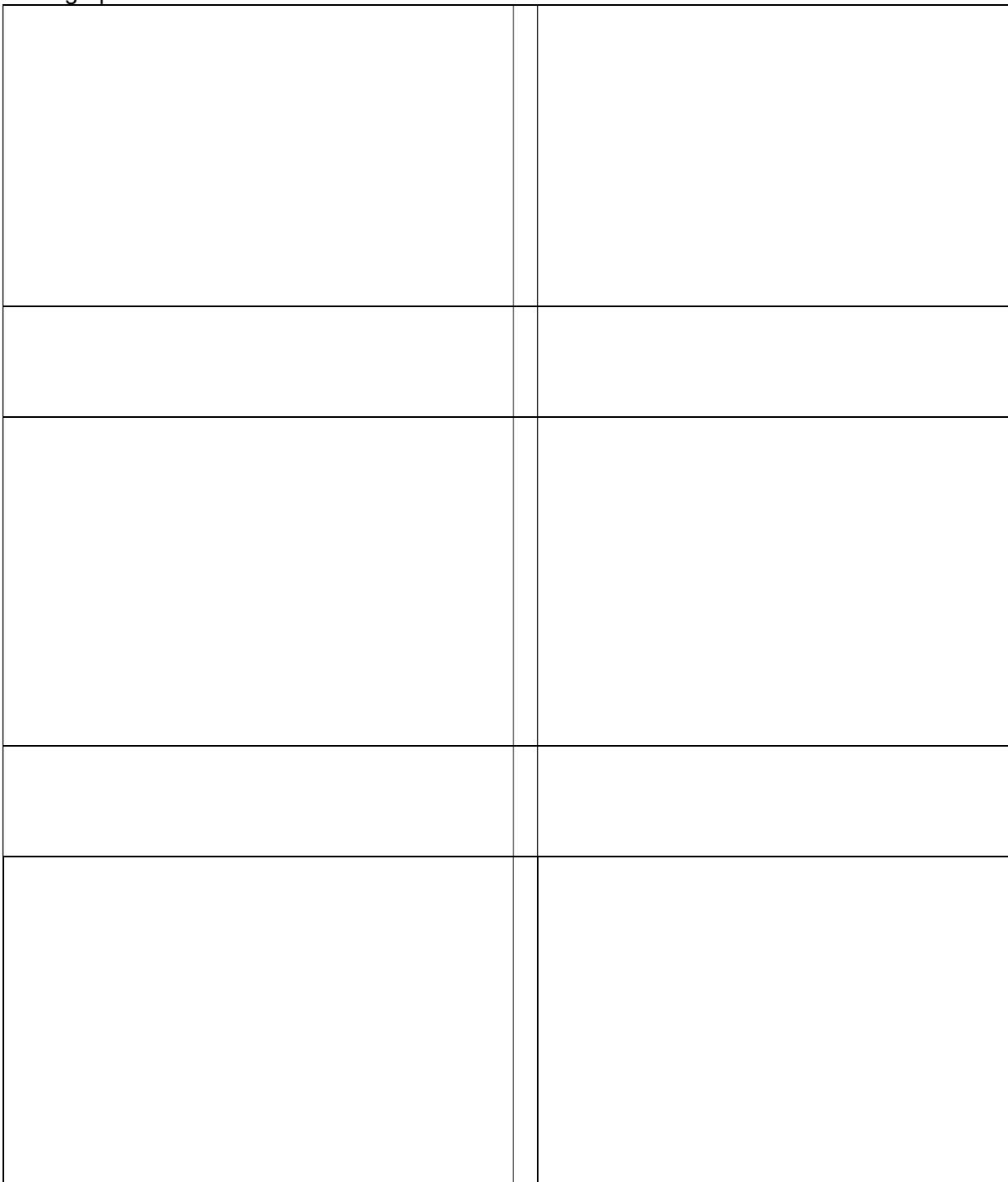
A. Brief of the consultation meeting (date, venue, organizer, and participants)

B. Topics discussed during the meeting

C. Reports / Materials disclosed to the participants

D. Suggestions and feedback of participants and response of project team

Photographs:



List of Participants: (insert scanned image of the attendance sheet)

