Initial Environmental Examination(Updated)

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IND: Tamil Nadu Urban Flagship Investment Program(Tranche 2) – Underground Sewerage System for Ambur town

Prepared by Tamil NaduWater Supply and Drainage Board on behalf of Ambur town for the Asian Development Bank.
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CURRENCY EQUIVALENTS

(as of 02 October 2021)

Currency Unit	–	Indian rupee (₹)
₹1.00	–	$0.0134
$1.00	=	₹74.15

ABBREVIATIONS

ADB	–	Asian Development Bank
ASI	–	Archeological Survey of India
CMSC	–	Construction Management and Supervision Consultant
CPCB	–	Central Pollution Control Board
CTE	–	Consent to establishment
CTO	–	Consent to operate
DWC	–	Double wall corrugated
EAC	–	Expert Appraisal Committee
EHS	–	Environmental health and safety
EIA	–	Environmental impact assessment
EMP	–	Environmental management plan
ESS	–	Environmental and social safeguards
ESZ	–	Eco sensitive zone
GOTN	–	Government of Tamil Nadu
IEE	–	Initial environmental examination
MOEFCC	–	Ministry of Environment, Forest and Climate Change
NOC	–	No objection certificate
PIU	–	Programimplementationunit
PMU	–	Programmanagementunit
PPTA	–	Project preparatory technical assistance
REA	–	Rapid environmental assessment checklist
ROW	–	Right-of-way
SEIAA	–	State Environmental Impact Assessment Authority
SPS	–	Safeguard Policy Statement
STP	–	Sewage treatment plant
TNPCB	–	Tamil Nadu Pollution Control Board
TNUFIP	–	Tamil Nadu Urban Flagship Investment Program
TNUIFSL	–	Tamil Nadu Urban Infrastructure Financial Services Limited
TWADB	–	Tamil Nadu Water Supply and Drainage Board
WHO	–	World Health Organization
OHS	–	Occupational health and safety

WEIGHTS AND MEASURES

°C	-	Degree Celsius
km	-	kilometer
LPCD	-	liters per capita per day
m	-	meter
Mgd	-	million gallons per day
MLD	-	million litres per day
mm	-	millimeter
nos	-	numbers
km^2	-	square kilometer
m^2	-	square meter

NOTE

In this report, "$" refers to United States dollars.

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EXECUTIVE SUMMARY

The Asian Development Bank (ADB) funded Tamil Nadu Urban Flagship Investment Program (TNUFIP) is aligned to support in the following: (i) urban infrastructure across the state improved and world class cities focusing on universal access to 24x7 water supply services and sanitation facilities including tertiary treatment of sewage to become engines for economic growth developed (Vision 2030, Government of Tamil Nadu, [GOTN]); (ii) five industrial corridors developed (GOTN Vision 2030); (iii) quality of life for all, especially the poor and the disadvantaged improved (Mission Statement and Guidelines, AMRUT Government of India, 2015); (iv) a clean and sustainable environment provided (Smart Cities - Mission Statement and Guidelines, Government of India, 2015). TNUFIP will focus on cities in five priority economic corridors: Chennai –Hosur, Chennai – Tiruchirapalli, Coimbatore –Madurai, Coimbatore– Salem, and Madurai – Thoothukudi. The reform-based component of the program will seek to provide results-based performance incentives to select cities and towns. The program shall also focus on transformative investments in 24x7 water supply, full sanitation coverage smart water management, and urban climate change resilience drawing from the support of various ADB grant technical assistance.

Components. The TNUFIP is structured under three main components: (i) investment in municipal infrastructure namely water supply and sewerage; (ii) municipal reform-based activities; and (iii) technical assistance for design, supervision, program management, reforms, and climate change.

The Subproject. Ambur is located in the central northern part of Tamil Nadu, in Vellore District. In this subproject to be implemented under the ADB-funded TNUFIP,it is proposed to provide underground sewerage system for Ambur town Subproject includes the following civil works components: (i) sewage collection system (106.878kilometer[km] length of sewers, 4,024 manholes); (ii) lift station-2nos;(iii) sub-pumping station-1 no, (iv) main pumping station-1 no; (v) sewage treatment plant (STP) of 16.71million litres per day (MLD) capacity; and (vi) 18,387house service connections.

Project implementation arrangements.The Municipal Administration and Water Supply Department (MAWS) of GOTN acting through the Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) is the state-level executing agency. A program management unit (PMU) has been established in TNUIFSL headed by a Project Director and Deputy Project Director (senior official from Commissionerate of Municipal Administration), and comprising dedicated full-time staff from TNUIFSL for overall project and financial management. The implementing agency is Tamil Nadu Water Supply and Drainage Board (TWAD). A program implementation unit (PIU) has been established in TWAD headed by a full-time Project Manager (Executive Engineer or above) and comprising dedicated full-time staff of the TWAD for day-to-day implementation of the project. Environmental and social safeguards (ESS) managers in PMU/TNUIFSL will have overall responsibility of safeguard compliance with environmental management plan (EMP) and environmental assessment and review framework(EARF) agreed for the TNUFIP. Safeguards Officers from Urban Local Bodies (ULB) will coordinate monitoring and implementation of safeguards requirements. Environmental expert from TWAD Board will assist PIU in implementation of project in compliance with EMP and EARF, and will carry out all necessary tasks.

Screening and assessment of potential impacts. ADB requires the consideration of environmental issues in all aspects of the bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009.

The SPS 2009 also requires that ADB-financed sub-projects to comply with host country regulations.As per the Government of India Environmental Impact Assessment (EIA) Notification, 2006 as amended, this subproject does not require EIA study or environmental clearance. Consent to Establish (CTE) for STP has been obtained from Tamil Nadu Pollution Control Board(TNPCB) on 23.09.2020. The Consent to Operate (CTO) the STP would be obtained from TNPCB prior to commissioning of the STP. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment Checklist for Sewerage. The potential negative impacts were identified in relation to pre-construction, construction and operationphases.

Categorization. Based on results of the assessment and ADB SPS 2009, the subproject is classified as environment category B, i.e., subproject's potential to cause adverse environmental impacts is less adverse than that of category A, and are site-specific, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE) is required.

Description of the Environment. Ambur town is a first grade municipality in Vellore district of Tamil Nadu lies at a latitude of 12°78 northand longitude of 78°62 east. It is situated at 52 km from Vellore Town. The Ambur town is surrounded by Somalapuram Panchayat in North, Solur Panchayat in South, Naikkeneri Panchayat in East and Palar river in West. The Town is located along Chennai – Bangalore National Highways road. The town is located 316.00 meter (m) above mean sea level. Ambur has tropical wet and dry climate, reaching high temperatures during summer and experiences wet winters. The area also experiences light rain fall during southwest monsoon. But to its tropical and subtropical climate mangoes, ground nuts, coconut and Jasmine are cultivated in and around town. The mean maximum and minimum temperatures during summer and winter varies between 42°C and 13°C. Highest temperature ever recorded is 43°C and lowest is 11°C. The humidity ranges are 38%–61% during summer and 65%–84% during winter. The maximum rain fall occur during September, October and November through northeast monsoon. The area experiences rain fall during the southwest monsoon as well. The average annual rain fall is 1,000mm. The wind direction is usually predominate towards southwest. During winter it is from north to east, in summer from south to west. Topography of the town is mostly plain with having moderate slope from south to north .

Potential environmental impacts and mitigation measures. The subproject is unlikely to cause significant adverse impacts because: (i) the components will involve straight forward construction and operation, so impacts will be mainly localized; (ii) there are no significant sensitive environmental features in the project sites; and (iii) predicted impacts are site-specific and likely to be associated with the construction process and are produced because the process is invasive, involving excavation and earth movementsand controlled blasting in some stretches along the alignment.
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Sewerage system performs a crucial function of safely collecting, transporting, treating and disposing domestic wastewater, including, human excreta. Subproject is likely to have numerous positive impacts on the environment and public health. In this IEE, negative impacts were identified in relation to pre-construction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning and design process wherever possible; thus, environmental impacts as being due to the project design or location were not significant.

Sewage pumping and lifting stations, which collect sewage to further pump to a higher elevation manhole, pump station or STP, are likely to generate odor. Although utmost care is taken to locate these away from the houses, due to design considerations and land constraints, only sewage pumping station (SPS)siteis located close to the devlopments at about 35m distance, for which necessary provision for odor control measures were given in the subproject. Another impact is that of STP operation: from malfunction or decrease in treatment efficiency and sludge handling and disposalwill result in release of untreated or partially treated wastewater that will pollute environment and cause public health issues. Accumulation of silt in sewers in areas of low over time, overflows, blockages, power outages, harmful working conditions for the workers cleaning sewers etc., may create nuisance, unhealthy and hazardous conditions.

Mitigation measures have been developed to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result significant measures have already been included in the designs for the infrastructure. Various measures suggested for odor control including: appropriately locating sewage wells within site faraway from the houses; developing tree cover; closed facilities; gas collection and treatment facilities;designandoperation measures to prevent odor build up;standard operating procedures for operation and maintenance; imparting necessary training; safety and personal protection equipment for workers;measures to maintain the STP treatment efficiency;and development of green buffer zone around the STP, etc.

Potential impacts during construction are considered significant but temporary, and are common impacts of construction in urban areas, and there are well developed methods to mitigate the same. Except sewer works, all other construction activities (lifting/pumping stations and STP) will be confined to the selected sites, and the interference with the general public and community around is minimal. In these works, the temporary negative impacts arise mainly from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety etc.), mining of construction material, and occupation health and safety aspects. Sewer works will be conducted along public roads in an urban areawith people, activities and traffic. Therefore these works will have significant impacts arising mainly from the disturbance of residents, businesses and traffic due to construction work; safety risk to workers, public and nearby buildings due to deep trench excavations in the road, especially in narrow roads; and some sections involving controlled blasting, especially in narrow roads; access impediment to houses and business; disposal oflarge quantities of construction waste; etc. These are all general impacts of construction in urban areas, and there are well developed methods of mitigation that are suggested in the EMP.

Environmental Management Plan. An EMP has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels. As stated above, various design related measures are already included in the project design. During construction, the EMP includes mitigation measures such as (i) proper planning of sewer works to minimize the public inconvenience;(ii) barricading, dust suppression and control measures; (iii) traffic management measures for works along the roads and for hauling activities; (iv) provision of walkways and planks over trenches to ensure access will not be impeded; and (v) finding beneficial use of excavated materials to extent possible to reduce the disposal quantity. Hard rock removal through controlled blasting for excavation has been identified for some sections of the pipeline alignment sites. Mitigation measures to ensure safety of humans and structures within the area of influence and impacts due to controlled blastingduring the implementation have been included in the EMP. The EMP will guide the environmentally-sound construction of the subproject. The EMP also includes a monitoring program to measure the effectiveness of EMP

implementation and include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

The EMP has already been included in the bid documents to ensure compliance withthe conditions set out in this document.The contractor will be required to submit to PIU, for review and approval, an updated EMP/ site environmental management plan (SEMP) also reflecting the associated mitigation and monitoring measures for the controlled blasting activities proposed nowin the updated IEE report. No works are allowed to commence prior to approval of SEMP. A copy of the updated EMP/approved SEMP will be kept on site during the construction period at all times.

Consultation, disclosure and grievance redress mechanism. The stakeholders were involved in developing the updated IEE through discussions on-site and a public consultation workshop at Municipality level, after which views expressed were incorporated into the IEE. The IEE will be made available at public locations and will be disclosed to a wider audience via the ADB,Ambur town and TNUIFSL websites. The consultation process will be continued during project implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

Monitoring and Reporting. The Contractor has been submitting a monthly SEMP implementation report to PIU. PIU, with the assistance of Ambur town, is monitoring the compliance of contractor, and submitting a quarterly environmental monitoring report to PMU. The PMU has been overseeing the implementation and compliance, and submiting semi-annual monitoring reports to ADB. Monitoring reports will be posted on websites of ADB, Ambur town and TNUIFSL websites.

Conclusions and Recommendations. Therefore, as per ADB SPS, the project continues to be classified as environmental category B and does not require further environmental impact assessment. However, to conform to government guidelines, consent to establishment for STP has been obtained from TNPCB and consent to operate would be obtained prior to commissioning. This IEE has been updated by PIU during the implementation phase to reflect project details and measures for controlled blasting.

I. INTRODUCTION

A. Background

. **Financing Agreement**. The Framework Financing Agreement (FFA) for Tamil Nadu Urban Flagship Investment Program(TNUFIP) was signed by Government of India and Asian Development Bank (ADB) on 20 July 2018. ADB approved the multitranche financing facility (MFF) on 25 September 2018 for $500 million and availability period is up to 30 June 2026 (8 years). Three tranches were envisioned under the MFF. The first periodic financing request (PFR) comprising Tranche 1 for a loan of $169 million was approved on 28 September 2018 and is expected to close on 31 December 2023. Tranche 2 is planned for an estimated ADB loan amount of $206 million with a 6-year implementation period from 15 December 2019 to 14 December 2025, and Tranche 3 for an estimated ADB loan amount of $78 million for a 4-year implementation period tentatively from 2022 to 2026. Under this MFF project, an environmental assessment and review framework (EARF) was prepared to guide selection of subprojects, screening and categorization, and preparation of environmental safeguard documents. Any component that is likely to have significant adverse environmental impacts (Category A) will not be considered for implementation.

. **Impact and outcome.** Tranche 2 is aligned with the following impacts of TNUFIP: (i) universal access to basic water and sanitation services achieved; (ii) “world-class” cities and industrial corridors across the state developed; and (iii) water security, reduced vulnerability to climate change in urban areas, achieved.The investment program will have the following outcome: livability and climate resilience in at least five cities in priority industrial corridors enhanced.

3. **Outputs.** Tranche 2 will support the development of water supply and sewerage facilities in five cities (Ambur, Madurai, Tiruchirappalli, Tiruppur and Vellore). There are six subprojects (four sewerage, two water supply) proposed. It will support improvement of urban governance in all project urban local bodies (ULBs) under the MFF. A summary description of the outputs is described below.

4. **Output 1: Climate-resilient sewage collection and treatment, and drainage systems developed in four cities.**[1] Works in Tiruchirappalli, Ambur, Tiruppur, and Vellore include:

(i) construction of two new sewage treatment plants (STPs) with a combined treatment capacity of 72 million liters per day (MLD);
(ii) rehabilitation of one STP (15 MLD capacity);
(iii) reuse of 3,000 cubic meters treated wastewater per day;
(iv) construction of 1,256 kilometers (km) of new sewage collection pipelines, with 100% households connected (152,580 households);
(v) construction 28 pump and 44 lift stations; and
(vi) formation of eight (two in each city) all-female community water and sanitation committees.

5. The breakdown by city is: (i) construction of new sewage collection system in Tiruchirappalli,[2] (ii) construction of new sewage collection system and 16.71 MLD STP in

[1] There is no drainage subproject planned in Tranche 2. Drainage subprojects are planned in Tranche 3.
[2] In Tiruchirappalli and Vellore, the sewage collected under Tranche 2 will be treated by the respective STPs

Ambur, (iii) construction of new sewage collection system with new 56 MLD STP and rehabilitation of one 15 MLD STP in Tiruppur, and (iv) construction of new sewage collection system in Vellore.

6. **Output 2: Water supply systems in two cities improved with smart features.** Works in Tiruppur and Madurai include:

(i) construction of 1,260 km of new distribution pipelines with 100% households connected (188,900 households) in 66 newly established district metered areas (DMAs) with new Supervisory Control and Data Acquisition (SCADA) systems to manage and reduce nonrevenue water (NRW);
(ii) construction of 66 new storage reservoirs with combined capacity of 92 million liters;
(iii) construction of 3 pump stations;
(iv) construction of 196 km new transmission mains and 230 km of feeder mains;
(v) construction of three new intakes and three new water treatment plants of combined capacity of 321 MLD; and
(vi) 80% of technical staff from each implementing agency of two cities trained in NRW reduction including 100% women staff.

7. The breakdown by city is: (i) construction of 1,060 km of distribution pipelines in 29 DMAs, 29 storage reservoirs, two pump stations, 46 km of transmission mains and 121 km of feeder mains, and a new intake with 196 MLD WTP in Tiruppur;and (ii) construction of 200 km of distribution pipelines in 37 DMAs, 37 storage reservoirs, one pump station, 150 km transmission mains and 109 km feeder mains, and a new intake structure with 125 MLD WTP in Madurai.

8. **Output 3: Institutional capacity, public awareness, and urban governance strengthened.** Governance improvement and awareness consultants recruited under Tranche1 will support output 3. This includes a performance-based urban governance improvement program implemented for 10 project cities to:

(i) achieve targeted household connections for water and sewerage projects,
(ii) timely completion of projects under the MFF as per the original implementation schedule,
(iii) actions in fecal sludge management in areas not covered by centralized sewerage system,
(iv) initiatives on reuse of treated wastewater (in all 10 program cities and in cities outside the program with functioning wastewater treatment systems), and
(v) implementation of gender action plan.

B. Purpose of this IEE Report

9. ADB requires the consideration of environmental issues in all aspects of the bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment Checklist (REA) for Water Supply (Appendix1). Then potential negative impacts were identified in relation to pre-construction, construction and operation of the improved infrastructure, and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Thus, this

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developed under Tranche 1. The design capacities in Tranche 1 have been designed to facilitate this.

initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects.

10. This IEE is based on the detailed project report prepared by Tamil Nadu Water and Drainage (TWAD) Board for Ambur town, The update is to reflect the (i) inclusion of controlled blasting as one of the construction methodologies identified for hard rock removal in some sections of the alignment and sites; and (ii) finalization of location,treatment process for 16.71 MLD STP under design and build arrangement.. The IEE update was based mainly on field reconnaissance surveys and secondary sources of information. No field monitoring (environmental) survey was conducted during IEE preparation; however, the environmental monitoring program carried out by the contractor have been included. The results will be reported as part of the environmental monitoring report and will be the basis to ensure no degradation will happen during subproject implementation. Stakeholder consultation was an integral part of the IEE update.

C. Report Structure

11. This Report contains the following 10 sections including the executive summary at the beginning of the report:

(i) Executive summary
(ii) Introduction
(iii) Description of the project
(iv) Policy, legal and administrative framework
(v) Description of the environment
(vi) Anticipated environmental impacts and mitigation measures
(vii) Public consultation and information disclosure
(viii) Grievance redress mechanism
(ix) Environmental management plan
(x) Conclusion and recommendation

II. DESCRIPTION OF THE PROJECT

A. Project Area

12. The area of the town, as per local body records, is 17.97 square kilometers (km^2). The total length of the street is about 120 km. The total area of the town is divided into 36 wards in Vellore District in the northern part of Tamil Nadu State.The current population (2021) of project area as per local Municipality census is 125,600. (The design base population for 2020 is considered as 129,100).

B. Existing Sewerage System

13. Ambur, a fast growing town, is not having underground sewerage system. The town is provided with open drains in the main area of the town. The open drains are constructed on the sides of the roads/streets. The wastewater generated from the town is collected through the main drain along the roads/streets.

14. The wastewater discharged into these drains includes the sullage water from kitchen and bathroom of the houses. Wastewater from all the open drains is discharged into the nearby lake and ponds. Most of the latrines in this town are flush type. Considerable number of latrines

is flushed out directly to street drains without any treatment. As the sewage is let into unprotected open ponds, the quality of ground water gets contaminated very easily.

1. Necessity for implementing sewerage system

15. The existing open drain system is not functioning satisfactorily. The water is stagnating in many places leading to breeding of mosquitoes and flies causing many diseases and creatingunhygienic conditions. Therefore, underground sewerage system (UGSS) is a must for Ambur town.

2. Proposed UGSS system

16. As per the government directions, UGSS is to be provided to each town in a phased manner in next 3 years. The Package-I (Collection System) in UGSS to Ambur Municipality is proposed to complete during October 2021, due Covid-19 lockdown the target date will be revised . For Package-II (STP) the private land was purchased on 26.02.2021 and handed over to the Contractor on the same day.The target date for completion of Package-II (STP) is fixed on 25.02.2023. In the proposal, the anticipated population for the year 2035 and 2050 has been worked out as 155,000 and 183,100,respectively.The water supply rate of 135 liters per capita per day (LPCD) has been considered in the design for working out the total sewage generation including infiltration per the Central Public Health and Environmental Engineering Organisation (CPHEEO) norms.

17. Ambur town is the responsible agency for providing basic urban services including sewerage in the Municipality, and is the implementation agency for this subproject. Detailed project report for the underground sewage scheme in Ambur town has been prepared by TWAD Board.

C. Proposed Project

18. Following table shows the nature and size of the various components of the subproject. Location of components and conceptual layout plans are shown in Figures 1to 4. It is designed as a separate underground system catering only to domestic wastewater; storm runoff generated during rains will be carried by existing open drains and disposed into natural streams/ water bodies. Industrial wastewater will not be disposed into sewers. System is designed for 115 LPCD, based on sewage generation rate of 80% of water supply. System is designed with gravity flow as far as possible, however topography does not permit a complete gravity system from collection to inlet at the STP, and therefore wherever required sewage lifting and pumping stations have been introduced to optimize the system design.

Table 1:Proposed Under Ground Sewerage Scheme Subproject Components

<table>
<tr><th>Infrastructure</th><th>Function</th><th>Description</th><th>Location</th></tr>
<tr><td>Sewer network</td><td>Collect wastewater from houses and convey by a combination of gravity and pressure pumping to the STP</td><td>New
106.878 km;
200-350 mm dia: DWCpipes (9.526 km)
250-700 mm dia: CIpipes
(10.471 km)
200mm-Upvc pipes: (86.881 km)
<table><tr><th>Type of Pipe</th><th>Length</th></tr></table></td><td>Sewers will be laid underground in the roads and internal streets.</td></tr>
</table>

<table>
<tr><th>Infrastructure</th><th>Function</th><th>Description</th><th>Location</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>uPVC</td><td></td><td></td></tr>
<tr><td>200 mm</td><td>86881</td><td>m</td></tr>
<tr><td>DWC</td><td></td><td></td></tr>
<tr><td>200 mm</td><td>7498</td><td>m</td></tr>
<tr><td>250 mm</td><td>1254</td><td>m</td></tr>
<tr><td>300 mm</td><td>774</td><td>m</td></tr>
<tr><td>CI LA CLASS S/S PIPE</td><td></td><td></td></tr>
<tr><td>250 mm</td><td>1446</td><td>m</td></tr>
<tr><td>300 mm</td><td>1084</td><td>m</td></tr>
<tr><td>350 mm</td><td>644</td><td>m</td></tr>
<tr><td>400 mm</td><td>779</td><td>m</td></tr>
<tr><td>450 mm</td><td>460</td><td>m</td></tr>
<tr><td>500 mm</td><td>1874</td><td>m</td></tr>
<tr><td>600mm</td><td>2622</td><td>m</td></tr>
<tr><td>700 mm</td><td>1562</td><td>m</td></tr>
</table>
Manholes
3411 nos. (brickwork)
613 nos. (reinforced cement concrete)
</td><td></td></tr>
<tr><td>LS</td><td>Collect sewage from low level sewer and pump to higher sewer or to pumping stations</td><td>2 nos.
Components of LS-1A
Collection well of dia2.0 m and depth 4 m (closed) with a vent pipe
Non-clog submersible pump sets with Control panel box
Components of LS-2A
Collection well of dia3.2 m and depth 6.38m (closed) with a vent pipe
Non-clog submersible pump sets with Control panel box</td><td>Lift well will be constructed on the available land near road shoulder where the sewerline terminates at the lift well. Pumps will be installed in the well, and a control panel box will be installed near the well.
Lift stations are proposed in
(i) Kannadasan Nagar in Zone 1A and (ii) Samiyarmadam in Zone 2.</td></tr>
<tr><td>SPS</td><td>Collect sewage and pump to main pumping stations</td><td>1 no.
Components of SPS
Screen well
Dia (6.40m) and depth (5.40 m)
Grit well
Dia (4.30 m) and depth (6.70 m)
Collection well
Dia (6.00m) and depth (9.12 m)
Non-clog submersible pump sets</td><td>Sewage sub pump station is proposed at Rafeeque Nagar.</td></tr>
</table>

Infrastructure	Function	Description	Location
MPS	Collect sewage from lift stations and pumping stations and pump to sewage treatment plant	1 no. Components of MPS • Screen well Dia (8.50 m) and depth (4.051 m) • Grit well Dia (6.00 m) and depth (5.351 m) • Collection well Dia (8.00 m) and depth (7.871 m) • Non-clog submersible pump sets	Main sewage pump station is proposed at Kaspa-A
STP	Treatment of collected wastewater to comply with disposal standards	STP– 16.71 MLD Treatment Technology – MBBR (Moving Bed Biofilm Reactor) Components of STP: - Receiving Chamber - Mechanical/Manual Screen Chamber - Grit Chamber - Flow Measurement Channel - Distribution Chamber - Anoxic tank - Aeration Tank with Difusers - Secondary Clarifier -Sludge Management System including Centrifuge Mechanism - Tertiary Treatment-Disinfection Arrangement with Chlorination. - Polishing Pond. The treated effluent will be let out into Palar River. Ambur Tannery Association has requested 3 MLD of treated waste water to Ambur Tanneries and the proposal is under examination by GoTN. Upon finalization of the same, 3MLD will be supplied to the CETPand balance 13.71 will be letout into Palar river.	Site is located at Kaspa-A and adjacent to MPS site at Palar River bank at a distance of 10m.
Outfall sewer	Disposal of treated water from STP intoPalar river after Disinfection arrangement as Tertiary treatment.	200m length open earthen channel from Polishing pond	Within the site located at Kaspa-A to Palar River.
House service connections	Collect sewage from individual houses and convey into network	• 16,600nos. (domestic) • 1,757 nos. (non-domestic – commercial, institutional, etc.), no connections to industrial establishments	At each household, connected to wastewater outlet drain

CI = cast iron, DBOT = design, build, operate and transfer,mmdia = diameter in millimeters,DWC = double walled corrugated, km = kilometer, LS = lift stations, m = meter, MLD = million liters per day,MPS = Main Sewage pumping station, SPS = sewage pumping station, STP = sewage treatment plant.

D. Implementation Schedule

19. The Underground sewerage scheme to Ambur Municipality is implemented in two packages. Details are as below.

Package 1– 106.878 km collection system, 5.05 km pumping main, 2nos of Lift stations, 1no.of Sub-Pumping station and one Main Pumping station.

Contract for Package 1 with construction period of 36 months was awarded to M/s.M/S. Anchor Ceramic Company Private Limited, Chennai on 04th October 2018. Works are in progress (84% works completed) due to Covid-19 lockdown the completion period llikely to be extended.

Package 2 – STP of 16.71 MLD capacity and 200m outfall sewer for disposal into Palar River.

Package 2 with construction period of 24 months was awarded to M/s.KCP Engineers Pvt, Ltd., Coimbatore-641045 Joint Venture with M/s.Enviro Technologies Inc Ltd, Chennai on 06 November 2019. So far structural design works are under progress , and are likely to be completed by February 2023.

The National Green Tribunal, New Delhi in its order O.A.No.1069 of 2018 dt.30.04.2019 recommended the revised discharge standards for STP.Based on this NGT order the Functional design is revised by Contractor. The revised Functional design has been approved by TWAD Board on 04.09.2021.

Figure 1:Location of Lifting and Pumping Stations

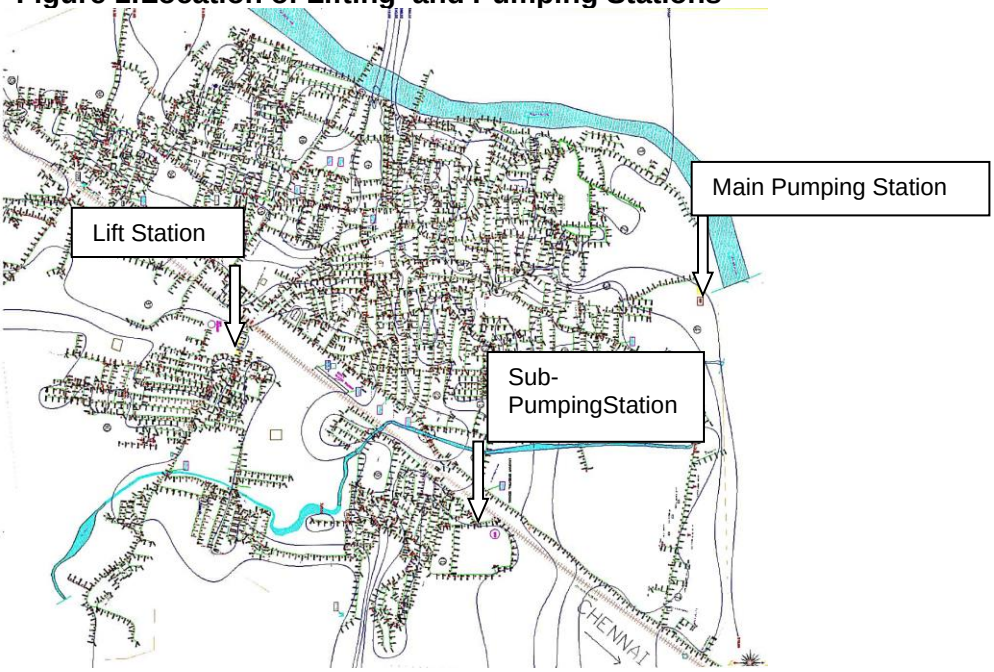
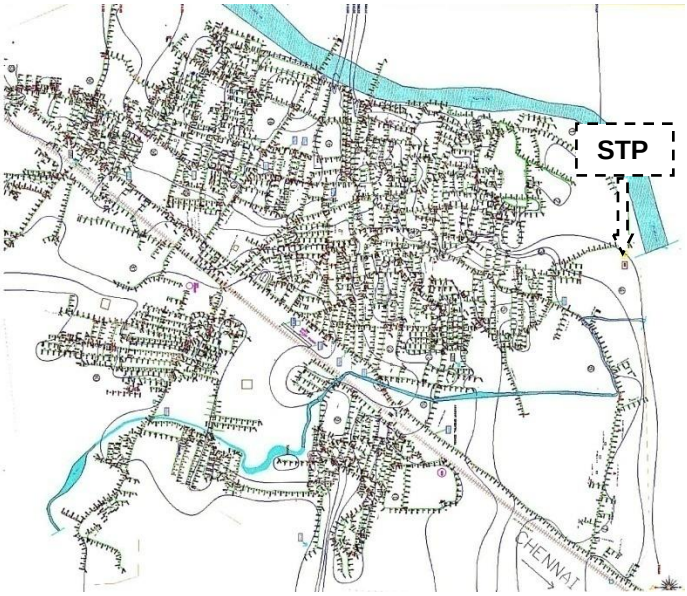


Figure 2: Sewage Treatment Plant site



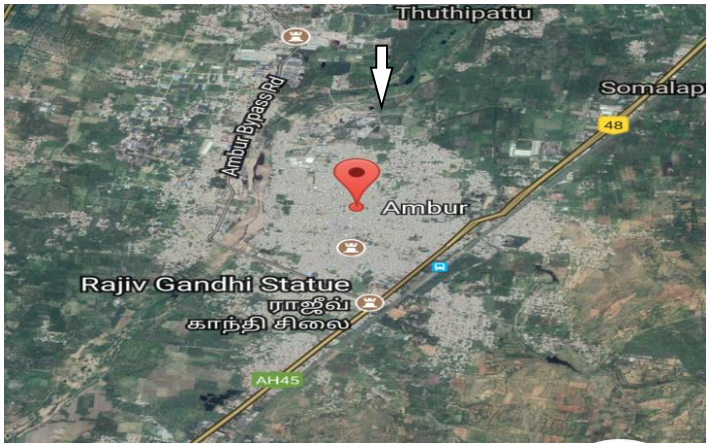
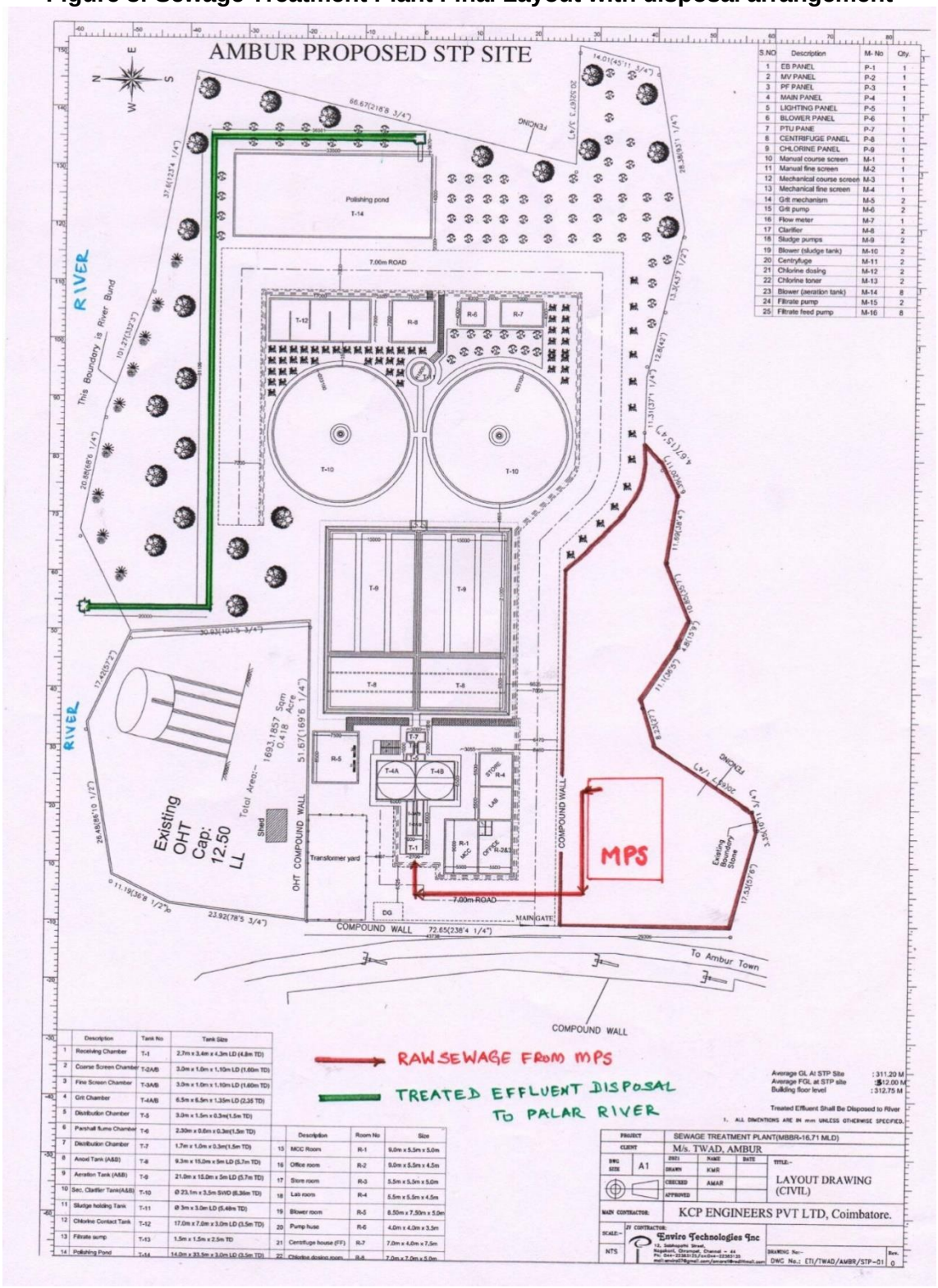


Figure 3: Sewage Treatment Plant Final Layout with disposal arrangement

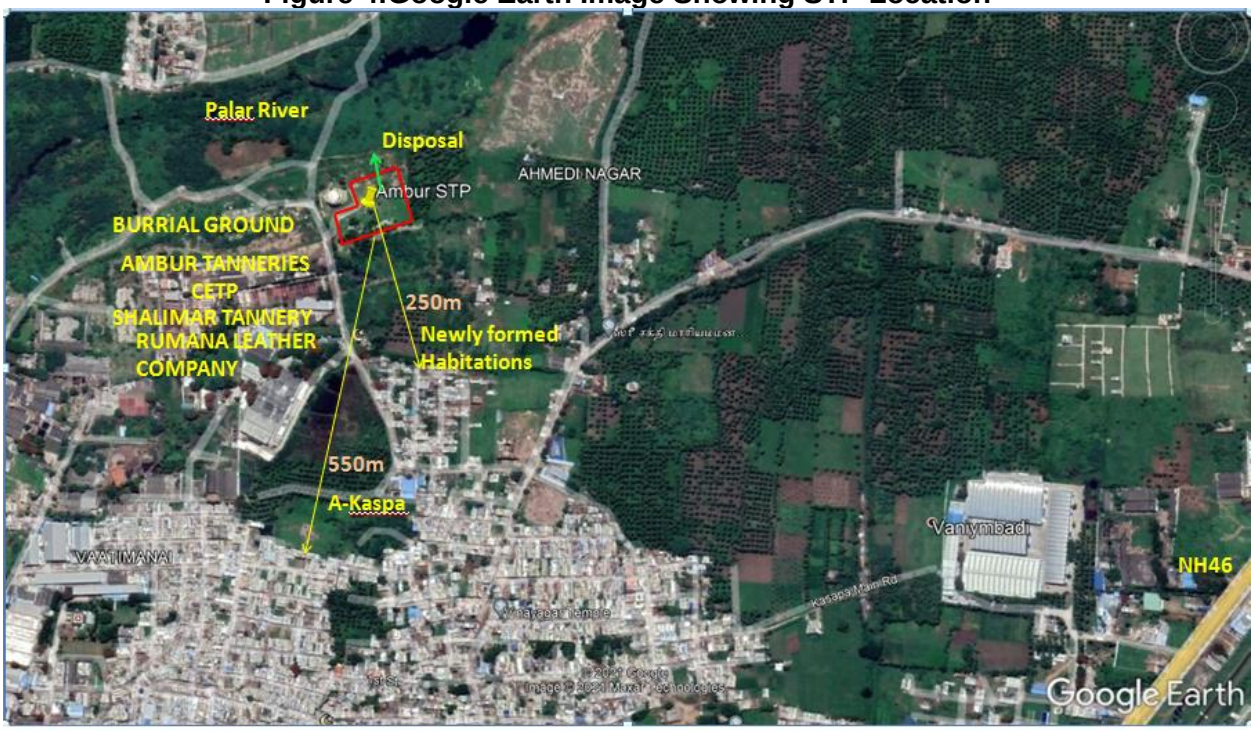


S.NO	Description	M- No	Qty.
1	EB PANEL	P-1	1
2	MV PANEL	P-2	1
3	PF PANEL	P-3	1
4	MAIN PANEL	P-4	1
5	LIGHTING PANEL	P-5	1
6	BLOWER PANEL	P-6	1
7	PTU PANE	P-7	1
8	CENTRIFUGE PANEL	P-8	1
9	CHLORINE PANEL	P-9	1
10	Manual course screen	M-1	1
11	Manual fine screen	M-2	1
12	Mechanical course screen	M-3	1
13	Mechanical fine screen	M-4	1
14	Grit mechanism	M-5	2
15	Grit pump	M-6	2
16	Flow meter	M-7	1
17	Clarifier	M-8	2
18	Sludge pumps	M-9	2
19	Blower (sludge tank)	M-10	2
20	Centryfuge	M-11	2
21	Chlorine dosing	M-12	2
22	Chlorine toner	M-13	2
23	Blower (aeration tank)	M-14	8
24	Filtrate pump	M-15	2
25	Filtrate feed pump	M-16	8

	Description	Tank No	Tank Size
1	Receiving Chamber	T-1	2.7m x 3.4m x 4.3m LD (4.8m TD)
2	Coarse Screen Chamber	T-2A/B	3.0m x 1.0m x 1.10m LD (1.60m TD)
3	Fine Screen Chamber	T-3A/B	3.0m x 1.0m x 1.10m LD (1.60m TD)
4	Grit Chamber	T-4A/B	6.5m x 6.5m x 1.35m LD (2.35 TD)
5	Distribution Chamber	T-5	3.0m x 1.5m x 0.3m(1.5m TD)
6	Parshall flume Chamber	T-6	2.30m x 0.6m x 0.3m(1.5m TD)
7	Distribution Chamber	T-7	1.7m x 1.0m x 0.3m(1.5m TD)
8	Anoxl Tank (A&O)	T-8	9.3m x 15.0m x 5m LD (5.7m TD)
9	Aeration Tank (A&B)	T-9	21.0m x 15.0m x 5m LD (5.7m TD)
10	Sec. Clarifier Tank(A&B)	T-10	Ø 23.1m x 3.5m SWD (6.36m TD)
11	Sludge holding Tank	T-11	Ø 3m x 3.0m LD (5.48m TD)
12	Chlorine Contact Tank	T-12	17.0m x 7.0m x 3.0m LD (3.5m TD)
13	Filtrate sump	T-13	1.5m x 1.5m x 2.5m TD
14	Polishing Pond	T-14	14.0m x 33.5m x 3.0m LD (3.5m TD)

	Description	Room No	Size
15	MCC Room	R-1	9.0m x 5.5m x 5.0m
16	Office room	R-2	9.0m x 5.5m x 4.5m
17	Store room	R-3	5.5m x 5.5m x 5.0m
18	Lab room	R-4	5.5m x 5.5m x 4.5m
19	Blower room	R-5	8.50m x 7.50m x 5.0m
20	Pump huse	R-6	4.0m x 4.0m x 3.5m
21	Centrifuge house (FF)	R-7	7.0m x 4.0m x 7.5m
22	Chlorine dosing room	R-8	7.0m x 7.0m x 5.0m

Figure 4:Google Earth Image Showing STP Location



III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

20. 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.

21. **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.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
(ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
(iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
(iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

22. **Environmental management plan.** 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 commensurate with the project's impact and risks.

23. **Public disclosure.** 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; and
(iii) environmental monitoring reports submitted by the implementing agency during project implementation upon receipt.

B. National Environmental Laws

24. **Environmental assessment.**The Government of India EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance 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.

25. Category A projects require Environmental Clearance from the central Ministry of Environment,Forestsand Climate Change (MOEFCC). The proponent is required to provide

preliminary details of the project in the prescribed manner with all requisite details, after which an Expert Appraisal Committee (EAC) of the MOEFCC prepares comprehensive terms of reference (TOR) for the EIA study. On completion of the study and review of the report by the EAC, MOEFCC considers the recommendation of the EAC and provides the Environmental Clearance if appropriate.

26. 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 Clearancebased 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.

27. None of the components of this under ground sewerage system subproject falls under the ambit of the EIA Notification 2006, and, therefore EIA Study or Environmental Clearanceis not required for the subproject.

28. **Applicable environmental regulations.** Besides EIA Notification 2006, there are various other acts, rules, policies and regulations currently in force in India that deal with environmental, health and occupational safety issues that could apply to infrastructure development.Some of the specific regulatory compliance requirements of the subproject are shown in Table 2.

Table 2:Applicable Environmental Regulations

Law	Description	Requirement
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Act was enacted to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water. Control of water pollution is achieved through administering conditions imposed in consent issued under to this Act. All pollution potential activities will require Consent to Establish (CTE) from Tamil Nadu Pollution Control Board (TNPCB) before starting implementation and Consent to Operate (CTO) before commissioning.	CTE for Construction of proposed STP has been obtained fromTNPCB. and requires CTO from TNPCBbefore commissioning of STP.
Environment (Protection) Act, 1986 and CPCB Environmental Standards.	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards.	To comply with applicable notified standards.
Noise Pollution (Regulation and Control) Rules, 2,000 amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	To comply with the noise standards.

Law	Description	Requirement
Air (Prevention and Control of Pollution) Act, 1981, amended 1987 and its Rules, 1982.	• Applicable for equipment and machinery's potential to emit air pollution (including but not limited to diesel generators and vehicles); • CTE and CTO from TNPCB; • Compliance to conditions and emissions standards stipulated in the CTE and CTO.	Generators will require CTE and CTO from TNPCB Generators to comply with applicable emission standards.
Solid Wastes Management Rules, 2016	Rules to manage municipal solid waste generated; provides rules for segregation, storage, collection, processing and disposal.	Solid waste generated at proposed facilities shall be managed and disposed in accordance with the SWM Rules
Coastal Regulation Zone Notification , 2019	The main objectives of this notification are to ensure livelihood security to the fishing communities and other local communities living in the coastal areas; to conserve and protect coastal stretches and; to promote development in a sustainable manner based on scientific principles, taking into account the dangers of natural hazards in the coastal areas and sea level rise due to global warming. The CRZ Notification, clearly lists out the areas that fall within the categories of I, II, III and IV of CRZ and the permissible and non-permissible activities in each zone.	Projects attracting this notification shall obtain CRZ clearance for implementation from the authority as required. This project is not falling under CRZ Notification.
Construction and Demolition Waste Management Rules, 2016	Rules to manage construction and to 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.	Construction and demolition waste generated from the project construction shall be managed and disposed as per the rules
Labor Laws	The contractor shall not make employment decisions based upon personal characteristics unrelated to job requirements. The contractor shall base the employment relationship upon equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment or retirement, and discipline. The contractor shall provide equal wages and benefits to men and women for work of equal value or type.	Appendix-2 provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.