<p>Tamil Nadu Urban Flagship Investment Program</p> <p>Stakeholder Consultation Workshop</p> <p>Subproject: _____ Date: _____ Venue: _____</p> <p>Organized by _____ (PIU)</p>					
S. No	Name	Gender (M/F)	Designation / Agency	Contact No.	Signature
1					
2					
3					
4					
5					
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Use additional sheets if required

Appendix 11: PUBLIC INFORMATION NOTICE TEMPLATE

**Public Announcement
Name of the work/project
Implementing Agency**

Under this project, works are being conducted by _____ Contractor to provide water supply/ sewerage network in City Name.

As part of this, works for laying pipeline / sewerage network will be taken up in _____ road/-
_____ street/ ____ lane _____. From _____ to (provide dates).

We request you to kindly co-operate for smooth implementation of the works.

We also request you to drive vehicles / pedestrians to walk carefully.

Inconvenience caused is regretted.

PIU - Contact No.

Contractor – Contact no.

Appendix 12: SAMPLE GRIEVANCE REGISTRATION FORM

(To be available in Tamil and English)

The _____ Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date	Place of registration	Project Town Project:			
Contact information/personal details					
Name		Gender	<input type="checkbox"/> * Male	<input type="checkbox"/> * Female	Age
Home address					
Place					
Phone no.					
E-mail					
Complaint/suggestion/comment/question Please provide the details (who, what, where, and how) of your grievance below:					
<p>If included as attachment/note/letter, please tick here:</p> <p><input type="checkbox"/> How do you want us to reach you for feedback or update on your comment/grievance?</p>					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)	
Mode of communication: <input type="checkbox"/> Note/letter <input type="checkbox"/> E-mail <input type="checkbox"/> Verbal/telephonic	
Reviewed by: (Names/positions of officials reviewing grievance)	
Action taken:	
Whether action taken disclosed:	<input type="checkbox"/> Yes <input type="checkbox"/> No

Means of disclosure:

Appendix 13: GENERIC DESIGN-STAGE ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES OF WATER SUPPLY and SEWERAGE PROJECTS

Applicable component	Anticipated Impact / issue	Mitigation Measures
1. Water Supply		
Water source	Source sustainability – lack of water availability	<ul style="list-style-type: none"> • Establish adequate water availability • Ensure that there are no water use-conflicts • In case of surface water source with multi-uses, ensure that necessary provision is made for respective town water supply through government statute as required before the start of detailed design. • For groundwater source, conduct hydrogeological study and establish source sustainability prior to detailed design
Water Treatment Plant (WTP)	Water efficiency and pollution issues due to disposal of backwash water and sludge	<ul style="list-style-type: none"> • Provide recirculation system for backwash water • Provide sludge collection and treatment system (sludge drying beds) • Check the suitability of dried sludge to use as soil conditioner; if not suitable, dispose through landfilling
Chlorination facility	Risk due to handling and application of chlorine	<p>Design and develop chlorination facility with all safety features and equipment to meet with any accidental eventuality, which may include</p> <ul style="list-style-type: none"> • Chlorine neutralization pit with a lime slurry feeder • Proper ventilation, lighting, entry and exit facilities • Personal protection and safety equipment for the operators in the chlorine plant • Provide training to the staff in safe handling and application of chlorine; • Provide standard operating manual for safe operation
All components	Consents, permits, clearances, NOCs, etc. Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	<ul style="list-style-type: none"> • Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of work • Include all consent conditions in the designs and construction schedules
All component	Operational impacts	<ul style="list-style-type: none"> • Develop operation and maintenance plan, including an environmental monitoring program
All components	Loss of vegetation and tree cover	<ul style="list-style-type: none"> • Avoid tree cutting by suitable site planning