STP = sewage treatment plant.

Table 3:
Standards prescribed for Discharge of treated sewage into water bodies of Mega & Metropolitan Cities by the NGT order dated.30.04.2019 in O.A.No.1069/2018 (As per the instructions by the Chairman, TNPCB & Managing Director, TWAD to follow the standards for all Cities and Towns)

S.No	Industry	Parameter	Standards applicable to all mode of disposal (Mega and Metropolitan Cities)
1	Sewage Treatment Plants (STPs)	pH	5.5 - 9.0
		Bio-Chemical Oxygen Demand (BOD), mg/l	10
		Total Suspended Solids (TSS), mg/l	20
		Chemical Oxygen demand (COD), mg/l	50
		Nitrogen Total, mg/l	10
		Phosphorus Total (For Discharge into Ponds, Lakes), mg/l	1.0
		Fecal Coliform (FC) (Most Probable Number per 100 milliliter, MPN/100ml	Desirable 100, Permissible 230

29. **Clearances / permissions to be obtained by Contractor.**Following Table shows the list of clearances/permissions required for project construction. This list indicative and the contractor should ascertain the requirements prior to start of the construction, and obtain all necessary clearances/permission prior to start of construction.

Table 4:Clearances and permissions required for Construction

S. No	Construction Activity	Statutory authority	Statute under which Clearance is Required	Implementation	Supervision
1	Construction of new STP	TNPCB	Consent to establish and consent to operate under Water Act, 1974	Contractor & PIU	PIU
2	Tree Cutting	Department of Forest and District Collector	Clearances from theauthorities as per the TamilNadu Timber TransitRules,1968 or latest.	PIU	PIU
3	Hot mix plants, Crushers and Batching plants	TNPCB	Consent to establish andconsent to operate under Air Act, 1981	Contractor	PIU

S. No	Construction Activity	Statutory authority	Statute under which Clearance is Required	Implementation	Supervision
4	Discharges from construction activities	TNPCB	Consent to establish and consent to operate under Water Act, 1974	Contractor	PIU
5	Storage, handling and transport of hazardous materials	TNPCB	Hazardous Wastes(Management and Handling)Rules. 1989Manufacturing, Storage and Import of HazardousChemicals Rules, 1989	Contractor	PIU
6	Sand mining, quarries and borrow areas	1. Department of Geology and mining, GOTN 2. MOEFCC	1.Tamil Nadu Minor MineralConcession Rules, 1959(corrected up to 31March2001) 2. Environmental clearance under EIA Notification 2006	1.Contractor	PIU
7	Groundwater extraction	Public Works Department	(Groundwater) Tamil Nadu Groundwater Development and Management Act 2000	Contractor	PIU
8	Disposal of bituminous wastes	Tamilnadu State Pollution Control Board	Hazardous Wastes (Management and Handling) Rules. 1989	Contractor	PIU
9	Temporary traffic diversion measures	TamilNadu Police Department & Transport Department	MoRTH 112 SP 55of IRC codes	Contractor	PIU
10	Disposal of treated effluent	TamilNadu Public Works Department	NOC from the Authority	Contractor & PIU	PIU
11	NOC for Controlled Blasting for excavation	District Collector, Thirupattur	Explosives Rules, 2008	Contractor	PIU

MoRTH = Ministry of Road Transport and Highways,PIU = program implementation unit, PMU =program management unit,STP = sewage treatment plant, TNPCB = Tamil Nadu PollutionControl Board.

30. **ADB SPS Requirements.** During the design, construction, and operation of the project the PMU and PIUs will 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, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are

appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

Table 5: Applicable Ambient Air Quality Standards for India Projects

Parameter	Location[a]	National Ambient Air Quality Standards[b]	WHO Air Quality Guidelines ($\mu g/m^3$)		Applicable Per ADB SPS[c] ($\mu g/m^3$)
			Global Update[d] 2005	Second Edition[e] 2000	
Particulate Matter PM_{10} ($\mu g/m^3$)	Industrial Residential, Rural and Other Areas	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-	20 (Annual) 50 (24-hr)
	Sensitive Area	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-	20 (Annual) 50 (24-hr)
Particulate Matter PM_{25} ($\mu g/m^3$)	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)	-	10 (Annual) 25 (24-hr)
	Sensitive Area	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)		10 (Annual) 25 (24-hr)
Sulfur Dioxide SO_2 ($\mu g/m^3$)	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	20 (Annual) 800 (24-hr) 500 (10-min)
	Sensitive Area	20 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	20 (Annual) 20 (24-hr) 500 (10-min)
Nitrogen Dioxide NO_2 ($\mu g/m^3$)	Industrial Residential, Rural and Other Areas	40 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	40 (Annual) 80 (24-hr) 200 (1-hr)
	Sensitive Area	30 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	30 (Annual) 80 (24-hr) 200 (1-hr)
Carbon Monoxide CO ($\mu g/m^3$)	Industrial Residential, Rural and Other Areas	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)	2,000 (8-hr) 4,000 (1-hr) 100,000 (15-min)
	Sensitive Area	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)	2,000 (8-hr) 4,000 (1-hr) 100,000 (15-min)
Ozone (O_3) ($\mu g/m^3$)	Industrial Residential, Rural and Other Areas	100 (8-hr) 180 (1-hr)	100 (8-hr)	-	100 (8-hr) 180 (1-hr)
	Sensitive Area	100 (8-hr) 180 (1-hr)	100 (8-hr)	-	100 (8-hr) 180 (1-hr)
Lead (Pb) ($\mu g/m^3$)	Industrial, Residential, Rural and Other Areas	0.5 (Annual) 1.0 (24-hr)	-	0.5 (Annual)	0.5 (Annual) 1.0 (24-hr)
	Sensitive Area	0.5 (Annual) 1.0 (24-hr)	-	0.5 (Annual)	0.5 (Annual) 1.0 (24-hr)
Ammonia (NH_3) ($\mu g/m^3$)	Industrial Residential, Rural and Other Areas	100 (Annual) 400 (24-hr)	-		100 (Annual) 400 (24-hr)
	Sensitive Area	100 (Annual) 400 (24-hr)	-	-	100 (Annual) 400 (24-hr)
Benzene (C_6H_6)	Industrial Residential, Rural	5 (Annual)	-	-	5 (Annual)

Parameter	Location[a]	National Ambient Air Quality Standards[b]	WHO Air Quality Guidelines (µg/m³)		Applicable Per ADB SPS[c](µg/m³)
			Global Update[d]2005	Second Edition[e] 2000	
(µg/m³)	and Other Areas				
	Sensitive Area	5 (Annual)	-	-	5 (Annual)
Benzo(o) pyrene (BaP) (ng/m³)	Industrial Residential, Rural and Other Areas	1 (Annual)	-	-	1 (Annual)
	Sensitive Area	1 (Annual)	-	-	1 (Annual)
Arsenic (As) (ng/m³)	Industrial Residential, Rural and Other Areas	6 (Annual)	-	-	6 (Annual)
	Sensitive Area	6 (Annual)	-	-	6 (Annual)
Nickel (Ni) (ng/m³)	Industrial Residential, Rural and Other Areas	20 (Annual)	-	-	20 (Annual)
	Sensitive Area	20 (Annual)	-	-	20 (Annual)

[a]Sensitive area refers to such areas notified by the India Central Government.
[b]http://cpcb.nic.in/uploads/National_Ambient_Air_Quality_Standards.pdf
[c]As per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.
[d]WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. *Global update 2005*. WHO. 2006.
[e]Air Quality Guidelines for Europe Second Edition. WHO 2000.

Table 6: Applicable Ambient Noise Level Standards for India Projects

Receptor/ Source	Noise Level Standards[a] (dBA)		World Health Organization Guidelines Value For Noise Levels Measured Out of Doors[b] (One Hour LA_{eq}indBA)		Applicable Per Asian Development BankSafeguard Policy Statement[c] (dBA)	
	Day	Night	07:00 – 22:00	22:00 – 07:00	Day time	Night time
Industrial area	75	70	70	70	70	70
Commercial area	65	55			65	55
Residential Area	55	45	55	45	55	45
Silent Zone	50	40			50	40

[a]Noise Pollution (Regulation and Control) Rules, 2002 as amended up to 2010.(http://cpcb.nic.in/displaypdf.php?id=Tm9pc2UtU3RhbmRhcmRzL25vaXNlX3J1bGVzXzIwMDAucGRm)
[b]Guidelines for Community Noise. WHO. 1999.
[c]As per ADB SPS, the Executing Agency shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

Table 7: Applicable Drinking Water Quality Standards for India Projects[a]

Group	National Standards for Drinking Water[b]			WHO Guidelines for Drinking-Water Quality, 4th Edition, 2011[c]	Applicable Per ADB SPS[d, de]
	Parameter	Unit	Max. Concentration Limit		
Physical	Turbidity	NTU	1 (5)	-	1 (5)
	pH		6.5 – 8.5	none	6.5 – 8.5
	Color	Hazen units	5 (15)	none	5 (15)
	Taste and Odor		Agreeable	-	Agreeable
	TDS	mg/l	500 (2,000)	-	500 (2,000)
	Iron	mg/l	0.3	-	0.3
	Manganese	mg/l	0.1 (0.3)	-	0.1 (0.3)
	Arsenic	mg/l	0.01 (0.05)	0.01	0.01
	Cadmium	mg/l	0.003	0.003	0.003
	Chromium	mg/l	0.05	0.05	0.05
	Cyanide	mg/l	0.05	none	0.05
	Fluoride	mg/l	1 (1.5)	1.5	1 (1.5)
	Lead	mg/l	0.01	0.01	0.01
	Ammonia	mg/l	0.5	none established	0.5
Chemical	Chloride	mg/l	250 (1,000)	none established	250 (1,000)
	Barium	mg/l	0.7	none	0.7
	Sulphate	mg/l	200 (400)	none	200 (400)
	Nitrate	mg/l	45	50	45
	Copper	mg/l	0.05 (1.5)	2	0.05 (1.5)
	Total Hardness	mg/l	200 (600)	-	200 (600)
	Calcium	mg/l	75 (200)	-	75 (200)
	Zinc	mg/l	5 (15)	none established	5 (15)
	Mercury	mg/l	0.001	0.006	0.001
	Aluminum	mg/l	0.1 (0.3)	none established	0.1 (0.3)
	Anionic detergents	mg/l	0.2 (1.0)	none	0.2 (1.0)
	Phenolic compounds	mg/l	0.001(0.002)	none	0.001(0.002)
	Residual Chlorine	mg/l	0.2	5	0.2
Microbial indicator	E-coli	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
	Total Coliform	MPN/100ml			

[a] http://cgwb.gov.in/Documents/WQ-standards.pdf

[b] Bureau of India Standard 10500: 2012 (Indian Standard, Drinking Water — Specification (Second Revision).

[c] Health-based guideline values.

[d] As per ADB SPS, the government shall achieve whichever of the drinking quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

[e] Figures in parenthesis are maximum limits allowed in the absence of alternate source.

Table 8: General Standards for Discharge of Environmental Pollutants[a]
Part- A: Effluents (SCHEDULE – V)

Sl. no	Parameter	Inland surface water	Public sewers	Land for irrigation	Marine/coastal areas
1	Suspended solids mg/l, max.	100	600	200	(a) For process wastewater (b) For cooling water effluent 10 per cent above total suspended matter of influent
2	Particle size of suspended solids	shall pass 850 micron IS Sieve	-	-	(a) Floatable solids, solids max. 3 mm (b) Settleable so lids, max 856 microns
3	pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Temperature	shall not exceed 5ºC above the receiving water temperature	-	-	shall not exceed 5ºC above the receiving water temperature
5	Oil and grease, mg/l max	10	20	10	20
6	Total residual chlorine, mg/l max	1	-	-	1
7	Ammonical nitrogen (N), mg/l, max	50	50	-	50
8	Total kjeldahl nitrogen (N) mg/l, max	100	-	-	100
9	Free ammonia (NH_3), mg/l,max.	5	-	-	5
10	Biochemical Oxygen Demand (3 days at 27ºC), mg/l, max	30	350	100	100
11	Chemical Oxygen Demand, mg/l, max	250	-	-	250
12	Arsenic(As) mg/l, max.	0.2	0.2	0.2	0.2
13	Mercury (Hg), mg/l, max.	0.01	0.01	-	0.01
14	Lead (Pb) mg/l, max	0.1	1	-	2
15	Cadmium (Cd) mg/l, max	2	1	-	2
16	Hexavalent chromium (Cr+ 6),mg/l, max.	0.1	2	-	1
17	Total Chromium (Cr) mg/l, max.	2	2	-	2
18	Copper (Cu)mg/l, max.	3	3	-	3

Sl. no	Parameter	Inland surface water	Public sewers	Land for irrigation	Marine/coastal areas
19	Zinc (Zn) mg/l, max	5	15	-	15
20	Selenium (Se) mg/l, max	0.05	0.05	-	0.05
21	Nickel (Ni) mg/l, max.	3	3	-	5
22	Cyanide (CN) mg/l, max	0.2	2	0.2	0.2
23	Fluoride (F) mg/l, max.	2	15	-	15
24	Dissolved phosphates (P), mg/l, max	5	-	-	-
25	Sulphide (S) mg/l, max.	2	-	-	5
26	Phenoliccompounds (C_6H_50H)mg/l, max.	1	5	-	5
27	Radioactive materials:				
	(a) Alpha emitters micro curie mg/l, max.	10^{-7}	10^{-7}	10^{-8}	10^{-7}
	(b)Beta emittersmicrocurie mg/l	10^{-6}	10^{-6}	10^{-7}	10^{-6}
28	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survivalof fish after 96 hours in 100% effluent	90% survivalof fish after 96 hours in 100% effluent
29	Manganese	2 mg/l	2 mg/l	-	2 mg/l
30	Iron (Fe)	3mg/l	3mg/l	-	3mg/l
31	Vanadium (V)	0.2mg/l	0.2mg/l	-	0.2mg/l
32	Nitrate Nitrogen	10 mg/l	-	-	20 mg/l

[a]http://cpcb.nic.in/industry-effluent-standards/.

Note: These are general standards applicable for various modes of disposal of effluents. However, for the sub-project the specific standards prescribed by CPCB and as suggested by NGT dt 30 April 2019 are applicable and are provided in Table 3.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for Baseline Study

31. **Data collection and stakeholder consultations.** Data for this study has been primarily collected through comprehensive literature survey, discussion with stakeholder agencies, and field visits to the proposed subproject sites.

32. The literature survey broadly covered the following:

(i) Project details, reports, maps, and other documents prepared by TWAD Board;
(ii) Discussions with Amburtown,TNUIFSLand other relevant government agencies;
(iii) Secondary data from previous project reports and published articles; and
(iv) Literature on land use, soil, geology, hydrology, climate, socioeconomic profiles, and other planning documents collected from Government agencies and websites.

33. **Ocular inspection.**Several visits to the project sites were made during IEE preparation period between 2018 to 2021 to assess the existing environment (physical, biological, and socioeconomic) by carrying out environmental impact studies by testing ground water, ambient

air and ambient noise levels once in six months from the date of project commencement and gather information with regard to the proposed sites and scale of the proposed project.

B. Physical Resources

1. Location, Area and Connectivity

34. Ambur town is a Selection Grade Municipality[3] in Tirupathur district of Tamil Nadu lies at a latitude of 12°78'N and longitude of 78°62'E. Ambur municipal limits are is bound by Somalapuram Panchayat in North, Solur Panchayat in South, Naikkeneri Panchayat in East and Palarriver in West.

35. The area of the town, as per local body records is 17.97km^2. The total length of the street is about 120km. The total area of the town is divided into 36 wards.

36. **Road and Rail.** Ambur town lies on the Chennai –Krishnagiri - Bangalore National Highway NH-4. The town is at a distance of 200 km from Chennai, 180 km from Bengaluru and 52 km from Vellore. The town is well connected by road and rail with the nearby urban centers. Air: The closest airport is in Chennai at a distance of 200 km which serves both domestic and International passengers.

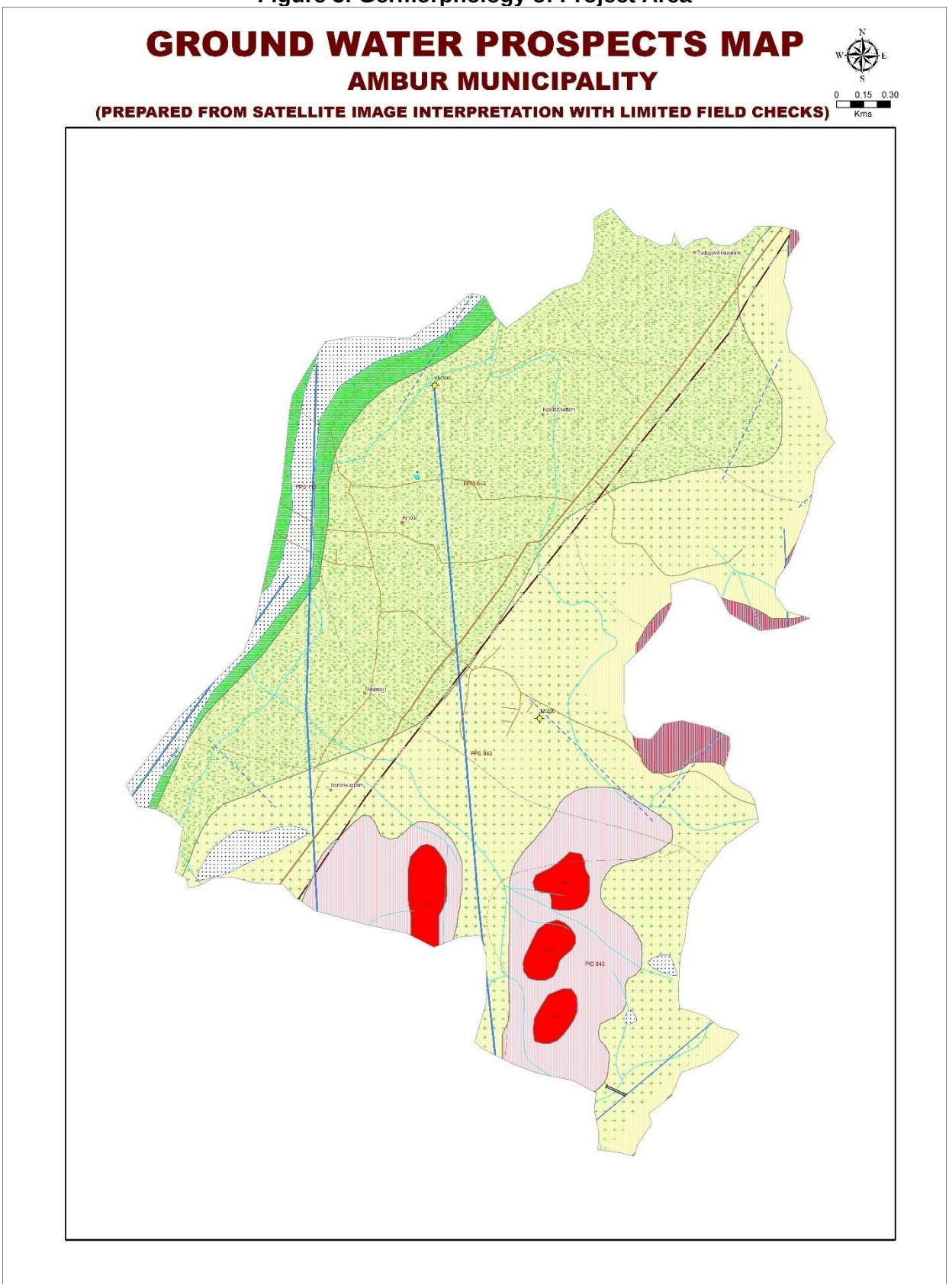
2. Topography, Soils and Geology

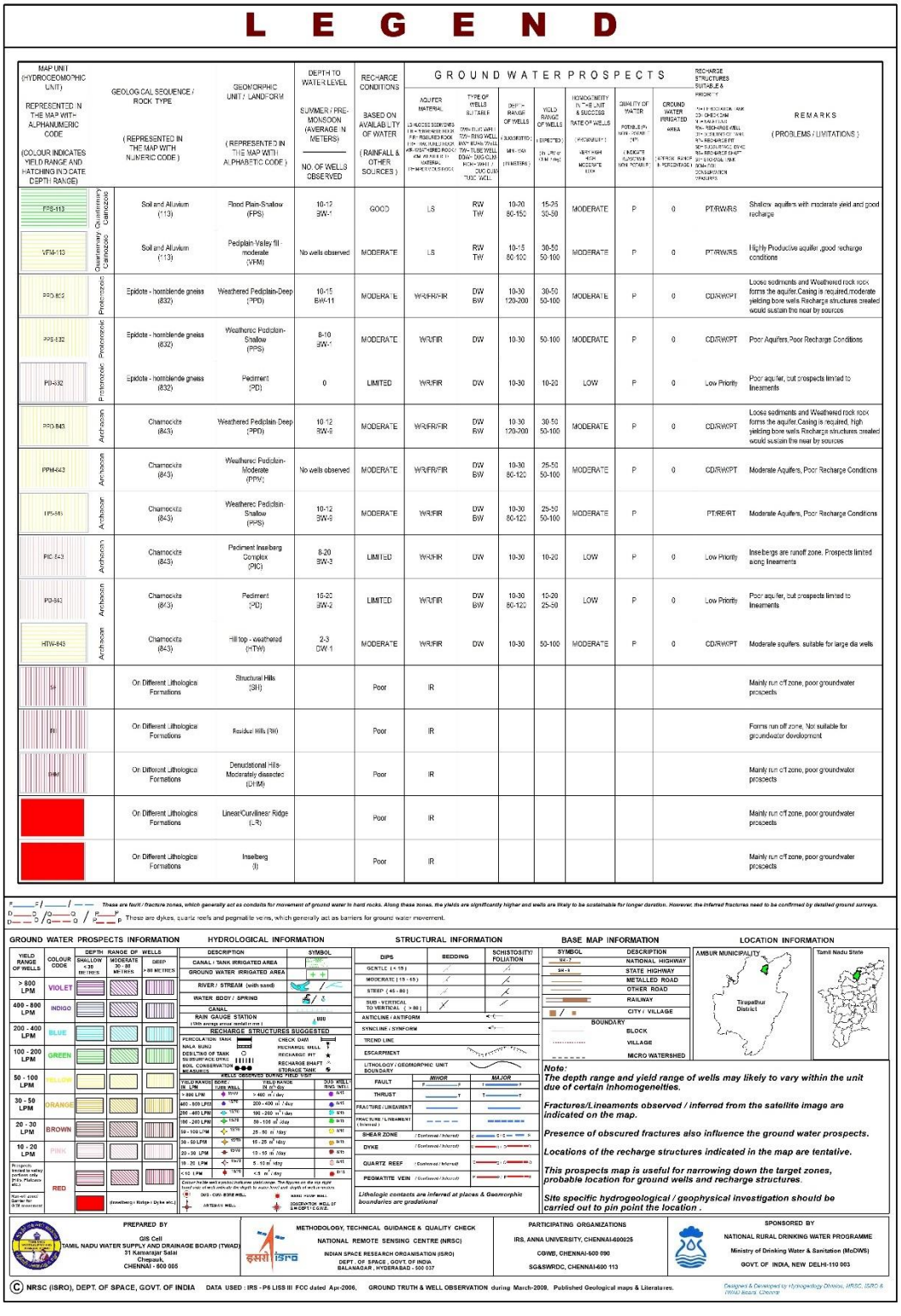
37. Topography is moderately sloped undulating with an elevation difference of approximately 20 m from the south to north near Palar River. The town is located 316 m above mean sea level. Ambur has Tropical wet and dry climate, reaching high temperatures during summer and experiences wet winters. The area also experiences light rain fall during Southwest monsoon. But to its tropical and sub tropical climate mangoes, ground nuts, coconut and jasmine are cultivated in and around town.

38. The topography is moderately sloped from south to north . There are no notable mineral resources. Black loam soil is found in parts of Ambur town. The other type of soil are chiefly gravelly, stony and sandy of the red variety.

[3]Municipalities having annual income of morethan Rs.10.00 crores are classified as Selection Grade Municipality. Ambur Municiplaity has annual income of Rs.15.00 crores, so it is classified as Selection Grade Municipality.

Figure 5: Germorphology of Project Area





Source: TamilNadu Water Supply & Drainage Board, 2017.

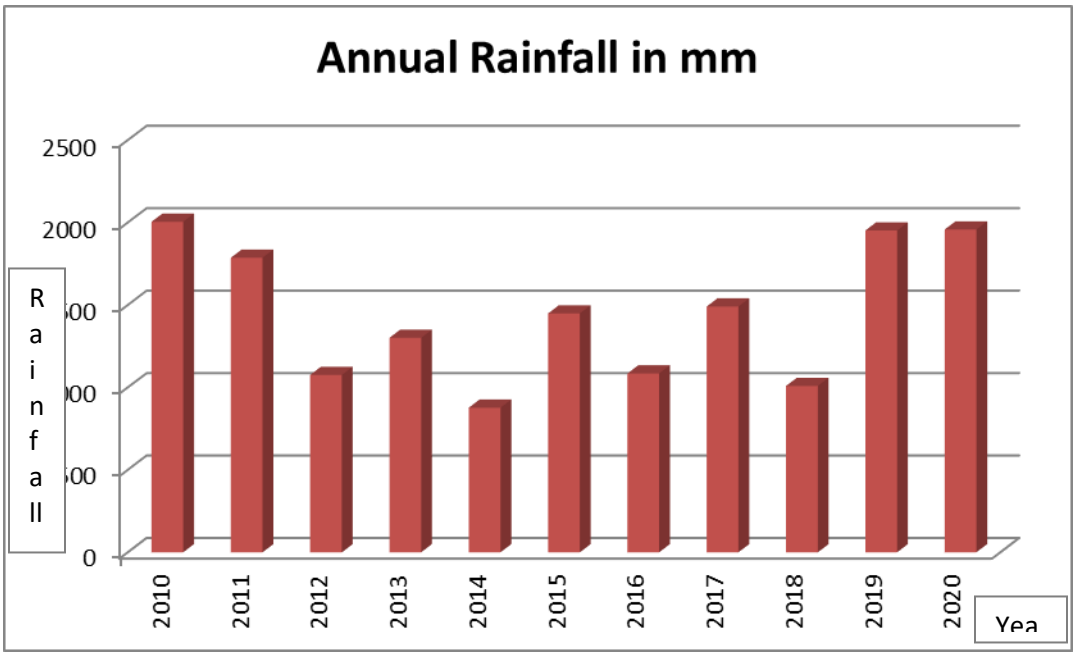
3. Seismology

39. As per the seismic zoning map of India, Amburfalls under Zone III, which is the moderate earthquake risk zone in India.

4. Climatic Conditions

40. Ambur has Tropical wet and dry climate, reaching high temperatures during summer and experiences wet winters. The area also experiences light rain fall during Southwestmonsoon. The mean maximum and minimum temperatures during summer and winter varies between 42°C and 13°C. Highest temperature ever recorded is 43°C and lowest is 11°C. The humidity ranges are 38%–61% during summer and 65%–84% during winter. The maximum rain fall occur during September, October and November through northeast monsoon.The area experiences rain fall during the Southwest monsoon as well. The average annual rain fall is 1,000mm. The wind direction is usually predominate towards southwest. During winter it is from north to east, in summer from south to west.

Figure 6: Annual Seasonal Rainfall in Project Area from 2010 to 2020



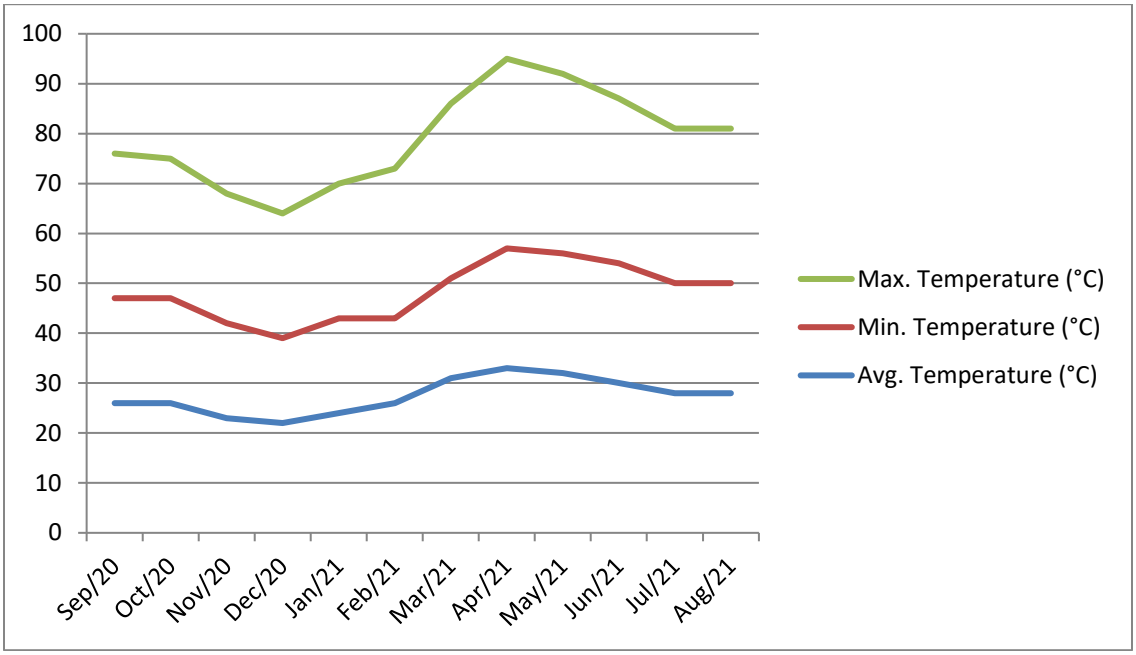
Source: https://www.worldweatheronline.com/ambur-weather-averages/tamil-nadu/in.aspx

Table 9: Monthly Maximum and Minimum Average Temperature for the period September 2020 to August 2021

	Sep 20	Oct20	Nov20	Dec 20	Jan 21	Feb 20	Mar 21	April21	May21	June 21	July 21	Aug21
Avg. Temperature (°C)	26	26	23	22	24	26	31	33	32	30	28	28
Min. Temperature (°C)	21	21	19	17	19	17	20	24	24	24	22	22
Max. Temperature (°C)	29	28	26	25	27	30	35	38	36	33	31	31
Avg. Temperature (°F)	78.8	78.8	73.4	71.6	75.2	78.8	87.8	91.4	89.6	86	82.4	82.4
Min. Temperature (°F)	69.8	69.8	66.2	62.6	66.2	62.6	68	75.2	75.2	75.2	71.6	71.6
Max. Temperature (°F)	842	82.4	78.8	77	80.6	86	95	100.4	96.8	91.4	87.8	87.8
Precipitation / Rainfall (mm)	463.2	406.9	200.4	82	53.5	16.1	0	28.1	94.5	108	142	79.3

Source: https://www.worldweatheronline.com/ambur-weather-averages/tamil-nadu/in.aspx

Figure 7: Monthly Maximum and Minimum Average Temperature in project area for the period Sep 2020 to Aug 2021



Source: https://www.worldweatheronline.com/ambur-weather-averages/tamil-nadu/in.aspx

5. Surface Water

41. The River Palar is a prominent feature of Ambur. **Palar** is a river of southern India. It rises in the Nandi Hills in Chikkaballapura district of Karnataka state, and flows 93 kilometres (58 mi) in Karnataka, 33 kilometres (21 mi) in Andhra Pradesh and 222 kilometres (138 mi) in Tamil Nadu before reaching its confluence into the Bay of Bengal at Vayalur about 100 kilometres (62 mi) south of Chennai. It flows as an underground river for a long distance only to emerge near Bethamangala town, from where, gathering water and speed, it flows eastward down the Deccan Plateau. The Towns of Bethamangala, Santhipuram, Kuppam, Ramanaickenpet, Vaniyambadi, Ambur, Melpatti, Gudiyatham, Pallikonda, Melmonavoor, Vellore, Katpadi, Melvisharam, Arcot, Ranipet, Walajapet, Kanchipuram, Walajabad, Chengalpattu, Kalpakkam, and Lattur are located on the banks of the Palar River. Of the seven tributaries, the chief tributary is the Cheyyar River.

The average rainfall in entire Palar river basin is low. This river basin used to suffer from frequent droughts. There has been no full scale flow for the past 10 years.
River seldom flows, and according to TamilNadu Public Works Department- Water Resource Organisation information, river experienced flow in 2015 due heavy floods after nearly two decades. There is surface water flow only for a few days in a year in this river in monsoon season.The Ambur Municipality depends on the Cauvery river source (CWSS to Vellore with a source of Cauvery river at Mettur dam). No intake structutes are available in Palar river in around Ambur town. Since the treated effluent from the proposed STP will meet the NGT permissible parameters which are stringent and hence disposal into Palar river is not envisaged to affect the river or near by community. Moreover . Upstream of Palar at Ambur town is Indira

Nagar and downstream at AhmediNagar.. since the .Monitoring of the effluent quality by the Contractor isincluded in the Management Plan.

6. Groundwater

42. Ground water occurs under phreatic conditions in the weathered zone and under semiconfined conditions in the fractures. The thickness of weathered zone varies from less than a metre to about 15 m in the area depending on the topography. Potential aquifer zones are also developed in these rocks by fractures persisting to depths, particularly along lineaments and their inter sections. The depth of dug wells in crystalline formations varies form 8–19.5 meters below ground level (mbgl). Fracture zones have been encountered in the well down to a depth of 116 mbgl in the borehole drilled by Central Ground Water Board (CGWB). The thickness of alluvium along the course of Palar River ranges from 8–12 m.

43. Vellore district is underlain by geological formations ranging in age from Archaean to Recent. In the crystalline formations comprising charnockites, gneisses and granites. In the consolidated formations, primary depositional features such as grain size are the major controlling factors.

44. In Gondwana formations, ground water abstraction is through dug wells and dug cum bore wells. These formations have considerably low yield potentials compared to both 6 hard rock and alluvium. Depth of dug wells in Gondwana sediments varies from 6–15 mbgl with extension of bores at the bottom ranging in depth from 15–25 m. Dug wells are the most common structures in recent alluvial formations too. The depth of dug wells tapping Palar alluvium ranges from 4–18.70 mbgl. These formations have moderate to good yield potential in the district and can sustain pumping for 3-4 hrs even during peak summer months and have yield up to 4.6 lps. Filter points of 10–15 mbgl depth are also being used in these formations for tapping ground water for domestic purposes.[4]

45. **Groundwater Quality.**The ground water samples collected from the Ambur town has been analysed for its physico-chemical, parameters. The outcome of the analysis has been depicted in the Table 10. The results were compared with the Indian Drinking water standard (IS 10500) and it was found not suitable for drinking purpose. .Groundwater will not be used for drinking purposes. The Ambur Municipality depends on the Cauvery river source (CWSS to Vellore with a source of Cauvery river at Mettur dam) for drinking purpose.

Table 10: Groundwater Quality in Ambur

Sl.no	Parameter	Ambur Town Basha Nagar 5th Cross street	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source as per IS 10500	Remarks
1.	pH	8.2	6.5 to 8.5	6.5 to 8.5	Within range
2.	Turbidity (NTU)	<0.5	1.0	-	
3.	Total Alkalinity (mg/l)	234	200	600	High
4.	Total Dissolved Solids	624	500	2000	High

[4]District Groundwater Brochure, Vellore District, Jan 2009 by Central Ground Water Board (CGWB).

	(mg/l)				
5.	Chlorides (mg/l)	232	250	1000	High
6.	Total Hardness (mg/l)	209	200	600	High
7.	Sulphates (mg/l)	97	200	400	Within range

Source: GROUND WATER QUALITY asseses as part of Baseline Monitoring carried out BY Package - IContractor.

46. In comparison with the IS 10500, it is observed that water quality in the Ambur town is highly deteriorated due to contamination of ground water by the discharge of industrial effluents (mainly from tannery industries).. Groundwater quality will be determined by contractors during pre-construction stage/ pre-works conditions documentation. Results are included in the Updated/Final IEE and/or semi-annual environmental monitoring report. (Annexure 12)

7. Ambient Air Quality

47. Secondary information on the air quality from Tamil Nadu Pollution Control Board (TNPCB) is not available for Ambur. As a recent update, the TNPCB has fixed monitoring stations in Ambur for periodic monitoring of air pollution. Based on the reconnaissance survey, the main source of air pollution in the city are attributed to vehicular traffic, road dust, construction and industrial activities.Baseline air quality has been determined by contractors as per pre-works condition documentation. Results are included in the Updated/Final IEE and/or semi-annual environmental monitoring report (Annexure 13)

8. Ambient Noise Levels

48. Secondary information on ambient noise levels are not available for the project area. Based on the reconnaissance survey, the main source of noise pollution in the city are attributed to vehicular traffic.Baseline noise level has been determined by contractors as per pre-works conditiondocumentation. Results are included in the Updated/Final IEE and/or semi-annual environmental monitoring report.(Annexure 14)

C. Ecological Resources

49. Ambur is geographically located at 12.78°N 78.7°E with an average elevation of 316 m (1,037 feet). Ambur Municipality is surrounded by plains at three sides and in eastern side hillocks which is outside the Municipality limit. There is no forest areas around Ambur town. Ambur town does not have any other environmentally/ ecologically sensitive areas.

50. Planning based on agro-ecological zoning aims at scientific management of regional resources to meet the food, fibre, fodder and fuel wood requirements without adversely affecting the status of natural resources and environment. An attempt has been made to map the agro-ecological units for Vellore district of Tamil Nadu and derive the crop-zone map for the four major crops namely, paddy, sugarcane, groundnut and millets. The basic theory of FAO framework for Land Evaluation was adopted to define the suitability of crops. Land quality details necessary for evaluating the agro-land suitability of crops and for delineating the agroecological units include the terrain, soil and climatic characteristics. Agro-ecological units map was generated by overlaying the agro-edaphic and agroclimatic map layers in GIS. The agro-land suitability map was generated by matching the crop requirement details with the land qualities. The results of the suitability evaluation, when compared with the current land use statistics of these crops showed that area cultivated is less than the area suitable for these crops.

D. Economic Development

1. Land use

51. The Regional Directorate of Town and country planning had conducted the land use survey in 1984 for Ambur town, based on the surveythetown land use has been classified into the following category.

(i) Residential;
(ii) Commercial;
(iii) Industrial;
(iv) Public and Semi Public;
(v) Transportation and Communication;
(vi) Recreational;
(vii) Public utilities;
(viii) Vacant development; and
(ix) Non-Urban use.

52. The following table shows the land use pattern for Ambur town in 2021.

Table 11: Land use Analysis for Ambur town (2021)

Sl.No	Land use	Area in Hectares	Percentage over total developed area	Percentage over total area
(I)	**DEVELOPED AREA**			
1	Residential	577.19	60.00	32.12
2	Commercial	56.74	5.46	3.15
3	Industrial	127.21	13.14	7.08
4	Public & Semi Public	135.16	13.95	7.52
5	Educational	72.15	7.45	4.03
	Total developed area	**968.45**	100.00	100.00
(II)	**UNDEVELOPED AREA**			
1	Agricultural Wet	93.13	11.24	5.18
2	Hillocks and Dry	579.25	69.91	32.23
3	Land under Water	156.17	18.85	8.69
	Total Undeveloped area	**828.55**	100.00	100.00
	Grand total	**1797.00 Hectares**		

Source: Ambur Municipality 2021

2. Industry and Agriculture

53. Ambur town has considerable number of industries due to the close proximity to Vellore (which is also known for leather goods). It is well connected to Vellore by NH48. Major employment in the town is provided by the presence of the leather industries and agricultural trading industries. Agriculture is generally practiced along the Palar river banks and in the outskirts of the city. The workforce depending on agriculture is not significant compared to industrial and services sectors.The Ambur town houses leather tanning and manufacturing facilities and is a leading cluster for export of finished leather. Leather industries are located around Ambur twon and they have separate Common Effluent Treatment Plant (CETP) to treat the tannery waste.

3. Infrastructure

E. Water Supply

1. Existing water supply system

54. The water supply need of the Town is 135 LPCD considering the recommendation of CPHEEO. The town area proposed to be covered under UGSS is having water supply from the local openwell sources & Mini Power Pump through bore wells sources and ,, Cauvery river as a source from Mettur dam(tapping from Vellore Combined Water Supply Scheme (CWSS) at Ambur)..

55. Augmentation scheme under Vellore Mega CWSS in Vellore district with river Cauvery as source near Mettur Dam was commenced in 2016 and provides water supply of 9.82 MLD to Ambur town. In addition to the above, 1.00MLD of water is being supplied to this town through local open well sources & Mini Power Pump through bore wells sources.

Quantity from Vellore Mega CWSS - 9.82 MLD
Quantity from local sources - 1.00 MLD
Total - 10.82 MLD

56. Water supply from Vellore Mega CWSS will be increased to 15.85 MLD (from current supply level of 9.82 MLD) after implementation of UGSS.Hence for UGSS design, the pro rata sewage generation is taken as 115 LPCD for the Ambur Town population.

F. Sewerage

1. Existing Sewerage System

57. Ambur does not have an underground sewerage system.The town is provided with open drain which is constructed on either side of the roads / streets.The wastewater generated from the town is collected through the main drain along the roads / streets. The wastewater discharged into these drains comprises ofsullage water from kitchen and bathroom. Wastewater from all the open drains are discharged into the nearby water bodies (lake,ponds etc.). Wastewater generated from the latrines are flushed out into septic tanks and very few are directly flushed to street drains without any treatment. As the sewage is let into unprotected open water bodies (lake, ponds etc.,) resulting in poor quality of groundwater as it is deteriorating.

58. **Solid Waste Management (SWM)**.Amburhas 26,302 households with a population of 114,608(as per the 2011 census). In this the Kaspa-A population is 7131. Two levels of SWM has been practiced in Ambur. The primary level collectionis done through door to door collection of solid waste using push carts, tricycles and mini trucks. Preliminary segregation of waste is also done during the primary collection. The collected waste is then dumped in anopen yard, where the re-cycle materials are segregated along with organic waste. The collected organic waste has been sent to fertilizer manufacturing process. Thesecondary level collectionis done through collection and transportation of the remaining non recyclable solid wasteto the designated open dumping yard at Tharuvazhi, which is maintained by the AmburMunicipalaity. It is estimated that nearly 30 Tons per day of solid waste has been generated in the Ambur municipality area, which was managed by 80 permanent Sanitary workers and 120 outsourced sanitary workers. The transporation vehicles available for SWM is as follows.

1. Primary Level Collection

- Push Carts : 54 nos.
- Tricycles : 40 nos.
- TATA Ace : 06 nos.

2. Secondary Level Collection

- Tipper Lorry : 03 nos.
- Dumper Blazer Lorry : 03 nos.
- Dumper BlazerBins : 42 nos.

59 Bylaws have been made and enforced as per Solid Waste Management Rule 2016 by which 20 Bulk waste generators have been identified and given notice for Self-Composting. Out of 20 Bulk Waste Generators (BWGs),twelve BWGs have started their processes. Municipal people and shop keepers are instructed to segregate wastes as Bio-Degradable and Non-degradable waste being collected at their places. Awareness to public is done through issuance of notice and awareness programs by nine animators and two Supervisors to segregate wastes as Bio – Degradable and Non – Degradable waste. They are also instructed to providemunicipal sanitation workers Non – degradable wastes on Wednesday and Bio – degradable on daily basis. As of now, source segregation is being done at 100% of wards and processed at 8.17 km^2area of municipal compost yard located at 1stTharvazhi where fertilizers are manufacturing by Window Composting method. From the collected 30 tons of garbage, 18 tons of garbage is dumped and processed at Compost yards' with three windrow platforms by which 1,800 kilogram (kg) of manure is produced so far.

60 Recently, a proposal of MCC has been submitted for approval to execute in a place at TNHB, ward 11. Under Amrut Scheme, construction of two parks has been completed in which onsite composting Shed work is going on.