Applicable component	Anticipated Impact / issue	Mitigation Measures
		<ul style="list-style-type: none"> If tree-removal will be required, obtain tree-cutting permit and plant two native trees for every one that is removed.
Pumping facilities	Energy efficiency	<ul style="list-style-type: none"> Design pumping equipment with maximum efficiency to optimize the power consumption Various combinations of number of pumps, stages, motor speed should be considered to select the best pump with ideal specific speeds.
Sewerage		
Sewage Treatment Plant (STP)	Nuisance to local people due to bad odor from STP	<ul style="list-style-type: none"> As far as possible, STP shall be located significantly away from the habitation (future development of area shall be considered, and site shall be selected in areas with least development potential as far as possible) Provide a green buffer zone of 20-30 m wide around the STP; this should be planted with trees in multi-rows. This will act as a visual screen around the STP and will improve the aesthetic appearance. To the extent possible, avoid anaerobic decomposition of sewage.
STP	<p>Pollution of surface water, groundwater and land resources due to inadequate treatment</p> <p>Design and development of STP as per disposal standards set by TNPCB/ CPCB</p>	<ul style="list-style-type: none"> The STP should be designed for treated water disposal standards (Refer Appendix 6) Provide regular monitoring system As far as possible utilize treated for beneficial purposes (such as for irrigation)
STP and sewerage system	Mixing of industrial effluent with sewage can affect the treatment efficiency	<ul style="list-style-type: none"> No industrial wastewater shall be allowed to dispose into municipal sewers No domestic wastewater from industrial units shall be allowed into municipal sewers Ensure that there is no illegal discharge through manholes or inspection chambers Conduct public awareness programs; in coordination with TNPCB, issue notice to all industries for compliance Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with the standards
Sewage pumping stations (SPS)	Odor and insect nuisance due to operation of SPS	<ul style="list-style-type: none"> Establish SPS away from the nearest house/shop etc., to the extent possible. Provide green buffer zone around the facility – at least 3 rows of trees around the facility shall be planted with trees; this will also improve the aesthetic appearance of the facility

Applicable component	Anticipated Impact / issue	Mitigation Measures
		<ul style="list-style-type: none"> • Provide backup power facilities for continuous and uninterrupted pumping of sewage; ensure that anaerobic conditions are not created in wet well through continues operation • Provide odor control measures, if required.
Sewer network	Measures to minimize Impacts during construction and operation of sewer network	<ul style="list-style-type: none"> • Limit the sewer depth where possible. • Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible); • In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm) • In unavoidable, where sewers are to be laid close to storm water drains or canals or natural streams, appropriate pipe material shall be selected (stoneware pipes shall be avoided) • For shallower sewers, use small inspection chambers in lieu of manholes; • Design manhole covers to withstand anticipated loads and ensure that the covers can be readily replace if broken to minimize silt/garbage entry • Ensure sufficient hydraulic capacity to accommodate peak flows and adequate slope in gravity mains to prevent buildup of solids and hydrogen sulfide generation • Equip pumping stations with a backup power supply, such as a diesel generator, to ensure uninterrupted operation during power outages, and conduct regular maintenance to minimize service interruptions. Consider redundant pump capacity in critical areas
Community toilets	Impacts due to lack of operation and maintenance impacts	<ul style="list-style-type: none"> • Provide water and power supply as part of the project • A memorandum of understanding (MoU) between the ULB and community shall be put in place during the design stage for OandM • Develop an operation and maintenance (O&M) system with community participation • As a minimum, the O&M plan should specify (i) cleaning procedures and frequency; (ii) responsible personnel, and (iii) maintenance and repairs schedule.
All components	Consents, permits, clearances, NOCs, etc. Failure to obtain necessary consents, permits, NOCs, etc. can result to design	<ul style="list-style-type: none"> • Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of work • Include all consent conditions in the designs and construction schedules

Applicable component	Anticipated Impact / issue	Mitigation Measures
	revisions and/or stoppage of works	
All components	Loss of vegetation and tree cover	<ul style="list-style-type: none"> • Avoid tree cutting by suitable site planning • If tree-removal will be required, obtain tree-cutting permit and plant ten native trees for every one that is removed.
Pumping facilities	Energy efficiency	<ul style="list-style-type: none"> • Design pumping equipment with maximum efficiency to optimize the power consumption • Various combinations of number of pumps, stages, motor speed should be considered to select the best pump with ideal specific speeds.