61 **Road and rail.**Ambur town lies on the Chennai-Bangalore National Highway. The town is at a distance of 200 km from Chennai, 180 km from Bengaluru and 50 km from Vellore. The town is well connected by road and rail with the nearby urban centers.

62 **Air.**The closest airport is in Chennai at a distance of 200 km which serves both domestic and International passengers.

G. Socio Cultural Resources

1. Demography

63 According to 2011 census, Ambur has a population of 114,608 (2021 population – 125600 as per Ambur Municipality local census) with a sex-ratio of 1,033 females for every 1,000 males, much above the national average of 929. A total of 13,235 were under the age of six, constituting 6,716 males and 6,519 females. Scheduled castes and scheduled tribes accounted for 16.83% and 0.57% of the population, respectively.

64 The average literacy of the city was 76.08%, compared to the national average of 72.99%. The city had a total of 26,302 households. There were a total of 40,654 workers, comprising 163 cultivators, 519 main agricultural labourers, 982 in house hold industries, 35,411

other workers, 3,579 marginal workers, 27 marginal cultivators, 174 marginal agricultural labourers, 306 marginal workers in household industries and 3,072 other marginal workers. As per the religious census of 2011, Ambur had 35.0% Hindus, 60.9% Muslims, 3.8% Christians, 0.3% following other religions.

Table 12:Percentage of working population - Ambur

Discription	Worker (Among total population)	Main Worker (Among workers)	Marginal Worker (Among workers)	Non Worker (Among total population)
Total	35.5%	32.3%	3.1%	64.5%
Male	55.4%	51.5%	3.8%	44.6%
Female	16.2%	13.8%	2.4%	83.8%

Source:https://indikosh.com/city/680479/ambur.

2. History, Culture and Tourism

65 Ambur was in existence from the Pallava period during the 15th and 16th Century, North arcot district was under control of Vijayanagar.In1687 onwards North arcot district was brought under the control of the Nawab's of Karnatic.In1749 NawabAnwaruddin was defeated and killed in Ambur by his rival Chandra Sahib. Haider Ali of Mysore, during his invasion of the Karnatic of 1767 laid seize to Ambur.The the British army resumed the seize of Ambur.During the beginning of 18th Century was brought under the control of British.From the above past incidents, through it is known that Ambur was existence since 15th century.There are no protected or notified physical cultural resources such as protected movements, Archaelogical Site of India (ASI) site, etc.Ambur is the one of the leather-oriented industrial towns in Tamil Nadu. .

H. Subproject Site Environmental Features

68. Features of the selected subproject sites are presented in the following table.

Table13:Site Environmental Features

Infrastructure	Location and Environmental Features	Site Photograph
Sewage	The STP site belongs to private owner has been	

Infrastructure	Location and Environmental Features	Site Photograph
treatment plant (STP)	purchased and enter upon given by ULB on 26.02.2021. The site has been handed over to Contractor on same day of 26.02.2021.The details of land record: TS no 1/1 Ward-A, block-3, in Kaspa A in Ambur town.The extent of land is (2.557 Acre) 10,351.273m^2 and the classification of land is Dry land(Punjai).STP site is 10m from river bank and 30m from the nearest process unit (Polishing Pond) to Palar river. Site is mostly surrounded by vacant and agricultural lands. And houses are located towards the Municipality, and are located 550m(0.55km) away from the site.(Figure.4: Google map) . In the proposed STP, an area of 2.557 acres allocated while required is about 1.26 acres. Balance land will be utilized for future expansion of STP .. There are no live trees in the extent earmarked for STP.There are some trees at the boundry of the site which need not be cut for execution of the work. Hence there will not be any tree cut in the STP site. Green belt development will be provided inside the STP to control Odour.Compound wall Fencing all around the STP is proposed.	
Main pumping station (MPS)	**2. Main pumping station at Kaspa-A** The MPS site belongs to private owner has been purchased and enter upon given by ULB on 26.02.2021. The site has been handed over to Contractor on same day of 26.02.2021. The details of land record: TS no 1/1 Ward-A, block-3, in Kaspa A in Ambur town. The extent of land is (0.230 Acre) 930.777 m2 and the classification of land is Dry land (Punjai).Site is mostly surrounded by vacant and agricultural lands. And houses are located towards the Municipality, and are located 550m(0.55km) away from the site. There is no live trees in the MPS campus and found some trees at the boundry of the site layout and no need to cut those trees while execution of the work. Hence there will not be any tree cut in the MPS site.Green belt development inside MPS to control Odour. Compound wall Fencing all around the MPS is proposed.	

Infrastructure	Location and Environmental Features	Site Photograph
Sub pumping station(SPS)	**3. Sub pumping station at Rafeequenagar** The SPS-I has been proposed in land record: SF no Ambur Town Ward-B, block-5, TS no 1/2 Rafeequenagar in Ambur town. The extent of land is 901 m2 and the classification of land is Road side waste land (Pattaiporambokku). The owner of the land is Revenue department.Land is surroundedby road and private vacant land and after road commercial establishments and residential colony are 70m apart from SPS site.	
Lift Station	**Lift Station-1A (LS-1A)**. Construction of lift station at Kannadhasan Nagar. Initially the site selected for LS-1A was adjacent to Railway track near the Forest Range Office. Since Railway department denied permission to lay sewer line parallel to the railway track, the lift station site is re-located to Ward-F, Block-2, T.S.No.1 with an extent of 0.01Acre (40.47sq.m) Pattai land belongs to Ambur MunicipalityatKannadhasan Nagar near Mariyamman temple. Lift station is essentially proposed to pump sewage to 1Km distancefitted with two sewage pumps (small capacity) with Kiosk to accommodate Pump control panels. Provision made in the design for the sidewall above GL is 1.0m and the top of the well will be covered with mesh.	

Infrastructure	Location and Environmental Features	Site Photograph
	<u>Lift Station-2A (LS-2A)</u>. Construction of lift station at Samiyarmadam. <u>Zone 2A, LS-2A</u>. As per the Technical sanction estimate remarks, the confirmatory levels were taken up before starting up the works and drawings were prepared for all zones and redesigned the sewer network system in which one more new lift station-2A was arisedatWard-D, Block-5, T.S.No.80/1 with an extent of 0.02Acre (80.94sq.m) Pattai land belongs to Ambur Municipality at Samiyamadam area near Ellaimariyamman temple.	
Sewer network	Sewer lines will be laid in the centre of road by cutting black top, within the road right of way. In wider roads, like state highway (SH), divided 2-way roads etc., sewers will be laid along the edge of the road, but mostly within the black top portion. In the outskirts where adequate land in the road shoulder is available along the blacktop and is clear of any structures or activities, pipes will be laid in this earthen shoulder. Large diameter pipes will be laid on main roads (400 – 900 mm), while the tertiary sewers of small size (150 mm to 300 mm dia) that collect wastewater from each house will be laid in all streets in the subproject area. There is one national highway (NH)& Railway crossing for SPS to MPS pumping main which will be made by trenchless technology. Trench size to bury the sewer will be of 0.8 m to 1.5 m wide and 1.2 m to 8 m deep (4.35% of sewer line exceeding 5m depth that also coming near SPS and MPS) Presence of hard rock in the sewer line alignment has been identified in few locations in Ambur Municipality. Kannadasan Nagar and PSN Nagar in Zone-1A has identified with hard rock. Similarly Kambikollai Main road, Basha Nagar 5th street, Kaja Nagar, Nathiseelapuam and Anish Nagar in Zone-1 has been identified with hard rock.	 

Infrastructure	Location and Environmental Features	Site Photograph
	The removal of hard rock in the identifeid locations were tried with excavators and breakers. But it is not effective. So the method of Control blasting is considered for hard rock removal. During excavation the options would be evaluated and depending upon site conditions if required controlled blasting will be adopted for hard rock removal.	
Outfall sewer and Disposal point	Treated water from STP(Polishing pond) will be disposedthrough open earthernchannel of 200m to disposal point of Palar River. And channel has been designed for ultimate flow and considered rain water at STP site.	

66. **Alternate Site Analysis**:

1. The site for STP is originally selected in Solur Village near Ambur Municipality. The TNUIFSL, ADB authorities along with Ambur Municipal authorities and TWAD officials had detailed field visits and had a meeting and as an outcome of the meeting after carefull analysis and consideration decided to shift the STP site from Solur to A-Kaspa near Palar to avoid the 8.5Km of Pumping main from MPS to STP all along the town and treated water disposal point is morethan 2.0km from Solur site. Further Railway crossing (2Nos.) & National Highway(2 Nos.) are avoided by shifting the STP site. Due to change of STP site an installation cost of Rs.16.95 crores saved and annual maintenance cost Rs.70.00 lakhs also saved. The topography terrain of Ambur Municipality is from South to North. The site is located at the extreme end of Ambur Municipality in North direction which is easy for maintenance and economical. Due to non-availability of Government land in A-Kaspa area private land is finalized and purchased.

2. The site selected for Lift Station-1A was selected initially at adjacent to Railway track near to the Forest Range Office. Since Railway department denied permission to lay sewer line parallel to the railway track, the lift station site is re-located to Ward-F, Block-2, T.S.No.1 with an extent of 0.01Acre (40.47sq.m) Pattai land belongs to Ambur Municipality in Kannadasan Nagar near Mariamman temple.

3. Lift Station-2A (LS-2A). Construction of lift station at Samiyarmadam. As per the Technical sanction estimate remarks, the confirmatory levels were taken up before starting up the works and drawings were prepared for all zones and redesigned the sewer network system in which one more new lift station-2A was arised atWard-D, Block-5, T.S.No.80/1 with an extent of 0.02Acre (80.94sq.m) Pattai land belongs to Ambur Municipality at Samiyamadam area near Ellaimariyamman temple.

67. Siting Criteria for Sewage Treatment Plants (Source: Circular Memo No. T16/25323/STP/Orange/2007-4, dated 23.10.2008)

S.No	Siting criteria	Remarks
1	The STP site should be at least 250 metres away from any lake or pond preferably in the downstream side of lake or pond so that the sewage shall not reach the water bodies.	No lake or pond near STP site
2	The STP site should be located more than at least 250 metres away from river or stream and shall ensure that the treated / untreated sewage should not reach the above water sources.	Due to non-availability of Government land in Ambur Municipality private land in A-Kaspa area is finalized and purchased near the river. The effluenttreated to standards will be stored for 2 hours in Polishing Pond and then discharged into the Palar river.
3	The STP site should be located at least 500 metres away from a notified habitated area and zone of 100 metres around STP site boundary should be declared as no-development zone so that green	The STP site is located away 250m from the habitations.

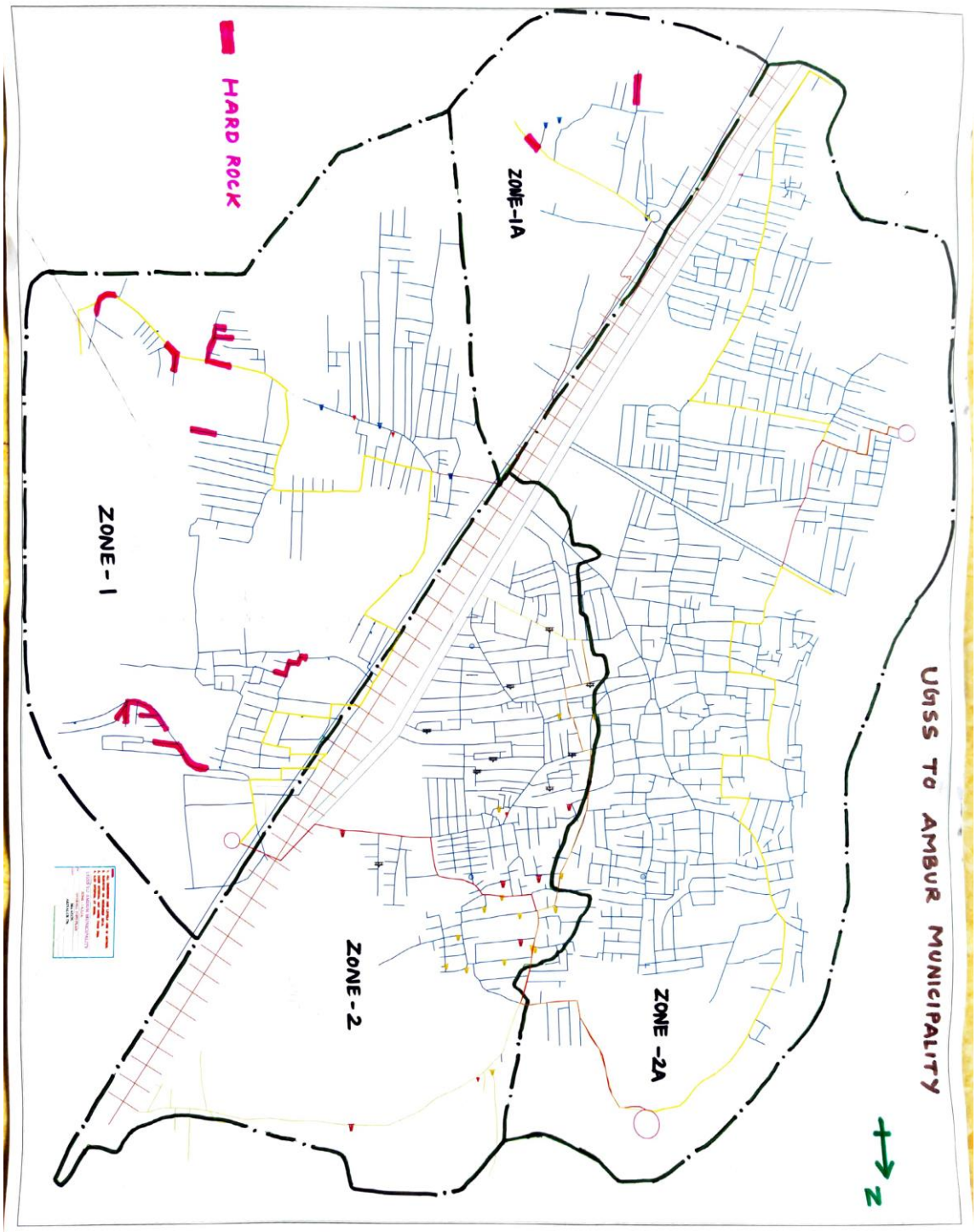
	belt can be developed in that area.	
4	The STP site should be at least 500 metres away from a public utility area such as park, temple, educational institution etc.,	There is no public utility area near the STP site.
5	The site of STP should be selected on dry lands and the treated sewage shall be utilized on land for irrigation.	The selected STP site is dry land. The treated effluent of 3MLD is proposed to utilized for Ambur Common Effluent Treatment Plant (CETP) by Ambur Tannery Association and the balance will be disposed into the river..
6	The local body shall also ensure that the land availability and consent from the land owners for the disposal of treated sewage, which should be mentioned at the time of application for NOC itself.	Does not arise.
7	In case of disposal of treated sewage into marine water bodies, the local body shall obtain CRZ clearance and this should be submitted along with NOC application.	Does not arise.
8	The local body shall obtain appropriate land use certificate from DTCP for STP site.	The local body obtained land use certificate from Ambur Local Town Planning Authority for the proposed STP site. .
9	The local body shall consider the treatment technology while selecting the site in respect of extent of land. Advanced treatment technology will require less footprint area in order to meet the inland surface water standards prescribed of the TNPCB.	The technology adopted in the STP is MBBR, which requires lesser extent of land.
10	A preliminary assessment of public / nearby residents opinion neighboring the location of STP site is essential.	Public consultation meeting were carried out during January 2018 & June 2018.

Table.14: HARD ROCK DETAILS

S.No	Place/Street	ength (m)	Street Width (m)	Avg. Depth(m)
	ZONE-1A			
1	Kannadhasan Nagar Main	30	4.5	1.30
2	PNR Nagar	30	4.0	1.30
	ZONE – 1			
3	Kambikollai Main road	350	5.0	2.00 to 5.00
4	Basha Nagar 5th st	30	4.5	1.20
5	Kaja Nagar Main Road	350	4.5	2.00 to 4.00
6	Kaja Nagar cross street	150	4.5	3.00 to 5.00
7	Nathiselapuram	30	4.0	2.00 to 2.50
8	Anish Nagar	50	4.0	2.00 to 3.00

(Public consultations will be carried out with the local residents along these stretches informing them regarding the need of carrying out controlled blasting and making them aware of the procedures and precautionary, preventive and mitigative measures being considered during implementation.)

Figure.8: Hard Rock Identified Area in Ambur Municipality



V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

55. Potential environmental impacts of the proposed infrastructure components are presented in this section. Mitigation measures to minimize/mitigate negative impacts, if any, are recommended along with the agency responsible for implementation. Monitoring actions to be conducted during the implementation phase is also recommended to reduce the impact.

56. Screening of potential environmental impacts are categorized into four categories considering subproject phases: location impacts and design impacts (pre-construction phase), construction phase impacts and operations and maintenance phase impacts.

(i) **Location impacts** include impacts associated with site selection and include loss of on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site.

(ii) **Design impacts** include impacts arising from Investment Program design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources, and ancillary services.

(iii) **Construction impacts** include impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust, noise, traffic congestion, and waste production.

(iv) **Operations and Maintenance (O&M)impacts**include impacts arising from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams, and occupational health and safety issues.

57. Screening of environmental impacts has been based on the impact magnitude (negligible/moderate/severe – in the order of increasing degree) and impact duration (temporary/permanent).

58. This section of the IEE reviews possible project-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB SPS (2009) require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the project's area of influence.

59. The ADB Rapid Environmental Assessment Checklist in http://www.adb.org/documents/guidelines/environmental_assessment/eaguidelines002.asphas been used to screen the project for environmental impacts and to determine the scope of the IEE.

60. In the case of this project (i) most of the individual elements involve straightforward construction and operationtechniques except for the blasting activities proposed for sections of sewerage alignment, so impacts will be mainly localized and not greatly significant; (ii) negative impacts associated with sewage facilities such as odor are already considered in the design and siting;(iii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements; and (iv) being mostly located in an urban area, will not cause direct impact on biodiversity values. The blasting proposed is "controlled blasting"following necessary precautionary measures including usage of appropriate quantities of explosives, hence that the nearby structures and properties are unlikely to be affectedand impacts related to controlled blasting such as dust generation, increased noise levels and vibrations would be mitigated.

A. Pre-Construction Impacts – Design and Location

61. **Design of the Proposed Components**. Technical design of the (i) sewage treatment plant; (ii) sewage pumping and lifting stations; and (iii) sewer network including manholes and house connections, follows the relevant national planning and design guidelines, focusing on providing a robust system which is easy to operate, sustainable, efficient and economically viable.

62. **Design of Sewage Treatment Plant**. A 16.71 MLD STP is proposed to be constructed at the identified site to treat the sewage generated from the subproject areas of Amburtown.The treated wastewater will be disposed through an open earthern channel within the site after polishing pond into Palarriver 200m from the STP site.Since the treatment and disposal system is proposed under a design, build, operate and transfer (DBOT)contract, the STP has beendesigned by the DBOT contractor to meet the stipulated effluent discharge standard.

1.Evaluation of Alternate Treatment Processes: The conventional treatment process used is ASP (Activated Sludge Process) technology. This technology requires more area i.e.1000Sqm/MLD. In the Ambur Municipality there is no government vacant land required for this method adoption. Due to insufficient land this technology is not possible to adopt. SBR (Sequential Batch Reactor) technology is not adopted due to higher capital cost and maintenance cost. Also it requires highly qualified man power for its operation. MBBR (Moving Bed Biofilm Reactor) technology requires less area i.e.550 Sqm/MLD and lesser sludge development. Due to the availability of land MBBR technology is selected. BOD removal efficiency for MBBR is 90-95%.

2.SWOT Analysis for MBBR Technology:

Strength	Weakness
1. It does not require Primary clarifier and no scum formation 2. Requires less area 3. Less moving part and low maintenance	1. No energy production
Oppurtunities	Threats
1.High expandability 2. Higher loads can be accepted with extra media.	1. Mixing of industrial waste water affects the treatment process. 2. Change in raw sewage characteristics at inlet of STP may affect the process and output quality

Table.15: Inlet raw sewage and Outlet teeated effluent Characteristics:

Sl.No.	Parameters/Pollutants	Unit of measurement	Inlet raw sewage characteristics	Outlet treated Effluent parameter as per NGT Norms
1	Bio-chemical Oxygen Demand (BOD)	Mg/L	240-270	10

2	Total Suspended Solids (TSS)	Mg/L	86-123	20
3	Chemical Oxygen Demand (COD)	Mg/L	750-808	50
4	pH		-	5.5 – 9.0
5	Oil and Grease	Mg/L	0.0016 to 0.0048	Less than 5
6	Total Nitrogen	Mg/L	30-45	Less than 10
7	Ammonia Nitrogen	Mg/L	10 to 20	Less than 5
8	Fecal Coliform	MPN/100ML	10^6	100 - 230
9	Phosphorus Total	Mg/L	17.60 to 24.8	1.0

3.Components of STP:

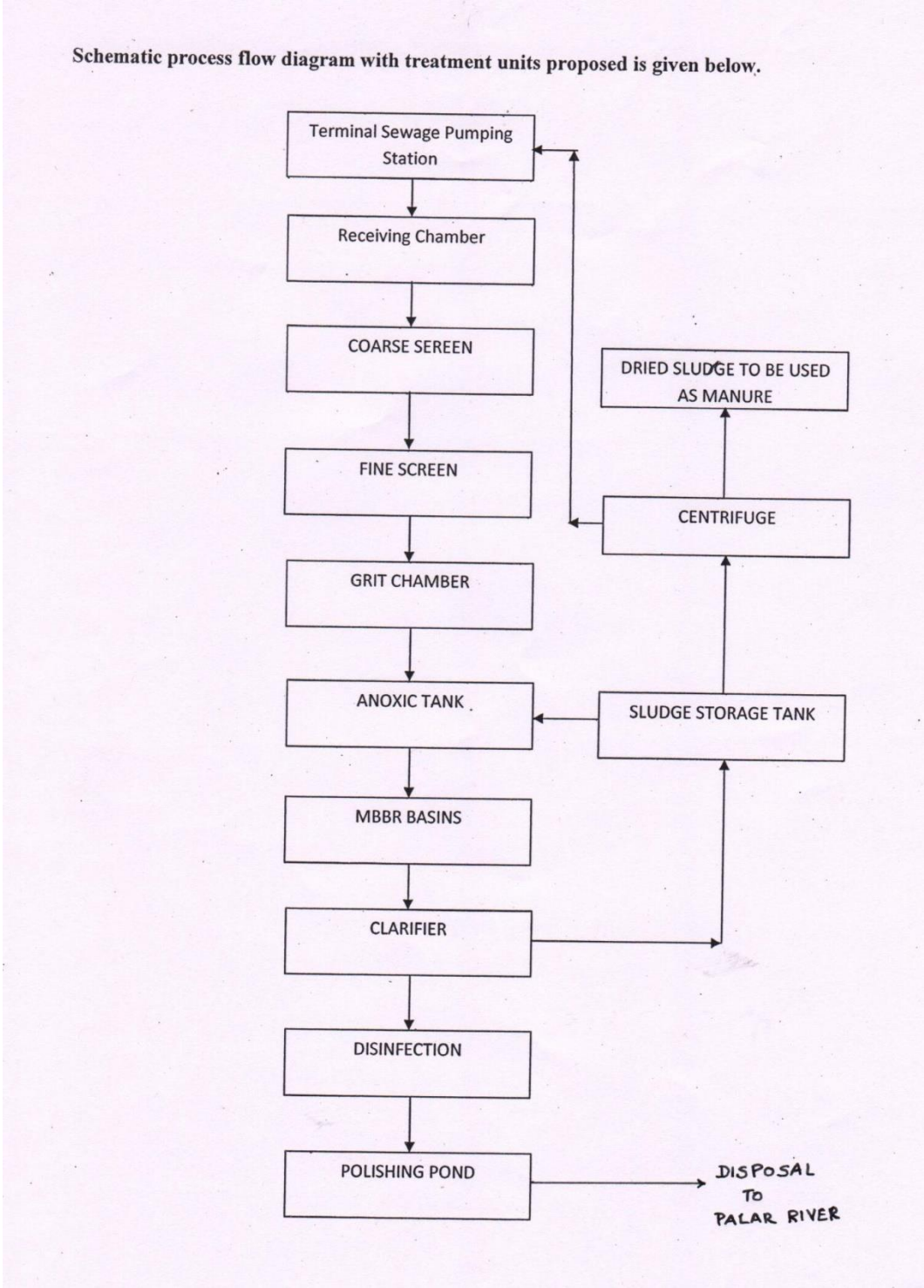
The Components of STP in the functional design consist of Receiving chamber, Mechanical/Manual Screen chambers, Grit Chambers, Flow Measurement channel, Distribution Chamber, Anoxic tank, Aeration Tank with Difusers, Secondary Clarifier, Sludge Management System including Centrifuge Mechanism, Disinfection Arrangement (Chlorination) and Polishing Pond.

4. Treatment Process:

The raw sewage from the terminal pumping station pumped through the pipeline. pumping main will be received in the receiving chamber. The receiving chamber is provided with 60 seconds detention time. The purpose of receiving chamber is to reduce the velocity. The sewage from the receiving chamber then flow by gravity to coarse screen- 2 Nos coarse screen (one manual and one mechanical) of opening size 25 mm are provided for removal of floating debris and other screening materials. Then the sewage is passed through 2 Nos. fine screens (one manual and one mechanical) of opening size 13 mm are provided for removal of floating and suspended particles of size less than 13 mm. The screens are designed for approach velocity of more than 0.3 m/s in the chamber and 0.6 to 1.2 m/s across the screens. The sewage then passed through Grit Chamber for removal of grit particles. The unit is designed for surface loading rate of 960 Cu.M/Sq.m/Day, detention time of 60 seconds and velocity of 0.15 to 0.3 m/s. The screened and de-gritted sewage is then passed through parshall flume for measurement of flow and collected in the anoxic tank. The anoxic tank is designed for 90 minutes detention time and provided with a mixer for mixing. Under anaerobic condition nitrification takes place. The sewage then flow by gravity to MBBR basin. MBBR basin is designed as per design parameters provided in CPHEEO Manual and provided with MBBR media for 25% of the volume. The MBBR basin is also provided with diffused aeration system for supply of organics take place. Excess aeration is provided for denitrification. The overflow from MBBR tank is allowed to settle in secondary clarifier. Secondary clarifier is designed as per norms provided in CPHEEO Manual. The over flow ie. Clarified sewage will be collected in

treated sewage tank. Disinfection is done by dosing 10 ppm of chorine by gas chlorinator and passed to polishing pond. The sludge from clarifier will be collected in sewage collection sump. Part of the sludge will be recirculated back to Anoxic tank. The remaining sludge will be pumped to centrifuge to sludge cake. The sludge cake can be used for gardening.

Figure.9: Schematic process flow diagram with treatment units proposed.



The National Green Tribunal, New Delhi in its order O.A.No.1069 of 2018 dt.30.04.2019 recommended thereviseddischarge standards for STP.Based on this NGT order the Functional design is revised by Contractor. The revised Functional design has been approved by TWAD Board on 04.09.2021. The assimilative capacity study and downstream users are identified and included as part of the detailed design of the STP. The contractor would carry out monitoring of the Palarriver as in the monitoring plan in this IEE.Water balance on wastewater treatment has been developed by the STP contractor in the functional design. The water balance on waste water treatment is 16.71 MLD.. Upon finalization, this re-use of treated water will be managed by the municipalityin consultation with common effluent treatment plant (CETP) owners since they requested Ambur Municipality to provide 3MLD of treated water for the tanneries and balance treated effluent will be discharged into the Palarriver through open earthen channel.One of the critical aspects in STP operation is, change in raw sewage characteristics at inlet of STP may affect the process and output quality. The system is designed for municipal wastewater, which does not include industrial effluent. Existing tannery units have own CETPs where the tannery effluent is treated. Hence Tannery effluent is not envisaged to be mixed with domestic sewage. The sewer network is also designed to prevent connection of industrial discharges.

63. The following measures are suggested to safeguard sewerage system efficiency after commissioning of the scheme:

(i) No industrial wastewater shall be allowed to dispose into municipal sewers;
(ii) No domestic wastewater from industrial units shall be allowed into municipal sewers;
(iii) Ensure that there is no illegal discharge through manholes or inspection chambers;
(iv) Conduct public awareness programs; in coordination with TNPCB; and
Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with the standards.

64. An area of 2.555 acres is allocated for the proposed STP, while the land requirement is about 1.26 acres and the balance land is to be used for ultimate stage expansion. This land is located in the northern periphery of Ambur town, surrounded bytanneriesburialground(at a distance of 30m across the road),Palar river and agricultural lands. Predominant wind direction in Ambur is southwest. Besides operating the STP as per the operating procedures, which will further minimize the odor potential, a green buffer zone of 15-20 m wide will be provided all around the STP with trees in multi-rows and land scaping. This will act as a visual screen around the facility and will improve the aesthetic appearance. Minimum quanity of Treated wastewater will be used for landscapingand 3 MLD of treated water is requested by tannery units. This re-use of treated water will be managed by Municipality/CETP owners in future.Balance treated water will be disposed into the Palar river through open earthen channel.

65. Sewage sludge generally consists of organic matter, pathogens, metals and micro pollutants. The concentration of parameters such as metals can be influenced by input to the sewers system from industry. Since no industrial wastewater is allowed into sewers, it is unlikely that sludge contains heavy metals. The sludge will be collected in sludge sump and conveyed to centrifuge for dewatering. The sludge in the form of a wet cake will be further air-dried in the sludge drying beds. The treatment and drying processes kill enteric bacteria and pathogens, and because of its high content of nitrates, phosphates and other plant nutrients the sludge is an excellent organic fertilizer for application to the land. Adequate drying is however necessary to ensure maximum kill of enteric bacteria. A sludge management plan will be developed by the STP facility designer.The dried sludge cakes from the Centrifuge will be used for gardening as

manure and the excess dried sludge may be disposed in the waste disposal site in Tharuvazhi at a distance of around 4 km from the STP site, in consultation with Ambur town. Sludge shall be periodically tested for presence of heavy metals. Proper sludge handling methods should be employed. Personal protection equipment (PPE)will be provided to the workers.

66. Dried and properly composted sludge can be used as soil conditioner. In case of reuse of sludge, periodic testing of dried sludge will be conducted by the Contractor to ensure that it does not contain heavy metals that make it unsuitable for food crops.Tests will be conducted to confirm the concentrations below the following standards. As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste Management Rules, 2016have been adopted.Rulesstipulate that “In order to ensure safe application of compost, the following specifications for compost quality shall be met”:

Table 16:Standards for Sludge Reuse as Manure

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/cm3)		<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 P205) percent by weight, minimum	percent by weight	0.4	10.4
Total Potassium (as K20), percent by weight, minimum	percent by weight	0.4	-
Colour			
Odor		Absence of foul Odor	
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

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)
* 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.			

67. **Sewer system – collection and conveyance.** The sewerage system is designed as a separate system of sewage collection (i.e., caters only to domestic wastewater). Existing roadside drains in the project area cater to collection and conveyance of runoff during rains. The underground gravity sewers will carry sewage from households to the nearest lifting or pumping station, from where the sewage is pumped to the STP.To maximize the benefits as intended, the municipality will ensure that all existing septic tanks are phased out by bypassing the inlet and connecting the toilet discharge from each house directly to sewerage system.

68. Accumulation of silt in sewers in low areasover time, overflows, blockages, power outages, harmful working conditions for the workers cleaning sewers, etc., are some of the issues that are taken into consideration during the sewer system design. Measures such as the following are included in sewer system design to ensure that the system provides the benefits as intended:

(i) Limit the sewer depth where possible;
(ii) Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible);
(iii) 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);
(iv) In unavoidable cases, where sewers are to be laid close to storm water drains, appropriate pipe material shall be selected (stoneware pipes shall be avoided);
(v) For shallower sewers and especially in narrow roads, use small inspection chambers in lieu of manholes;
(vi) Controlled blasting would be undertaken in some stretches where hard rock is encountered based on thesite conditions.For the safety of humans and the structures within the area influenced by the blasting, the vibrations related impacts would be addressed by designing the blast charge by complying with the provisions elaborated in the applicable Indian regulations and standards. All records shall be maintained by the Contractors and PIU. Training related to controlled blasting activity will be included in the overall safeguards training programme meant for PIUs and Contractors.
(vii) Design manhole covers to withstand anticipated loads and ensure that the covers can be readily replaced if broken to minimize silt/garbage entry; and
(viii) Ensure sufficient hydraulic capacity to accommodate peak flows and adequate slope in gravity mains to prevent build-up of solids and hydrogen sulphide generation.

69. **Sewage Pumping stations and lift stations.** It is proposed to construct twosewage lift stations, and twosewage pumping stations, which will receive sewage from the catchment area via the sewer network and pump to higher level manholes or pumping stations or to STP as per the design. Lift stations are necessitated where in the design the depth of sewer exceeds the

downstream interlinking manhole invert levels. Attempts to eliminate lift stations by examining the feasibility of providing rider mains are assessed to be uneconomical. Therefore, in such situations, the feasible and practical solution was to opt for a low capacity lift station with submersible pumps to lift and convey the collected sewage from peripheral areas to the downstream system through a bell-mouth chamber.

70. Lift stations will cater to small area, and will be located at lowest point where the sewage from catchment area will be collected, and then pumped to a higher level manhole for further gravity flow or to a pumping station, from where it is ultimately pumped to the STP. Lift station consists of a sewage sump or suction well with requireddiameter and depth, below the ground, to receive sewage, submersible pumps in the sump to pump out, and an electrical panel board for operation of pumps above the ground. A generator set will also be provided at each lift station of required size.No hard rock found in Lift stations sites. .

71. **Sewage pump stations**will also perform same function as sewage lift stations but cater to much larger area or sewage flow, and will also have several components, and occupy comparatively larger area. No hard rock found in Pumping stations sites. Components of sewage pumping station include:

(i) Screen well;
(ii) Grit well;
(iii) Suction well;
(iv) DG set platform; and
(v) Pump room.

72. At the these pumping or lifting stations, the operation involves accumulation of incoming sewage in the suction well, and then pumping out as the sewage level reaches the designed pumping depth. The water level in the well rises up before the pumping cycle starts, and as the pumping is performed the water level goes down, registering its lowest depth at the end of pumping of cycle. This cycle of rising and lowering will continue throughout the day and night, however, the duration between successive pumping cycles will significantly vary depending on the sewage generation. During morning and evening peak hours, sewage will accumulate quickly, and pumping frequency will be high. The sewage retention time in the suction well therefore varies throughout the day, with very high retention periods during the nights and mid-days.

73. **Odor from pump and lift station.** In the suction wells, the sewage emits gases, which accumulated in the air above water surface. The gas may include odorous compounds like hydrogen sulphides (H_2S), amines, fatty acids, aldehydes, ketones and other volatile organic compounds (VOCs). As the water level rises before the pumping cycle, it physically displaces the air, along with the odorous gas compounds. H_2S is the most dominant odor causing compound, and therefore can cause nuisance to nearby households.Developments are located at a distance of 35m from Pumping stations in the Northwest direction. If the wind direction is towards Southwest it doesnot create any nuisance since it is vacant area. When sewage becomes stagnant, H_2S is generated in the anaerobic conditions. The quantum of H_2S generation depend on quantity of accumulated sewage and sewage retention time that create anaerobic conditions. Both increase in quantity of sewage accumulation and retention time will increase the H_2S generation. Designconsiderations are included to minimize the both as much as possible. Pumping stations cater to large area and will have high capacity of suction wells and pump sets, while lift stations are small with lower capacity of suction wells and pumps sets. The retention time is kept to its lowest possible so that there is no stagnation of sewage for long

time which could create anaerobic conditions. The retention time for the pumping/liftingstations is 10minutes. Necessary DG set arrangements are made in every pumping/lifting stations.

74. Given that lifting stations and pumping stations are to be located at technically feasible locations (e.g., lowest point to where sewage can be conveyed from households by gravity) within or close to the residential areas which are being served by respective pumping/lifting station. Given the very limited land availability in urban areas like the project area, that tooofgovernment-owned lands, locating the pumping stations ideally about 50-100 m away from the houses is not practical. InAmbur, sites for pumping stations were identified based on the technical suitability and availability of government owned land parcels to avoid land acquisition.Priority is to locate pumping stations away from houses and in sparsely populated areas.

75. The following design-related measures are included in the sewage pumping and lifting station design. Odor potential of lifting stations is very minimal given small scale operation, however, given close location to houses, design related measures as given below are included.

1. Layout planning related measures

(i) Siting of sewage pumping and ligting stations within the identified site at an internal location as far as possible from any residential buildings;

(ii) Develop green buffer zone around the facilities with a combination of tall and densely growing trees in multi rows to a width of 3mfor 300sqm approximately in each pumping stations to control odorand also act as visual shield, and improve aesthetical appearance; and

(iii) Provision of 2.0m height compound wall.

2. Design related measures to prevent and control odor from pumping/lifting station operations

(i) Proposed sewage pumping and ligting stations to be closed using reinforced cement concrete (RCC) slabs. Design of RCC slab to consider both superimposed loads (human and equipment loads) and severe corrosion risk from sewer gas from within wells;

(ii) RCC slab to be designed and fixed in a modular manner such that access to pumps/appurtenances and other equipment can be provided for maintenance/replacement/renewal purposes;

(iii) Since human intervention is involved and safety shall be primary and critical consideration, additional protection by way of a metalled grating/grill work shall be provided over the sections (or full cross section if required) where workers will stand/work for inspection and repair/O&M purposes;

(iv) Provision of passive gas ventilation arrangement by providing a take-off vent from top of well by positioning vent in such a way that cover slab fitment/movement/drawl if required for maintenance purposes is not compromised;

(v) Height of vent to be provided appropriately and a minimum 2 m above the lintel level (top level) of window(s)/passageways/doors in the nearby adjoining buildings;

(vi) Provision of odor control/mitigation system as per site conditions/requirements.Suitable granular activated carbon (GAC) filter with bird-screen fitted at the vent outlet to control odor. Size of GAC (including material size) should be selected based on the vent diameter

and expelled air flow rate expected;

(vii) Submersible sewage pumps of suitable rating, minimum submergence requirements, open impeller with cutting-tearing arrangement and high strength-corrosion resistant heavy duty construction shall be proposed;

(viii) In locations/cases where sewage flow in the present to intermediate design stage is envisaged to be low, position of the submersible pumps and design of the collection well floor by providing necessary side benching/sloped flooring to allow for higher submergence during low flow shall be made to ensure regular pump operation and avoid sewage stagnation beyond the permissible limit;

(ix) Diesel generators shall be provided for all pump stations and in cases of lift stations with space for control room. In cases of lift manholes (road-side or road-center type structures with only provision of kerb-side kiosk), an electrical cut-out provision shall be made for connecting an emergency mobile/skid mounted diesel generator for pumping out during electric supply interruption;

(x) Develop standard operating procedures/operational manual for operation and maintenance of lifting and pump stations; this shall include measures for emerge situations;

(xi) Provide training to the staff in standard operating procedures (SOP) and emergency procedures; and

(xii) Periodic monitoring of H_2S levels at sewage pumping and lifting stations using handheld H_2S meters.

3. Provision of odor treatment system. Besides the above measures, following odor control and mitigation measures are consideredat all sewage pumping and lifting stations, for facilities located very close to the houses/properties:

(i) Provide closed wells fitted with necessary ventilation wherever required;

(ii) Provide greenbelt (tree cover) around the pumping station to a width of 3m for 300sqm approximately, and

(iii) A suitable arrangement such to capture the gaseous emissions from the wells and treat via scrubber/activated carbon filter before letting out into the ambient air; such system should be designed appropriately to meet the likely emissions/flow rate of respective pumping / lifting stations.

(iv) Developing Green belt around STP for a width of 3m in multiple rows for an area of about 1000sqm.

(v) Necessary H_2S monitoring will be carried out after commencement of project by PMU.

76. **Noise from pumping operations.**Operation of pumps and motors and diesel generators is a major source of noise. As the pumping and lifting stations are located in the residential areas, noise control measures are necessary. High noise levels can affect the health of operators and staff at the facilities, and therefore, noise levels needs to be maintained within and outside the plant at acceptable levels. Internal noise level in a room will be maintained as per standards.

(i) Procure good quality latest technology high pressure pumps that guarantee controlled noise at a level of around 80 dB(A) at a distance of 1 m;[5]

[5] Indian Standards require to maintain the noise level of 70 dBA or less during night time. However, in case of STPs/WTPs/water supply head works, where heavy duty pump sets are to be installed and the noise levels may

(ii) Use appropriate building materials and construction techniques for pump houses which can absorb sound rather than reflect noise;
(iii) Use acoustic enclosures – manufacturer specified, for all pumps, motors;
(iv) Procure only Central Pollution Control Board (CPCB) approved generators[6] with low emission and low noise fitted with acoustic enclosures;
(v) Provide sound mufflers for ventilators in the plant rooms;
(vi) Provide sound proof doors; and
(vii) Provide ear plugs to workers.

77. To optimize the power consumption, the hydraulic design shall follow optimal approach, and the following alsoconsidered in design and selection of pumping systems. According to Manual for the Development of Municipal Energy Efficiency Projects in India (jointly developed by Bureau of Energy Efficiency [BEE] and International Finance Corporation in 2008), energy savings, at minimum, of 25% to 40% is possible with appropriate measures.The following measures considered and incorporated into the subproject designs:

(i) Using low-noise and energy efficient pumping systems;
(ii) Efficient Pumping system operation; and
(iii) Installation of Variable Frequency Drives (VFDs).

78. **Tree cutting at selected project sites.**There is no live trees in the STP & Pumping station sites and found some trees at the boundary of the STP site layout and no need to cut those trees while execution of the work. Hence there will not be any tree cut in the STP& Pumping Station sites. Sewers are proposed within the roads, and therefore no tree cutting envisaged. Following measures would be considered in the unlikely event of cutting trees:

(i) .
(ii) Obtain prior permission for tree cutting; and
(iii) Plant and maintain number of trees specified in the tree cutting permissions or 10 trees (whichever is higher) for each tree that is removed.

79. **Utilities.** Telephone lines, electric poles and wires, water lines, drains, if exists within the project locations may require to be shifted. All the selected project sites are vacant landsand there are no notable existing utilities.Main pumping station(MPS) and STP sites wereprivately owned landspurchased by Ambur municipality from the private owner. Sewer lines are proposed within the right-of-way for the roads, where there are no utilities. In the outer areas where there is adequate earthen shoulder along the road carriage way, sewer lines can be accommodated in the shoulder. In such cases, the work may require shifting of utilities on the shoulder. To

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even exceed 80 decibels at 1 m distance, noise level will be measured at the time of commissioning the units and necessary mitigation measures such as noise barriers will be installed if required.

[6]CPCB has published Genset notifications, which includes specification for emission limits for new Diesel Engines (upto 800KW) and Noise limits for Generator sets with Diesel as Fuel type

Emission limits for DG's

POWER RANGE	HC+ NO_X	CO	PM	SMOKE
	g/kWh			m^{-1}
Up to 19 kW	7.5	3.5	0.3	0.7
>19 kW Up to 75 kW	4.7	3.5	0.3	0.7
>75 kW Up to 800 kW	4.0	3.5	0.2	0.7

Noise limit shall not exceed 75 dB (A) at 1m distance.

The generators that are in line with the specifications shall be procured. The requirement for the same is specified in the BoQ that are to be monitored to ensure that generation of noise and potential deterioration of ambient air quality will be avoided.

mitigate the adverse impacts due to relocation of the utilities, the contractor, in collaboration with the Municipality will:

(i) identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase; and
(ii) instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

80. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** Priority is to locate these near the project location. However, if it is deemed necessary to locate elsewhere, sites to be considered will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered for setting up construction camps to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposal of construction debris/ construction wastes near water bodies,or other environmentally sensitive areas.

81. **Site selection of sources of materials.** Significant quantities of coarse aggregate and fine aggregate will be required for construction works. Contractor should procure these materials only from the quarries permitted/licensed by DepartmentofGeology and Mining and compliant with environmental regulations of India.Contractor should, to the maximum extent possible, procure material from existing quarries, and creation of new quarry areas should be avoided as much as possible. If new quarries are required then the contractor will be responsible for obtaining all permissions and clearances,including environmental clearance for mining. It will be the construction contractor's responsibility to verify the suitability and legal status of all material sources and to obtain the regulatory approvals of relevant authoritie as applicable..