Refer to the EHS Guideline on Water and Sanitation for addition impacts/measures that should be followed; these can be downloaded from

<https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES>

Appendix 14: GENERIC CONSTRUCTION-STAGE ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES OF WATER SUPPLY AND SEWERAGE PROJECTS

Applicable Component	Anticipated Impact / Issue	Mitigation Measures
All components	Environment, health and safety issues during construction of civil works	<ul style="list-style-type: none"> • All the site staff – workers, supervisors, engineers from Contractor, CMSC, PIU and ULB will be required to undergo training on EMP implementation, standard operating procedures (SOP) for construction works; occupational health and safety (OHS), core labor laws, applicable environmental laws, etc., prior to start of construction work
All components	Health risks associated with AC pipes	<ul style="list-style-type: none"> • No AC pipes shall be included in the project; leave the existing AC pipes, if any, in-situ without disturbing • Obtain details from ULB/Metro Water on location of underground AC pipes • Locate the new pipe/sewer carefully to avoid encountering AC pipes
All components	Construction work camps, stockpile areas, storage areas, and disposal areas (disruption to traffic flow and sensitive areas and receptors)	<ul style="list-style-type: none"> • Prioritize areas within or nearest possible vacant space in the subproject location • Construction work camps shall be located at least 100 m from residential areas • Do not consider residential areas for stockpiling the waste/surplus soil • Material stockpiles shall be protected by bunds during the monsoon to arrest the silt laden runoff into drains • Surplus soil from trench excavations (pipeline and sewers) shall be utilized for construction works as far as possible • Identify site for disposal of construction waste/soil
All components	Source of construction materials (Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution)	<ul style="list-style-type: none"> • Contractor should obtain material from existing mines approved/licensed by Mines and Geology Department/ Revenue Department. • Submit a monthly statement of construction material procured indicating material type, source and quantity.
All components	Air quality (dust and emissions from construction activity)	<ul style="list-style-type: none"> • Damp down exposed soil and any stockpile on site by spraying with water when necessary during dry weather;

Applicable Component	Anticipated Impact / Issue	Mitigation Measures
	may degrade the air quality)	<ul style="list-style-type: none"> • Bring materials (aggregates, sand, etc. gravel) as and when required; • Use tarpaulins to cover sand and other loose material when transported by vehicles; • Clean wheels and undercarriage of vehicles prior to leaving construction site • Ensure valid Pollution Under Control (PUC) Certificates for all vehicles and equipment used in the construction activity
All components	Impacts on surface drainage and water quality due to contaminated runoff from construction areas in monsoon	<ul style="list-style-type: none"> • Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets • Stockpiles shall be provided with temporary bunds • Prioritize re-use of excess spoils and materials in the construction works. If necessary, dispose spoils only at identified disposal sites • Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies • Place storage areas for fuels and lubricants away from any drainage leading to water bodies • Do not dispose debris and waste soils in or near water bodies/rivers
All components	Impacts due to waste soil	<ul style="list-style-type: none"> • Coordinate with ULB / PIU for beneficial uses of excess excavated soils or immediately dispose to designated areas
All components	Employment generation	<ul style="list-style-type: none"> • Employ at least 50% of the labor force from project area if manpower is available

Applicable Component	Anticipated Impact / Issue	Mitigation Measures
All components	Occupational health and safety to workers	<p>Safety at Work Place</p> <ul style="list-style-type: none"> • Follow standard and safe procedures for all site activities; do not employ arbitrary procedures • All trenches deeper than 1.5 m shall be protected with wooden bracing • Ensure that qualified first-aid at all times and be easily accessible • Secure all installations from unauthorized intrusion and accident risks • Provide H and S orientation training to all workers including basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers, etc., • Prohibit / control public entry into work site • Ensure the visibility of workers; use high visibility vests where required • Ensure moving equipment is outfitted with audible back-up alarms; • Provide sign boards easily understood by workers, visitors • Disallow worker exposure to noise level (>85 dBA); use protection • Document of work-related accidents • Provide medical insurance coverage for workers • Provide supplies of potable drinking water at work sites • Provide clean eating areas where workers are not exposed to hazardous or noxious substances • Provide toilet facilities, separate for men and women