82. **Social and Cultural Resources – Chance Finds.** Any work involving ground disturbance can uncover and damage archaeological and historical remains. For this project, excavation will occur in project sites for foundations, laying pipelines, and for construction of underground structures at pumping/lifting stations and at STP.There are no archeologically or historically recognized sites or places close to project sites or within the project area. Therefore it is not likely that the project sites contain any archaeological or historical remains, and risk of uncovering them is very low. Nevertheless, Municipality will follow chance finds protocol to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved:

(i) Construction contractors to follow these measures in conducting any excavation work;
(ii) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work;
(iii) Stop work immediately to allow further investigation if any finds are suspected; and
(iv) Inform State Archaeological Department if a find is suspected, and taking any action they require to ensure its removal or protection in site.

B. Construction Impacts

83. Main civil works in the subproject include construction of sewage treatment plant, sewage pumping and lifting stations at the identified sitesand the excavation by controlled blasting technique for sewer lines in some specific areas.These works will be confined to sites,

and construction will include general activities like site clearance, excavation for foundations, and creation of concrete structures will be one of the major construction activities for this project, as many of the subproject components will be fixed to concrete plinths and most will be housed in buildings with at least some concrete structural elements. Most such structures will be constructed from RCC, where steel reinforcing rods and bars are placed and tied manually to create an interior skeleton for the foundations, walls, columns, plinths, etc., and heavy-duty metal and timber/plywood formwork is bolted around the outside to build a mould into which pre-mixed concrete is poured. Once the concrete has set, the formwork is removed, and the concrete surface is finished by masons if necessary.Some buildings, such as the pump station, facilities, etc., may be constructed from brick work, in which case this work will be done using standard house-building techniques.

84. Technical components of the STP comprise a variety of pre-fabricated elements, which are installed on site as ready-made individual units. These will be directly brought from the manufacturers place to the sites,lifted into position by crane, affixed to plinths or other installation points, and connected up to pipework and theelectricalsupply.

85. Since these works are confined to the boundary of identified sites, there is no direct or significant interference of construction work with the surrounding land use. However, construction dust, noise, use of local roads for transportation of construction material, waste, labour camps etc., will have negative impacts, which needs to be avoided or mitigated properly.

86. Subproject also includeslinear works (laying of 112.5 km sewers along the roads). This covers almost entire project area of Ambur town, and sewers will be laid along almost all the roads. Small sewers (tertiary sewers) that collect sewage from households will be laid in all streets and roads, the larger sewers that collect sewage from tertiary sewers and convey to pumping stations and STP will be laid mostly on wider main roads. Sewers will be laid by open cut method.

87. Open cut trenching method of sewer laying involves trench excavation in the road, placing sewers in the trench, jointing and testing, and refilling with the excavated soil. Proposed pipes for tertiary sewers are double wall corrugated (DWC) pipes and conveying mains (pumping mains) are of cast iron. The diameter of sewer ranges from 150 mm to 900 mm, of which nearly 93% of the sewers are of size between 150 mm and 250 mm. According to the design the sewers will be laid at a depth of 1 to 8 m. The width of the trench excavation along the roads will vary from 0.8 m to 1.4 m, and the depth varies from a minimum of 1 m to 8 m. Nearly 95% length of sewers will be laid in trench of depth 5 m or less, and there are very few sewers that will be laid in a trench of more than 5m deep (4.35% sewers only).The design is optimized to minimize the sewer depth to the extent possible with an optimal combination of sewer depth and pumping requirements. Details of sewer construction are provided in the following table.

Table 17:Sewer construction

Types of Pipe	**Length**	
uPVC		
200 millimeter (mm)	86881	m
double wall corrugated (DWC)		
200 mm	7498	m
250 mm	1254	m

300 mm	774	m
CI LA CLASS S/S PIPE		
250 mm	1446	m
300 mm	1084	m
350 mm	644	m
400 mm	779	m
450 mm	460	m
500 mm	1874	m
600mm	2622	m
700 mm	1562	m

88. Earthwork excavation will be undertaken by machine (backhoe excavator) and include danger lighting and using sight rails and barricades. The work will also be supplemented manually where there is no proper working area (e.g., very narrow streets) for the backhouse excavators. In deeper trenches there is risk of collapse of trenchesand/ordamage to surrounding buildings, safety risk to pedestrians and traffic.Necessary precautions such as bracing/shoring in the trench will be provided for trenches. The normal working hours will be 8 hours daily, the total duration of each stage depends on the soil condition and other local features. Excavated soil will be used for refilling the trench after placing the sewer and therefore residual soil after pipe laying and refilling is not significant. Total earthwork excavation will be over 136,013.58cubic meters (m^3), of which nearly 85% will be reused, and the remaining excess soil needs to bedisposed.The excess material can will be disposed in a waste disposal site in Tharuvashi operated by the ULB. The disposal site has been approved and permitted by TNPCB.Some sections of the alignment are identified with hard rock and hence controlled blasting is proposed in such locations for excavation. Necessary statutory permisssionswere obtained for undertaking controlled blasting and necessary precautions will be carried out to prevent safety risk to both public and nearby structuresas provisioned in the prevailing Indian regulations and standards.

89. Although sewer laying work involves quite simple techniques of civil workexcept the stretches where controlled blasting is proposed, the invasive nature of excavation in the urban areawhere there are a variety of human activities, will result in impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are temporary and for short duration, however, needs to be mitigated.

90. Sewers will extend to all residential and developed areas, while large diameter sewers will be laidmostlyalongthe proposed trunk mains alignment in each zone.

91. Anticipated impacts during the construction phase are discussed below along with appropriate mitigation measures to avoid, minimize or mitigate those impacts to acceptable levels.

92. **Sources of Materials.** Significant amount of sand andcoarse aggregate will be required for this project, which will be sourced from quarries. Quarries inevitably cause extensive physical changes; as construction materials are excavated from the ground, leaving large cavities, or levelling hillsides, etc. The physical damage caused by quarries is controlled by allowing them to operate within specific limited areas only, so the damage is restricted in extent and not allowed to spread indiscriminately. New quarries are subject to a rigorous process of

environmental assessment to ensure appropriate siting and adequate environmental controls on the operation. It will therefore be important to ensure that construction materials for this project are obtained from government approvedlicensed quarries only that are compliant with environmental regulations of India, to ensure these controls are in place. In Ambur, construction sand is normally obtained from Pernampattu (about 30 km), and gravel and aggregate is available locally in Minnur and just 5 km away from Ambur.Contractorshould avoid new borrow pits/quarries as far as possible, if necessary, all the permissions, including conduct of environmental assessment, and environmental clearance as necessary shall be obtained prior to start of quarrying activity. The contractor should also make a concerted effort to re-use as much excavated material from this project as possible. The construction contractor will be required to:

(i) Obtain construction materials only from government approved quarrieshaving requisite environmental permissionswith prior approval of PIU;
(ii) PIU to review, and ensure that proposed quarry sources have all necessary regulatory clearances/ permissions in place prior to approval;
(iii) Contractor to submit to PIU on a monthly basis documentation on material obtained from each sources (quarry/borrow pit); and
(iv) Avoid creation of new borrow areas, quarries, etc., for the project; if unavoidable, contractor to obtain all clearances and permissions as required under law, including Environmental Clearance prior to approval by PIU.

93. **Air Quality.**Construction work, especially from earthwork activities including controlled blasting works, coupled with dry and windy working conditions, material and debris transport, and works along the public roads carrying significant traffic, have high potential to generate dust. Significant quantities of earthwork will be conducted in the subproject, spread all over the project area. Over 136,013.58m^3 of earthwork is anticipated from the subproject, and 85% of which will be reused for filling the trenches. Also emissions from construction vehicles, equipment, and machinery used for excavation and construction will induce impacts on the air quality. Anticipated impacts include dust and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons. Dust generation from construction work in individual and confined work sites like STP, pumping stations, etc., will be mainly during the initial construction phase of earth work, as the site is confined, dust can be effectively controlled with common measures. While pumping and lifting stations are located within residential neighbourhoods, STP is located outside the Municipality, away from habitation area. Dust generation will be significant during sewer laying along the roads.Increase in dust/particulate matter in ambient air is detrimental,and may have adverse impacts on people and environment. To mitigate the impacts, construction contractors will be required to:

1. For all construction works

(i) Provide a dust screen around the construction sites of pumping and lifting stations and STP;
(ii) Damp down the soil and any stockpiled material on site by water sprinkling;
(iii) Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition;
(iv) Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process;
(v) Cover the soil stocked at the sites with tarpaulins;

(vi) Control access to work area, prevent unnecessary movement of vehicle, public trespassing into work areas; limiting soil disturbance will minimize dust generation;

(vii) Use tarpaulins to cover the loose material (soil, sand, aggregate etc.,) when transported by open trucks;

(viii) Control dust generation while unloading the loose material (particularly aggregate, sand, soil) at the site by sprinkling water and unloading inside the barricaded area;

(ix) Clean wheels and undercarriage of haul trucks prior to leaving construction site;

(x) Ensure that all the construction equipment, machinery are fitted with pollution control devises, which are operating correctly, and have a valid pollution under control (PUC) certificate; and

(xi) No vehicles or plant to be left idling at siteandgenerators to be at placed maximum distance from properties.

2. For sewerworks

(i) Inform the residents likely to be affected by the works in the locality about the upcoming sewer laying works well in advance so that necessary arrangements are planned by the residents with reduced inconvenience.

(ii) For sections where the controlled blasting is proposed, the residents are provided with the schedule of blasting at least three days in advance and the residents are explained about the preventive, precautionary, mitigation and emergency response measures being taken to address their concerns.

(iii) The project staff from the PIU, consultants and contractors would undertake a survey of structures (including videography and/or photography) lying within the area of influence of blasting from the vibrations related impacts (preferably in the presence of the owners of the said structures) during pre- and post-blasting situations to assess and/or ascertain regarding the damages, if any, caused to the structures because of blasting activities.

(iv) Barricade the construction area using hard barricades (of 2 m height) on both sides;

(v) Initiate site clearance and excavation work only after barricading of the site is done;

(vi) Confine all the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.,) to the barricaded area;

(vii) Limit the stocking of excavated material at the site sufficiently away from the edges of excavated trench; remove the excess soil from the site immediately to the designated disposal area;

(viii) Undertake the work section wise: a 500m minimum section should be demarcated and barricaded; open up several such sections at a time, but care shall be taken to locate such sections in different zones;

(ix) The section proposed for blasting shall be supervised by properly trained staff toensure no movement of pedestrians, motorized or non-motorized vehicles, andresidents takes place during blasting within the area of influence.

(x) For sections involving controlled blasting, ensure that dust curtains of adequate height are provided to the trenches to prevent emission of dust during drilling for charge holes and controlled blasting.

(xi) Ensure that the excavated soil and debris along the section identified for blasting is sprinkled with adequate water prior to blasting to reduce dust emissions upon explosion of charge placed for breaking the hard rock;

(xii) Ensure that adequate precautions are taken to avoid flying debris post blasting (such as covering the trench with sturdy metallic sheets having sufficient weights to absorb the blast waves);

(xiii) Conduct work sequentially - excavation, sewer laying, backfilling; testing section-wise (for a minimum length as possible) so that backfilling, stabilization of soil and restoration of UGD cutting portion can be done immediately after work is completed;

(xiv) Remove the excavated soil of first section to the disposal site; as the work progresses sequentially, by the time second section is excavated, the first section will be ready for backfilling, use the freshly excavated soil for back filling, this will avoid stocking of material, and minimize the dust; and

(xv) Backfilled trench at any completed section after removal of barricading will be the main source of dust pollution. The traffic, pedestrian movement and wind will generate dust from backfilled section. Road restoration shall be undertaken immediately.

94. **Immediate road restoration after refilling the trench.** Excavation and refilling activities disturb the top soil, and under the influence of wind, traffic, pedestrians, and other activities, etc., produces dust. There is large potential to generate significant quantities of dust after refilling the trench, and prior to road relaying. It is a common practice not to restore the road immediately after refilling the trench so as to allow sufficient time for the refilled material to stabilize naturally. Given the dry and windy conditions, and heavy traffic and other activities along the roads, the refilled trenches with loose top soil along the roads will generate maximum dust, and create very unhealthy conditions. Moreover, as the barricades/dust screens will removed after the trench is refilled, there will be absolutely nothing to control the dust generation. Dust control activities like wetting of top soil will not be effective given the site conditions. It is therefore necessary to restore/relay the road surface immediately or take suitable steps to arrest the dust. Soil consolidation technique shall be used so that road can be restored immediately.

95. Immediately consolidate the backfilled soil and restore the road surface; if immediate road restoration is not possible, provide a layer of plain cement concrete (PCC) of suitable mix on the backfilled trench so that dust generation, erosion is arrested and it will also provide a smooth riding surface for the traffic until the road is properly restored. Backfilled trench without any road restoration is a major source of dust and this shall be avoided.

96. **Surface Water Quality.**Run-off from stockpiled materials and chemicals from fuels and lubricants during construction works can contaminate water quality of the receiving water bodies and streams/rivers.Project area receives rainfall in southwest and northeast monsoon seasons, between June/July to November/December. Construction contractor will be required to:

(i) All earthworks be conducted during the dry season to prevent the problem of soil/silt run-off during rains;

(ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;do not stock earth/material close to edges of the trenches and the at least 100m away from the water bodies.

(iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, only designated disposal areas shall be used;
(iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
(v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
(vi) Store fuel, construction chemicals, etc., on an impervious floor, also avoid spillage by careful handling; provide spill collection sets for effective spill management;
(vii) Dispose any wastes generated by construction activities in designated sites; and
(viii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

97. **Surface and Groundwater Quality.** Another physical impact that is often associated with excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. In the project area, groundwater table is much deeper than the anticipated excavation depth and therefore this impact is not envisaged. However during the rains, water will be collected in open pits and trenches. The water collected in excavated pits will contain silt and disposal of this in drainage channels lead to silting. To avoid this the contractor needs to implement the following measures:

(i) As far as possible control, the entry of runoff from upper areas into the excavated pits, and work area by creation of temporary drains or bunds around the periphery of work area;
(ii) Pump out the water collected in the pits/excavations to a temporary sedimentation pond; dispose off only clarified water into drainage channels/streams after sedimentation in the temporary ponds; and
(iii) Consider safety aspects related to pit collapse due to accumulation of water.

98. **Generation of Construction Wastes.** Solid wastes generated from the construction activities are excess excavated earth (spoils), discarded construction materials, cement bags, wood, steel, oils, fuels and other similar items. Domestic solid wastes may also be generated from the workers' camp. Improper waste management could cause odor and vermin problems, pollution and flow obstruction of nearby watercourses; and could negatively impact the landscape. In Total earthwork excavation, nearly 95% of soilwill be reused, and the remaining of soil needs to be disposed safely. The following mitigation measures to minimize impacts from waste generation shall be implemented by the contractor:

(i) Prepare and implement a Construction Waste (spoils) Management Plan (format is given in Appendix 3);
(ii) As far as possible utilize the debris and excess soil in construction purpose, for example for raising the ground level or construction of access roads, etc.;
(iii) Avoid stockpiling any excess spoils at the site for long time. Excess excavated soils should be disposed off to approved designated areas immediately;
(iv) If disposal is required, the site shall be selected preferably from barren, infertile lands; sites should be located away from residential areas, forests, water bodies and any other sensitive land uses;
(v) Domestic solid wastes should be properly segregated in biodegradable and non-biodegradable for collection and disposal to designated solid waste disposal site; create a compost pit at workers camp sites for disposal of biodegradable waste; non-biodegradable / recyclable material shall be collected separately and sold in the local recycling material market;

(vi) Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposedoff in disposal sites approved by TNPCB;
(vii) Prohibit burning of construction and/or domestic waste;
(viii) Ensure that wastes are not haphazardly thrown in and around the project site; provide proper collection bins, and create awareness to use the dust bins; and
(ix) Conduct site clearance and restoration to original condition after the completion of construction work; PIU to ensure that site is properly restored prior to issuing of construction completion certificate.

99. **Noise and VibrationLevels.**Whilepumping and lifting station sites are located in predominantly urban and suburban areas, MPS and STP is located at theboundaryof Municipalitynear Palarriver.Sewer lines are spread over entire project area. Except STP, all these sites are located close to habitation areas, where there are houses, schools and hospitals, religiousplaces,and businesses.Increase in noise level may be caused by excavation, particularly breaking of cement concrete or bitumen roadsand controlled blasting for hard rocks along the alignment for laying of sewers, operation of construction equipment, and the transportation of equipment, materials, and people. Vibration generated from construction activity, for instance from the use of explosives for controlled blasting and pneumatic drills, will have impact on nearby buildings. This impact is negative,short-term, and manageable by mitigation measures. The construction contractor will be required to:

(i) Plan activities in consultation with PIU so that activities with the greatest potential to generate noise and vibrations such as controlled blasting are conducted during periods of the day which will result in least disturbance;especially near schools, hospitals, religious places, courts and other sensitive receptors.
(ii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimise sound impact to surrounding sensitive receptor;
(iii) Maintain maximum sound levels within the limits as prescribed by the prevailing Indian regulations and standards;;
(iv) Ensure to conduct a pre-blasting survey through videography and photography of residential properties and other structures falling along the sewerage alignment including pump/lift stations to ascertain the prevailing conditions of the structures likely to be impacted by the controlled blasting and take adequate measures to minimise such impacts.
(v) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle’s approach; and
(vi) Consult local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.
(vii) All the controlled blasting,shall be done by an approved and licensed Explosive contractor after submitting a blasting plan to PIU.

100. **Accessibility and Traffic Disruptions.**Excavation along the roads for laying of sewers, (especially controlled blasting)hauling of construction materials and operation of equipment on-site will cause traffic problems. There are twotypes of roads/highways in the project area that provide regional connectivity: national highway (NH), state highway (SH). Sewers are proposed along:

(i) NH48 (Chennai-Bangalore Highway); and
(ii) SH130A (Ambur-Pernampattu Bypass-Road).

101. National highway and state highways carry considerable traffic.Sewers will also be laid along the internal main roads that provide connectivity within the Municipality. These roads also carry considerable flow of traffic and are centres of commercial activities. Internal roads in the project area are narrow, except in the newly developing residential layout which comparatively have wide roads.

102. As the sewer lines are proposed to be laid within the road carriage way, it will disrupt the traffic in one-traffic lane. In the narrower roads, sewers will be laid in the center of the road, and therefore during the work traffic movement will be mostly disrupted.

103. Works related to all the remaining components (lifting/pumping stations and STP) will be confined to the selected sites, therefore there is no direct interference of these works with the traffic and accessibility.

104. Hauling of construction material, equipment, construction waste, etc., to and from the work site may increase the road traffic on local roads.This will further inconvenience the local community and road users. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

1. Sewer works

(i) Prepare a sewer work implementation plan in each zone separately and undertake the work accordingly; ensure that for each road where the work is being undertaken there is an alternative road for the traffic diversion; take up the work in sequential way so that public inconvenience is minimal;

(ii) Plan the sewer work in coordination with the traffic police; provide temporary diversions, where necessary and effectively communicate with general public;

(iii) Avoiding conducting work in all roads in a colony at one go; it will render all roads unusable due to excavations at the same time, creating large scale inconvenience;

(iv) Undertake the work section-wise: a 500section should be demarcated and barricaded; open up several such sections at a time, but care shall be taken to locate such sections in different zones;

(v) Confine work areas in the road carriageway to the minimum possible extent; all the activities, including material and waste/surplus soil stocking should be confined to this area. Proper barricading should be provided; avoid material/surplus soil stocking in congested areas – immediately removed from site/ or brought to the as and when required;

(vi) Limit the width of trench excavation as much as possible by adopting best construction practices; adopt vertical cutting approach with proper shoring and bracing; this is especially to be practiced in narrow roads and deeper sewers; if deep trenches are excavated with slopes, the roads may render completely unusable during the construction period;

(vii) Leave spaces for access between mounds of soil to maintain access to the houses / properties; access to any house or property shall not be blocked completely; alternative arrangements, at least to maintain pedestrian access at all times to be provided;

(viii) Provide pedestrian access in all the locations; provide wooden/metal planks over the open trenches at each house to maintain the access.

(ix) Inform the affected local population 1-week in advance about the work schedule;
(x) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum;
(xi) Keep the site free from all unnecessary obstructions;
(xii) Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. Provide information to the public through media – newspapers and local cable television (TV) services; and
(xiii) At work site, public information/caution boards shall be provided including contact for public complaints.
(xiv) For sections where the controlled blasting is proposed, the residents are provided with the schedule of blasting at least three days in advance and the residents are explained about the preventive, precautionary, mitigation and emergency response measures being taken to address their concerns.
(xv) The contractor in coordination with the urban local body officials would conduct pre- blasting physical surveys through videography and photography of the adjacent residential properties and other structures along the sewerage alignment and take adequate measures to minimise such impacts.

2. Hauling (material, waste/debris and equipment) activities

(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
(ii) Schedule transport and hauling activities during non-peak hours;
(iii) Locate entry and exit points in areas where there is low potential for traffic congestion;
(iv) Drive vehicles in a considerate manner; and
(v) Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.
(vi) For controlled blasting, required quantity of explosives shall be transported to the blasting site only through suitable explosive vehicle. After blasting is over, the balance explosives shall be returned to the licensed storage.

105. **Socio-Economic – Income.**Sites for all projects components are carefully selected avoidingrequirement for land acquisition or any resettlement.Blocking of access to the business / livelihood activities, especially during pipeline laying along the roads, may impact the income of households. However, given the alignment of pipeline within the road carriageway, and also the measures suggested for ensuring accessibility during sewer works, no notable impact is envisaged. Some shops and other premises along the roads may lose business income if the access will be impeded by excavation of trenches, the presence of heavy vehicles and machinery, etc. Access disruption to hospitals, socio cultural places etc., will inconvenience public. Implementation of the following best construction measures will avoid the disturbance reduce the inconvenience and disturbance to the public. Resettlement and social issues are being studied in a parallel resettlement planning study of this subproject.

(i) Inform all businesses and residents about the nature and duration of any work well in advance so that they can make necessary preparations;

(ii) Do not block any access; leave spaces for access between barricades/mounds of excavated soil and other stored materials and machinery, and providing footbridges so that people can crossover open trenches;
(iii) Barricade the construction area and regulate movement of people and vehicles in the vicinity, and maintain the surroundings safely with proper direction boards, lighting and security personnel – people should feel safe to move around;
(iv) Control dust generation;
(v) Immediately consolidate the backfilled soil and restore the road surface;this will also avoid any business loss due to dust and access inconvenience of construction work;
(vi) Employee best construction practices, speed up construction work with better equipment, increase workforce, etc., in the areas with predominantly commercial, and with sensitive features like hospitals, and schools;
(vii) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
(viii) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.

106. **Socio-Economic – Employment.** Manpower will be required during the 36-months construction stage. This can result in generation of temporary employment and increase in local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to employlocal labour force as far as possible.

107. **Occupational Health and Safety.** Workers need to be mindful of the occupational hazards which can arise from working in confined areas such as trenches, working at heights, near the heavy equipment operating areas,controlled blasting, etc. Potential impacts are negative and long-term but reversible by mitigation measures. The construction contractor will be required to:

(i) Follow all national, state and local environmental and labour laws (indicative list is inAppendix2);
(ii) Develop and implement site-specific occupational health and safety (OHS) Plan informed by OHS risk assessment seeking to avoid, minimise and mitigate risk,including controlled blasting actviity, which shall include measures such as: (a) safe and documented construction procedures to be followed for all site activities; (b) ensuring all workers are provided with and use personal protective equipment; (c) OHS Training[7] for all site personnel; (d) excluding public from the work sites; and (e) documentation of work-related accidents;followinternational standards such as the World Bank Group's Environment, Health and Safety Guidelines;[8]

[7] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

[8]http://www.ifc.org/wps/wcm/connect/a99ab8804365b27aa60fb6d3e9bda932/EHS-Guidelines+101-Webinar.pdf?MOD=AJPERES

(iii) Ensure that first-aidisavailableat all times. Equipped first-aid stations shall be easily accessible throughout the sites;
(iv) Secure all installations from unauthorized intrusion and accident risks;
(v) Provide Health and Safety orientation and training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
(vi) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
(vii) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
(viii) Ensure moving equipment is outfitted with audible back-up alarms;and blinkers.
(ix) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage(especially explosives) and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate;
(x) Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively;
(xi) Provide supplies of potable drinking water; and
(xii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances.

108. **Community Health and Safety.**Sewers worksanddeep excavations along the roads and narrow streets, and hauling of equipment and vehicles have potential to create safety risks to the community. Deep excavations without any proper protection may endanger the close by buildings. Hazards posed to the public, specifically in high-pedestrian areas may include traffic accidents and vehicle collision with pedestrians. Potential impact is negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

(i) Confine work areas; prevent public access to all areas where construction works are on-going through the use of barricading and security personnel;
(ii) Attach warning signs, blinkers to the barricading to caution the public about the hazards associated with the works, and presence of deep excavation;
(iii) Minimize the duration of time when the sewer trench is left open through careful planning; plan the work properly from excavation to refilling and road relaying;
(iv) Control dust pollution – implement dust control measures as suggested under air quality section;
(v) Ensure appropriate and safe passage for pedestrians along the work sites;
(vi) Provide road signs and flag persons to warn of on-going trenching activities;
(vii) Restrict construction vehicle movements to defined access roads and demarcated working areas (unless in the event of an emergency);
(viii) Enforce strict speed limit (20-30 kmph) for plying on unpaved roads, construction tracks;
(ix) Provide temporary traffic control (e.g. flagmen) and signs where necessary to improve safety and smooth traffic flow;
(x) Where traffic is diverted around crossings, traffic control or careful selection of the exit from the working areas will be provided with the aim of ensuring that vehicles join the road in a safe manner;

(xi) At sensitive locations particularly where there are schools and markets close to the road, awareness of safety issues will be raised through neighbourhood awareness meetings;
(xii) All drivers and equipment operators will undergo safety training; and
(xiii) Maintain regularly the construction equipment and vehicles; use manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.

123. Safety Measures for Controlled blasting during excavation: Presence of sub-surface rock (at a depth of 2 m whereas the sewer depth is in the range of 1.2-5.0 m) in the alignment has been identified in few locationsinAmbur Municipality. During excavation, alternatives like drilling and chiselling, controlled blasting etc have been examined and the suitable technology has been identifieddepending upon the site conditions. Wherever controlled blasting is proposed, the following measures shall be carried outfor execution in a safe manner.

(i) Carryout controlled blasting in consultation with PIU so that blasting activities with least vibration are conducted during periods of the day which will result in least disturbance; especially near schools and other sensitive receptors
(ii) The contractor shall submit a blasting plan in advance to PIU; and implement in accordance to the plan.
(iii) Permission has been obtained from the District Collector, Thirupattur for controlled blasting for excavation and the conditions issued shall be complied with during implementation (Permission letter enclosed in annexue).
(iv) Blasting shall be done through a licensed Explosive Contractor only.
(v) For controlled blasting, explosives including blasting caps, shall be transported to the blasting site only through exclusive vehiclein safemanner in accordance with the requirements of the blasting license. After blasting is over, the balance explosives shall be returned to the licensed storage.
(vi) Cost for implementation of mitigation measures and liability are the responsibility of contractor.
(vii) Proper prior notice will be issued to the Residents before Commencing UGSS activity works Schedule
(viii) Prior information will be Given to Police Officials
(ix) Workers (Flagman) shall be stationed on both end of roads to warn people before firing any blastsand not to permit the traffic.
(x) When blasting, ample warning shall be given to all persons within the vicinity prior to blasting. Warning signs shall be erected a minimum of 24 hours prior to the blast time.The warning signs will state the time and date of each blast.
(xi) Contractor shall ensure necessary precautions / protection (like excavated earth, sand-filled bags, etc) to reduce Ground Vibrations, , Reduce noise levels, etc. Sites shall be provided with necessary shields all around.
(xii) Minimum Explosive will be used for Control Blasting for Residential areas.
(xiii) After a blast has been fired, the Blast Control Specialist shall make a careful inspection to determine that all charges have exploded before employees are allowed to return to the operation..
(xiv) The contractor shall be responsible for any and all damage to property or injury to persons resulting from blasting or accidental or premature explosions that may occur in connection with his use of explosives. The contractor shall do the activities after obtaining the blasting permission from District Collector, Thirupattur.

(xv) For the diversion of traffic in the blasting area, the contractor shall prepare a traffic management plan and obtain permission from Ambur Municipality and traffic police.

124. **Construction Camps.**Contractor may require to set up construction camps – for temporary storage of construction material (sewer, cement, steel, fixtures, fuel, lubricants,explosives, etc.), and stocking of surplus soil, and may also include separate living areas for migrant workers. The contractor will however be encouraged to engage local workers as much as possible. Operation of work camps can cause temporary air, noise and water pollution, and may become a source of conflicts, and unhealthy environment if not operated properly. Potential impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

(i) Consult PIU before locating project offices, sheds, and construction plants;
(ii) Select a camp site away from residential areas (at least 100 m buffer shall be maintained) or locate the camp site within the existing facilities of Municipality;
(iii) Avoid tree cutting for setting up camp facilities;
(iv) Provide a proper fencing/compound wall for camp sites;
(v) Camp site shall not be located near (100 m) water bodies, flood plains, flood prone/low lying areas, or any ecologically, socially, archeologically sensitive areas;
(vi) Separate the workers living areas and material storage areas clearly with a fencing and separate entry and exit;
(vii) Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit-in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be used as accommodation for workers;
(viii) Camp shall be provided with proper drainage, there shall not be any water accumulation;
(ix) Provide drinking water, water for other uses, and sanitation facilities for employees;
(x) Prohibit employees from cutting of trees for firewood; contractor should provide cooking fuel (cooking gas); fire wood not allowed;
(xi) Train employees in the storage and handling of materials which can potentially cause soil contamination;
(xii) Wastewater from the camps shall be disposed properly either into sewer system; if sewer system is not available, provide on-site sanitation with septic tank and soak pit arrangements;
(xiii) Recover used oil and lubricants and reuse or remove from the site;
(xiv) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; provide a compost pit for bio degradable waste, and non-biodegradable / recyclable waste shall be collected and sold in local market;
(xv) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
(xvi) At the completion of work, camp area shall be cleaned and restored to pre-project conditions, and submit report to PIU; PIU to review and approve camp clearance and closure of work site.

C. Operation and Maintenance Impacts

125. Operation and Maintenance of the sewerage system will be carried out by Amburtown.Operation will involve:collection and conveyance of wastewater from houses to nearest lifting / pumping stations; operation of lifting/pumping stations to pump accumulated sewage main pumping stations; operation of main pumping stations to pump accumulated sewage to STP; treatment of sewage at STP to meet the disposal standards; and final disposal of treated wastewater into Palarriver through 200m open earthern channel from polishing pond.STP is proposed under DBOT modality, and the contractor prepared the functional design and structural designs for STP including the outfall sewer and disposal arrangements is in progress. The functional design has been approved by TWAD Board on 04.09.2021. .During its operation phase, STPwill treat 16.71 million liters ofwastewater every day. As discussed in the pre-construction stage impacts,following measures are suggested for detailed design to avoid and/or mitigate any impacts on the environment due to operation of STP:

(i) Process design to meet the applicable disposal standards.
(ii) Develop a sludge management plan: Sludge management to collect, treat and dispose the accumulated sludge safely; sludge will be processed in a mechanical centrifuge which will separate the sludge into liquid as centrate water and solid sludge in the form of cake, this sludge cake will be used for gardening asmanure and the balance will be disposed to Municipal Composite yard. Sludge will be tested periodically for heavy metal concentration;
(iii) Designing the entire system to maintain optimal flow and terminal pressure, and optimising the overall energy usage in sewer system, including STP;
(iv) Using low-noise and energy efficient pumping systems;
(v) Installing the noise-producing pumps and motors etc., in enclosed buildings with noise reducing walls, and also maintaining adequate buffer to the nearby inhabited areas; and
(vi) Provision of appropriate personal protection equipment to the workers and staff.
(vii) Developing Green belt around STP for a width of 3m in multiple rows for an area of about 1000sqm.
(viii) Necessary H_2S monitoring will be carried out after commencement of project by PMU.

126. **Treatment and Disposal.**Sewage treatment facilitywould bedesigned to meet the disposal standards notified by CPCB (and as per NGT order 30.04.2019) for disposal of treated wastewater for STPs.The treated sewage effluent after disinfectionwould be disposed into Palar river through 200m open earthern channel from polishing pond(STP).Any change / lowering of treatment efficiency during operation may lead to poor quality of wastewater and may further pollute Palar river. It is therefore critical that STP treats the sewage as designed. Water balance on wastewater treatment is designed by the STP contractor and included in the Updated/Final IEE.Operation and maintenance of STP and change in incoming sewage quality will have impact on the treatment efficiency. For MBBR technology the Sensitivity is low, owing to very high bacterial population. No sensitivity to temperature. (Source: Table.No.5.6, Page No.96, TWAD Board Sewerage System Manual).

127. **STP operation.**It must be ensured that the facility is operated with standard operating procedures and only by trained staff. Ensuring uninterrupted power supply with back-up facility is a must.Standard operating procedures and operation manual shall be prepared by the contractor. Besides routine operation, this will cover all necessary items such as preventive maintenance, periodic maintenance and emergency maintenance, replacement of pumps, motors, and other electro-mechanical parts as per the design life to optimize energy use and

system efficiency, etc. Manual shall also include safety awareness and mock drills for worker safety.

128. **Quality of Raw Sewage.** As discussed previously, one of the critical aspects in STP operation is, change in raw sewage characteristics at inlet of STP may affect the process and output quality during operation of STP. The system is designed for municipal wastewater, which does not include industrial effluent. Characteristics of industrial effluent widely vary depending on the type of industry, and therefore disposal of effluent into sewers may greatly vary the inlet quality at STP, and will upset process and affect the efficiency.Therefore, no wastewater from industries is to be allowed into the sewer network and to be strictly monitored and enforced during commissioning of project.

129. **Sewage sludge.**Sewage sludge contains harmful substances such as bacteria and pathogens, and nutrients like nitrogen and/or phosphates. Improper handling and disposal of the sludge will have adverse impacts on health and environment. STP will have proper facilities for handling, treatment and disposal of sludge safely with implementation of sludge management plan. Therefore no adverse impacts envisaged.The treatment and drying processes kill enteric bacteria and pathogens, and because of its high content of nitrates, phosphates and other plant nutrients the sludge is an excellent organic fertilizer for application to the land.The reuse of sludge should be preceded by rigorous bacteriological tests to confirm that the treatment methods render all dried sludge and effluent free from enteric bacteria and pathogens, so that it is safe to humans, animals and crops.Sludge shall also need to be periodically tested for presence of heavy metals, to check if it meets the compost standards specified in the Solid Waste Management and Handling Rules, 2016.

130. STP is proposed under design-build contract modality, following measures have been considered and included in the detailed design of the STP:

(i) Process design to meet the discharge standards;
(ii) Regular monitoring to ensure that treated wastewater always meets the design disposal standards;
(iii) Sludge management to collect, treat and dispose the accumulated sludge safely; sludge will be treated in a mechanical centrifuge which will thicken the sludge by separating the liquid, thicken sludge will be further dried, and dried sludge will be used as a soil conditioner in fields; Sludge will be tested periodically for heavy metal concentration;
(iv) Designing the entire system to maintain optimal flow and terminal pressure, and optimising the overall energy usage in sewer system, including STP;
(v) Using low-noise and energy efficient pumping systems;
(vi) Installing the noise-producing pumps and motors etc., in enclosed buildings with noise reducing walls, and also maintaining adequate buffer to the nearby inhabited areas;
(vii) Provision of appropriate personal protection equipment to the workers and staff.
(viii) Develop green belt inside the STP premises for Odor management

131. Following measures are to be implemented during the operation phase:
(i) Ensure proper knowledge transfer, hands-on training to municipal staff engaged in STP operation has been provided by contractor prior to handover of facility;
(ii) Ensure continuous uninterrupted power supply; DG sets will be provided for capacity of 330KVA. Store room will be provided to store fuel.
(iii) Operate and maintain the facility following standard operating procedures of

operational manual;

(iv) Undertake preventive and periodic maintenance activities as required;

(v) Maintain the mechanical / electrical parts as per the maintenance plan to avoid any hazards;

(vi) Conduct periodic training to workers;

(vii) Ensure that all safety apparatus at STP including personal protection equipment are in good condition all times; and are at easily accessible and identifiable place; periodically check the equipment, and conduct mock drills to deal with emergency situations;

(viii) Implement sludge management plan at the STP;

(ix) No wastewater from industrial premises (including domestic wastewater) shall be allowed to dispose into municipal sewers;

(x) Monitor regularly and ensure that there is no illegal discharge through manholes or inspection chambers; conduct public awareness programs; in coordination with TNPCB; after commencement of the project.

(xi) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with design standards; and

(xii) Conduct periodic testing of dried sludge/compost to check presence of heavy metals and confirming the concentrations to use as compost as specified in the Standards for Composting, Schedule II A, Solid Waste Management Rules, 2016, FCO = Fertilizer Control Order, 1985, amendments in 2009 and 2013. It shall not be used for food crops.

132. **Odor and Noise from Sewage lifting and pumping stations.** Various measures are included in the design of these facilities giving utmost importance to odor and noise. Therefore it is anticipated there will not be any significant generation of odor or noise that will impact the surrounding households. Following measures are to be implemented during the operation:

(i) Strictly follow standard operating procedures / operational manual for operation and maintenance of lifting and pump stations;

(ii) Ensure that operating staff is properly trained, and have clear understanding of odor issues vis-à-vis its related with operational practices;

(iii) Ensure that pumping cycles are properly followed; and there is no build-up of sewage beyond design volume in the wells; and

(iv) Conduct periodic hydrogen sulfide (H_2S) monitoring at pumping and lifting stations using handheld H_2S meters.[9]

133. **Sewer network.**During the system design life (15/30 years for mechanical/civil components), it shall not require major repairs or refurbishments and should operate with little

[9]There are no any standards notified by Government of India or Government of Tamil Nadu. However, Central Pollution Control Board (CPCB) has stipulated Guidelines on Odor Pollution and its Control. These guidelines deal only with the basics of odor pollution, its sources and measurement, technologies for its control, etc., but do not specify any threshold limits for odor-causing pollutants. Therefore, as part of mitigation, provision for odor control measures has been made in the sewage pumping stations for all underground sewerage system (UGSS) subprojects. However, in case of STPs, the odor-causing processing units will be located far off to the extent possible within the premises so as to mitigate the odor nuisance. Further, the technology for treating sewage plays a vital role since release of gases like H_2S cannot be avoided in the process involving anaerobic decomposition whereas release of H_2S will almost be nil in case of aerobic treatment.
It is suggested to refer to WHO guidance notes for H_2S which can be considered by the bidders for designing the STP as well as for selecting a suitabletechnology. Sufficient mitigation measures have been taken for all sewage pumping stations and will be taken for all STPs when finalizing/revising the IEEs based on the detailed engineering design.

maintenance beyond routine actions required to keep the equipment in working order. The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts.

134. There are also certain environmental risks from the operation of the sewer system, most notably from leaking sewer pipes as untreated faecal material can damage human health and contaminate both soil and groundwater. It will be imperative therefore that the PIU &ULB has to establish a procedure to routinely check the operation and integrity of the sewers, and to implement rapid and effective repairs where necessary. There is an occupation health risk to workers engaged in sewer maintenance activities. Following measures should be followed:

(i) Establish regular maintenance program, including:
- 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;
- Monitoring of sewer flow to identify potential inflows and outflows; and
- Conduct repairs on priority 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).

(ii) Maintain records; review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed.

(iii) 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.

(iv) Prohibit/prevent disposal of wastewater/effluent from industrial units in the sewers; ensure regular checking to ensure no illegal entry of industrial wastewater into sewers.

(v) Develop an Emergency Response System for the sewerage system leaks, burst and overflows, etc.

(vi) Provide necessary health and safety training to the staff in sewer cleaning and maintenance.

(vii) Provide all necessary personnel protection equipmen.

(viii) Do not conduct manual cleaning of sewers; for personnel engaged sewer maintenance work, there is a risk due to oxygen deficiency and harmful gaseous emissions (hydrogen sulphide, methane, etc.); provide for adequate equipment (including oxygen masks) for emergency use.

(ix) As part of the public consultation during the project implementation/ construction, the Emergency Response System (sewerage system leaks, burst and overflows, etc.),have to be explained in detail to the local public to create an awareness to act during emergency situations thar might arise due to the environmental risks from the operation of the sewer system.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

135. The active participation of stakeholders including local community, non-government organizations (NGOs) / community based organizations (CBOs),etc.,in all stages of project preparation and implementation is essential for successful implementation of the project. It will ensure that the subprojects are designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and will bring maximum benefits to the people. Public consultation and information disclosure is a must as per the ADB policy.

136. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Primary stakeholders of the subproject are: residents, shopkeepers, and businesspeople who live and work near sites where facilities will be built (sewer network, pumping/lifting stations, and STP), and government and utility agencies responsible for provision of various services in project area. Secondary stakeholders are: NGOs and CBOs working in the area, community representatives, beneficiary community in general, government agencies, TNUIFSL, Government of Tamil Nadu, and the ADB.

B. Public Consultation

137. The public consultation and disclosure program is a continuous process throughout the project implementation, including project planning, design and construction.

1. Consultation during Project Preparation

138. The subproject proposal is formulated by Amburtownin consultation with the public representatives bodies in the project area to suit their requirements.

139. Focus-group discussions with other stakeholders were conductedduring project preparation, and information on likely issues and the proposed mitigation and monitoring measures provided, to learn their views and concerns. A socio-economic household survey has been conducted in the project area, covering sample households, to understand the household characteristics, health status, and the infrastructure service levels, and also the demand for infrastructure services. General public and the people residing along the project activity areas were also consulted. A project area level consultation workshop was conducted in Amburon 27 January 2018 with public representatives and prominent citizens, NGOs,and women participants.Another consultation was held with stakeholders in the Project town on 2 June 2018due to change of STP site from Solur village to A-Kaspa.Details of consultation is provided in Appendix 9.

140. It was observed that people are willing to extend their cooperation as the proposed project will provide sewerage system, and enhance basic infrastructure service levels and overall living standard of the public. The public expressed their concern regarding the nuisance and disturbance (dust, road closure, and traffic management activities) during the construction stage which can have impact on their day to day activities. Public demanded for advance notice before construction and proper warning signs along the construction area to avoid accidents and inconvenience. Public opined that an appropriate operation and maintenance system should be in place for sewerage system for its best functioning and to have the maximum health and aesthetic benefits. Issue of bad odors from lifting and pumping stations located close to the

houses is also raised. Project team explained proposed EMP to manage the negative impacts, including odor prevention and control measures included in the design and operation.

2. Consultation during construction

141. Prior to start of construction, PIU conducts information dissemination sessions at various places and solicit the help of the local community, and leadersprominent for the project work, as required. Focus group meetings will be conducted to discuss and plan construction work (mainly pipeline work) with local communities to reduce disturbance and other impacts and also regarding the project grievance redress mechanism. Project information and construction schedule will be provided to the public via mass media(Annexure 16) (newspapers, television, ULB websites etc.). A constant communication will be established with the affected communities to redress the environmental issues likely to surface during construction phase.Contractor will provide prior public information (in Tamil and English) about the construction work in the area, 7 days prior to the start of work, and again a day before the start of work via pamphlets (a sample public information template is provided in Appendix 4). At the work sites, information boards are being provided to disseminate project related information.During construction stage of the project, dissemination programs will be conducted at various locations of the Ambur Municipalty to create awareness among the public about the proposed controlled blasting activity for hard rock removal in excavation. The dissemination included the need for the controlled blasting, regulatory requirements &compliance to conditions, safety measures followed,etc.

C. Information Disclosure

142. Executive summary of the IEE has been translated in Tamiland is made available at the offices of PIU, and Ambur Municipality and also displayed on the notice boards. Hard copies of the IEE will be accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE in English and Executive Summary in Tamilwill be placed in the official website of the TNUIFSL, TWAD Board and Ambur Municipality after approval of the IEE by ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

143. Public information campaigns to explain the project details to a wider population will be conducted. Public disclosure meetings will be conducted at key project stages to inform the public of progress and future plans as required. Prior to start of construction, the PIU will issue notification on the start date of implementation in local newspapers. A board showing the details of the project will be displayed at the construction sites for the information of general public.

144. Local communities are continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signage, etc.

VII. GRIEVANCE REDRESS MECHANISM

145. A common Grievance Redness Mechanism (GRM)is 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 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 PIU will ensure that their grievances are addressed.

146. Affected persons will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes or through telephone hotlines at accessible locations, by e-mail, by post, or by writing in a 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.