Applicable Component	Anticipated Impact / Issue	Mitigation Measures
All components	Temporary worker/construction camps	<ul style="list-style-type: none"> • Avoid worker camps by sourcing workers locally • The contractor should establish and operate the temporary worker camps in compliance the applicable government standards. • Locate camps away from residential areas (1km); consult ULB/ PIU • Accommodation provided shall be appropriate with good construction material; prefabricated structures are preferable • Camp site should be adequately drained to avoid water accumulation • Provide proper water and sanitation facilities; potable water in adequate quantities; all water storage structures must be cleaned regularly and covered properly to avoid any contamination • Provide separate facilities for men and women; sanitary facilities shall be properly built and well maintained; toilet and bath facilities should be provided on basis of 1 per 15 or less persons • Recover used oil and lubricants and reuse or remove from the site • Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas
All components	Site restoration clean-up	<ul style="list-style-type: none"> • Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; • All excavated roads shall be reinstated to original condition. • All disrupted utilities restored • All affected structures rehabilitated/compensated • The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and be cleaned up. • All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and regrassed
All components located within urban area	High noisy construction activities may have adverse impacts on sensitive receptors and structures	<ul style="list-style-type: none"> • Plan activities such that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; • Construction work shall be limited to day light hours (6 AM to 6 PM) for all the works located within the town; for facilities outside the towns, timings may be relaxed with ULB permission, however no work should be conducted between 10 PM – 6 AM at any site.

Applicable Component	Anticipated Impact / Issue	Mitigation Measures
		<ul style="list-style-type: none"> • Provide prior information to the local public about the work schedule; • Ensure that there are no old and sensitive buildings that may come under risk due to the use of pneumatic drills; if there is risk, conduct manual work • Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and • Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s
All linear components	Disturbance/damage to existing utilities on the sites (Telephone lines, electric poles and wires, water lines etc.)	<ul style="list-style-type: none"> • Identify utilities and services likely to be affected by the construction works (especially linear works like laying of water pipes/sewers) • Coordinate with respective agencies and take necessary measures to minimize disruptions • Prepare a contingency plan to include actions to be done in case of unintentional interruption of services
All linear components	Hindrance to traffic movement	<ul style="list-style-type: none"> • Plan pipeline work in consultation with the traffic police; Prepare a Traffic Movement Plan for the construction work in busy/high traffic /narrow roads • Plan work such that trench excavation, pipe laying, and refilling including compacting, at a stretch is completed in a minimum possible time • Provide for immediate consolidation of backfilling material to desired compaction - this will allow immediate road restoration and therefore will minimize disturbance to the traffic movement • Do not close the road completely, ensure that work is conducted onto edge of the road; allow traffic to move on one line; In unavoidable circumstances of road closure, provide alternative routes, and ensure that public is informed about such traffic diversions • At all work sites public information/caution boards shall be provided – information shall inter-alia include: project name, cost and schedule; executing agency and contractor details; nature and schedule of work at that road/locality; traffic diversion details, if any; entry restriction information; competent official's name and contact for public complaints.
All linear components	Nuisance/disturbance to sensitive areas (schools, hospitals and religious places) due construction work in the proximity	<ul style="list-style-type: none"> • No material should be stocked in this area; material shall be brought to the site as and when required • Conduct work manually with small group of workers and less noise; minimize use of equipment and vehicles

Applicable Component	Anticipated Impact / Issue	Mitigation Measures
	(within 250 m of such place)	<ul style="list-style-type: none"> • No work should be conducted near the religious places during religious congregations • Material transport to the site should be arranged considering school timings; material should be in place before school starts • Notify concerned schools, hospitals etc., 1 week prior to the work; conduct awareness program on nature of work, likely disturbances and risks and construction work, mitigation measures in place, entry restrictions and dos and don'ts • Implement all measures strictly - dust and noise control, public safety, traffic management, strictly at the sites
All linear components	Impediment of access to houses and business	<ul style="list-style-type: none"> • Leave space for access between mounds of excavated soil • Provide wooden planks/footbridges for pedestrians and metal sheets for vehicles to allow access across trenches to premises where required • Consult affected person to inform them in advance when work will occur • Address livelihood issues, if any; implement the Resettlement Plan to address these issues • Provide sign/caution/warning boards at work site indicating work schedule and traffic information; prevent public entry into work sites through barricading and security • Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.
All linear components	Trench excavation in narrow streets will pose high risk to children and elders in the locality	<ul style="list-style-type: none"> • Provide prior information to the local people about the work • Conduct awareness program on safety during the construction work • Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day • Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches
All linear components and components located within densely	Community health and safety	<ul style="list-style-type: none"> • Plan material and waste routes to avoid times of peak-pedestrian activities • Liaise with ULB in identifying risk areas on route cards/maps • Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially

Applicable Component	Anticipated Impact / Issue	Mitigation Measures
populated areas		<p>serious accidents caused by equipment malfunction or premature failure</p> <ul style="list-style-type: none"> • Provide road signs and flag persons to warn of dangerous conditions, in case of location near the road

Refer to the EHS Guideline on Water and Sanitation for addition impacts/measures that should be followed; these can be downloaded from

<https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWATER%2Band%2BSanitation.pdf?MOD=AJPERES>

<http://www.ifc.org/wps/wcm/connect/9aef2880488559a983acd36a6515bb18/2%2BOccupational%2BHealth%2Band%2BSafety.pdf?MOD=AJPERES>

Appendix 15: GENERIC OPERATION-STAGE ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES OF WATER SUPPLY AND SEWERAGE PROJECTS

Field	Anticipated Impact	Mitigation Measures
1. Water Supply		
Check for blockage and leakage problems reducing the water losses	Loss of water, increased demand and inconvenience to consumers and general public	Effectiveness of leak detection and water auditing to reduce the water losses
WTP operation – malfunction and effect on efficiency	Public health, safety and environmental impacts	<ul style="list-style-type: none"> (i) Operate as per the Operational Manual following Standard Operating Procedures as per the WTP design (ii) Undertake preventive and periodic maintenance activities as required (iii) Ensure periodic training to staff in WTP operation, especially in chemical handling and dosing, filter backwash, etc., (iv) replace pumps, motors and other parts as per the operating life prescribed by manufacturer (v) Maintain the mechanical parts as per the maintenance plan to avoid any hazards (vi) Ensure that all safety apparatus at WTP including personal protection equipment are in good condition all times; and are at easily accessible and easily identifiable place; periodically check the equipment, and conduct mock drills to deal with emergency situations (vii) Ensure that backwash recirculation system and sludge management system are operated as per the manual
Occupational health and safety	Health, social and economic impacts on the workers	<ul style="list-style-type: none"> (i) Provide appropriate PPE and training on its proper use and maintenance. (ii) Use fall protection equipment when working at heights. (iii) Maintain work areas to minimize slipping and tripping hazards. (iv) Implement a training program for operators who work with chlorine regarding safe handling practices and emergency response procedures. <p>Prepare escape plans from areas where there might be a chlorine emission.</p> <ul style="list-style-type: none"> (v) Install safety showers and eye wash stations near the chlorine equipment and other areas where hazardous chemicals are stored or used. (vi) Prohibit eating, smoking, and drinking except in designated areas.

Field	Anticipated Impact	Mitigation Measures
Increased in sewage generation	Water pollution, and impacts on public health and environment	(i) Sanitation and sewerage/septage facilities needs to be improved/provided in the project area to suit the increased sewage generation
Sewerage		
STP	Operation efficiency as per the design	<ul style="list-style-type: none"> • Develop operating manual with all standard operating procedures (SOPs) for operation and maintenance of the facility; this should include guidance on the follow up actions in case of process disruptions, inferior quality of treated water; etc. Necessary training (hands-on and class room / exposure visits) shall be provided to the ULB staff dealing with STP • Provide training to the staff to implementation SOP • Operate STP as per the SOP and monitor the treated water quality • Ensure continuous uninterrupted power supply; provide back-up facility (such as generator) and make sure that adequate fuel supplies • Ensure availability of spare parts and consumables • Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with the standards
Sewerage system	Leakage, overflow, blockage of sewer lines may affect the sewer system, contaminate land, water and create public health issues	<ul style="list-style-type: none"> • Establish routine maintenance program, including: <ul style="list-style-type: none"> ○ Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas. ○ Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or exfiltration; and ○ Monitoring of sewer flow to identify potential inflows and outflows • Conduct repairs prioritized based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g. pump station failures, sewer line ruptures, or sewer line blockages); • Review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system