147. 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 Cell (GRC) is established in PIUs; Safeguards officer, supported by the social, gender and environmental safeguards specialist of experts 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.

148. 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).

149. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor, and supervision personnel of the experts 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.

150. 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. The Steering Committeewill resolve escalated/unresolved grievances received.

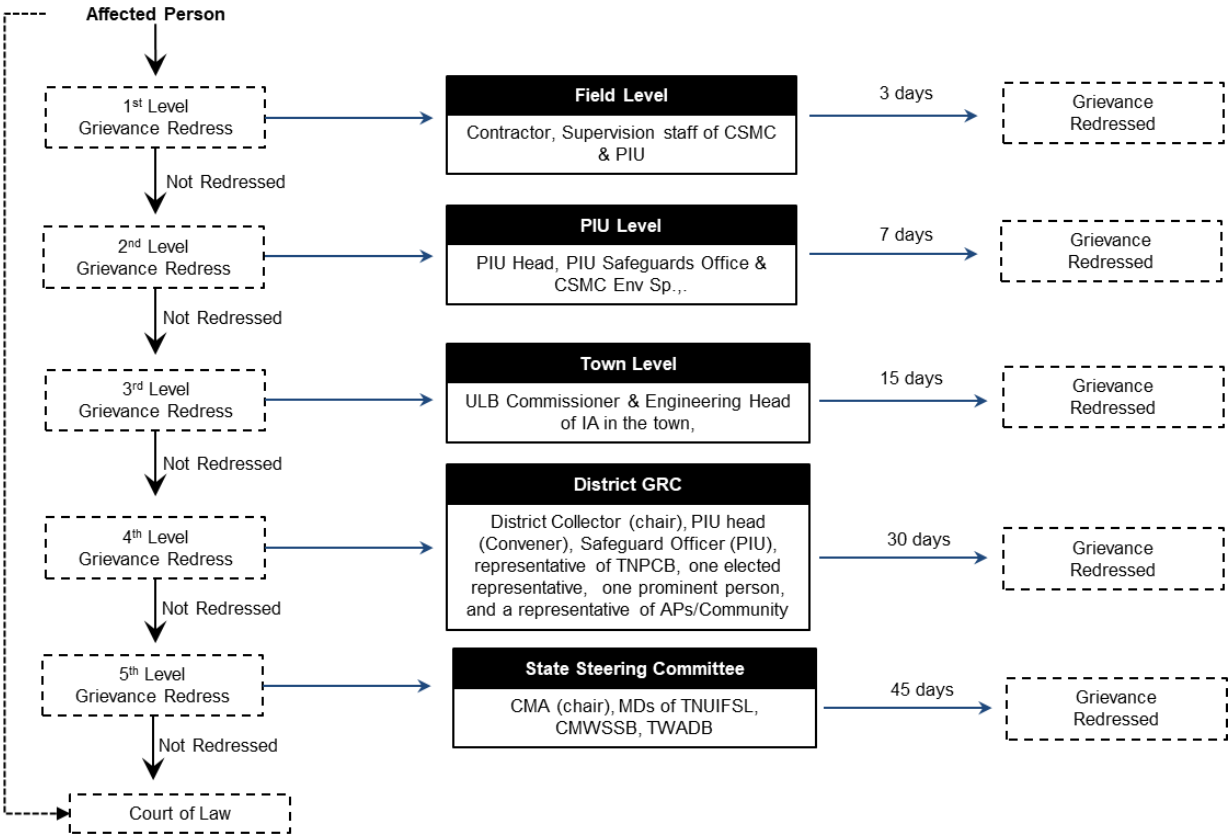
151. **Composition of GRC.** GRC will be headed by the District Collector, and members include: PIU head, Safeguards Officer of PIU, representative of TNPCB, one elected representative / prominent citizen from the area, and a representative of affected community. GRC must have a women member.

152. **State level steering committee**will include Commissioner of Municipal Administration as chair, member include managing directors of TNUIFSL, CMWSSB, TWAD Board and others as necessary.

153. **Areas of Jurisdiction.** The areas of jurisdiction of the GRC, headed by the District Collectorwill 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 Committeewill have jurisdictional authority across the state (i.e.,areas of influence of subproject facilities beyond district boundaries, if any).

154. The multi-tier GRM for the project is outlined in Figure 8, 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 project duration. The implementing agencies/ULBs shall issue notifications to 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.

Figure10: Proposed TNUFIP Grievance Redress Mechanism



155. **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 PIUandAmbur town submitted to PMU.

156. **Information dissemination methods of the GRM.** 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 entitlements per agreed entitlement matrix including 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 is attached in Appendix 5.

157. **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.

158. **Costs.**All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the respective PIU. Cost estimates for grievance redress are included in resettlement cost estimates.

159. **Country legal procedure.** An aggrieved person shall 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.

160. **ADB's Accountability Mechanism.** 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. The complaint can be submitted in any of the official languages of ADB's developing member countries. Before submitting a complaint to the Accountability Mechanism, it is recommended that affected people make a good faith effort to resolve their problems by working with the concerned ADB operations department (in this case, the resident mission). Only after doing that, and if they are still dissatisfied, they could approach the Accountability Mechanism. The ADB Accountability Mechanism information will be included in the project-relevant information to be distributed to the affected communities, as part of the project GRM.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

161. An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels.

162. The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between TNUIFSL, PMU, implementing agency, PIU, consultants and contractors. The EMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with. The EMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries.TNUIFSL will be overall responsible for monitoring the implementation of the various provisions elaborated in this draft updated IEE document by the PIU, Ambur Municipality and the contractors and report on its compliance to ADB through submission of semi-annual environmental monitoring reports.

163. The Package-I contractor submitted the SEMP to PIU for review and approved. The Package-II contractor has to submit to PIU, for review and approval, a site environmental management plan (SEMP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; and (iii) monitoring program as per SEMP. No works are allowed to commence prior to approval of SEMP.

164. A copy of the EMP/approved SEMP will be kept on site during the construction period at all times. The EMP included in the bid and contract documents to ensure compliance to the conditions set out in this document.

165. For civil works, the contractor will be required to (i) carry out all of the mitigation and monitoring measures set forth in theapprovedSEMP; and (ii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and SEMP. The contractor shall allocate budget for compliance with these SEMP measures, requirements, and actions.

166. The following tables show the potential environmental impacts, proposed mitigation measures and responsible agencies for implementation and monitoring.

Table 18:Design Stage Environmental Impacts and Mitigation Measures

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
Design of STP	Deficient treatment due to substandard operation/system malfunction.	(i) Design process to meet the CPCB disposal standards of inland water disposal. (ii) Ensuring continuous uninterrupted power supply, including a back-up facility (such as generator). (iii) Providing operating manual with all SOPs for O&M of the facility (iv)Necessary training to ULB staff dealing with STP. (v) Extended contractor period for O&M, proper transfer of facility to ULB with adequate technical know-how on O&M and hands-on training to ULB staff. (vi)Provision for online monitoring of crucial wastewater quality parameters at the inlet and outlet of the plant (BOD, pH, ammonia, etc.)	DBOT Contractor and TWADB	Project cost - DB Contractor
	Odor nuisance	(i) Site layout design of STP within allocated land. (ii) Providing a green buffer zone of 15-20 m wide all around the STP with trees in multi-rows and land scaping. This will act as a visual screen around the facility and will improve the aesthetic appearance. Treated wastewater will be used for land scaping.	DBOT Contractor and TWADB	Project cost - DB Contractor
	Sludge disposal	(i) Prepare sludge management plan to ensure safe collection, adequate treatment prior to reuse / disposal.	DBOT Contractor and TWADB	Project cost - DB Contractor

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
		(ii) Conduct periodic testing of sludge to check its quality according to set standards for reuse as manure/soil conditioner. (iii) Provide training on safe handling of sludge, along with proper apparatus and PPEs to workers.		
Sewer network	Nuisance due to leaks, overflows, contamination of water supplies, occupation health and safety of workers, etc.	(i) Limit the sewer depth where possible. (ii) Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible). (iii) 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) (iv) In unavoidable cases, where sewers are to be laid close to storm water drains, appropriate pipe material shall be selected. (stoneware pipes shall be avoided) (v) For shallower sewers and especially in narrow roads, use small inspection chambers in lieu of manholes.(vi) Controlled blasting would be undertaken in some stretches where hard rock is encountered based on the site conditions.For the safety of humans and the structures within the area influenced by the blasting, the vibrations related impacts would be addressed by designing the blast charge by complying with the provisions	PIU/Ambur town	Project Costs

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
		elaborated in the applicable Indian regulations and standards. All records shall be maintained by the Contractors and PIU. Training related to controlled blasting activity will be included in the overall safeguards training programme meant for PIUs and Contractors. (vii) Design manhole covers to withstand anticipated loads and ensure that the covers can be readily replaced if broken to minimize silt/garbage entry. (viii) Ensure sufficient hydraulic capacity to accommodate peak flows and adequate slope in gravity mains to prevent buildup of solids and hydrogen sulfide generation.		
Sewage pumping stations	Odor nuisance	**Measures specific (additional) to New Pumping Station near household area** (i) Maintain maximum buffer distance from the nearest residences to the pumping station wells. (ii) Locate pumping station as far as away from the road. (iii) Develop green buffer zone around	TWADB/Amburtown	Project Costs

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
		the facility with a combination of tall and densely growing trees in multi rows to a width of 3m for 300sqm approximately in each pumping stations to control odor and also act as visual shield, and improve aesthetical appearance. **(iv)** Provision of 2.0m height compound wall **Design measures** (i) Proposed wells to be closed using RCC slabs. Design of RCC slab to consider both superimposed loads (human and equipment loads) and severe corrosion risk from sewer gas from within wells. (ii) RCC slab to be designed and fixed in a modular manner such that access to pumps/appurtenances and other equipment can be provided for maintenance/replacement/renewal purposes. (iii) Since human intervention is involved and safety shall be primary and critical consideration, additional protection by way of a metalled grating/grill work shall be provided over the sections (or full cross section if required) where workers will stand/work for inspection and repair/O&M purposes. (iv) Provision of passive gas ventilation arrangement by providing a take-off vent from top of well by positioning vent in such a way that cover slab		

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
		fitment/movement/drawl if required for maintenance purposes is not compromised. (v) Height of vent to be provided appropriately and a minimum 2 m above the lintel level (top level) of window(s)/passageways/doors in the nearby adjoining buildings. Provision of odor control/mitigation system as per site conditions/requirements (vi) Suitable granular activated carbon filter with bird-screen fitted at the vent outlet to control odor. Size of GAC (including material size) should be selected based on the vent diameter and expelled air flow rate expected. (vii) Submersible sewage pumps of suitable rating, minimum submergence requirements, open impeller with cutting-tearing arrangement and high strength-corrosion resistant heavy duty construction shall be proposed. (viii) In locations/cases where sewage flow in the present to intermediate design stage is envisaged to be low, position of the submersible pumps and design of the collection well floor by providing necessary side benching/sloped flooring to allow for higher submergence during low flow shall be made to ensure regular pump operation and avoid sewage stagnation beyond the permissible limit. (ix) Diesel Generators shall be		

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
		provided for all pump stations and in cases of lift stations with space for control room. In cases of lift manholes (road-side or road-center type structures with only provision of kerb-side kiosk), an electrical cut-out provision shall be made for connecting an Emergency Mobile/Skid Mounted Diesel Generator for pumping out during electric supply interruption. (x) Develop standard operating procedures/operational manual for operation and maintenance of lifting and pump stations; this shall include measures for emergency situations. (xi) Provide training to the staff in SOPs and emergency procedures. (xii) Periodically monitorodor generation at pumping stations.		
	Sewage pumping and lifting stations located close to houses	(i) For subpumping station and lift station which are located adjacent to houses with a buffer distance of less than 20 m from the sewage wells to nearest house/property boundary, a suitable arrangement such to capture the gaseous emissions from the wells and treat via scrubber/activated carbon filter before letting out into the ambient air; such system should be designed appropriately to meet the likely emissions/flow rate of respective pumping stations. (ii) For lifting stations, the above arrangement should be provided where the buffer distance between		

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
		sewage well and nearest house/property is less than 10 m.		
	Noise and vibrations	(i) Procure good quality latest technology high pressure pumps that guarantee controlled noise at a level of around 80 dB(A) at a distance of 1 m. At site boundary noise shall be within the prescribed limits for residensial areas. (ii) Use appropriate building materials and construction techniques for pump houses which can absorb sound rather than reflect noise (iii) Use acoustic enclosures – manufacturer specified, for all pumps, motors (iv) Procure only CPCB approved generators with low emission and low noise fitted with acoustic enclosures (v) Provide sound mufflers for ventilators in the plant rooms; and sound proof doors (vi) Provide ear plugs to workers	PIU/Ambur town	
Sewerage system	Energy consumption	(i) Using low-noise and energy efficient pumping systems. (ii) Efficient Pumping system operation. (iii) Installation of VFDs.	PIU/Ambur town	Project Costs
	Tree cutting	(i) Obtain prior permission for tree cutting. (ii) Plant and maintain number of trees specified in the tree cutting permissions or 10 trees (whichever is higher)10 trees for each tree that is removed.	PIU/Ambur town	Project Costs

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
Controlled blasting	Ground vibrations Noise (airblast) Flying debris Dust	(i) For the safety of humans and the structures within the area influenced by the blasting, the vibrations related impacts would be addressed by designing the blast charge by complying with the provisions elaborated in the applicable Indian regulations and standards. (ii) All records shall be maintained by the Contractors and PIU. (iii) An emergency response system shall be developed at the site level to address the situations emerging due to accidents or any other unfortunate incidents pertaining to human and structure safety. Training related to controlled blasting activity will be included in the overall safeguards training programme meant for PIUs and Contractors. (iv) The project staff from the PIU, consultants and contractors would undertake a pre-blasting survey of structures (including videography and/or photography) lying within the area of influence of blasting from the vibrations related impacts (preferably in the presence of the owners of the said structures) to assess and/or ascertain regarding the prevailing conditions of thestructures prior to blasting activities. Based on the	Contractor and PIU	Contractor costs

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
		assessment, the Project staff would consider necessary measures to avoid, minimize or mitigate such impacts..		

CPCB = Central Pollution Control Board;DBOT = design, build, operate and transfer; GAC = granular activated carbon; m = meter; mm = millimeter; O&M = operations and maintenance;PPE = personnel protection equipment;RCC = reinforced cement concrete; SOP = standard operating procedures; STP = sewage treatment plants;TWADB = Tamil Nadu Water and Drainage Board;ULB = urban local body;VFD = Variable Frequency Drives.

Table 19:Pre Construction Stage Environmental Impacts and Mitigation Measures

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
Submission of updated EMP/SEMP; EMP implementation and reporting	Unsatisfactory compliance to EMP	(i) Appoint EHS Supervisor to ensure EMP implementation; (ii) Submission of updated EMP/ SEMP; and (iii) Timely submission monthly of monitoring reports including documentary evidence on EMP implementation such as photographs.	Contractor	Contractor cost
Utilities	Telephone lines, electric poles and wires, water lines within proposed project area	(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) Require construction contractors to prepare a contingency plan to include actions to be taken in case of unintentional interruption of services.	Contractorincoordination with PIU	Project cost-
Construction work camps, stockpile areas, storage areas, and disposal areas.	Conflicts with local community; disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the project location; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems; (iii) Do not consider residential areas; (iv) Take extreme care in selecting sites to avoid direct disposal to water body which will inconvenience the community.	Contractor to finalize locations in consultation and approval of PIU	Project cost-

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
		(v) For excess spoil disposal, ensure (a) site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, written consent from landowners (not lessees) will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) no residential areas shall be located within 50 m downwind side of the site; and (d) site is minimum 250 m away from sensitive locations like settlements, ponds/lakes or other water bodies.		
Sources of 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.	(i) Obtain construction materials only from government approved quarries having requisite environmental permissionswith prior approval of PIU (ii) PIU to review, and ensure that proposed quarry sources have all necessary regulatory clearances/ permissions in place prior to approval (iii) Contractor to submit to PIU on a monthly basis documentation on material obtained from each sources (quarry/ borrow pit) (iv) Avoid creation of new borrow areas, quarries etc., for the project; if unavoidable, contractor to obtain all clearances and permissions as required under law, including Environmental Clearance prior to approval by PIU	Contractor to prepare list of approved quarry sites and sources of materials with the approval of PIU	Contractor cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	(i) Obtain all necessary consents, permits, clearance, NOCs, etc. prior to award of civil works. (ii) Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction (iii) Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc.	Construction Contractor and PIU	Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PIU.
Chance finds	Damage / disturbance to artifacts	(i) Construction contractors to follow these measures in conducting any excavation work (ii) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work (iii) Stop work immediately to allow further investigation if any finds are suspected; (iv) Inform State Archaeological Department if a find is suspected, and taking any action they require to ensure its removal or protection in site.	Construction Contractor and PIU	Contractor cost

EHS = environmental Health and Safety, EMP = environmental management plan, m = meter, NOC = no objection certificate, PIU = program implementation unit, SEMP = site environmental management plan.

Table20:Construction Stage Environmental Impacts and Mitigation Measures

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
EMP Implementation Training	Irreversible impact to the environment, workers, and community.	(i) Project manager and all key workers will be required to undergo training on EMP implementation including spoils/waste management, SOPfor construction works; OHS, core labor laws, applicable environmental laws, etc.	Contractor	Contractor cost
Air Quality	Dust, emissions	**For all construction works** (i) Provide a dust screen around the construction sites of pumping	Contractor	Contractor cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
	from construction vehicles, equipment, and machinery used for installation of pipelines resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons.	and lifting stations and STP; (ii) Damp down the soil and any stockpiled material on site by water sprinkling; (iii)Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition; (iv)Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process; (v) Cover the soil stocked at the sites with tarpaulins; (vi)Control access to work area, prevent unnecessary movement of vehicle, public trespassing into work areas; limiting soil disturbance will minimize dust generation; (vii) Use tarpaulins to cover the loose material (soil, sand, aggregate etc.,) when transported by open trucks; (viii) Control dust generation while unloading the loose material (particularly aggregate, sand, soil) at the site by sprinkling water and unloading inside the barricaded area; (ix)Clean wheels and undercarriage of haul trucks prior to leaving construction site; (x) Ensure that all the construction equipment, machinery are fitted with pollution control devises, which are operating correctly, and have a valid PUCcertificate; ; and (xi)No vehicles or plant to be left idling at site and generators to be at placed maximum distance from properties. **For sewer works** (i) Inform the residents likely to be affected by the works in the locality about the upcoming sewer laying works well in advance so that necessary arrangements are planned by the residents with reduced inconvenience. (ii) For sections where the controlled blasting is proposed, the residents are provided with the schedule of blasting at least three days in advance and the residents are explained about the preventive, precautionary, mitigation and emergency response measures being taken to address their concerns. (iii) The project staff from the PIU, consultants and contractors		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		would undertake a survey of structures (including videography and/or photography) lying within the area of influence of blasting from the vibrations related impacts (preferably in the presence of the owners of the said structures) during pre- and post-blasting situations to assess and/or ascertain regarding the damages, if any, caused to the structures because of blasting activities. (iv) Barricade the construction area using hard barricades (of 2 m height) on both sides; (v) Initiate site clearance and excavation work only after barricading of the site is done; (vi)Confine all the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.), to the barricaded area; (vii) Limit the stocking of excavated material at the site; sufficiently away from the edge of excavated trench, remove the excess soil from the site immediately to the designated disposal area; (viii) Undertake the work section wise: a 500 section should be demarcated and barricaded; open up several such sections at a time, but care shall be taken to locate such sections in different zones; (ix) The section proposed for blasting shall be supervised by properly trained staff toensure no movement of pedestrians, motorized or non-motorized vehicles, andresidents takes place during blasting within the area of influence. (x) For sections involving controlled blasting, ensure that dust curtains of adequate height are provided to the trenches to prevent emission of dust during drilling for charge holes and controlled blasting. (xi) Ensure that the excavated soil and debris along the section identified for blasting is sprinkled with adequate water prior to blasting to reduce dust emissions upon explosion of charge placed for breaking the hard rock; (xii) Ensure that adequate precautions are taken to avoid flying debris post blasting (such as covering the trench with sturdy metallic sheets having sufficient weights to absorb the blast waves); (xiii) Conduct work sequentially - excavation, sewer laying,		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		backfilling; testing section-wise (for a minimum length as possible) so that backfilling, stabilization of soil can be done; (xiv) Remove the excavated soil of first section to the disposal site; as the work progresses sequentially, by the time second section is excavated, the first section will be ready for back filling, use the freshly excavated soil for back filling, this will avoid stocking of material, and minimize the dust; (ixv) Backfilled trench at any completed section after removal of barricading will be the main source of dust pollution. The traffic, pedestrian movement and wind will generate dust from backfilled section. Road restoration shall be undertaken immediately; and(xvi)Immediately consolidate the backfilled soil and restore the road surface; if immediate road restoration is not possible, provide a layer ofPCC of suitable mix on the backfilled trench so that dust generation, erosion is arrested and it will also provide a smooth riding surface for the traffic until the road is properly restored. Backfilled trench without any road restoration is a major source of dust. (xvii)		
Surface water quality	Mobilization of settled silt materials, and Wchemical contamination from fuels and lubricants during construction can contaminate nearby surface water quality. Ponding of water in the pits / foundation	(i) All earthworks be conducted during the dry season to prevent the problem of soil/silt run-off during rains; (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;do not stock earth/material close to edges of the trenches and the at least 100m away from the water bodies. (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, only designated disposal areas shall be used; (iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (vi)Store fuel, construction chemicals etc., on an impervious floor, also avoid spillage by careful handling; provide spill collection sets for effective spill management; (vii) Dispose any wastes generated by construction activities in designated sites; and	Contractor	Contractor cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
	excavations.	(viii)Conduct surface quality inspection according to the EMP.		
	Water accumulation in trenches/pits.	(i) As far as possible control the entry of runoff from upper areas into the excavated pits, and work area by creation of temporary drains or bunds around the periphery of work area; (ii) Pump out the water collected in the pits / excavations to a temporary sedimentation pond; dispose off only clarified water into drainage channels/streams after sedimentation in the temporary ponds; and (iii) Consider safety aspects related to pit collapse due to accumulation of water.	Contractor	Contractor cost
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people.	(i) Plan activities in consultation with PIU so that activities with the greatest potential to generate noise and vibrations as well as controlled blasting are conducted during periods of the day which will result in least disturbance;especially near schools, hospitals, religious places, courts and other sensitive receptors. (ii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimise sound impact to surrounding sensitive receptor; (iv) (iii) Maintain maximum sound levels within the limits as prescribed by the prevailing Indian regulations. Ensure to conduct a pre-blasting survey through videography and photography of residential properties and other structures falling along the sewerage alignment including pump/lift stations to ascertain the prevailing conditions of the structures likely to be impacted by the controlled blasting and take adequate measures to minimise such impacts. (v) Horns should not be used unless it is necessary to warn other	Contractor	Contractor cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		road users or animals of the vehicle's approach; and (vi) Consult local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals. (vii) All the controlled blasting,shall be done by an approved and licensed Explosive contractor after submitting a blasting plan to PIU.		
Removal of rock during excavation for sewer works	Increase in vibration due to the controlled blasting and associated activities	(i) During excavation for sewer works, wherever removal of rock is identified, alternatives like drilling and chiselling, controlled blasting etc will be examined and the suitable technology shall be finalised depending upon the site conditions. Following measures for ensuring safety shall be ensured during controlled blasting. (ii) Carryout controlled blasting in consultation with PIU so that blasting activities with the least potential to generate vibration are conducted during periods of the day which will result in least disturbance; especially near schools and other sensitive receptors. (iii) Permission were obtained from the District Collector, Thirupattur for controlled blasting for excavation.Conditions stipulated in the permission issued by the District Collector shall be complied with during implementation (iv) The contractor shall submit a blasting plan in advance to PIU; and implement in accordance to the plan. (v) Blasting shall be done through an licensed Explosive Contractor only (vi) For controlled blasting, explosives including blasting caps, shall be transported to the blasting site only through exclusive vehiclein safemanner in accordance with the requirements of the blasting license. After blasting is over, the balance explosives shall be returned to the licensed storage. (vii)Cost for implementation of mitigation measures and liability are the responsibility of contractor. (viii) Proper prior notice will be issued to the Residents before Commencing UGSS activity works Schedule (ix) Proper information will be Given to Police Officials	Construction Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		(x) Workers (Flagman) shall be stationed on both end of roads to warn people before firing any blastsand not to permit the traffic. (xi) When blasting, ample warning shall be given to all persons within the vicinity prior to blasting. Warning signs shall be erected a minimum of 24 hours prior to the blast time. The warning signs will state the time and date of each blast. (xii) Contractor shall ensure necessary precautions / protection (like excavated earth, sand-filled bags, etc) to reduce Ground Vibrations, Reduce noise levels, ,etc.,Sites shall be provided with necessary shields all around. (xiii) Minimum Explosive will be used for Control Blasting for Residential areas (xiv) After a blast has been fired, the Blast Control Specialist shall make a careful inspection to determine that all charges have exploded before employees are allowed to return to the operation. (xv) The contractor shall be responsible for any and all damage to property or injury to persons resulting from blasting or accidental or premature explosions that may occur in connection with his use of explosives. (xvi) The contractor shall do the activities after obtaining the blasting permission from District Collector, Thirupattur. (xvii) For the diversion of traffic in the blasting area, the contractor shall prepare a traffic management plan and obtain permission from Ambur Municipality and traffic police. (xviii) Ensure to conduct a pre-blasting survey through videography and photography of residential properties and other structures falling along the sewerage alignment to ascertain the prevailing conditions of the structures likely to be impacted by the controlled blasting and take adequate measures to minimize such impacts.		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Landscape and aesthetics – waste generation.	Impacts due to excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items.	(i) Prepare and implement a Construction Waste Management Plan (refer Appendix 3); (ii) As far as possible utilize the debris and excess soil in construction purpose, for example for raising the ground level or construction of access roads etc.; (iii) Avoid stockpiling any excess spoils at the site for long time. Excess excavated soils should be disposed off to approved designated areas immediately; (iv) If disposal is required, the site shall be selected preferably from barren, infertile lands; sites should be located away from residential areas, forests, water bodies and any other sensitive land uses; (v) Domestic solid wastes should be properly segregated in biodegradable and non-biodegradable for collection and disposal to designated solid waste disposal site; create a compost pit at workers camp sites for disposal of biodegradable waste; non-biodegradable / recyclable material shall be collected separately and sold in the local recycling material market; (vi) Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed off in disposal sites approved by TNPCB; (vii) Prohibit burning of construction and/or domestic waste; (viii) Ensure that wastes are not haphazardly thrown in and around the project site; provide proper collection bins, and create awareness to use the dust bins; and (ix) Conduct site clearance and restoration to original condition after the completion of construction work; PIU to ensure that site is properly restored prior to issuing of construction completion certificate.	Contractor	Contractor cost
Accessibility and traffic disruptions.	Traffic problems and conflicts near project locations and haul road	**Sewer works** (i) Prepare a sewer work implementation plan in each zone separately and undertake the work accordingly; ensure that for each road where the work is being undertaken there is an alternative road for the traffic diversion; take up the work in sequential way so that public inconvenience is minimal;	Contractor	Contractor cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		prepare traffic management plans for each section (refer sample in Appendix 6); (ii) Plan the sewer work in coordination with the traffic police; provide temporary diversions, where necessary and effectively communicate with general public; (iii) Avoiding conducting work in all roads in a colony at one go; it will render all roads unusable due to excavations at the same time, creating large scale inconvenience; (iv) Undertake the work section wise: a 500 m section should be demarcated and barricaded; open up several such sections at a time, but care shall be taken to locate such sections in different zones; (v) Confine work areas in the road carriageway to the minimum possible extent; all the activities, including material and waste/surplus soil stocking should be confined to this area. Proper barricading should be provided; avoid material/surplus soil stocking in congested areas – immediately removed from site/ or brought to the as and when required; (vi) Limit the width of trench excavation as much as possible by adopting best construction practices; adopt vertical cutting approach with proper shoring and bracing; this is especially to be practiced in narrow roads and deeper sewers; if the deep trenches are excavated with slopes, the roads may render completely unusable during the construction period; (vii) Leave spaces for access between mounds of soil to maintain access to the houses / properties; access to any house or property shall not be blocked completely; alternative arrangements, at least to maintain pedestrian access at all times to be provided; (viii) Provide pedestrian access in all the locations; provide wooden/metal planks over the open trenches at each house to maintain the access; (ix) Inform the affected local population 1-week in advance about the work schedule; (x) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum; (xi) Keep the site free from all unnecessary obstructions;		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		(xii) Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. Provide information to the public through media – newspapers and local cableTV services; and (xiii) At work site, public information/caution boards shall be provided including contact for public complaints. (xiv) For sections where the controlled blasting is proposed, the residents are provided with the schedule of blasting at least three days in advance and the residents are explained about the preventive, precautionary, mitigation and emergency response measures being taken to address their concerns. (xv) The contractor in coordination with the urban local body officials would conduct pre- blasting physical surveys through videography and photography of the adjacent residential properties and other structures along the sewerage alignment and take adequate measures to minimise such impacts. **Hauling (material, waste/debris and equipment) activities** (i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (ii) Schedule transport and hauling activities during non-peak hours; (iii) Locate entry and exit points in areas where there is low; potential for traffic congestion; (iv) Drive vehicles in a considerate manner; and (v) Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. (vi) For controlled blasting, required quantity of explosives shall be transported to the blasting site only through suitable explosive vehicle. After blasting is over, the balance explosives shall be returned to the licensed storage.		
Controlled blasting	Ground vibrations Noise (airblast)	(i) Carryout controlled blasting in consultation with PIU so that blasting activities are conducted during periods of the day which will result in least disturbance; especially near schools and	Contractor and PIU	Contractor Costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
	Flying debris Dust	othersensitive receptors. (ii) The contractor shall submit a blasting plan in advanceto PIU for approval; and implement in accordance tothe plan once approved. (iii) The controlled blasting at identified locations shall bepermitted only after the requisite statutorypermissions from regulatory authorities are obtained.The contractor shall comply with all terms andconditions stipulated in such permissions. Thecontrolled blasting would be monitored by followingthe necessary requirements to prevent safety risk toboth public and nearby structures as provisioned inthe prevailing Indian regulations and standards. (iv) Blasting shall be carried out through a licensedExplosive Contractor only. (v) For controlled blasting, explosives including blastingcaps, shall be transported to the blasting site onlythrough exclusive vehicle in safe manner inaccordance with the requirements of the blastinglicense. After blasting is over, the balance explosivesshall be returned to the licensed storage. (vi) Cost for implementation of mitigation measures andliability are the responsibility of contractor. (vii) Proper prior notice will be issued to the residentsbefore commencing blasting activity works. Inform theresidents likely to be affected by the works in thelocality about the upcoming blasting works well inadvance so that necessary arrangements areplanned by the residents with reduced inconvenience. (viii) For sections where the controlled blasting isproposed, the residents shall be provided with theschedule of blasting at least three days in advanceand the residents are explained about the preventive,precautionary, mitigation and emergency responsemeasures being taken to address their concerns. (ix) Prior information will be given to Police Officials		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		(x) Workers (Flagman) shall be stationed on both end ofroads to warn people before firing any blasts and notto permit the traffic. The section proposed for blastingshall be supervised by properly trained staff to ensureno movement of pedestrians, motorized or nonmotorizedvehicles, and residents takes place duringblasting within the area of influence. For the diversionof traffic in the blasting area, the contractor shallprepare a traffic management plan and obtainpermission from Ambur Municipality and trafficpolice. (xi) When blasting, ample warning shall be given to allpersons within the vicinity prior to blasting. Warningsigns shall be erected a minimum of 24 hours prior tothe blast time. The warning signs will state the timeand date of each blast. (xii) Sites shall be provided with necessary shields allaround. (xiii) Minimum explosive will be used for ControlledBlasting specifically within residential areas. (xiv) After a blast has been fired, the Blast ControlSpecialist shall make a careful inspection todetermine that all charges have exploded beforeemployees are allowed to return to the operation, andsubsequently the movement of residents /pedestriansand vehicles is permitted. (xv) Ensure appropriate measures are taken to maintainmaximum ambient noise levels within the limits aspermitted by the prevailing Indian regulations andstandards. The ambient noise levels would bemonitored to ascertain the efficacy of acousticmeasures thus implemented and compliance withassociated regulatory permissions. (xvi) Ensure that adequate precautions are taken to avoidflying debris post blasting (such as covering thetrench with sturdy metallic sheets with sand filledbags to absorb the blast waves); (xvii)For sections involving controlled blasting, ensure thatdust curtains of adequate height are provided to thetrenches to prevent		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		emission of dust during drilling forcharge holes and controlled blasting. (xviii) Ensure that the excavated soil and debris along thesection identified for blasting is sprinkled withadequate water prior to blasting to reduce dustemissions upon explosion of charge placed forbreaking the hard rock. (xix) The project staff from the PIU, consultants and contractors would undertake a post-blasting survey ofstructures (including videography and/or photography) lying within the area of influence of blasting from the vibrations related impacts (preferably in the presence of the owners of the said structures) to assess and/or ascertain regarding the damages, if any, caused to the structures because of blasting activities. (xx) The contractor shall be responsible for any and all damages to property or injury to persons resulting from blasting or accidental or premature explosions that may occur inconnection with use of explosives. The log of such events would be properly maintained.The contractor shall provide immediate support andrelief measures commensurate with the damages. (xxi) Training related to controlled blasting activity will be included in the overall safeguards training programme meant for PIUs and Contractors.		
Socio-Economic Loss of access to houses and business.	Loss of income	(i) Inform all businesses and residents about the nature and duration of any work well in advance so that they can make necessary preparations; (ii) Do not block any access; leave spaces for access between barricades/mounds of excavated soil and other stored materials and machinery, and providing footbridges so that people can crossover open trenches; (iii) Barricade the construction area and regulate movement of people and vehicles in the vicinity, and maintain the surroundings safely with proper direction boards, lighting and security personnel – people should feel safe to move around;	Contractor	Contractor cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		(iv) Control dust generation; (v) Immediately consolidate the backfilled soil and restore the road surface; this will also avoid any business loss due to dust and access inconvenience of construction work; (vi) Employee best construction practices, speed up construction work with better equipment, increase workforce, etc., in the areas with predominantly commercial, and with sensitive features like hospitals, and schools; (vii) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (viii) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.		
Socio-Economic - Employment	Generation of temporary employment and increase in local revenue.	(i) Employ local labour force as muchas possible; and (iii) Comply with labor laws.	Contractor	Contractor cost
Occupational Health and Safety	Occupational hazards which can arise during work.	(i) Follow all national, state and local, environmental and labour laws (indicative list is in Appendix 2); (ii) Develop and implement site-specific OHSPlan informed by OHS risk assessment seeking to avoid, minimize and mitigate risk, including control blasting, which shall include measures such as: (a) safe and documented construction procedures to be followed for all site activities; (b) ensuring all workers are provided with and use personal protective equipment; (c) OHS training for all site personnel, (d) excluding public from the work sites; and (e) documentation of work-related accidents;Follow International Standards such as the World Bank Group's Environment, Health and Safety Guidelines.For controlled blasting activity, identify the risks involved for the labourers and public and include measures in the OHS plan. Provide necessary training and PPEs to the labourers to ensure safety during implementation. (iii) Ensure that first-aid is available at all times. Equipped first-aid	Contractor	Contractor cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		stations shall be easily accessible throughout the sites; (iv) Secure all installations from unauthorized intrusion and accident risks (v) Provide health and safetyorientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; (vi) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; (vii) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; (viii) Ensure moving equipment is outfitted with audible back-up alarms; and blinkers; (ix) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage (especially explosives) and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; (x) Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively; (xi) Provide supplies of potable drinking water; and (xii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances.		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	(i) Confine work areas; prevent public access to all areas where construction works are on-going through the use of barricading and security personnel; (ii) Attach warning signs, blinkers to the barricading to caution the public about the hazards associated with the works, and presence of deep excavation; (iii) Minimize the duration of time when the sewer trench is left open through careful planning; plan the work properly from excavation to refilling and road relaying; (iv) Control dust pollution – implement dust control measures as suggested under air quality section; (v) Ensure appropriate and safe passage for pedestrians along the work sites; (vi) Provide road signs and flag persons to warn of on-going trenching activities; (vii) Restrict construction vehicle movements to defined access roads and demarcated working areas (unless in the event of an emergency); (viii) Enforce strict speed limit (20-30 kmph) for plying on unpaved roads, construction tracks; (ix) Provide temporary traffic control (e.g. flagmen) and signs where necessary to improve safety and smooth traffic flow; (x) Where traffic is diverted around crossings, traffic control or careful selection of the exit from the working areas will be provided with the aim of ensuring that vehicles join the road in a safe manner; (xi) At sensitive locations particularly where there are schools and markets close to the road, awareness of safety issues will be raised through neighbourhood awareness meetings; (xii) All drivers and equipment operators will undergo safety training; and (xiii) Maintain regularly the construction equipment and vehicles; use manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.	Contractor	Contractor cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Work Camps and worksites	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	(i) Consult PIU before locating project offices, sheds, and construction plants; (ii) Select a camp site away from residential areas (at least 100 m buffer shall be maintained) or locate the camp site within the existing facilities of Municipality; (iii) Avoid tree cutting for setting up camp facilities; (iv) Provide a proper fencing/compound wall for camp sites; (v) Camp site shall not be located near (100 m) water bodies, flood plains flood prone/low lying areas, or any ecologically, socially, archeologically sensitive areas; (vi) Separate the workers living areas and material storage areas clearly with a fencing and separate entry and exit; (vii) Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times; living quarters and construction camps shall be provided with standard materials (as much as possible to use portable ready to fit-in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be used as accommodation for workers; (viii) Camp shall be provided with proper drainage, there shall not be any water accumulation; (ix) Provide drinking water, water for other uses, and sanitation facilities for employees; (x) Prohibit employees from cutting of trees for firewood; contractor should provide cooking fuel (cooking gas); fire wood not allowed; (xi) Train employees in the storage and handling of materials which can potentially cause soil contamination; (xii) Wastewater from the camps shall be disposed properly either into sewer system; if sewer system is not available, provide on-site sanitation with septic tank and soak pit arrangements; (xiii) Recover used oil and lubricants and reuse or remove from the site; (xiv) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; provide a compost pit for bio degradable waste, and non-biodegradable / recyclable waste shall be collected and sold in	Contractor	Contractor cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		local market; (xv) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (xvi) At the completion of work, camp area shall be cleaned and restored to pre-project conditions, and submit report to PIU; PIU to review and approve camp clearance and closure of work site.		
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; (ii) All excavated roads shall be reinstated to original condition; (iii) All disrupted utilities restored; (iv) All affected structures rehabilitated/compensated; (v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc., and these shall be cleaned up; (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document; (vii) The contractor must arrange the cancellation of all temporary services; and (viii) Request PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.	Contractor	Contractor cost

dBA = decibels,EMP = environmental management plan, m = meter, OHS = occupational health and safety, PCC = plain cement concrete, PIU= Program Implementation Unit ,PUC = pollution under control,SOP = Standard operating procedures STP = sewage treatment plants.

[a]https://www.ifc.org/wps/wcm/connect/a99ab8804365b27aa60fb6d3e9bda932/EHS-Guidelines+101-Webinar.pdf?MOD=AJPERES

Table20:Operation Stage Environmental Impacts and Mitigation Measures

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
STP operation – malfunction and effect on efficiency	Public health, safety and environmental impacts	(i) Ensure proper knowledge transfer, hands-on training to municipal staff engaged in STP operation has been provided by contractor prior to handover of facility; (ii) Ensure continuous uninterrupted power supply; DG sets will be provided for capacity of 330KVA. Store room will be provided to store fuel. (iii) Operate and maintain the facility following standard operating procedures of operational manual; (iv) Undertake preventive and periodic maintenance activities as required; (v) Maintain the mechanical / electrical parts as per the maintenance plan to avoid any hazards; (vi) Conduct periodic training to workers; (vii) Ensure that all safety apparatus at STP including personal protection equipment are in good condition all times; and are at easily accessible and identifiable place; periodically check the equipment, and conduct mock drills to deal with emergency situations; (viii) Implement sludge management plan at the STP. sludge management to collect, treat and dispose the accumulated sludge safely; sludge will be tested periodically for heavy metal concentration; (ix) No wastewater from industrial premises (including domestic wastewater) shall be allowed to dispose into municipal sewers; (x) Monitor regularly and ensure that there is no illegal discharge through manholes or inspection chambers; conduct public awareness programs; in coordination with TNPCB after commencement of the project (xi) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with the standards; and (xii) Conduct periodic testing of dried sludge/compost to check presence of heavy metals and confirming stipulated concentrations to use as compost, the concentrations to use as compost as specified in the Standards for Composting, Schedule II A, Solid Waste Management Rules, 2016, FCO = Fertilizer Control Order,	DBOT Contractor and PIU /Ambur town	Operating costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		1985, amendments in 2009 and 2013. It shall not be used for food crops.		
Operation of sewage lifting and pumping stations.	Odor nuisance	(i) Strictly follow standard operating procedures / operational manual for operation and maintenance of lifting and pump stations; (ii) Ensure that operating staff is properly trained, and have clear understanding of odor issues vis-à-vis its related with operational practices; (iii) Ensure that pumping cycles are properly followed; and there is no buildup of sewage beyond design volume in the wells; (iv) Conduct H_2S monitoring periodically.	PIU and Ambur town	Operating costs
Operation and maintenance of sewerage system	Blocks, overflows, system malfunction, occupational health and safety	(i) Establish regular maintenance program, including: • 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. • Monitoring of sewer flow to identify potential inflows and outflows. • Conduct repairs on priority 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). (ii) Maintain records; review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance	PIU and Ambur town	Operating costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed; (iii) 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; (iv) Prohibit/prevent disposal of wastewater/effluent from industrial units in the sewers; ensure regular checking to ensure no illegal entry of industrial wastewater into sewers; (v) Develop an Emergency Response System for the sewerage system leaks, burst and overflows, etc; (vi) Provide necessary health and safety training to the staff in sewer cleaning and maintenance; (vii) Provide all necessary personnel protection equipment;and (viii) Do not conduct manual cleaning of sewers; for personnel engaged sewer maintenance work, there is a risk due to oxygen deficiency and harmful gaseous emissions (hydrogen sulphide, methane, etc.); provide for adequate equipment (including oxygen masks) for emergency use.		

DBOT = design, build, operate and transfer;H_2S = hydrogen sulfide;PIU = Program Implementation; STP =sewage treatment plants; TNPCB = Tamil Nadu Pollution Control Board.

Table21:Construction Stage Environmental Monitoring Plan

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
Construction disturbance, nuisances, public and worker safety,	All work sites	Implementation of construction stage EMP including safety measures,dust control, noise control, traffic management, andSafety during controlled blasting Site inspection checklist to review implementation is appended at Appendix 7	Weekly during construction	Supervising staff and safeguards specialists of PIU	Staff and consultant costs are part of incremental administration costs
Ambient air quality	Five locations (STP andfour monitoring locations 50 m downwind direction near sewer and pumping station work sites in the Municipality) ;	• PM10, PM2.5 NO2, SO2, CO	Once before start of construction Quarterly (yearly 4-times) during construction (3-year period considered)	ConstructionContractor	Cost for implementation of monitoring measures responsibility of contractor (65 samples x 5000 per sample = 325,000)
Ambient noise	Five locations (STP in Kaspa-A and four monitoring locations near sewer and pumping station work sites in the Municipality) ;	• Day time and night time noise levels	Once before start of construction Quarterly (yearly 4-times) during construction (3year period considered)	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor (65 samples x 1500 per sample = 97,500)
Surface	two	• pH, Oil and	Once before	Construction	Cost for

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
water quality	locations (Kaspa-A)	grease, Cl, F, NO3, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalnity • Heavy metals and pesticides.	start of construction Half yearly during construction (3-year construction period considered)	Contractor	implementation of monitoring measures responsibility of contractor (14 samples x 4000 per sample = 56,000)

EMP = Environmental Management Plan, m = meter, PIU = Program Implementation Unit,STP = sewage treatment plants.