Field	Anticipated Impact	Mitigation Measures
		<p>failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed;</p> <ul style="list-style-type: none"> • When a spill, leak, and/or overflow occurs, keep sewage from entering the storm drain system by covering or blocking storm drain inlets or by containing and diverting the sewage away from open channels and other storm drain facilities (using sandbags, inflatable dams, etc.). Remove the sewage using vacuum equipment or use other measures to divert it back to the sanitary sewer system. • Ensure that appropriate equipment is available for maintenance
Sewerage system	Occupational health and safety: for personnel cleaning underground sewers there is a risk due to oxygen deficiency and harmful gaseous emissions (hydrogen sulphide, carbon monoxide, methane, etc.);	<ul style="list-style-type: none"> • Provide necessary health and safety training to the staff sewer cleaning and maintenance; STP operation; sludge handling • Provide all necessary personnel protection equipment • For personnel cleaning underground sewers there is a risk due to oxygen deficiency and harmful gaseous emissions (hydrogen sulphide, carbon monoxide, methane, etc.); provide adequate equipment (including oxygen masks) for emergency use

Refer to the EHS Guideline on Water and Sanitation for addition impacts/measures that should be followed; these can be downloaded from

<https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES>

Appendix 16 : SAMPLE CONSTRUCTION SITE CHECKLIST FOR EMP MONITORING

Project Name: TNUFIP Name of the Subproject and IA: Contractor:	Yes (✓) No (x)
Monitoring	Details:
EHS supervisor appointed by contractor and available on site	
Construction site management plan (spoils, safety, material, schedule, equipment etc.,) prepared	
Traffic management plan prepared	
Dust is under control	
Excavated soil properly placed within minimum space	
Construction area is confined; no traffic/pedestrian entry observed	
Surplus soil/debris/waste is disposed without delay	
Construction material (sand/gravel/aggregate) brought to site as and when required only	
Tarpaulins used to cover sand and other loose material when transported by vehicles	
After unloading , wheels and undercarriage of vehicles cleaned prior to leaving the site	
No AC pipes disturbed/removed during excavation	
No chance finds encountered during excavation	
Work is planned in consultation with traffic police	
Work is not being conducted during heavy traffic	
Work at a stretch is completed within a day (excavation, pipe laying and backfilling)	
Pipe trenches are not kept open unduly	
Road is not completely closed; work is conducted on edge; at least one line is kept open	
Road is closed; alternative route provided and public is informed, information board provided	
Pedestrian access to houses is not blocked due to pipe laying	
Spaces left in between trenches for access	
Wooden planks/metal sheets provided across trench for pedestrian	
No public/unauthorized entry observed in work site	
Children safety measures (barricades, security) in place at work sites in residential areas	
Prior public information provided about the work, schedule and disturbances	
Caution/warning board provided on site	
Guards with red flag provided during work at busy roads	
Workers using appropriate PPE (boots, gloves, helmets, ear muffs etc.)	
Workers conducting or near heavy noise work is provided with ear muffs	
Contractor is following standard and safe construction practices	
Deep excavation is conducted with land slip/protection measures	
First aid facilities are available on site and workers informed	
Drinking water provided at the site	
Toilet facility provided at the site	

Project Name: TNUFIP Name of the Subproject and IA: Contractor:		Yes (✓) No (x)
Monitoring	Details:	
Separate toilet facility is provided for women workers		
Workers camps are maintained cleanly		
Adequate toilet and bath facilities provided		
Contractor employed local workers as far as possible		
Workers camp set up with the permission of PIU		
Adequate housing provided		
Sufficient water provided for drinking/washing/bath		
No noisy work is conducted in the nights		
Local people informed of noisy work		
No blasting activity conducted		
Pneumatic drills or other equipment creating vibration is not used near old/risky buildings		

Appendix 17: SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT TEMPLATE

This template must be included as an appendix in the IEE that will be prepared for the project. It can be adapted to the specific project as necessary.

I. Introduction

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

Name	Designation/Office	Email Address	Contact Number	Roles
1. PMU				
2. PIUs				
3. Consultants				

- Overall project and sub-project progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

Package Number	Components/List of Works	Contract Status (specify under bidding or contract awarded)	Status of Implementation (Preliminary Design/On-going Construction/Completed/O&M) ²³	If On-going Construction	
				%Physical Progress	Expected Completion Date

²³ If on-going construction, include %physical progress and expected date of completion

II. Compliance status with National/State/Local statutory environmental requirements²⁴

Packag e No.	Subprojec t Name	Statutory Environmental Requirements ²⁵	Status of Compliance ²⁶	Validity if obtaine d	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permi t to Establish ²⁷

III. Compliance status with environmental loan covenants

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

IV. Compliance status with the environmental management plan (refer to EMP Tables in APPROVED IEE/S)

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

Package-wise IEE Documentation Status

Package Number	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) approved by	Remarks
	Not yet due (detailed design not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclosed on project website (Provide Link)	Final IEE provided to Contractor/s (Yes/No)		

24 All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to commencement of works. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the "remarks" column.

25 Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

26 Specify if obtained, submitted and awaiting approval, application not yet submitted

27 Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.

					Project Director? (Yes/No)	

- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.

Package-wise Contractor/s' Nodal Persons for Environmental Safeguards

Package Name	Contractor	Nodal Person	Email Address	Contact Number

- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below.

V. Summary of Environmental Monitoring Activities (for the Reporting Period)²⁸

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						

28 Attach Laboratory Results and Sampling Map/Locations

Operational Phase						

Overall Compliance with CEMP/ EMP

No.	Sub-Project Name	CEMP/ Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

Approach and methodology for environmental monitoring of the project

- Briefly describe the approach and methodology used for environmental monitoring of each sub-project.

VI. Monitoring of environmental IMPACTS on PROJECT SURROUNDINGS (ambient air, water quality and noise levels)

- Discuss the general condition of surroundings at the project site, with consideration of the following, whichever are applicable:

- Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
- Identify if muddy water is escaping site boundaries or if muddy tracks are seen on adjacent roads.
- Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these are intact following heavy rain;
- Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area in the Appendix.
- Confirm spill kits on site and site procedure for handling emergencies.
- Identify any chemical stored on site and provide information on storage condition. Attach photograph.
- Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
- Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
- Provide information on barricades, signages, and on-site boards. Provide photographs in the Appendix.
- Indicate if there are any activities being undertaken out of working hours and how that is being managed.

- Briefly discuss the basis for environmental parameters monitoring.
- Indicate type of environmental parameters to be monitored and identify the location.
- Indicate the method of monitoring and equipment used.
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements.

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Noise Quality Results

Site No.	Date of Testing	Site Location	LAeq (dBA) (Government Standard)		
			Day Time	Night Time	

Site No.	Date of Testing	Site Location	LAeq (dBA) (Monitoring Results)		
			Day Time	Night Time	

VII. Grievance Redress Mechanism

- Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).

VIII. Complaints Received during the Reporting Period

- Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).

IX. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

- Summary of follow up time-bound actions to be taken within a set timeframe.

X. APPENDICES

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- all supporting documents including signed monthly environmental site inspection reports prepared by consultants and/or contractors
- Others

SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name
Contract Number

NAME: _____ DATE: _____
 TITLE: _____ DMA: _____
 LOCATION: _____ GROUP: _____

WEATHER CONDITION:

INITIAL	SITE	CONDITION:
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CONCLUDING SITE CONDITION:

Satisfactory _____ Unsatisfactory _____ Incident _____ Resolved _____
 Unresolved _____

INCIDENT:

Nature of incident:

Intervention Steps:

Incident Issues

Resolution	Project Activity Stage	Survey	
		Design	
		Implementation	
		Pre-Commissioning	
		Guarantee Period	

Inspection

Emissions	Waste Minimization		
Air Quality	Reuse and Recycling		
Noise pollution	Dust and Litter Control		
Hazardous Substances	Trees and Vegetation		

Site Restored to Original Condition

Yes

No

Signature

Sign off

Name
Position

Name
Position