Table 22:Operation Stage Environmental Monitoring Plan

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
Monitoring of treated wastewater quality from STP	Inlet and outlet of STP	Parameters as specified by TNPCB in the consent/ disposal standards notified for STPs.	Monthly Once	Ambur town	AmburtownOperating Cost.
Water quality at disposal point	Kaspa-A / Palar river disposal point	pH, Cl, F, NO3, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalinity, Heavy metals and pesticides	Baseline monitoring prior to start of commissioning Monthly once during operation Yearly twice during operation (pre and post monsoon)	Ambur town	O&M costs (water quality will be tested at the internal laboratory part of STP).
Odor monitoring at STP	three points (at boundary in the downwind direction and at nearest house, and including other units within the STP)	H_2S	Periodical (throughout the operation phase)	Ambur town	Handheld H_2S meters to be procured as part of the project and operated by operating staff.

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
Odor monitoring at pumping stations	three points (downwind direction) at all pumping stations: near inlet/suction well; outside the pumping station and at nearest house	H_2S	Periodical (throughout the operation phase)	Ambur town	Handheld H_2S meters to be procured as part of the project and operated by operating staff.
Odor monitoring at lifting stations	two points (downwind direction) at all lifting stations: near suction well and at nearest house	H_2S in ambient air	Periodical (throughout the operation phase)	Ambur town	Handheld H_2S meters to be procured as part of the project and operated by operating staff.
Sludge quality and suitability as manure	STP	Analysis for concentration of heavy metals and confirm that value are within the limits for use as compost	Start of operation and Yearly once	Ambur town	O&M costs (testing to be done at an accredited external laboratory).

H_2S = Hydrogen sulfide, O&M = operations and maintenance, STP = sewage treatment plants, TNPCB = Tamil Nadu Pollution Control Board.

B. Implementation Arrangements

167. The Municipal Administration and Water Supply Department (MAWS) of GOTN acting through the Tamil Nadu Urban Infrastructure Financial Services Ltd. (TNUIFSL) is the state-level executing agency. A project management unit (PMU) will be established in TNUIFSL headed by a Project Director and Deputy Project Director (senior official from Commissionerate of Municipal Administration [CMA]), and comprising dedicated full-time staff from TNUIFSL for overall project and financial management. A Project Steering Committee, headed by Principal Secretary, MAWS, and members include managing directors of TNUIFSL, CMA, and Chennai Metro Water Supply and Sewerage Board (CMWSSB) will be established.

168. The implementing agency for this subproject is TWAD Board. A project implementation unit(PIU) has been established in TWAD headed by a full-time Project Manager (Executive Engineer or above) and comprising dedicated full-time staff of the TWADfor day-to-day implementation of the project.PIUunder the TWAD Board will be responsible for planning, implementation, monitoring and supervision, and coordination of all activities of subproject.

169. **Safeguards Compliance Responsibilities.**Environmental and Social Safeguards (ESS) Managers in PMU/TNUIFSL will have overall responsibility of safeguard compliance with EMP and EARF. ULB Safeguards Officer will coordinate monitoring and implementation of safeguards. Environmental expert from TWAD Board will assist PIU in implementation of project in compliance with EMP and EARF, and will carry out all necessary tasks.

170. **PMU Safeguard Responsibilities**. Key tasks and responsibilities of the PMU for this subprojectinclude the following:

1. DPR finalization and Bidding stage:

(i) Ensure that all design related measures of the EMP are included in the designs;
(ii) Ensure that EMP is included in bidding documents and civil works contracts including requirement for EHS supervisor with the contractor;
(iii) Ensure that the bid/contract documents include specific provisions requiring contractors to comply with all applicable labor laws and core labor standards;
(iv) Ensure that staff required for implementation of EMP(EHS officer) is included in the bid requirements;
(v) Ensure that EMP cost is included in the project cost; and
(vi) Prior to invitation of bids and prior to award of contract ensure that all clearance/permissions as required for implementation of subproject are in place,to the extent possible.

2. Construction stage:

(i) Prior to start of construction:
- Ensure that all necessary clearances/permissions/licences, including that of contractor's are in place prior to start of construction; and
- provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by PIUs and contractors.

(ii) Oversee and provide guidance to the PIU to properly carry out the environmental monitoring as per the EMP;
(iii) Oversee grievance redress mechanism to address any grievances brought about in a timely manner; ensure that records are properly maintained;
(iv) Consolidate quarterlyenvironmental monitoring reports from PIU and submit semi-annual monitoring reports to ADB; and
(v) Oversee site closures to ensure that all work / facility sites are restored properly prior to issuing work completion certificate to the contractor.

3. Operation stage. Ensure that all clearances as required for operation of project are in place prior to operation, such as consent to operate (CTO) for STP from TNPCB.

171. **PIU Safeguard Responsibilities**. Key tasks and responsibilities of the PIU assisted by experts for this subproject include the following:

1. DPR finalization and Bidding stage:

(i) Include design related measures of the EMP in the project design and DPR;
(ii) Include EMP in the bidding documents and civil works contracts, including requirement of staff (EHSsupervisor) with contractor for EMP implementation;
(iii) Provide necessary budget in the project as IEE for EMP Implementation;
(iv) Ensure that the bid/contract documents include specific provisions requiring contractors to comply with all applicable labor laws and core labor standards including:
  (a) Labour welfare measures and provision of amenities
  (b) prohibition of child labor as defined in national legislation for construction and maintenance activities;
  (c) equal pay for equal work of equal value regardless of gender, ethnic Municipality, or caste;
  (d) elimination of forced labor; and
  (e) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites.
(v) In the pre-bid meeting, provide insight into EMP measures, and overall compliance requirements to the bidders; and
(vi) Obtain all clearance/permissions as required for implementation of subproject, including consent to establish (CTE) from TNPCB for STPand permission from Public Works Department (PWD) for disposal of treated effluent prior to invitation of bids and/or prior to award of contract / prior to constructionasappropriate.

2. Construction stage:

(i) Identify regulatory clearance requirements and obtain all necessary clearances prior to start of construction; ensure construction work by contractor is conducted in compliance with all government rules and regulations including pollution control, labour welfare and safety etc.;
(ii) Prior to start of construction organize an induction course for the training of contractors, preparing them on EMP implementation, environmental monitoring, and on taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation;
(iii) Ensure contractor compliance with staff resources as per the IEE/EMP/Bid;
(iv) Guide contractor on updating EMP / preparing Site Environmental Plan at the start of the project;
(v) Update IEE and EMP; ensure that IEE reflects the final design being implemented by contractor;
(vi) Conduct public consultation and information disclosure as necessary;
(vii) Take necessary action for obtaining rights of way;
(viii) Supervise day-to-day EMP implementation on site by contractor, including the environmental monitoring plan;
(ix) Superviseambientenvironmental monitoring by contractors;
(x) Take corrective actions when necessary to ensure no environmental impacts;
(xi) Submit quarterlyenvironmental monitoring reports to PMU;
(xii) Conduct continuous public consultation and awareness;

(xiii) Address any grievances brought about through the grievance redress mechanism in a timely manner as per the EMP;
(xiv) Monitor Contractor's compliance with the measures set forth in the EMP and any corrective or preventative actions set forth in a safeguards monitoring report that the PMU will prepare from time to time;
(xv) Implement corrective or preventative actions in case of non-compliance or new/unanticipated impacts;
(xvi) Inform PMU promptly in case if any significant impacts surfaces, which were not identified in the IEE and develop necessary corrective actions as necessary and ensure implementation by the contractors; include all such impacts and suggested actions in the Quarterly Environmental Monitoring Reports;
(xvii) Implementation grievance redress system, and undertake appropriate actions to redress the complaints; ensure that complaints/grievances are addressed in a timely manner and resolutions are properly documented;
(xviii) Review and approve monthly progress reports submitted by Contractor on EMP compliance;
(xix) Prepare quarterly environmental monitoring reports and submit to PMU /TNUIFSL; and
(xx) Provide any assistance in environmental safeguard related tasks as required by PMU to ensure compliance and reporting to ADB.

3. Operation stage:

(i) Obtain all clearances as required for operation of project prior to operation, such as CTO for STP from TNPCB; and
(ii) Conduct environmental management and monitoring activities as per the EMP.

172. **Contractor's Responsibilities:**

1. Bidding stage:

(i) Understand the EMP requirements and allocate necessary resources (budget, staff, etc.); and
(ii) Understand the regulatory compliance requirements related to labour welfare, safety, environment, etc.

2. Construction stage:

(i) Mobilize EHS Supervisor prior to start of work;
(ii) Prepare SEMP and submit to PIU;
(iii) Ensure that all regulatory clearances (both project related and contractor related) are in place prior start of the construction work;
(iv) Confirm with PIU availability of rights of way at all project sites prior to start of work;
(v) Prepare and submit:
  (a) Construction waste management (CWM) plan (sample is in Appendix 3); and
  (b) Traffic management plan (sample is Appendix 6).
(vi) Implement the mitigation measures as per the EMP including CWMandtraffic management Plans;

(vii) Follow the EMP measures/guidelines for establishment of temporary construction camps, construction waste disposal sites, and material borrow areas, etc.;
(viii) ImplementEMP and ensure compliance with all the mitigation and enhancement measures;
(ix) Conduct environmental monitoring (air, noise, water etc.,) as per the EMP
(x) Undertake immediate action as suggested by PIU to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation;
(xi) Submit monthly progress reports on EMP implementation to PIU;
(xii) Act promptly on public complaints and grievances related to construction work and redress in a timely manner in coordination with PIU and Ambur town; and
(xiii) Comply with applicable government rules and regulations.

C. Training Needs

173. Table 23presents the outline of capacity building program to ensure EMP implementation. These capacity building and trainings will be conducted at the offices of PMU and PIU by the environmental safeguards specialist of PMU/PIU and their consultants, which are part of project implementation set-up, and therefore no separate or additional costs are envisaged.Adequate costs are already considered in project's capacity building program. The detailed program and specific modules will be customized for the available skill set after assessing the capabilities of the target participants and the requirements of the project by the PMU.

Table 23:Pre Outline Capacity Building Program on EMP Implementaiton

Description	Target Participants and Venue	Estimate (₹)	Cost and Source of Funds
1.Introduction and Sensitization to Environmental Issues (1 day) - ADB Safeguards Policy Statement - Government of India and Tamil Naduapplicable safeguard laws, regulations and policies including but not limited to core labor standards, OHS, etc. - Incorporation of EMP into the project design and contracts. - Monitoring, reporting and corrective action planning	All staff and consultants involved in the project At PMU (combined program for all PIU)	-	Included in the overall program cost

Description	Target Participants and Venue	Estimate (₹)	Cost and Source of Funds
2. EMP implementation (1/2 day) - EMP mitigation and monitoring measures -Roles and responsibilities - Public relations, - Consultations - Grievance redress - Monitoring and corrective action planning - Reporting and disclosure - Construction site SOP - Chance find (archeological) protocol - AC pipe protocol - Traffic management plan - Waste management plan - Site clean-up and restoration - Controlled blasting	All PIU staff, contractor staff and consultants involved in the subproject At PIU	-	To be conducted by PIU at the PIU office; part of project implementation cost
3. Contractors Orientation to Workers (1/2 day) - EHS in project construction Health & safety measures during coronavirus disease (COVID-19) pandemic	Once before start of work, and thereafter regular briefing every month once. Daily briefing on safety prior to start of work All workers (including unskilled laborers)	-	Contractors' EHS officer to conduct program, with guidance of PIU

ADB = Asian Development Bank, EHS = environmental Health and Safety, EMP = environmental management plan, OHS = occupational health and safety, PMU = program management unit, PIU = program implementation unit, SOP = standard operating procedures.

D. Monitoring and Reporting

174. Immediately after mobilization and prior to commencement of the works, the contractor will submit a compliance report to PIU that all identified pre-construction mitigation measures as detailed in the EMP are undertaken. Contractor should confirm that the staff for EMP implementation (EHS supervisor) is mobilized. PIU will review, and approve the report and permit commencement of works.

175. During construction, results from internal monitoring by the contractor will be reflected in their monthly EMP implementation reports to the PIU. The PIU will monitor, review and advise contractors for corrective actions if necessary. Quarterly eport summarizing compliance and corrective measures, if any, taken will be prepared by PIU team at PIU and submitted to PMU (Report format is at Appendix 8). During operation, PIU will conduct management and monitoring actions as per the operation stage EMP, and submit to PMU anannualreport.

176. Based on PIU Quarterly monitoringreports and oversight visits to subproject work sites, PMU will submit semi-annual Environmental Monitoring Report (EMR).Once concurrence from the ADB is received the report will be disclosed on TNUIFSL, PMU and Amburtownwebsites.

177. ADB will review project performance against the TNUFIPcommitments as agreed in the legal documents (loan and project agreements, 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.

E. Environmental Management PlanImplementation Cost

178. Most of the mitigation measures require the contractors to adopt good site practices, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. The costs which are specific to EMP implementation and are not covered elsewhere in the projects are given below.

Table 24:Cost Estimates to Implement the Environmental Management Plan

	Particulars	Stages	Unit	Total Number	Rate (₹)	Cost (₹)	Costs Covered By
A.	**Implementation staff**						
1	EHS Supervisor	Construction	permonth	36x2	35,000	25,20,000	Civil work contract
	Subtotal (A)					**25,20,000**	
B.	**Mitigation Measures**						
1	Providing odor control system sewage pumping & lifting stations (gas capturing & treatment at required stations) and handheld H_2S meters for monitoring	Design	Lump sum provision	-	-	15,00,000	Provisional sums of contract (PIU)
2	Consent for establishments and consent for operation from TNPCB	Pre construction	Lump sum			200,000	Project costs (PIU)
3	Provision for tree cutting and compensatory plantation measures (1: 5 ratio replantation)	Construction	Per tree	100	1,000	100,000	Project costs (PIU)
4	Preparation of plans traffic management plan, waste (spoils) management plan etc.), traffic management at work sites(Pavement Markings, Channelizing Devices, Arrow Panels and Warning Lights)	Construction	Lump sum	-	-	250,000	Civil works contract
5	Safety barricading	Construction	Lump sum	Lumsum		2,000,000	Civil works contract
	Subtotal (B)					**40,50,000**	
C.	**Monitoring Measures**						
1	Air quality monitoring	Construction	per sample	65	5,000	325,000	
2	Noise levels	Construction	Per	65	1,500	97,500	

	Particulars	Stages	Unit	Total Number	Rate (₹)	Cost (₹)	Costs Covered By
	monitoring		sample				
3	Surface water monitoring	Construction	Per sample	12	4,000	48,000	
	Subtotal (C)					**470,500**	
D.	**Capacity Building**						
1.	Training on EMP implementation	Pre-construction				**-**	Part of PIU and PMU , consultant tasks
2.	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite				-	Civil works contractor cost
	Subtotal (D)						
	Total (A+B+C+D)				**INR**	**70,40,500**	
	Contractor Cost					-47,70,000	
	PIU Cost					-22,70,500	

EHS = environmental Health and Safety, EMP = environmental management plan, H_2S = Hydrogen sulfide, PIU = program implementation unit,TNPCB = Tamil Nadu Pollution Control Board.

IX. CONCLUSION AND RECOMMENDATIONS

179. The process described in this document has assessed the environmental impacts of all elements of the proposed underground sewerage subproject in area of Ambur town. All potential impacts were identified in relation to pre-construction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning and design process wherever possible; thus, environmental impacts as being due to the project design or location were not significant. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result significant measures have already been included in the designs for the infrastructure. This means that the number of impacts and their significance has already been reduced by amending the design. Various design related measures suggested for: STP treatment process design to meet disposal standards, ensuring efficient treatment, and sludge management,odor control at pumping stations, uninterrupted power supply provision; standard operating procedures for operation and maintenance; and imparting necessary training for ULB staff; providing necessary safety no manual cleaning of sewers, and personal protection equipment for workers (protection against oxygen deficiency, harmful gaseous emissions) and sludge handling, and development of green buffer zone around the sewage treatment plant.

180. The site selected for STP is located within a vast parcel of land. Considering the current and future development around the facility, various measures are included in the subproject design, including: design of a compact, superior process with lowodor potential; sensitive layout design by maintaining adequate distance from the boundary, so that STP is deep inside the

campus with tree cover around, etc. All the lifting and pumping station sites are situated on vacant land parcels, and sewers will be laid on the public roads.

181. Sewage and pumping stations sites, which collect sewage from the sewer network and pump to higher level to convey to sewage to STP for safe treatment and disposal, are located within or near residential areas, which it will serve. Site selection is done with utmost care to located as far as away from the houses, however, given design considerations and land constraints, some of the sites identified are close to the houses. Various site planning, green buffer and design related measures are included in the project to prevent and control odor generation. These include: appropriately locating sewage wells within site maintaining maximum distance from the nearby houses; developing tree cover; closed facilities; design and operation measures to prevent odor; and providing gas collection and treatment facilities. Periodical odor monitoring is proposed at pumping and lifting stations.

182. STP malfunction or decrease in treatment efficiency will have adverse impacts.This will result in release of untreated or partially treated wastewater that will pollute environment and cause public health issues. STP has been designed by the DBOT contractor to meet the disposal standards and disposal is proposed into Palar river through 200m open earthern channel from polishing pond(STP).Required measures to ensure that sewage system is operated and maintained with designed efficiencyare to be included in the design and operation by the contractor. Proper sludge management system to collect, treat and dispose safety will be followed. Periodic monitoring of dried sludge to check suitability as a manure is suggested.

183. Except sewer works, all other construction activities will be confined to the selected sites, and the interference with the general public and community around is minimal. There will betemporary negative impacts, arising mainly from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety, etc.), mining of construction material, occupation health and safety aspects. Sewer line works will be conducted along public roads in an urban area congested with people, activities and traffic, subproject is likely to significant impacts during construction. Impacts mainly arise from the construction dust and noise; from the disturbance of residents, businesses, traffic by the construction work, safety risk to workers, public and nearby buildings due to deep trench excavations, especially in narrow roads, dust, access impediment to houses and business,disposal of large quantities of construction waste, etc. Some sections of the proposed alignment may have to opt for controlled blasting as the construction methodology for excavation owing to presence of hard rock. These are all general impacts of construction in urban areas, and there are well developed methods of mitigation that are suggested in the EMP.

184. Once the new system is operating, the facilities will operate with routine maintenance, which should not affect the environment. Improved system operation will comply with the O&M manual and standard operating procedures to be developed for all the activities.

185. Mitigation will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures are implemented, and to determine whether the environment is protected as intended. This will include observations on- and off-site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the PMU. There will also be longer-term surveys to monitortreatment efficiency of STP (raw and treated sewage quality), sludge and odor. Mitigation and monitoring measures, along with the project agency responsible for such actions, form part of the EMP.

186. Stakeholders were involved in developing the IEE through face-to-face discussions, on site meetings, and aMunicipality level consultation workshop, whichwas conducted for larger public participation in the project. Views expressed by the stakeholders were incorporated into the IEE and the planning and development of the project. The IEE will be made available at public locations and will be disclosed to a wider audience via the PMU, AmburtownandADB websites. The consultation process will be continued during project implementation, as necessary, to ensure that stakeholders are engaged in the project and have the opportunity to participate in its development and implementation.

187. The project's grievance redress mechanism will provide the citizens with a platform for redress their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

188. The EMP will assist the project agencies and contractor in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project.A copy of the updated EMP/SEP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site, and will be included in the contractual clauses to ensure compliance to the conditions set out in this document.

189. The citizens of the Ambur town will be the major beneficiaries of this subproject. The new sewerage system will remove the human waste from those areas served by the network rapidly and treated to an acceptable standard, and treated wastewater is utilized beneficial purposes. In addition to improved environmental conditions, the subproject will improve the over-all public health in theproject area. Diseases of poor sanitation, such as diarrhoea and dysentery, should be reduced, so people should spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health.

190. Therefore, as per ADB SPS, the project is classified as environmental category B and does not require further environmental impact assessment. However, to conform to government guidelines STPrequiresconsenttoestablishment (CTE) and consent to operate (CTO) from Tamil NaduPollution Control Board. Consent to establish has been obtained from TNPCB on 23.09.2020..

191. This IEE has been updatedby the PIU to incorporate changes to reflect the changes in the project details including use of Controlling Blasting and STP design finalization, and is now been updated.

RAPID ENVIRONMENTAL ASSESSMENTCHECKLIST

Sewerage

Instructions:
- This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Sustainable Development and Climate ChanteDepartment.
- This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- 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.

Country/Project Title: India/Tamil Nadu Urban Flagship Investment Program– Underground Sewerage Subproject for Ambur town

Sector Division: Urban Development

Screening Questions	Yes	No	Remarks
A. Project Siting **Is the project area…**			
▪ Densely populated?	✓		Subproject activities are located in the outer areas of AmburMunicipality, which were originally municipalities. Old habilitation areas within these municipalities have density residential pockets, with narrow and congested roads. Newly developing residential areas have low density and well planned layouts. Agriculture is still practiced in the outer areas.
▪ Heavy with development activities?	✓		All the project towns are developing towns; urban expansion is considerable.
Adjacent to or within any environmentally sensitive areas?			
▪ Cultural heritage site	✓		In Vellore and Tiruchirappalli, sewer alignments will pass thru regulated areas of the protected monuments of the Archaeological Society of India (ASI). Potential impacts from civil works will be avoided by (i) consulting with and obtaining permission from ASI, and (ii) appointing an archaeological expert to assess impacts and supervise construction. No impacts anticipated during operation phase.
▪ Protected Area		✓	In Tamil Nadu State, there are 5 national parks, 15 wildlife sanctuaries (including four tiger reserves), 15 bird sanctuaries, and two conservation reserves. The ADB Mission team confirmed during pre- and fact-finding missions that Tranche 2 locations are not in these protected areas.
▪ Wetland		✓	

Screening Questions	Yes	No	Remarks
▪ Mangrove		✓	
▪ Estuarine		✓	
▪ Buffer zone of protected area		✓	There are 3 biosphere reserves in Tamil Nadu. Biosphere reserves have vast areas and may cover urban and developing areas. The ADB Mission team confirmed during pre- and fact-finding missions that Tranche 2 locations are components are/will be in the biosphere core zones.
▪ 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?		✓	**Not anticipated.** The Mission team confirmed during pre- and fact-finding missions that Tranche 2 locations are not within nor adjacent to any protected historical/cultural monuments/areas.
▪ interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?	✓		**Anticipated during operations but can be avoided and mitigated.** STP, sewage lifting, and pump stations are in urban areas and odor may create nuisance to communities. Appropriate odor standards will be applied, and necessary odor control measures are included in the designs and EMPs.
▪ dislocation or involuntary resettlement of people?	✓		**Anticipated but can be managed.** Any involuntary resettlement impact is addressed in the resettlement plan prepared per ADB SPS.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	**Not anticipated.** The contractor will be encouraged to hire workers from the local labor force.
▪ impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		✓	**Not anticipated.** Sewage will be treated in the proposed STPs. The designs and operation of the STPs will consider on assimilative capacity of receiving body of water and effluents will comply with discharge standards.
▪ overflows and flooding of neighboring properties with raw sewage?		✓	**Not anticipated.** Risks, climate change factors, and 30 years population projects have been considered in identifying the capacity and design of the sewerage systems. The design engineers confirmed no risk of overflow.
▪ environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?		✓	**Not anticipated.** STP designs will include sludge collection, treatment and disposal process. The sewerage collection systems will only allow flow domestic sewage by direct connections to households. The designs ensure no industrial effluent will be allowed into the sewer network.
▪ noise and vibration due to blasting and other civil works?	✓		Controlled blasting would be undertaken based on the site conditions. controlled blasting shall be done onlyby licensed explosive contractor. All Temporary nuisance/disturbance due to construction activities will be minimized with appropriate mitigation

Screening Questions	Yes	No	Remarks
			measures. Necessary noise and vibration control measures such as designing the blast charge by complying with the applicable Indian regulations and standards,Covered with MS sheet + Excavated earth + sand filled gunny bags are deployed. Necessary permissions are obtained from District Collector, Thirupattur for controlled blasting work.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?	✓		**Anticipated but temporary, site-specific and can be mitigated.** EMPs and contract provisions include requirement for contractors' Health and Safety (H&S) plan. The contractors' H&S plans will be reviewed and cleared by PIUs prior to commencement of works.
▪ discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		✓	**Not anticipated.** The sewerage collection systems are designed to only allow flow of domestic sewage by direct connections to households. The designs ensure no industrial effluent will be allowed into the sewer network.
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		✓	**Note anticipated.** STP, pump and lifting stations will include buffer zones as required and condition in the Consent to Establish by the Tamil Nadu State Pollution Control Board.
▪ road blocking and temporary flooding due to land excavation during the rainy season?	✓		**Anticipated during construction but temporary, site-specific and can be mitigated.** Complete road blocks are not envisaged. In narrow roads, traffic may be diverted but access will be ensured for pedestrians. Works will be conducted during dry season. Contractors are required to submit traffic management plan as part of site-specific EMP.
▪ noise and dust from construction activities?	✓		Controlled Blasting proposed will be carried out with necessary precautionary measures. Dust will be controlled with proper measures.
▪ traffic disturbances due to construction material transport and wastes?	✓		**Anticipated during construction but temporary, site-specific and can be mitigated.** EMPs and contract provisions include requirement for contractors' Traffic Management Plan which will be reviewed and cleared by PIUs prior to commencement of works.
▪ temporary silt runoff due to construction?	✓		**Anticipated during construction but temporary, site-specific and can be mitigated.** EMPs and contract provisions include requirement for contractors to provide silt control measures.
▪ hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?		✓	**Not anticipated.** O&M Manuals will be developed as part of the contracts. Necessary equipment and training to workers will be provided under TNUIFP. The ULBs will be trained on standard operating procedures and maintenance to ensure facilities are functioning according to the designs.
▪ deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		✓	**Not anticipated.** The STP designs include sludge handling and treatment facilities. Necessary equipment and training to ULBs/workers on sludge handling and effluent

Screening Questions	Yes	No	Remarks
			monitoring will be provided under TNUIFP.
▪ contamination of surface and ground waters due to sludge disposal on land?		✓	**Not anticipated.** The STP designs include sludge handling and treatment facilities. O&M Manual will include testing procedures, parameters and restriction on re-use of treated sludge. Only if it meets the Government of India standards for soil conditioner and fertilizer then will be allowed for re-use and strictly for non-food crops only.
▪ Health and safety hazards to workers from toxic gases and hazardous materials which may be contained in confined areas, sewage flow and exposure to pathogens in untreated sewage and unstabilized sludge?	✓		**Anticipated during operation but temporary, site-specific and can be mitigated.** Workers may be exposed during cleaning of blockages in sewerage network. However, O&M Manuals will include standard operating procedures. All necessary health and safety training and personal protection equipment will be given to workers and staff during operation of sewerage system. Implementation of contractors' H&S will be strictly enforced by the PIUs.
▪ Large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?		✓	**Not anticipated.**
▪ Social conflicts between construction workers from other areas and community workers?		✓	**Not anticipated.** The contractor will be encouraged to hire workers from the local labor force.
▪ 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?	✓		**Anticipated but can be mitigated.** Construction will not involve use of explosives and chemicals. During operations, chemicals such as pH adjusters, flocculants, or coagulants may be used. The complete list of chemicals, quantities, and requirements for safe use and storage will be included in the Updated/Final IEE for the STPs (these are design-build-operate packages). The EMPs in the current IEEs already include measures and monitoring requirements conforming with IFC EHS Guidelines. O&M Manuals will include health and safety requirements for managing chemicals.
▪ 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?		✓	**Not anticipated.** Work area will be clearly demarcated. STPs will have compound walls and security personnel. Pump houses and lifting stations will be secured and locked. Only workers and project-concerned members will be allowed to enter the sites. PIUs, in coordination with water and sanitation committees, will disseminate information on community health and safety.

CHECKLIST FOR PRELIMINARY CLIMATE RISK SCREENING

Screening Questions		Score	Remarks[a]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	1	Some project locations may experience flooding during heavy rains. No components will be sited in river flood plains, drainage channels, etc. Locations may however be in low-lying areas. Adequate measures will be included in the designs to safeguard facilities from extreme events.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	1	Intakes and other structures (e.g., pumping stations, STPs) located in or close to rivers/water bodies, low lying flat lands, etc., to be designed with proper hydro-meteorological parameters
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	No significant effect
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	0	No significant effect
Performance of project outputs	Would weather/climate conditions and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	No significant effect

[a]If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): <u>Medium Risk</u>

SALIENT FEATURES OF MAJOR LABOR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN CONSTRUCTION OF CIVIL WORKS

(i) Workmen Compensation Act, 1923 - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

(ii) Payment of Gratuity Act, 1972 - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

(iii) Employees' PF and Miscellaneous Provisions Act, 1952 - The Act provides for monthly contributions by the employer plus workers at 10% or 8.33%. The benefits payable under the Act are: (a) Pension or family pension on retirement or death as the case may be; (b) deposit linked insurance on the death in harness of the worker; (c) payment of PF accumulation on retirement/death etc.

(iv) Maternity Benefit Act, 1951 - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

(v) 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 applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.

(vi) 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.

(vii) Payment of Wages Act, 1936 - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

(viii) 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.

(ix) Payment of Bonus Act, 1965 - The Act is applicable to all establishments employing 20 or more workmen. The Act provides for payments of annual bonus subject to a minimum of 8.33 % of wages and maximum of 20 % of wages to employees drawing Rs. 3,500/- per month or less. The bonus to be paid to employees getting Rs. 2,500/- per month or above up to Rs.3,500/- per month shall be worked out by taking wages as Rs.2,500/- per month only. The Act does not apply to certain establishments. The newly set up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of the Act.

(x) Industrial Disputes Act, 1947 - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what

are the requirements for laying off or retrenching the employees or closing down the establishment.

(xi) Industrial Employment (Standing Orders) Act, 1946 - It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the employer on matters provided in the Act and get the same certified by the designated Authority.

(xii) Trade Unions Act, 1926 - The Act lays down the procedure for registration of trade unions of workmen and employees. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities.

(xiii) Child Labor (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.

(xiv) Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979 - The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc

(xv) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996 - All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. 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.

SAMPLE OUTLINE SPOILS (CONSTRUCTION WASTE) MANAGEMENT PLAN

- The Spoil Management Plan should be site specific and be part of the monthly Construction Management Plan.
- The contractor, in consultation with the PIU, has to find out appropriate location/s for the disposal of the excess soil generated. The spoils should be deposited only at these sites.
- Further precautions need to be taken in case of the contaminated spoils
- The vehicle carrying the spoil should be covered properly.
- The spoils generating from each site should be removed on the same day or immediately after the work is complete. The site / road should be restored to the original condition.

I. Spoils information

The spoil information contains the details like a) The type / material, b) Potential contamination by that type, c) Expected volume (site / component specific), d) Spoil Classification etc.

II. Spoils management

The Spoil Management section gives the details of a) Transportation of spoil b) disposal site details c) Precautions taken d) Volume of contaminated spoil, if present, d) Suggested reuse of disposal of the spoil

III. Documentation

The volume of spoil generated (site specific, date wise), site disposed, reuse / disposal details should be documented properly.

Public Information Notice Template

Public Announcement
Providing Underground Sewerage System to Ambur town

Under this project, works are being conducted by xxxx Contractor to provide sewerage network in Ambur

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.

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	* Male * 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: If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)	
Mode of communication: Note/letter E-mail Verbal/telephonic	
Reviewed by: (Names/positions of officials reviewing grievance)	
Action taken:	
Whether action taken disclosed:	Yes No
Means of disclosure:	

SAMPLE OUTLINE TRAFFIC MANAGEMENT PLAN

A. Principles for TMP around the Construction Sites

1. One of the prime objectives of this TMP is to ensure the safety of all the road users along the work zone, and to address the following issues:

(i) the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
(ii) protection of work crews from hazards associated with moving traffic;
(iii) mitigation of the adverse impact on road capacity and delays to the road users;
(iv) maintenance of access to adjoining properties; and
(v) addressing issues that may delay the project.

B. Operating Policies for TMP

2. The following principles will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around work zones while reasonably protecting workers and equipment.

(i) Make traffic safety and temporary traffic control an integral and high-priority element of project from planning through design, construction, and maintenance.
(ii) Inhibit traffic movement as little as possible.
(iii) Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
(iv) Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
(v) Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
(vi) Train all persons that select, place, and maintain temporary traffic control devices.
(vii) Keep the public well informed.
(viii) Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

3. **Figure A6.1**illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyze the impact due to street closure

4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

(i) approval from the ULB/Public Works Department (PWD) to use the local streets as detours;
(ii) consultation with businesses, community members, traffic police, PWD, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
(iii) determining of the maximum number of days allowed for road closure, and in of such provisions into the contract documents;
(iv) determining if additional traffic control or temporary improvements are needed along the detour route;
(v) considering how access will be provided to the worksite;

(vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and

(vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

5. If full road-closure of certain streets within the area is not feasible due to inadequate capacity of the detour street or public opposition, the full closure can be restricted to weekends with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

Figure A6.1: Policy Steps for the TMP

D. Public awareness and notifications

6. As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, albeit on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area, as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as a result of street closures to accommodate the works.

7. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for

this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and Municipality level meeting with the elected representatives.

8. The PIU will also conduct an awareness campaign to educate the public about the following issues:

(i) traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
(ii) defensive driving behaviour along the work zones; and
(iii) reduced speeds enforced at the work zones and traffic diversions.

9. It may be necessary to conduct the awareness programs/campaigns on road safety during construction.

10. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community centres. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the PIU, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

(i) explain why the brochure was prepared, along with a brief description of the project;
(ii) advise the public to expect the unexpected;
(iii) educate the public about the various traffic control devices and safety measures adopted at the work zones;
(iv) educate the public about the safe road user behaviour to emulate at the work zones;
(v) tell the public how to stay informed or where to inquire about road safety issues at the work zones (name, telephone, mobile number of the contact person; and
(vi) indicate the office hours of relevant offices.

E. Install traffic control devices at the work zones and traffic diversion routes

11. The purpose of installing traffic control devices at the work zones is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the work zones. The following traffic control devices are used in work zones:

- Signs
- Pavement Markings
- Channelizing Devices
- Arrow Panels
- Warning Lights

12. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new Municipality areas are wide but in old Municipality roads very narrow

and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

13. **Figure A6.2 to Figure A6.6** illustrates a typical set-up for installing traffic control devices at the work zone of the area, depending on the location of work on the road way, and road geometrics:

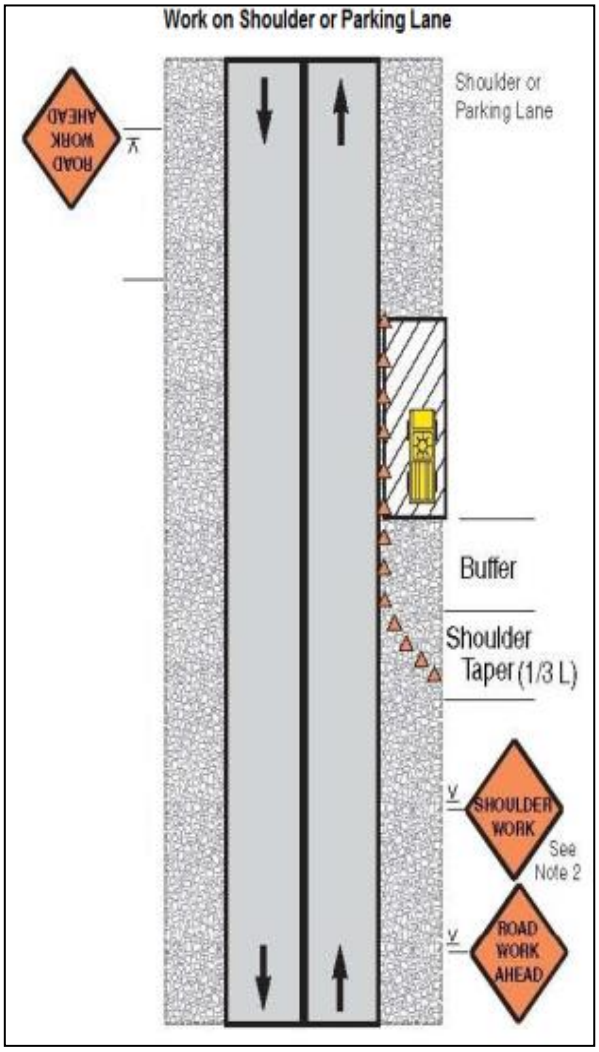
- Work on shoulder or parking lane
- Shoulder or parking lane closed on divided road
- Work in Travel lane
- Lane closure on road with low volume
- Street closure with detour

14. The work zone should take into consideration the space required for a buffer zone between the workers and the traffic (lateral and longitudinal) and the transition space required for delineation, as applicable. For the works, a 30 cm clearance between the traffic and the temporary STOP and GO signs should be provided. In addition, at least 60 cm is necessary to install the temporary traffic signs and cones.

15. Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flagggers/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

16. In addition to the delineation devices, all the construction workers should wear fluorescent safety vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

Figure A6.2 and A6.3: Work on shoulder or parking lane and Shoulder or parking lane closed on divided road



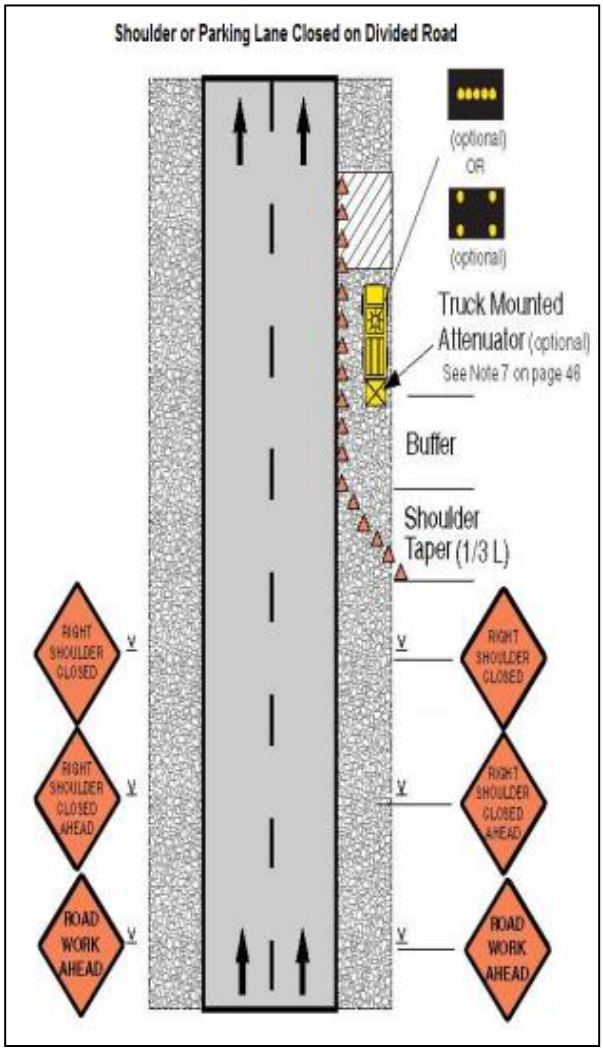
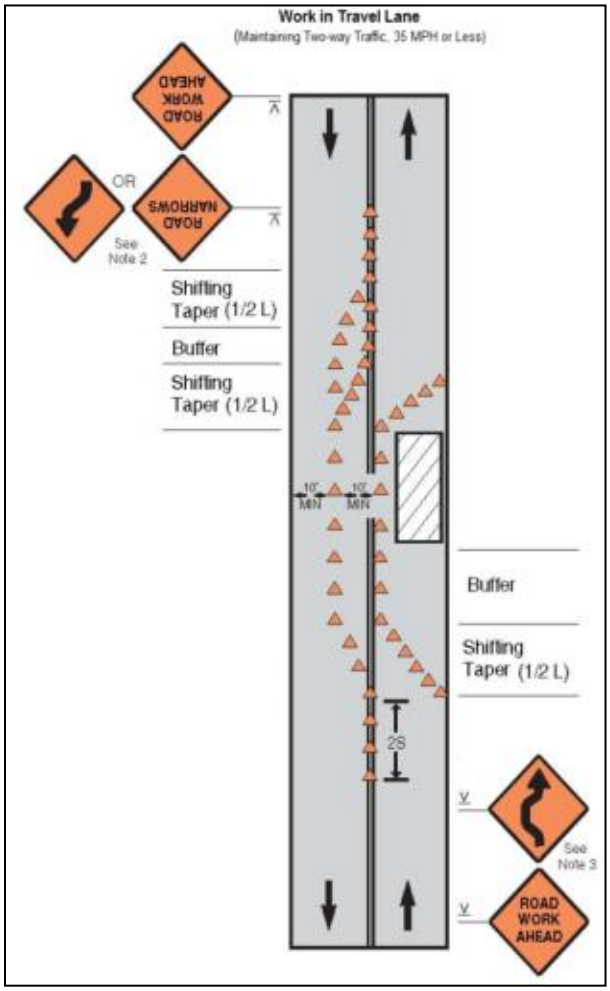


Figure A6.4 and A6.5: Work in Travel lane and Lane closure on road with low volume



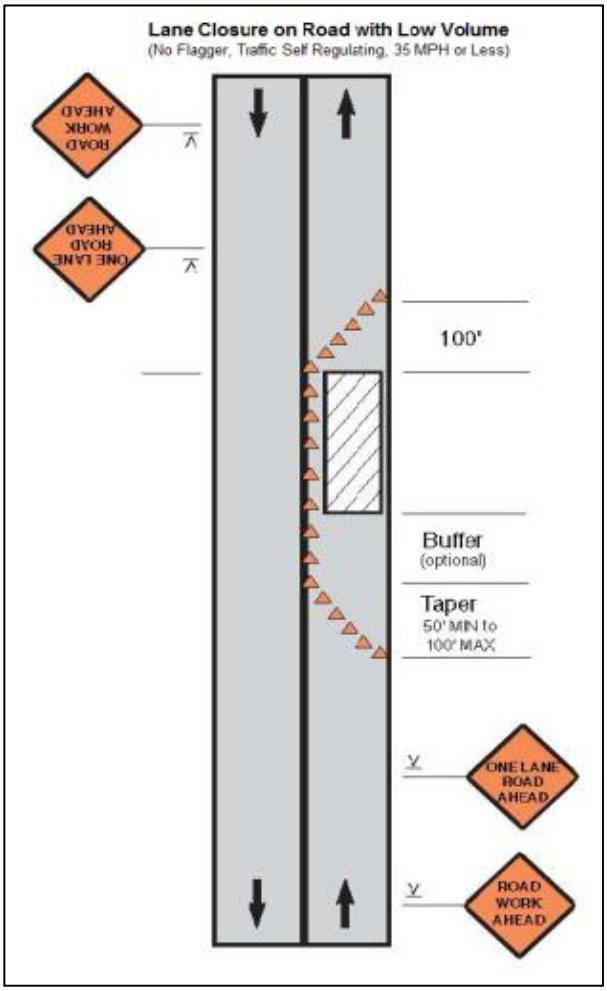
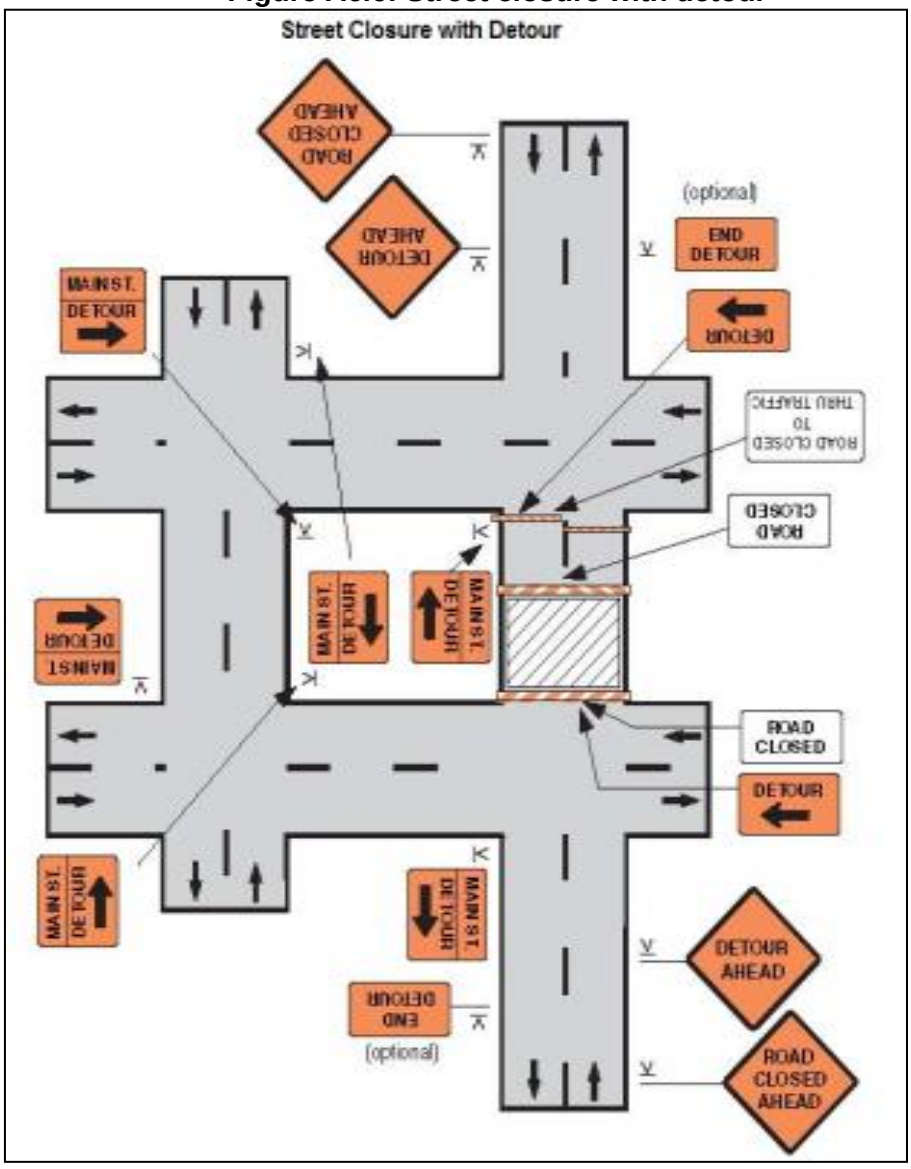


Figure A6.6: Street closure with detour



SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name
Contract Number

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

WEATHER:

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Monitoring Items	Compliance
Compliance marked as Yes / No / Not applicable (NA) / Partially Implemented (PI)	
EHS supervisor appointed by contractor and available on site	
Construction site management plan (spoils, safety, 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 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 works 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	
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	

Signature

_____

Sign off

_____ _____

Name **Name**
Position **Position**

QUARTERLY REPORTING FORMAT FOR AMBUR TOWN/PIU

1. Introduction

- Description of sub-project implemented by PIU
- Environmental category of the sub-project
- Details of site personnel and/or consultants responsible for environmental monitoring
- Subproject status

No.	Subproject Name	Subproject status	List of Works	Progress of Works
		Design☐ Pre-Construction☐ Construction☐ Operational Phase☐		

2. Compliance status with National/ State/ Local statutory environmental requirements

No.	Subproject Name	Statutory Environmental Requirements	Status of Compliance	Action Required

3. Compliance status with environmental loan covenants, if any

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

4. Compliance status with the environmental management and monitoring plan

- Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
- There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:
    - What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;

- If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;
- adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;
- Are their designated areas for concrete works, and refuelling;
- Are their spill kits on site and if there are site procedure for handling emergencies;
- Is there any chemical stored on site and what is the storage condition?
- Is there any dewatering activities if yes, where is the water being discharged;
- How are the stockpiles being managed;
- How is solid and liquid waste being handled on site;
- Review of the complaint management system;
- Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

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						
Operational Phase						

Overall Compliance with EMP

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

5. Approach and methodology for environmental monitoring of the project

- Brief description on the approach and methodology used for environmental monitoring of each sub-project

6. Monitoring of environmental impacts on project surroundings (ambient air, water quality and noise levels)

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be 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	SO_2 µg/m³	NO_2 µg/m³

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m³	SO_2 µg/m³	NO_2 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	LA_{eq} (dBA) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Monitoring Results)	
			Day Time	Night Time

7. Summary of key issues and remedial actions

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

8. Appendixes

- Photos
- Summary of consultations conducted, if any
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- Other

Annexure-9: DETAILS OF PUBLIC CONSULTATIONS

Minutes of the Public Consultation Conducted on 27 January 2018 at Ambur town Office, Ambur for The Proposed Underground Sewerage Scheme (UGSS by Tamil Nadu Water Supply and Drainage Board and AmburMunicipality

The Public Consultation commenced at 11.00 AM with officials from TWAD Board and Ambur town.The public/residents of the area and the residential association members were present at the meeting based on prior public notice given in newspapers about the details of the public consultation. The list of participants and residents participated in public opinion hearing meeting is as entered in the attendance register. The copy of Attendance register is attached herewith as Annexure - I for your reference.

Officials of TWAD & Ambur town welcomed the gathering and outlined the procedure for Public Consultation. They described that the TWAD Board &Amburtownhave proposed to develop the Under Ground Sewerage Scheme for Ambur Municipality. They requested the gathered public to express their views and opinions. This was followed by description of the project in detail. The summary of the project details was also circulated to the gathering.

The following details regarding the scheme were shared with the public:

The proposed UGSS will consist of 1 main pumping stations, 1 Sub Pumping station , 1 lifting station and a STP at Sollurvillage.The project area is divided into 4 Zones for better implementation. The sewer network will cover all the streets in the Municipality areas of 36-wards.The proposed project will collect the sewage from residential, commercial and institutional areas.. Also, the entire sewage collected in Amburtownwill be directly pumped to STP at Sollur village.The STP will be executed on DBOOT (design, build, own, operate and transfer) basis and the process will provide the treated wastewater in line with the discharge standards prescribed by Tamil Nadu Pollution Control Board (TNPCB). The proposal will prevent pollution of the natural water bodies present in the area, due to discharge of sewage.

Following this, the TWAD and AmburtownOfficials invited the public/residents to express their views, concerns and queries. Also, they requested the public/residents to introduce themselves before expressing their views and raising questions.

The views and questions of the public/residents and clarifications given by the Officials are detailed below:

S. No.	**The views and questions of the public**	**Clarification given by the Officials of TWAD / Ambur town**
1.	The proposed location of the pumping stations and STP.	SPS-Rafeeque Nagar MPS-Kaspa-A STP - Sollur village
2.	Time period of the project i.e., start and end time of the project	The project will be started after the tender process. Execution period 36 months.

S. No.	The views and questions of the public	Clarification given by the Officials of TWAD / Ambur town
3.	Questioned about whether there will be any impact to the surrounding peoples in the Rafeeque Nagar because of proposedSub pumping station.	The Sub Pumping station will be placed beyond the residential units and the proper green belt will be provided in the pumping station so that there will not be any impact to peoples in this locality.
4.	About the project cost and the implementation of project whether increase in the taxes of the households in the project area.	The individual households will have to pay taxes for the sewerage connection as like that of water connection. Also, the tax payment will be calculated based on the type and built-up area of houses.
5.	About the sizes of the pipes used and durability of the pipes.	The sizes of pipes are calculated based on the ultimate period population calculated for 2050. Thus there will not be any resizing of pipes required untilthe year 2050.
6.	About the implementation schedule of the project proposal	The construction and trial run for the project proposal will be about 3 years and 6 months for collection system.
7.	During implementation whether the connections to the household will be given based on type of houses i.e., only for R.C. houses or on what basis.	The connections will be given to all households in the proposed project area. Only the amounttaxed will vary based on the type or built-up area of the house.
8.	Whether the public fund is included in the design and construction phase of project cost.	The project cost is about Rs. 165.55 Crores. Out of which 50% will be granted by Government of India, 20 % will be granted by Government of Tamil Nadu and 10% will be provided by Urban Local Body(own), 20% will be provided by Urban Local Body(fund under ADB)i.e., Ambur town. Taxes will be collected from public/residents only during the operation phase.
9.	Whether Under Ground Sewerage Scheme and Storm Water drain are the same.	UGSS will collect only sewage and the storm water will be collected in separate open drain that will be connected to the water bodies.
10.	Whether the proposal will collect grey water and black water	The scheme will collect both the grey and black water from the residential, commercial and institutional areas in the project area
11.	Proposed pumping station will have any odor problems in the vicinity of the area.	There will not be any odor problem as the pumping stations are proposed with development of greenbelt around the periphery. In addition the pumping stations will be fitted with odor control devices.
12.	There is no provision of sewage network in Ward No. 26.	As said earlier, the present project proposal will cover entire Municipality areas of Ambur town.
13.	Implementation of project schedule.	The current proposal of UGSS will be available to the public within 3 years of time.
14.	If any discontinuity in the project proposal which will contribute disturbances to the public where should we contact. Kindly give the authorized person's name, designation and address.	The concerned authority for this project proposal is the Ambur town and it is requested to contact Ambur town officials in their locality directly if there are any disturbances to the public/residents. If no action taken then they can contact the Ambur

S. No.	The views and questions of the public	Clarification given by the Officials of TWAD / Ambur town
		town.
15.	Need clarification about any deposit needed for sewerage connection or taxes to be paid.	The deposit and the taxes will be calculated based on type and built-up area of the project. Also, the deposit and taxes will be based on the bye-law passed by Government of Tamil Nadu.
16.	On What basis chambers will be laid and Distance between the chambers	The chambers will be laid at 30 m interval for easy inspection purpose.
17.	Pipe quality and diameter of the pipes	The pipes will be laid based on IS standard so that the durability of pipes will be ensured. The diameter will be vary based on the quantity calculated.
18.	Whether household connections will be given on any priority	The household connections will be given to all the housesin Municipality areas of Ambur town.
19.	At present there are no sewer and storm water drain facilities in our locality (Ward No. 12) and we are facing many problems. The proposed sewer network will come into operation only after 2 years. What will happen for this 3 years.	We will provide temporary facilities for collection of sewage so that there will not be any problems in your locality.
20.	There are many vacant sites in our locality and this proposal will work if the sites are constructed with residential units.	The sizes of pipes are calculated based on the ultimate period population projected for 2050. This will take into account any increase in residents in the project area.
21.	The proposal is for the Ambur town. The information about the public consultation has not reached the peoples in the locality. Giving advertisement in News Paper alone is not sufficient. Thus, the public consultation should be postponed and conducted again after informing all the peoples.	All the regulations for conducting the public hearing have been followed. Kindly give your opinions for the proposal.
22.	Whether there will be any impact on ground water by proposing the STP in Sollur village.	There will not be any impact in ground water since all the sewage generated are collected through sewer network and treated in STP tanks which are above ground. Also, the treated sewage will match the discharge standards prescribed by TNPCB.

The officials of TWAD and Amburtownconcluded the Public Consultation with vote of thanks.

Copy of the photographs and copy of the News Paper advertisementof the entire proceedings are enclosed.

Photographs of Public Consultation in Ambur on 27January2018for proposed UGSS in Ambur town

Photographs of Public Consultation in Ambur on 27January2018for proposed UGSS in Ambur town

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News items related to Ambur town in Tamil Newspaper

27–இல் பாதாள சாக்கடைத் திட்ட கருத்துக் கேட்பு, கலந்தாய்வுக் கூட்டம்

ஆம்பூர், ஜன. 25: ஆம்பூரில் பாதாள சாக்கடைத் திட்டம் செயல்படுத்தப்பட உள்ள தால் பொதுமக்கள் கருத்துக் கேட்பு மற்றும் கலந்தாய்வுக் கூட்டம் ஜனவரி 27–ஆம் தேதி நடைபெற உள்ளது.

இதுகுறித்து ஆம்பூர் நகராட்சி ஆணையர் (பொறுப்பு) எல். குமார் வெளியிட்டுள்ள செய்திக் குறிப்பு:

ஆம்பூர் நகராட்சியில் அம்ருத் திட்டத்தின் கீழ் ரூ. 165.55 கோடி மதிப்பீட்டில் பாதாள சாக்கடைத் திட்டம் செயல்படுத்தப்பட உள்ளது. இது குறித்து பொதுமக்களிடம் கருத்துக் கேட்பு மற்றும் கலந்தாய்வுக் கூட்டம் நகராட்சி அலுவலகத்தில் ஜனவரி 27–ஆம் தேதி (சனிக்கிழமை) காலை 10.30 மணிக்கு நடைபெற உள்ளது.

இதில், நகராட்சி ஆணையர், தமிழ்நாடு குடிநீர் வடிகால் வாரிய அலுவலர்கள் கலந்து கொள்கின்றனர்.

பொது மக்கள் கூட்டத்தில் பங்கேற்று கருத்துகளைத் தெரிவிக்கலாம் என தெரிவிக்கப்பட்டுள்ளது.

திரா காந்தி பெயரில் இந்டும் உணவகங்கள் அறிமுகம் செய்யப்பட்டன. இதன் மூலம் ரூ.5–க்கு சிற்றுண்டியும், ரூ.10–க்கு மதிய உணவும் வழங்கப்படுகிறது.

இந்த வகை உணவகங்களை குடியரசு தினத்தையொட்டி நடைபெற்ற நிகழ்ச்சியில் கர்நாடகமுதல்வர்சித்தராமையா தொடங்கி வைத்தார். பசியில்லாத கர்நாடக மாநிலம் என்ற இலக்கை அடையும் நோக்கில் இந்த உணவகங்கள் தொடங்கப்பட்டுள்ளதாக சித்தராமையா தெரிவித்தார். முன்னாள் பிரதமர் இந்திரா காந்தியின் பெயரில் இந்த உணவகங்கள் தொடங்கப்பட்டுள்ளன.

பெங்களூருவில் அறிமுகம்!!

ஆம்பூரில்

பாதாள சாக்கடை திட்டம்!

ஆம்பூர், ஜன. 28–

ஆம்பூர் நகராட்சியில் மொத்தம் 36 வார்டுகள் உள்ளது. இங்கு 1 லட்சத்து 25 ஆயிரத்திற்கும் மேற்பட்ட மக்கள் வசிக்கின்றனர். கழிவு நீர் பாலாற்றில் கலப்பதால் ஆறு மாசடைகிறது. இந்நிலையை போக்க அம்ருத் திட்டத்தின் கீழ் சுமார் ரூ.165.55 கோடி மதிப்பீட்டில் அனைத்து பகுதிகளுக்கும் அமைக்கப்படவுள்ள பாதாள சாக்கடை திட்டத்திற்கு மக்களிடையே கருத்து கேட்கும் கூட்டம் ஆம்பூர் நகராட்சியில் ஆணையாளர் பொறுப்பு குமார் தலைமையில் நடந்தது.

நிகழ்ச்சியில் நூகர்வோர் சங்க நிர்வாகிகள் விஜயராஜ், குணசீலன், முன்னாள் நகர மன்ற உறுப்பினர் கராத்தே மணி உட்பட பொதுமக்கள் ஏராளமானோர் கலந்து கொண்டு தங்களின் சந்தேகங்களையும் கருத்துகளையும் கேட்டனர். பொதுமக்களின் சந்தேகங்களுக்கு தமிழ்நாடு குடிநீர் வடிகால் வாரிய உதவி செயற்பொறியாளர் சண்முகம் பதிலளித்தார். கூட்டத்தில் துப்புரவு அலுவலர் பாஸ்கர் மற்றும் பலர் கலந்து கொண்டனர்.

ஆம்பூரில்

பாதாள சாக்கடை திட்டப்பணி தொடங்கினால் விரைந்து முடிக்க வேண்டும்

ஆலோசனை கூட்டத்தில் பொதுமக்கள் கோரிக்கை

ஆம்பூர், ஜூன்.28–

ஆம்பூர் நகராட்சியில் அம்ருத் திட்டத்தின் மூலம் ரூ.165½ கோடி மதிப்பீட்டில் பாதாள சாக்கடை திட்டப்பணிகளை மேற்கொள்ள அரசு அனுமதி வழங்கியுள்ளது. இதையொட்டி பொதுமக்களிடம் கருத்துகேட்பு கூட்டம் நகராட்சி அலுவலகத்தில் நேற்று நடந்தது. ஆணையாளர் எல்.குமார் தலைமை தாங்கினார். துப்புரவு அலுவலர் பாஸ்கர் வரவேற்றார். தமிழ்நாடு குடிநீர் வடிகால் வாரிய உதவி செயற்பொறியாளர் சண்முகம் திட்டப்பணிகள் குறித்து பேசினார்.

கூட்டத்தில் பாதாள சாக்கடை திட்டப்பணிகள் தொடங்கப்பட்டால் நிர்ணயிக்கப்பட்ட காலத்திற்குள் பணியை விரைந்து முடித்து, சாலையை சீரமைக்க வேண்டும். மேலும் ஒரு குறிப்பிட்ட பகுதியில் பணியை தொடங்கி அங்கு முடித்தபின்னர் அடுத்த பகுதிக்கு செல்ல வேண்டும் என பொதுமக்கள் தெரிவித்தனர். கூட்டத்தில் நுகர்வோர் பாதுகாப்பு மன்ற தலைவர் குணசீலன், செயலாளர் விஜயராஜ் உள்பட பலர் கலந்து கொண்டனர்.

ஆம்பூர் நகராட்சியில் பாதாள சாக்கடை அமைப்பதற்காக மக்களிடையே கருத்து கேட்பு கூட்டம் ஆணையாளர் குமார் தலைமையில் நடந்தது. படத்தில் குடிநீர் வடிகால் வாரிய உதவி செயற்பொறியாளர் சண்முகம், துப்புரவு அலுவலர் பாஸ்கர் ஆகியோர் உள்ளனர்.

Edited and Published by S.N.Selvam on behalf of M/s. Chennai Murasu Pvt.Ltd., Printed by

ஆம்பூர் நகராட்சியில்

பாதாள சாக்கடை திட்டம் செயல்படுத்துவது குறித்த ஆலோசனைக்கூட்டம்

நாளை நடக்கிறது

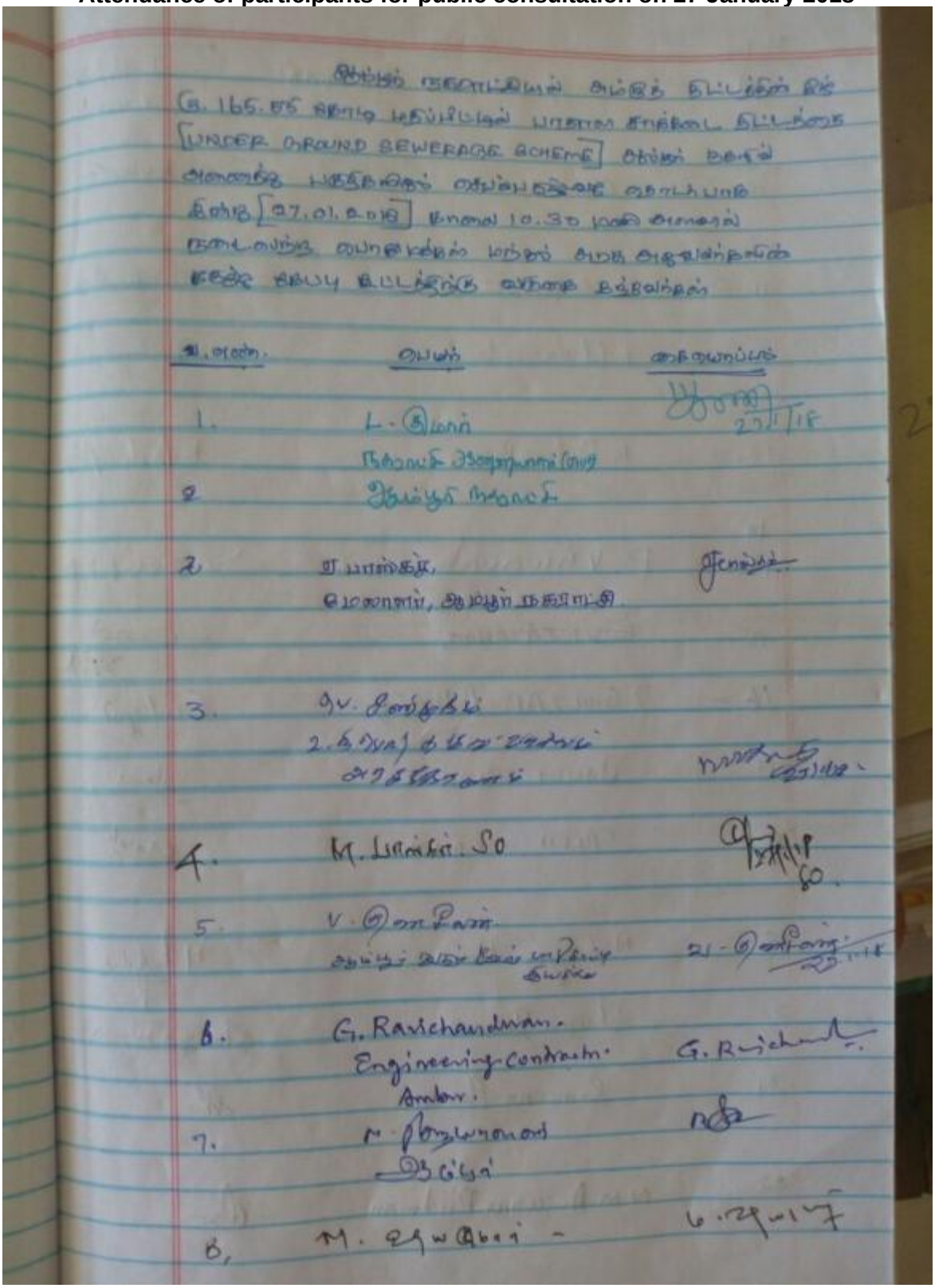
ஆம்பூர், ஜன.26–

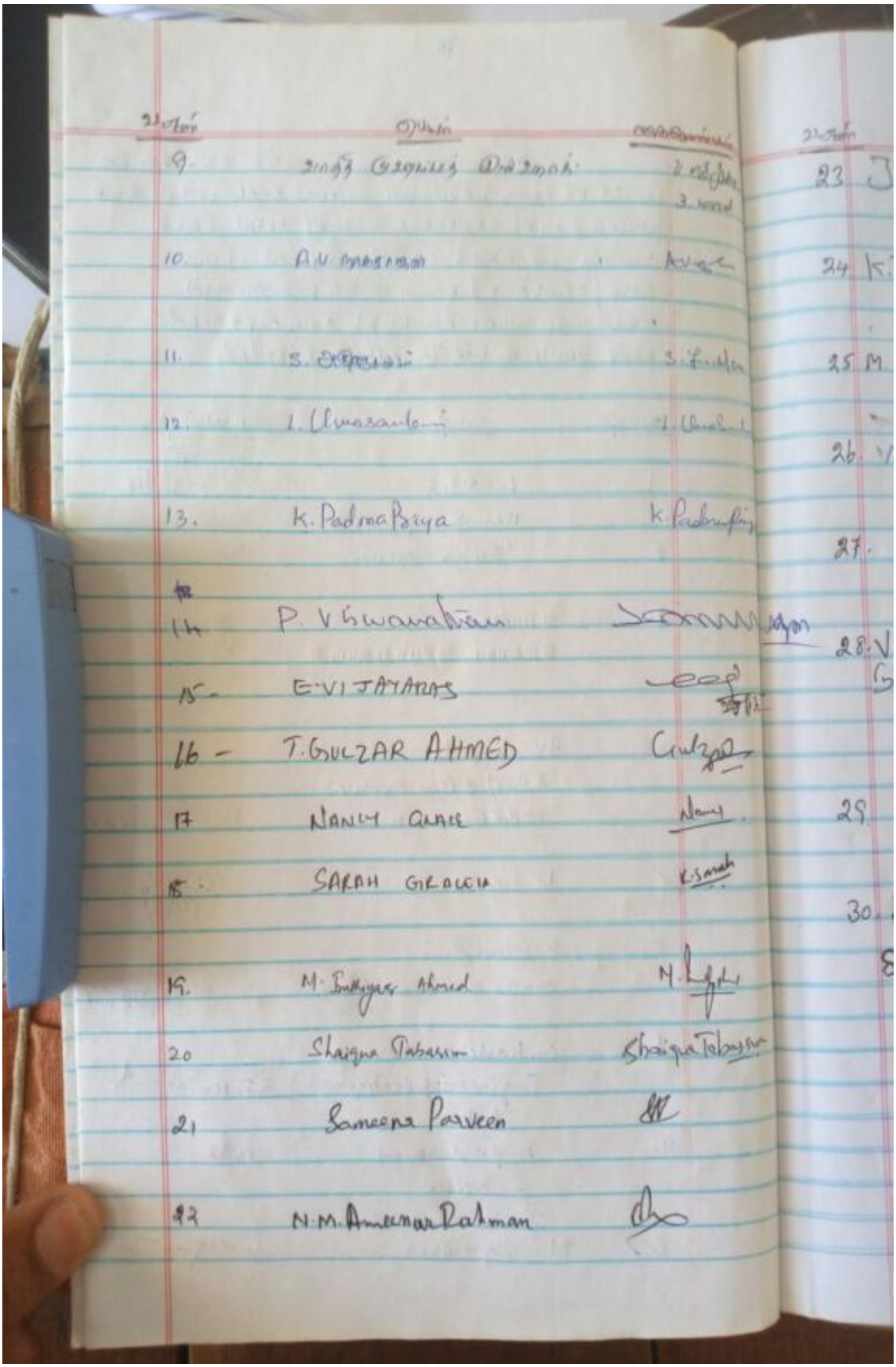
ஆம்பூர் நகராட்சியில் அம்ருத் திட்டத்தின் கீழ் ரூ.165½ கோடி மதிப்பீட்டில் பாதாள சாக்கடை திட்டம் அமல்படுத்தப்பட உள்ளது. ஆம்பூர் நகரில் உள்ள அனைத்து பகுதிகளிலும் இந்த திட்டம் செயல்படுத்துவது குறித்து ஆம்பூர் நகராட்சியில் நாளை (சனிக்கிழமை) காலை 10.30 மணிக்கு பொதுமக்கள் கருத்து கேட்பு ஆலோசனை கூட்டம் நடைபெற உள்ளது.

இக்கூட்டத்தில் நகராட்சி ஆணையாளர், தமிழ்நாடு குடிநீர் வடிகால் வாரிய அலுவலர்கள் கலந்து கொண்டு பொதுமக்களிடம் இருந்து ஆலோசனைகளை பெற உள்ளனர். எனவே கூட்டத்தில் பொதுமக்கள், அரசுதுறை அலுவலர்கள் தவறாமல் பங்கேற்று ஆலோசனைகளை தெரிவிக்கும்மாறு கேட்டுக் கொள்ளப்படுகிறது.

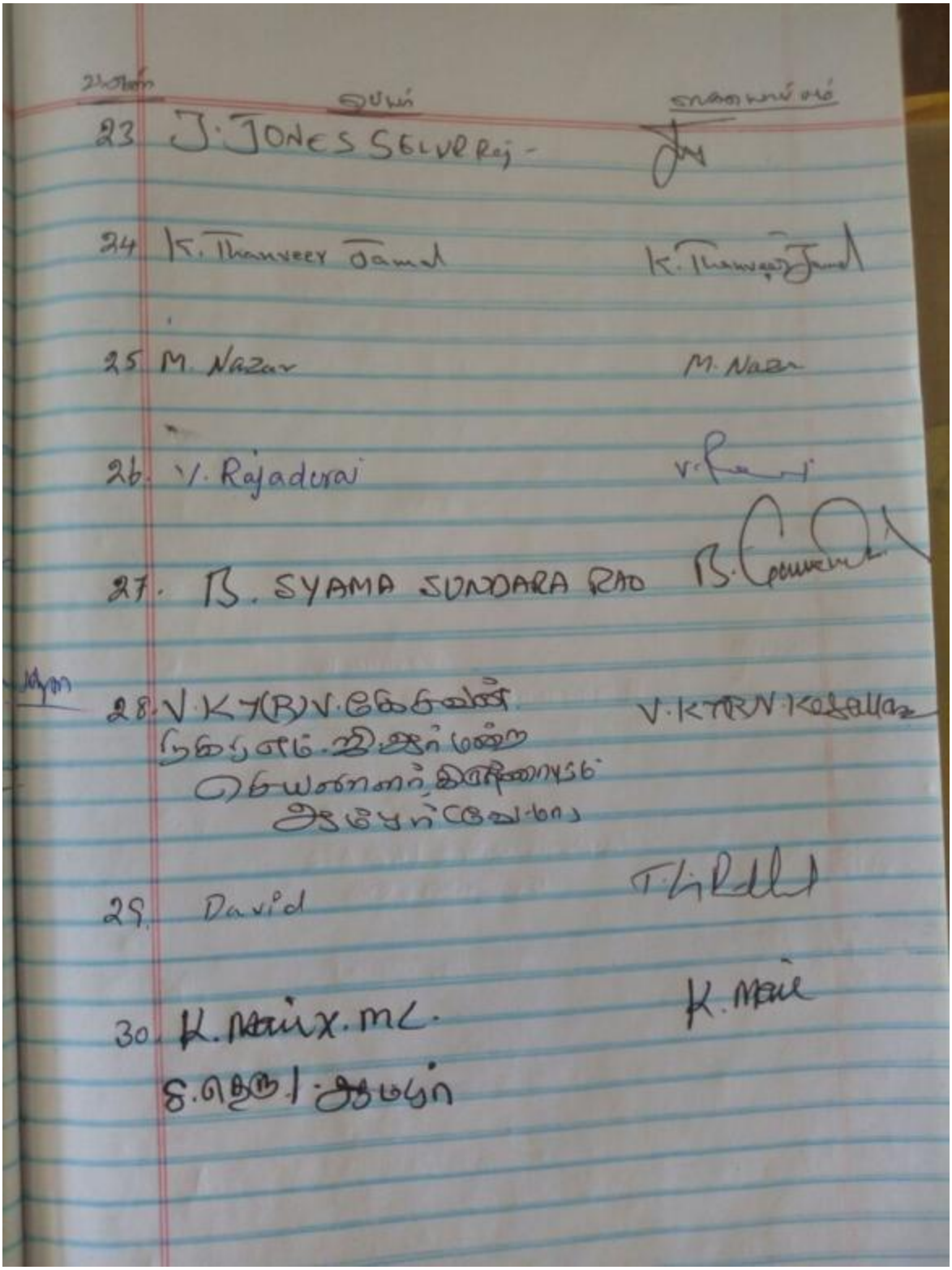
மேற்கண்ட தகவலை நகராட்சி ஆணையாளர் (பொறுப்பு) எல்.குமார் தெரிவித்துள்ளார்.

Attendance of participants for public consultation on 27 January 2018





9.	[illegible]	[illegible]	
10.	A.V. [illegible]	A.V.	
11.	S. [illegible]	S. [illegible]	
12.	I. Umasankari	I. Umasankari	
13.	K. Padmapriya	K. Padmapriya	
14.	P. Viswanathan	[illegible]	
15.	E. VIJAYARAS	[illegible]	
16.	T. GULZAR AHMED	Gulzar	
17	NANCY GRACE	Nancy	
18.	SARAH GRACE	K. Sarah	
19.	M. Bathyar Ahmed	M. Bathyar	
20	Shaiqua Tabassum	Shaiqua Tabassum	
21	Sameena Parveen	[illegible]	
22	N.M. Ameenar Rahman	[illegible]	



Annexure-9: Minutes of the Public Consultation Conducted on 2 June 2018 at Ambur town Office, Ambur for The Proposed Underground Sewerage Scheme (UGSS by Tamil Nadu Water Supply and Drainage Board and AmburMunicipality

The Public Consultation commenced at 11.00 AM with officials from TWAD Board and Ambur town.The public/residents of the area and the residential association members were present at the meeting based on prior public notice given in newspapers about the details of the public consultation. The list of participants and residents participated in public opinion hearing meeting is as entered in the attendance register. The copy of Attendance register is attached herewith as Annexure - I for your reference.

Officials of TWAD & Ambur town welcomed the gathering and outlined the procedure for Public Consultation. They described that the TWAD Board &Ambur town have proposed to develop the Under Ground Sewerage Scheme for Ambur town. They requested the gathered public to express their views and opinions. This was followed by description of the project in detail. The summary of the project details was also circulated to the gathering.

The following details regarding the scheme were shared with the public:

The proposed UGSS will consist of 1Main pumping station, 1 Sub Pumping station , 1 lifting station and a STP at Kaspa-A instead of Sollur village. The project area is divided into 4 Zones for better implementation. The sewer network will cover all the streets in the Municipality areas of 36-wards.The proposed project will collect the sewage from residential, commercial and institutional areas. The sewage will be pumped to Sewage Treatment Plant at Kaspa-A for treatment and disposal. Also, the entire sewage collected in Amburtownfrom 4 Zones (Z1,Z1A,Z2,Z2A) will be directly pumped to STP at Kaspa-A. The STP will be executed on DBOT (design, build, own, operate and transfer) basis and the process will provide the treated wastewater in line with the discharge standards prescribed by CPCB. The proposal will prevent pollution of the natural water bodies present in the area, due to discharge of sewage.

Following this, the TWAD and Ambur town Officials invited the public/residents to express their views, concerns and queries. Also, they requested the public/residents to introduce themselves before expressing their views and raising questions.

The views and questions of the public/residents and clarifications given by the Officials are detailed below:

S. No.	**The views and questions of the public**	**Clarification given by the Officials of TWAD / Ambur town**
1.	Why have been changed STP site.?	For reducing the project cost and Annual Maintenance cost.
2.	Neccessity of project..?	To provide safe disposal and hygienic environment to the living areas, public of the Municipal town.
3.	Wheather all the streets are covered or not?	Yes. All the streets were covered except NH road where septage management will be carried out.

S. No.	**The views and questions of the public**	**Clarification given by the Officials of TWAD / Ambur town**
4.	How the treatment process will be done and where..?	Typical STP layout plan for serwerage scheme has been shown and explained the treatment process.
5.	While excavating the roads and streets, what precautionary measures taken to stream line the traffic and other safety measures.	Proper barricading will be provided during excavation of the trenches and sign boards will be provided at the both ends of streets and roads to regulate the traffic and two&four wheelers and pedestrians.
6.	Wheather concrete roads and BT roads will be laid after laying of the sewers	Yes. Damaged portion will be rectified and put in to the benificial use as quick as possible.
7.	What cost will be paid for getting HSC.?	It will be decided by municipality after completion of the scheme and HSC cost will be fixed by the municipality and the same will be intimated/notified to the public.

The officials of TWAD and Ambur town concluded the Public Consultation with vote of thanks.

Copy of the photographs and copy of the News Paper advertisementof the entire proceedings are enclosed.

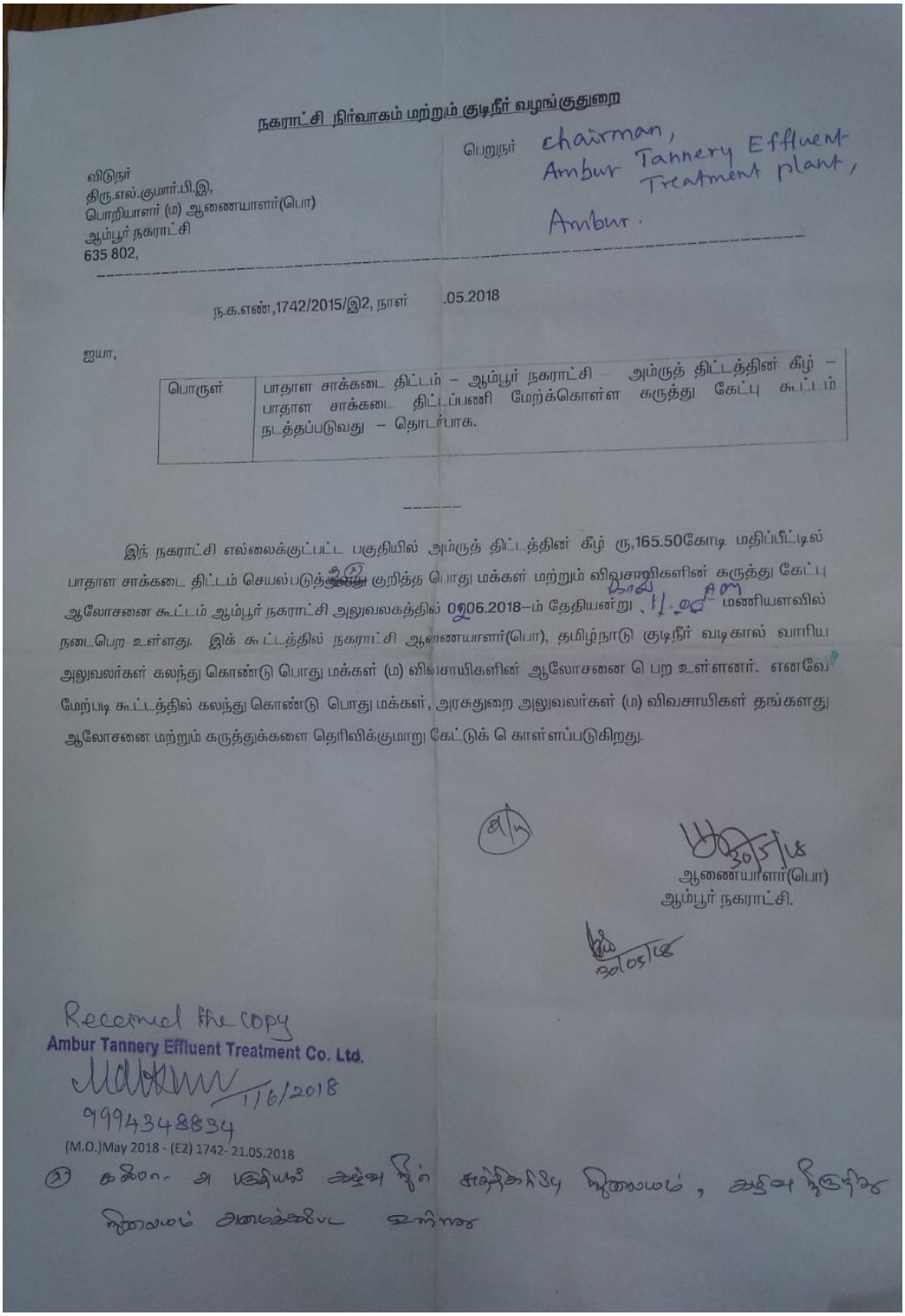
Photographs of Public Consultation in Amburon 2 June 2018for proposed UGSS in Ambur town

Photographs of Public Consultation in Amburon 2 June 2018for proposed UGSS in Ambur town

Photographs of Public Consultation in Amburon 2June 2018for proposed UGSS in Ambur town

Photographs of notice distribution for Public Consultation in Ambur on 2 June 2018for proposed UGSS in Ambur town

Notice for Public Consultation in Ambur on 2 June2018for proposed UGSS in Ambur town



நகராட்சி நிர்வாகம் மற்றும் குடிநீர் வழங்குதுறை

பெறுநர் chairman,
Ambur Tannery Effluent
Treatment plant,
Ambur.

விடுநர்
திரு.எல்.குமார்.பி.இ,
பொறியாளர் (மு) ஆணையாளர்(பொ)
ஆம்பூர் நகராட்சி
635 802,

ந.க.எண்,1742/2015/இ2, நாள் .05.2018

ஐயா,

பொருள்	பாதாள சாக்கடை திட்டம் – ஆம்பூர் நகராட்சி – அம்ருத் திட்டத்தின் கீழ் – பாதாள சாக்கடை திட்டப்பணி மேற்க்கொள்ள கருத்து கேட்பு கூட்டம் நடத்தப்படுவது – தொடர்பாக.

இந் நகராட்சி எல்லைக்குட்பட்ட பகுதியில் அம்ருத் திட்டத்தின் கீழ் ரு.165.50கோடி மதிப்பீட்டில் பாதாள சாக்கடை திட்டம் செயல்படுத்துவது குறித்த பொது மக்கள் மற்றும் விவசாயிகளின் கருத்து கேட்பு ஆலோசனை கூட்டம் ஆம்பூர் நகராட்சி அலுவலகத்தில் 02.06.2018–ம் தேதியன்று மணியளவில் நடைபெற உள்ளது. இக் கூட்டத்தில் நகராட்சி ஆணையாளர்(பொ), தமிழ்நாடு குடிநீர் வடிகால் வாரிய அலுவலர்கள் கலந்து கொண்டு பொது மக்கள் (மு) விவசாயிகளின் ஆலோசனை பெற உள்ளனர். எனவே மேற்படி கூட்டத்தில் கலந்து கொண்டு பொது மக்கள், அரசுதுறை அலுவலர்கள் (மு) விவசாயிகள் தங்களது ஆலோசனை மற்றும் கருத்துக்களை தெரிவிக்குமாறு கேட்டுக் கொள்ளப்படுகிறது.

30/5/18

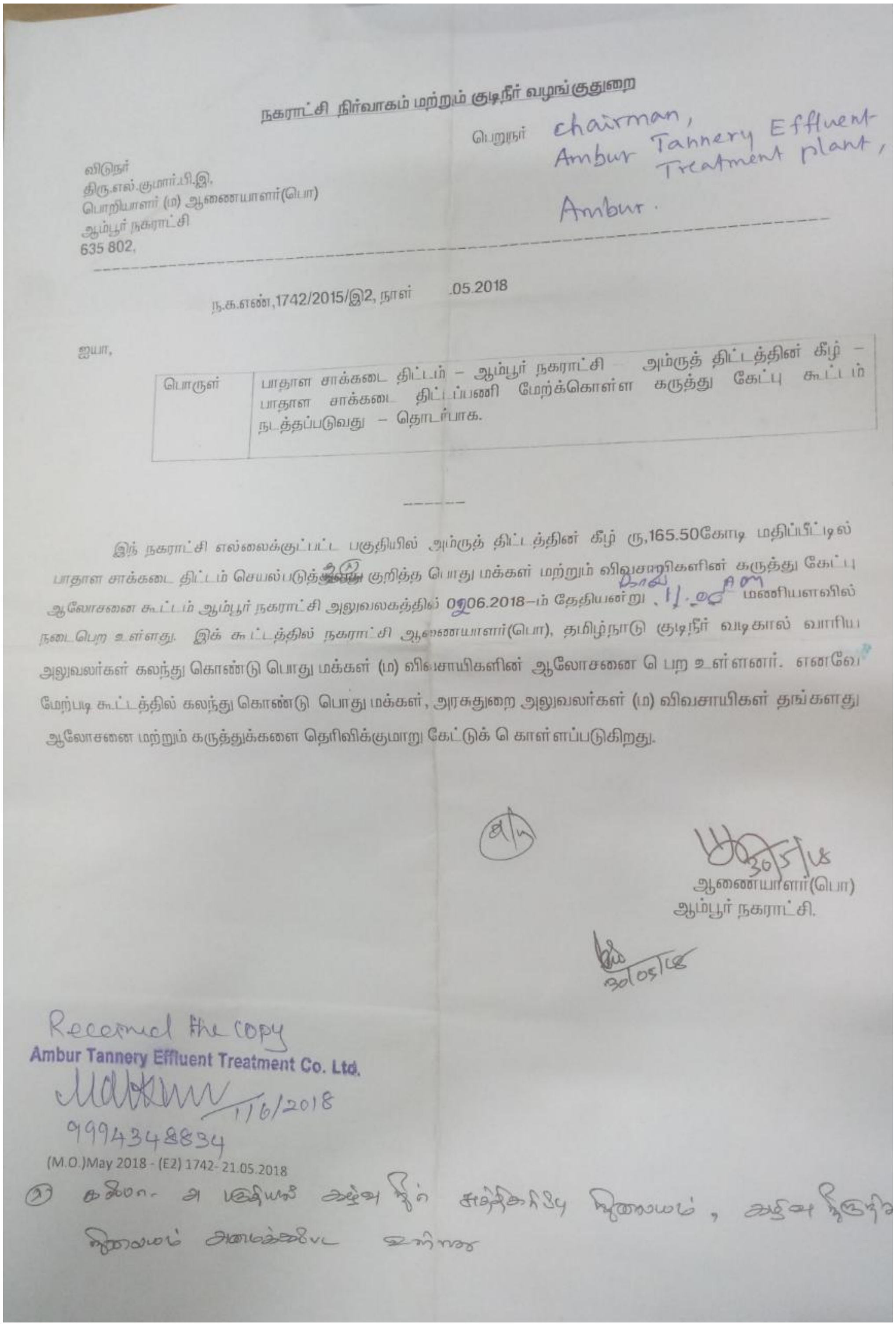
ஆணையாளர்(பொ)
ஆம்பூர் நகராட்சி.

30/05/18

Received the copy
Ambur Tannery Effluent Treatment Co. Ltd.
1/6/2018
9994348834
(M.O.)May 2018 - (E2) 1742- 21.05.2018

(1) கலைஞர் அ பகுதியில் கழிவு நீர் சுத்திகரிப்பு நிலையம், கழிவு நீருந்து நிலையம் அமைக்கவிட வேண்டும்

Notice for Public Consultation in Ambur on 2June2018for proposed UGSS in Ambur town



நகராட்சி நிர்வாகம் மற்றும் குடிநீர் வழங்குதுறை

விடுநர்
திரு.எல்.குமார்.பி.இ,
பொறியாளர் (ம) ஆணையாளர்(பொ)
ஆம்பூர் நகராட்சி
635 802,

பெறுநர் Chairman,
Ambur Tannery Effluent Treatment plant,
Ambur.

ந.க.எண்,1742/2015/இ2, நாள் .05.2018

ஐயா,

பொருள்	பாதாள சாக்கடை திட்டம் – ஆம்பூர் நகராட்சி அம்ருத் திட்டத்தின் கீழ் – பாதாள சாக்கடை திட்டப்பணி மேற்க்கொள்ள கருத்து கேட்பு கூட்டம் நடத்தப்படுவது – தொடர்பாக.

இந் நகராட்சி எல்லைக்குட்பட்ட பகுதியில் அம்ருத் திட்டத்தின் கீழ் ரு,165.50கோடி மதிப்பீட்டில் பாதாள சாக்கடை திட்டம் செயல்படுத்துவது குறித்த பொது மக்கள் மற்றும் விவசாயிகளின் கருத்து கேட்பு ஆலோசனை கூட்டம் ஆம்பூர் நகராட்சி அலுவலகத்தில் 02.06.2018–ம் தேதியன்று 11.00 AM மணியளவில் நடைபெற உள்ளது. இக் கூட்டத்தில் நகராட்சி ஆணையாளர்(பொ), தமிழ்நாடு குடிநீர் வடிகால் வாரிய அலுவலர்கள் கலந்து கொண்டு பொது மக்கள் (ம) விவசாயிகளின் ஆலோசனை பெற உள்ளனர். எனவே மேற்படி கூட்டத்தில் கலந்து கொண்டு பொது மக்கள், அரசுதுறை அலுவலர்கள் (ம) விவசாயிகள் தங்களது ஆலோசனை மற்றும் கருத்துக்களை தெரிவிக்குமாறு கேட்டுக் கொள்ளப்படுகிறது.

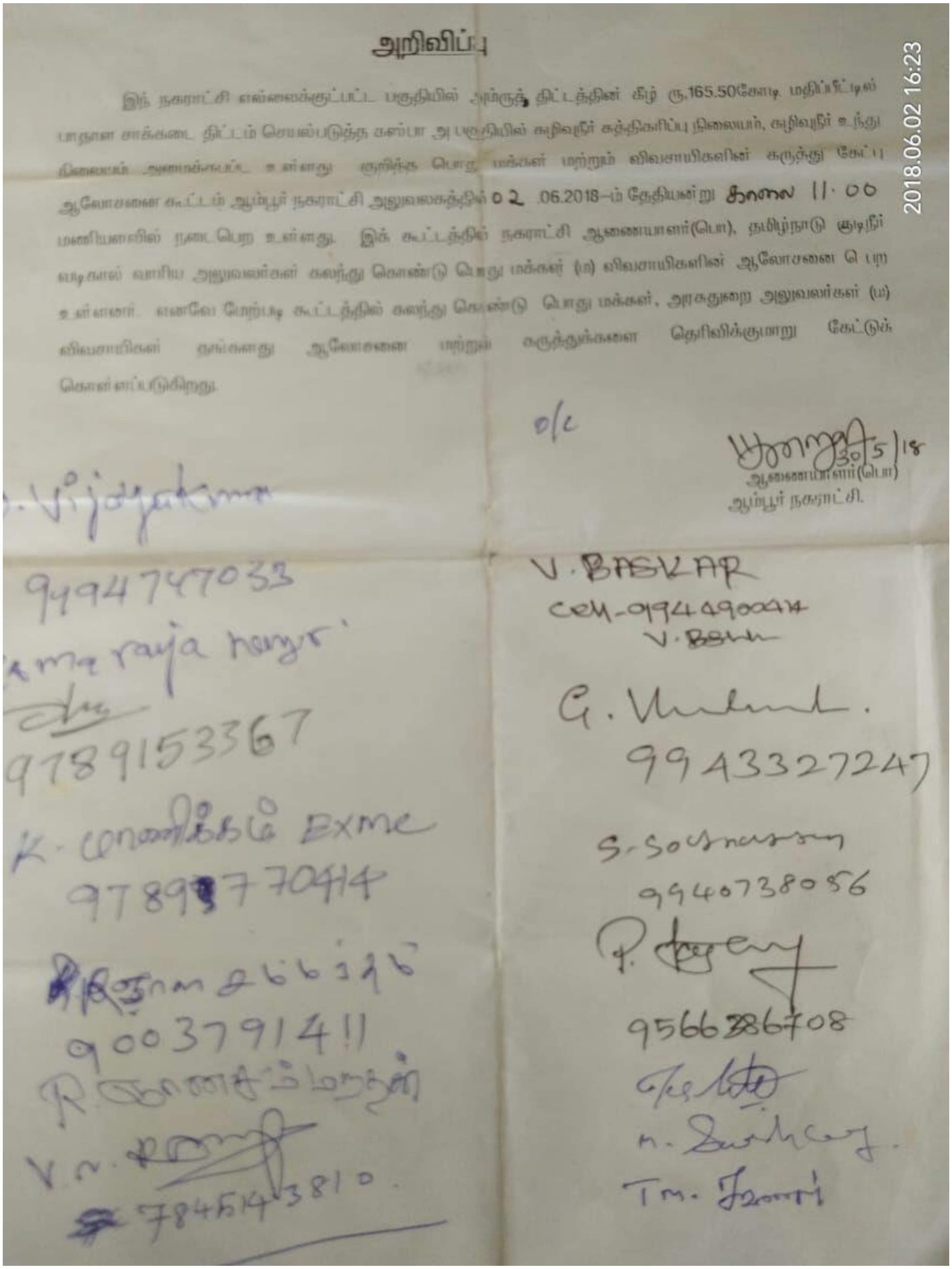
30/5/18
ஆணையாளர்(பொ)
ஆம்பூர் நகராட்சி.

30/05/18

Received the copy
Ambur Tannery Effluent Treatment Co. Ltd.
1/6/2018
9994348834

(M.O.)May 2018 - (E2) 1742- 21.05.2018

Notice for Public Consultation in Ambur on 2 June 2018for proposed UGSS in Ambur town



அறிவிப்பு

இந் நகராட்சி எல்லைக்குட்பட்ட பகுதியில் அம்ருத் திட்டத்தின் கீழ் ரு.165.50கோடி மதிப்பீட்டில் பாதாள சாக்கடை திட்டம் செயல்படுத்த கஸ்பா அ பகுதியில் கழிவுநீர் சுத்திகரிப்பு நிலையம், கழிவுநீர் உந்து நிலையம் அமைக்கபட்ட உள்ளது குறித்த பொது மக்கள் மற்றும் விவசாயிகளின் கருத்து கேட்பு ஆலோசனை கூட்டம் ஆம்பூர் நகராட்சி அலுவலகத்தில் 02 .06.2018–ம் தேதியன்று காலை 11.00 மணியளவில் நடைபெற உள்ளது. இக் கூட்டத்தில் நகராட்சி ஆணையாளர்(பொ), தமிழ்நாடு குடிநீர் வடிகால் வாரிய அலுவலர்கள் கலந்து கொண்டு பொது மக்கள் (ம) விவசாயிகளின் ஆலோசனை பெற உள்ளனர். எனவே மேற்படி கூட்டத்தில் கலந்து கொண்டு பொது மக்கள், அரசுதுறை அலுவலர்கள் (ம) விவசாயிகள் தங்களது ஆலோசனை மற்றும் கருத்துக்களை தெரிவிக்குமாறு கேட்டுக் கொள்ளப்படுகிறது.

o/c

30/5/18
ஆணையாளர்(பொ)
ஆம்பூர் நகராட்சி.

9494747033

9789153367

9789770414

9003791411

7845143810

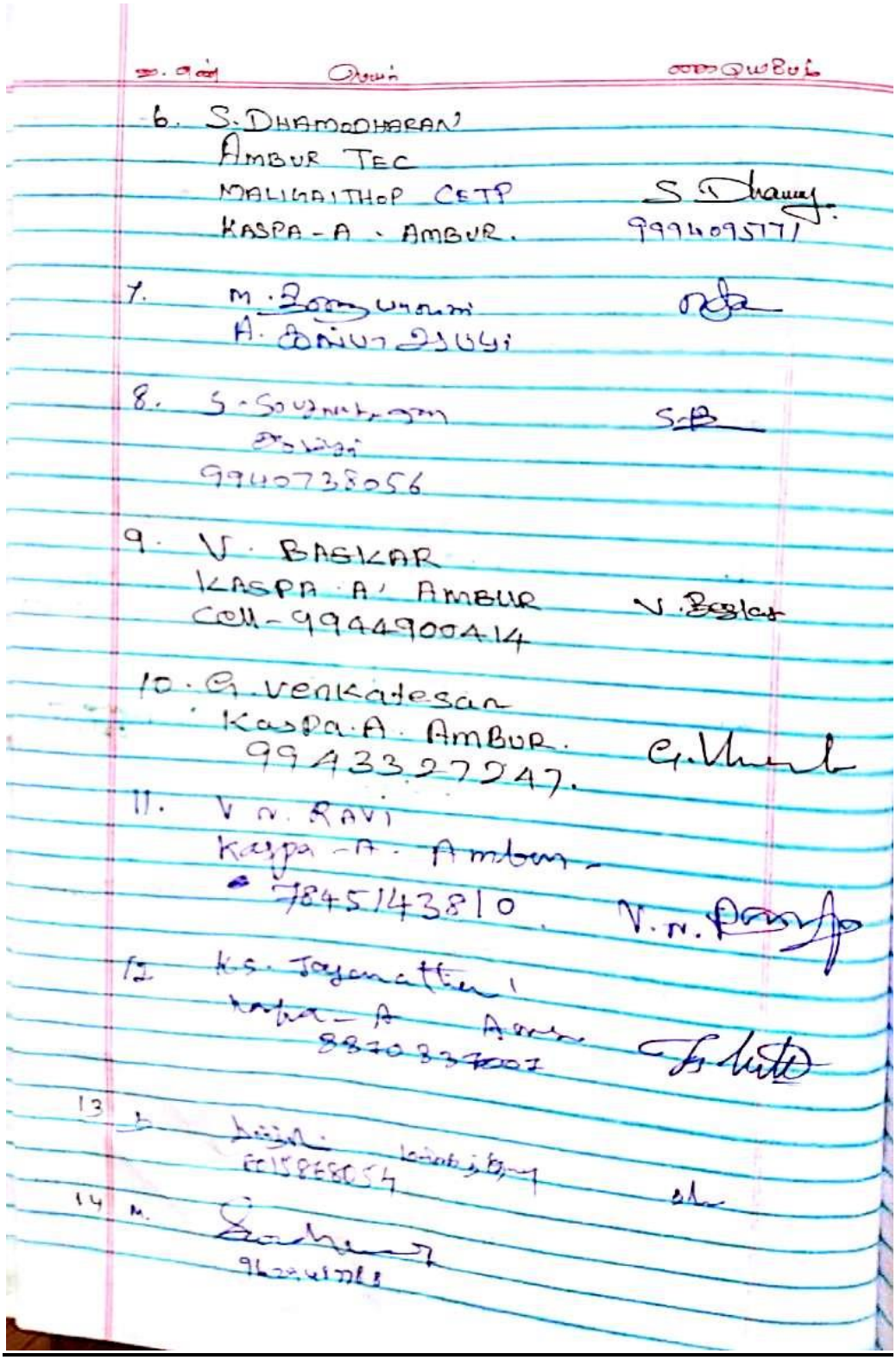
V. BASKAR
Cell-9944900414

9943327247

9940738056

9566386708

Attendance of participants for public consultation on 2 June 2018



6. S. DHAMODHARAN
AMBUR TEC
MALIGAITHOP CETP
KASPA-A . AMBUR.
9994095771

7. M.
A.

8. S.
9940738056

9. V. BASKAR
KASPA A' AMBUR
Cell-9944900414

10. G. Venkatesan
Kaspa A. Ambur.
9943327247.

11. V. RAVI
Kaspa - A. Ambur -
7845143810

12. K.S.

13.

14. M.

வ.எண்	பெயர்	கையொப்பம்
15	T M [illegible] 9566663881	T.M. [illegible]
16	M. மதியழகன். [illegible] [illegible]	[illegible]
17	K. [illegible] EXMC	K. [illegible]
18	[illegible] K. [illegible] EX.MC.	

-36-

Annexure-10

Permission obtained for Controlled Blastingfrom District Collector, Thirupathur

From

Thiru.M.P.Sivanarul, I.A.S.,
District Collector,
Thirupathur District,
Thirupathur.

To

The Executive Engineer,
TWARD Board,
RWS Division, Vellore

Rc.No.05/2021(Mines) Dated: 20.04.2021

Sir,

Sub: Mines and Minerals – TWAD Board – UGSS to Ambur municipality in Tirupathur District under AMRUT – Construction of Manholes and laying of sewer lines in Municipality area - Permission requested for Removal of hard rock by controlled blasting – Regarding.

Ref: 1.The Executive Engineer, TWAD Board, RWS Division, Vellore letter No. F.AMBUR UGSS / JDO / RWS / VELLORE / 2021 dated: 09.04.2021.
2. The Assistant Director(i/c), Geology and Mining, Tirupathur, Inspection report dated: 19.4.2021.

****

The request in the reference cited above has been verified in detail and you are permitted to carried out controlled blasting to remove the hard rock encountered (in residential area) while Construction of Manholes and laying of sewer lines in Municipality area for providing UGSS to Ambur municipality in Tirupathur District under AMRUT by a valid explosive license holder after following procedures stipulated in rule 90 to 96 and 98 of Explosive rules 2008 within the said project period. In addition, the following instructions should be strictly followed:

1. Ensure that the traffic is stopped at sufficient far off place at the time of blasting.
2. Whenever blasting is taken up near petrol bunk, ensure that all inflammable materials including petrol and diesel are removed from the place.
3. Trained and expert personnel with valid certificated to be appointed for blasting.
4. Whenever blasting is taken up near electric lines, ensure that line clearances are taken.
5. Take all necessary precautions whenever blasting is taken near public area like habitation, hotel etc and ensure no loss to public property and life.

Further, it is directed that the minerals derived during blasting operation should be removed after adopting the procedures laid down in Mines Act.

(Sd)xxxxx(20.04.2021)
District Collector,
Tirupathur

// By order //

For Collector

Annexure-11

Consent to Establish (CTE) from TNPCB for STP – AIR ACT

Category of the Industry :

RED

CONSENT ORDER NO. 2001234381266 DATED: 23/09/2020.

PROCEEDINGS NO.T1/TNPCB/F.1395VBD/RL/VBD/A/2020 DATED: 23/09/2020

SUB: TNPC Board-Consent for Establishment-M/s. SEWAGE TREATMENT PLANT AMBUR , S.F. No. T.S No 1/1, AMBUR village, Ambur Taluk and Tirupathur District - for the establishment or take steps to establish the industry under Section 21 of the Air(Prevention and control of Pollution)Act,1981, as amended in 1987(Central Act. 14 of 1981)-Issued -Reg.

REF: 1. Unit's Application for CTE (new) dated: 01.09.2020
2. IR.No : F.1395VBD/RL/AEE/VBD/2020 dated 03/09/2020
3. Board's (Consent Clearance Committee) Resolution No.270-22dated:11.09.2020

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

Municipal Commisioner,
M/s . SEWAGE TREATMENT PLANT AMBUR
S.F No.T.S No 1/1,
AMBUR Village,
Ambur Taluk,
Tirupathur District.

Authorizing occupier to establish or take steps to establish the industry in the site mentioned below:

S.F No. T.S No 1/1,
AMBUR Village,
Ambur Taluk,
Tirupathur District.

This Consent to establish is valid upto **March 31, 2025**, or till the industry obtains consent to operate under Section 21 of the Air (Prevention and control of Pollution) Act, 1981, as amended in 1987 whichever is earlier subject to special and general conditions enclosed.

G. Gopalakrishnan

For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai

To
Municipal Commisioner,
M/s.SEWAGE TREATMENT PLANT AMBUR,
The Commisioner Jinna Road,Ambur Municipality.,
Pin: 635802

Copy to:

1.The Commissioner, AMBUR-Municipality, Ambur Taluk, Tirupathur District .
2. The District Environmental Engineer, Tamil Nadu Pollution Control Board, VANIYAMBADI.

3. The JCEE-Monitoring, Tamil Nadu Pollution Control Board, Vellore.

4. File

SPECIAL CONDITIONS

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

Sl. No.	Description	Quantity	Unit
	Product Details		
1.	Treated Sewage	16710	KLD

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

I	**Point source emission with stack :**			
Stack No.	**Point Emission Source**	**Air pollution Control measures**	**Stack height from Ground Level in m**	**Gaseous Discharge in Nm3/hr**
1	DG SET 330KVA	Acoustic enclosures with stack	6	
II	**Fugitive/Noise emission :**			
Sl. No.	**Fugitive or Noise Emission sources**	**Type of emission**	**Control measures**	
1.	DG SET 330KVA	Fugitive	Acoustic Enclosure	

3. **Special Additional Conditions:**

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

4. **Additional Conditions:**

1. The STP facility shall install necessary Air Pollution Control Measures for the emission sources so as to satisfy the AAQ/Emission standards prescribed by the Board.
2. The STP shall develop green belt of native species of location specific with thick canopy of trees for adequate width in and around the premises.
3. The unit shall not use ‘use and throwaway plastics’ such as plastic sheets used for food wrapping, spreading on dining table etc., plastic plates, plastic coated tea cups, plastic tumbler, water pouches and packets, plastic straw, plastic carry bag and plastic flags irrespective of thickness, within the industry premises. Instead it shall encourage use of eco friendly alternative such as banana leaf, arecanut palm plate, stainless steel, glass, porcelain plates/cups, cloth bag, Jute bag etc.,

G. Gopalakrishnan

Digitally signed by G. Gopalakrishnan
DN: c=IN, o=Tamilnadu Pollution Control Board, ou=Engineering Department, postalCode=600032, st=Tamil Nadu, 2.5.4.20=c5457e0d335ebb27e47bbca345ead344cd2609a20a871b2330276639d76e16a, serialNumber=346b6e839d18279e6c00b0ebb69ca23d3e35a80e1b91cc279bfb3fc0d715d517, cn=G. Gopalakrishnan
Date: 2020.09.24 10:52:30 +05'30'

For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai

GENERAL CONDITIONS

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

G. Gopalakrishnan

For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai

Consent to Establish (CTE) from TNPCB for STP – WATER ACT

Category of the Industry :

RED

CONSENT ORDER NO. 2001134381266 DATED: 23/09/2020.

PROCEEDINGS NO.T1/TNPCB/F.1395VBD/RL//VBD/W/2020 DATED: 23/09/2020

SUB: TNPC Board-Consent for Establishment-M/S SEWAGE TREATMENT PLANT AMBUR S.F No. T.S No 1/1, AMBUR Village, Ambur Taluk, Tirupathur District - for the establishment or take steps to establish the industry under Section 25 of the Water (Prevention and control of Pollution)Act,1974, as amended in 1988(Central Act 6 of 1974)- Issued- Reg.

REF: 1. Unit's Application for CTE (new) dated: 01.09.2020
2. IR.No : F.1395VBD/RL/AEE/VBD/2020 dated 03/09/2020
3. Board's (Consent Clearance Committee) Resolution No.270-22dated:11.09.2020

Consent to establish or take steps to establish is hereby granted under Section 25 of the Water (Prevention and control of Pollution) Act,1974, as amended in 1988(Central Act 6 of 1974) (hereinafter referred to as 'The Act') and the Rules and Orders made there under to

Municipal Commisioner,
SEWAGE TREATMENT PLANT AMBUR

Authorizing occupier to establish or take steps to establish the industry in the site mentioned below:

S.F. No.T.S No 1/1,
AMBUR Village,
Ambur Taluk,
Tirupathur District.

This Consent to establish is valid upto **March 31, 2025**, or till the industry obtains consent to operate under Section 25 of the Water (Prevention and control of Pollution) Act, 1974, as amended in 1988 whichever is earlier subject to special and general conditions enclosed.

G. Gopalakrishnan
Digitally signed by G. Gopalakrishnan
DN: c=IN, o=Tamilnadu Pollution Control Board, ou=Engineering Department, postalCode=600032, st=Tamil Nadu,
2.5.4.20=c5457e0d335ebb27e47bbca345ead344cd2609a20a871b2333027b639d76e16a,
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cn=G. Gopalakrishnan
Date: 2020.09.24 10:53:52 +05'30'

For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai

To
Municipal Commisioner,
M/s.SEWAGE TREATMENT PLANT AMBUR,
The Commisioner Jinna Road,Ambur Municipality.,
Pin: 635802

Copy to:

1.The Commissioner, AMBUR-Municipality, Ambur Taluk, Tirupathur District .
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3. The JCEE-Monitoring, Tamil Nadu Pollution Control Board, Vellore.
4. File

SPECIAL CONDITIONS

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

Sl. No.	Description	Quantity	Unit
	Product Details		
1.	Treated Sewage	16710	KLD

2. The unit shall provide Sewage Treatment Plant and /or Effluent Treatment Plant as indicated below.

a	**Sewage Treatment Plant:**		
Treatment status: Common STP			
SL. No.	Name of the Treatment Unit	No. of Units	Dimensions in metres
1.	Receiving Chamber	1	2.7*3.0*3.3
2.	Screen Chamber - Coarse	2	3.0*1.0*1.5
3.	Screen Chamber - fine	2	3.0*1.0*1.5
4.	Distribution Chamber	1	3.0*1.5*1.5
5.	Grit Chamber	2	6.0*6.5*1.0
6.	Anoxic Tank	2	9.28*15.0*5.5
7.	Aeration Tank	2	18.0*15.0*5.5
8.	Secondary Clarifier	2	Dia 23.0*3.5
9.	Sludge holding tank	1	Dia 3.0*2.3
10.	Chlorine Contact Tank	1	17.5*7*3.5
11.	Polishing Pond	1	14*40.4*3.5
12.	Filtrate Sump	1	1.5*1.5*2.5
13.	Centrifuge mechanism	2	7.5 cum per hour
b	**Effluent Treatment Plant:**		
Treatment status: No trade effluent and hence does not arise			
SL. No.	Name of the Treatment Unit	No. of Units	Dimensions in metres
1.			

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

Outlet No.	Description of Outlet	Maximum daily discharge in KLD	Point of disposal
Effluent Type : Sewage			
1.	Treated Sewage	16710.0	Palar River
Effluent Type : Trade Effluent			

4. **Additional Conditions:**

1. The STP shall not commence its operation without obtaining CTO of the Board.
2. The Municipality shall provide sewage treatment plant of capacity 16.71 MLD as proposed.
3. The unit shall explore the possibility of providing alternate treatment system instead of Chlorination.
4. The Municipality shall declare the lands which are located within a radius of 100 m from the STP as no development zone in consultation with DTCP and develop green belt
5. Electromagnetic flow meters with computer recording arrangement shall be provided at the inlet and outlet of STP to record actual flow on a daily basis.
6. The unit shall provide online continuous effluent monitoring system for the flow and parameters pH, TSS and BOD at the inlet and outlet of the STP and connect the same to the WQW, TNPCB, Chennai.
7. The unit shall analyze quality of ground water in and around the STP site before commissioning of the STP as baseline data to assess the ground water quality in that area.
8. The unit shall provide monitoring wells to assess the ground water quality before and after commissioning of the project in the area.
9. Closed pipeline should be laid from the outlet of STP to the Palar river where the treated sewage is proposed to be disposed.
10. Provision for standby electricity power shall be made to operate the STP continuously in case of power failure.
11. The Municipality shall provide necessary storm water drain in and around the proposed STP area and ensure that there will not be any water logging in and around the proposed STP.
12. The Municipality shall obtain and furnish NOC from PWD for the discharge of the treated sewage into the Palar river while applying for Consent to Operate.
13. The STP shall follow the "Action plan for usage of treated waste water from Sewage Treatment Plants" prepared by Municipal Administration and Water Supply Department , Government of Tamil Nadu.
14. The STP shall be designed to achieve the new STP standards prescribed as per MoEF Notification Dt 13.10.2017 (pH- 6.5-9,BOD-30 mg/lt, TSS <100 mg/lt, Fecal coliform<1000MPN/100ml).
15. The Municipality shall provide rain water harvesting facilities for all the utility buildings so as to recharge the ground water table.
16. The Municipality shall provide necessary infrastructure facilities required for mechanical cleaning for maintenance so as to avoid manual cleaning of treatment units during maintenance.
17. The STP shall ensure that it shall discharge treated sewage of quantity 3 MLD to leather industries and remaining 13.71 MLD for utilization in agricultural lands as committed.

G. Gopalakrishnan

For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai

GENERAL CONDITIONS

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

G. Gopalakrishnan

For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai

Annexure: 12

GROUND WATER QUALITY LEVEL IN AMBUR MUNICIPALITY AT BASHA NAGAR 5TH CROSS ST

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Recognized by BIS as per IS : 14543 : 2004

Report No : ECI-NN-WA-272/04/2019

17.	Mineral Oil	mg/L	BDL (DL = 0.5)	IS 3025 Part 39	0.5
18.	Molybdenum(as Mo)	mg/L	<0.01	AAS Method	NA
19.	Nickel(as Ni)	mg/L	BDL (DL = 0.01)	IS 3025 Part 54	0.02
20.	Nitrate (as NO3)	mg/L	< 1.0	IS 3025 Part 34	NA
21.	Odor	--	Agreeable	IS 3025:Part 05	Agreeable
22.	pH Value @ 25°C	--	8.2	IS 3025:Part 11	6.5 - 8.5
23.	Phenolic Compound (as C6H5OH)	mg/L	< 0.001	IS 3025 Part 43	0.001
24.	Poly Chlorinated Biphenyls (PCB)	µg/L	BDL (DI = 0.025)	IS 13428 (Annex M)	0.0005
25.	Poly Nuclear Aromatic Hydrocarbon (PAH)	µg/L	BDL (DL = 0.025)	APHA 22nd Edition 6440	0.0001
26.	Residual Free Chlorine (RFC)	mg/L	< 0.1	IS 3025 Part 26	0.2
27.	Selenium (as Se)	mg/L	BDL (DL = 0.01)	IS 3025 Part 56	0.01
28.	Silver (as Ag)	mg/L	BDL (DL = 0.01)	IS 13428 (Annex J)	0.1
29.	Sulphates (as SO_4^{2-})	mg/L	97	IS 3025 Part 24	200
30.	Sulphide (as H_2S)	mg/L	< 0.04	IS 3025 Part 29	0.05
31.	Taste	-	Disagreeable	IS 3025:Part 08	Agreeable
32.	Total Alkalinity (as $CaCO_3$)	mg/L	234	IS 3025 Part 23	200
33.	Total Ammonia(as NH_3 - N)	mg/L	< 0.1	IS 3025:Part 34	0.5
34.	Total Arsenic(as As)	mg/L	BDL (DL = 0.01)	IS 3025 Part 37	NA
35.	Total Chloramines (as Cl_2)	mg/L	< 0.2	IS 3025:Part 26	4.0
36.	Total Chromium (as Cr)	mg/L	BDL (DL = 0.01)	IS 3025 Part 52	0.05
37.	Total Dissolved Solids(TDS) @ 105°C	mg/L	624	IS 3025:Part 16	500
38.	Total Hardness(as $CaCO_3$)	mg/L	209	IS 3025 Part 21	200
39.	Turbidity	NTU	< 0.5	IS 3025:Part 10	1.0
40.	Zinc(as Zn)	mg/L	BDL (DL = 0.01)	IS 3025 Part 49	5.0
Microbiological Parameters:					
41.	Escherichia coli(MPN)	MPN/100ml	<2.0 *	IS: 1622	Absent
42.	T.Coliform (MPN)	MPN/100ml	2.0	IS: 1622	Absent

<--- End of Report --->

Verified By : [illegible]

Remarks : * As Per IS 1622 MPN Table (Table-4) <2 Can be taken as absent. The above sample does not meets the requirements of drinking water quality (as per IS: 10500) with respect to the parameters tested. NA – Not Applicable BDL –Below Detectable Limit, DL – Detectable Limit

For ENVIRO CARE INDIA PRIVATE LIMITED
(Laboratory Division)
[illegible]
Authorized Signatory

ENVIRO CARE INDIA PRIVATE LIMITED MADURAI

CHENNAI Tel : [illegible] Mobile : 9944938[illegible] e-mail : ecichennai@envirocareindia.com
MADURAI Tel : +91 (452) 4355103 Mobile : 8220015870 e-mail : lab@envirocareindia.com
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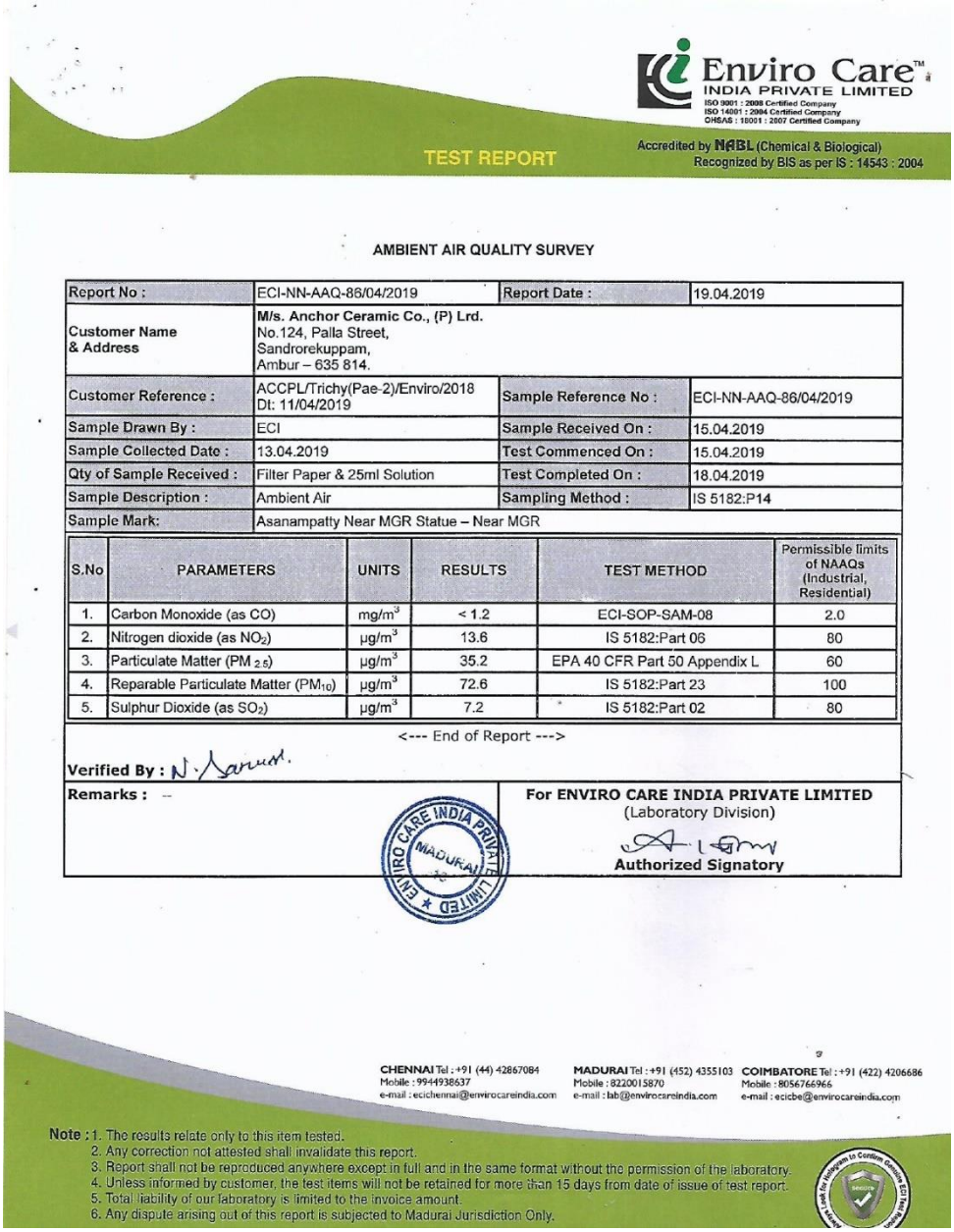
Always Look for Hologram to Confirm Genuine ECI Test Report

Annexure: 13

AMBIENT AIR QUALITY IN AMBUR MUNICIPALITY IN ASANAMPATTU



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TEST REPORT

Accredited by NABL (Chemical & Biological)
Recognized by BIS as per IS : 14543 : 2004

AMBIENT AIR QUALITY SURVEY

Report No :	ECI-NN-AAQ-86/04/2019	Report Date :	19.04.2019
Customer Name & Address	M/s. Anchor Ceramic Co., (P) Lrd. No.124, Palla Street, Sandrorekuppam, Ambur – 635 814.		
Customer Reference :	ACCPL/Trichy(Pae-2)/Enviro/2018 Dt: 11/04/2019	Sample Reference No :	ECI-NN-AAQ-86/04/2019
Sample Drawn By :	ECI	Sample Received On :	15.04.2019
Sample Collected Date :	13.04.2019	Test Commenced On :	15.04.2019
Qty of Sample Received :	Filter Paper & 25ml Solution	Test Completed On :	18.04.2019
Sample Description :	Ambient Air	Sampling Method :	IS 5182:P14
Sample Mark:	Asanampatty Near MGR Statue – Near MGR		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial, Residential)
1.	Carbon Monoxide (as CO)	mg/m^3	< 1.2	ECI-SOP-SAM-08	2.0
2.	Nitrogen dioxide (as NO_2)	$\mu g/m^3$	13.6	IS 5182:Part 06	80
3.	Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	35.2	EPA 40 CFR Part 50 Appendix L	60
4.	Reparable Particulate Matter (PM_{10})	$\mu g/m^3$	72.6	IS 5182:Part 23	100
5.	Sulphur Dioxide (as SO_2)	$\mu g/m^3$	7.2	IS 5182:Part 02	80

<--- End of Report --->

Verified By : N. Sarvesh.

Remarks : --

For ENVIRO CARE INDIA PRIVATE LIMITED
(Laboratory Division)

Authorized Signatory

ENVIRO CARE INDIA PRIVATE LIMITED MADURAI

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MADURAI Tel : +91 (452) 4355103 Mobile : 8220015870 e-mail : lab@envirocareindia.com
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Annexure: 13

AMBIENT AIR QUALITY IN AMBUR MUNICIPALITY IN BASHA NAGAR 5TH CROSS ST

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AMBIENT AIR QUALITY SURVEY

Report No :	ECI-NN-AAQ-87/04/2019	Report Date :	19.04.2019
Customer Name & Address	M/s. Anchor Ceramic Co., (P) Lrd. No.124, Palla Street, Sandrorekuppam, Ambur – 635 814.		
Customer Reference :	ACCPL/Trichy(Pae-2)/Enviro/2018 Dt: 11/04/2019	Sample Reference No :	ECI-NN-AAQ-87/04/2019
Sample Drawn By :	ECI	Sample Received On :	15.04.2019
Sample Collected Date :	13.04.2019	Test Commenced On :	15.04.2019
Qty of Sample Received :	Filter Paper & 25ml Solution	Test Completed On :	18.04.2019
Sample Description :	Ambient Air	Sampling Method :	IS 5182:P14
Sample Mark:	Basha Nagar-5th Cross – Near School		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial, Residential)
1.	Carbon Monoxide (as CO)	mg/m^3	< 1.2	ECI-SOP-SAM-08	2.0
2.	Nitrogen dioxide (as NO_2)	$\mu g/m^3$	14.2	IS 5182:Part 06	80
3.	Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	30.6	EPA 40 CFR Part 50 Appendix L	60
4.	Reparable Particulate Matter (PM_{10})	$\mu g/m^3$	63.3	IS 5182:Part 23	100
5.	Sulphur Dioxide (as SO_2)	$\mu g/m^3$	6.8	IS 5182:Part 02	80

<--- End of Report --->

Verified By : N. Saravanan.

Remarks : --

For ENVIRO CARE INDIA PRIVATE LIMITED
(Laboratory Division)

Authorized Signatory

ENVIRO CARE INDIA PRIVATE LIMITED * MADURAI

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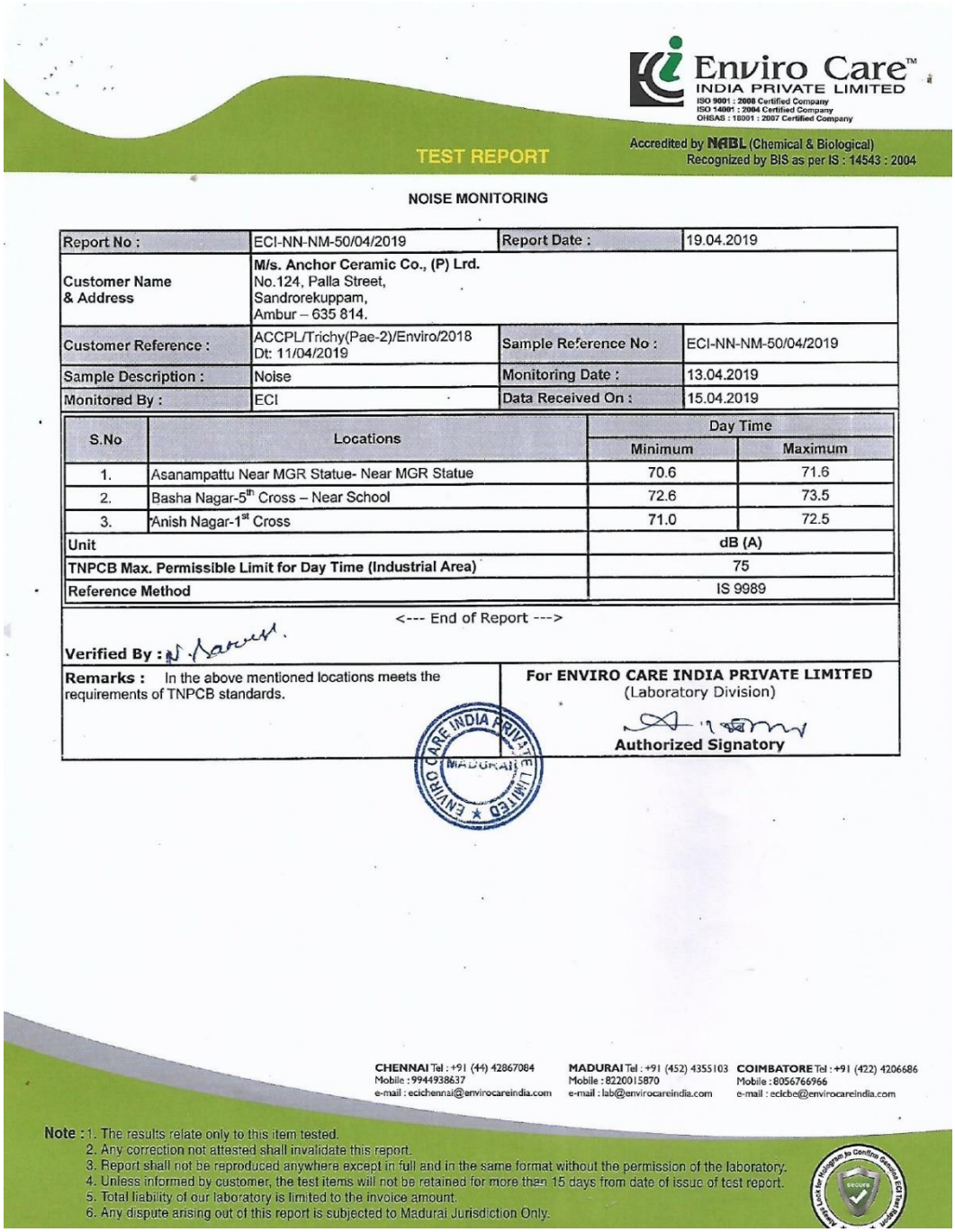
Look for Hologram to Confirm Genuine ECI Test Report

Annexure: 14

AMBIENT NOISE QUALITY IN AMBUR MUNICIPALITY AT DAY TIME



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TEST REPORT

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Recognized by BIS as per IS : 14543 : 2004

NOISE MONITORING

Report No :	ECI-NN-NM-50/04/2019	Report Date :	19.04.2019
Customer Name & Address	M/s. Anchor Ceramic Co., (P) Lrd. No.124, Palla Street, Sandrorekuppam, Ambur – 635 814.		
Customer Reference :	ACCPL/Trichy(Pae-2)/Enviro/2018 Dt: 11/04/2019	Sample Reference No :	ECI-NN-NM-50/04/2019
Sample Description :	Noise	Monitoring Date :	13.04.2019
Monitored By :	ECI	Data Received On :	15.04.2019

S.No	Locations	Day Time	
		Minimum	Maximum
1.	Asanampattu Near MGR Statue- Near MGR Statue	70.6	71.6
2.	Basha Nagar-5th Cross – Near School	72.6	73.5
3.	Anish Nagar-1st Cross	71.0	72.5
Unit		dB (A)	
TNPCB Max. Permissible Limit for Day Time (Industrial Area)		75	
Reference Method		IS 9989	

<--- End of Report --->

Verified By :

Remarks : In the above mentioned locations meets the requirements of TNPCB standards.

For ENVIRO CARE INDIA PRIVATE LIMITED
(Laboratory Division)

Authorized Signatory

ENVIRO CARE INDIA PRIVATE LIMITED MADURAI

CHENNAI Tel : +91 (44) 42867084 Mobile : 9944938637 e-mail : ecichennai@envirocareindia.com
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Annexure: 14

AMBIENT NOISE QUALITY IN AMBUR MUNICIPALITY AT DAY TIME

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Recognized by BIS as per IS : 14543 : 2004

TEST REPORT

NOISE MONITORING

Report No :	ECI-NN-NM-51/04/2019	Report Date :	19.04.2019
Customer Name & Address	M/s. Anchor Ceramic Co., (P) Lrd. No.124, Palla Street, Sandrorekuppam, Ambur – 635 814.		
Customer Reference :	ACCPL/Trichy(Pae-2)/Enviro/2018 Dt: 11/04/2019	Sample Reference No :	ECI-NN-NM-51/04/2019.
Sample Description :	Noise	Monitoring Date :	13.04.2019
Monitored By :	ECI	Data Received On :	15.04.2019

S.No	Locations	Night Time	
		Minimum	Maximum
1.	Asanampattu Near MGR Statue- Near MGR Statue	67.7	68.7
2.	Basha Nagar-5th Cross – Near School	60.1	62.8
3.	Anish Nagar-1st Cross	59.4	60.8
Unit		dB (A)	
TNPCB Max. Permissible Limit for Night Time (Industrial Area)		70	
Reference Method		IS 9989	

<--- End of Report --->

Verified By : N. Varun.

Remarks : In the above mentioned locations meets the requirements of TNPCB standards.

ENVIRO CARE INDIA PRIVATE LIMITED

For ENVIRO CARE INDIA PRIVATE LIMITED
(Laboratory Division)

Authorized Signatory

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Look for Hologram to Confirm Genuine Eco Test Report

Annexure 15

MANAGING DIRECTOR, TWAD,LETTER DT.17.10.2020 FOR FOLLOWING NGT ORDER

TAMILNADU WATER SUPPLY AND DRAINAGE BOARD
31. Kamarajar Salai, Chepauk, Chennai-05.

Dr. C. N. Mahesvaran, I.A.S.,
Managing Director,

Lr. No. F. 110320 / Genl- Govt./ DO/ PDC / 2020 /dated.17.10.2020

22 OCT 2020

To
All the Chief Engineers of TWAD Board

Sir,

Sub: TNPC Board – Coastal and marine pollution – Hon'ble National Green Tribunal (PB) Delhi order dated 29.06.2020 in the matter of Lt.col Sarvadaman singh Oberoi Vs Union Bank of India and other – reg.

Ref:
1. The Chairman, TNPCB, Chennai. Lr.No.TNPCB/ LAW/LA-III/NGT/ 31499 / 2020-3, dt.24.01.2020
2. Law Officer, TWAD Board, Chennai U.O.Note No.F.O.A.No. 8229/ 2019/ AE/ LC, Dated 06.08.2020.
3. The Chairman, TNPCB Lr.No.TNPCB/ P&D/ 25614/ 2001, dt.10.08.2020

.....

In the reference 1st cited, the Chairman, Tamilnadu Pollution Control Board, Chennai informed that the Hon'ble NGT has issued the following orders dated 30.04.2019 in O.A.No.1069 of 2018:

"Accordingly, we accept the report of the Expert Committee with the modification that the standards recommended for Mega and Metropolitan Cities will also apply to rest of the country. We also direct that the standards will apply not only for new STPs but also for existing/under construction STPs without any delay and giving of seven years time standards disapproved".

Further, the Chairman, Tamilnadu Pollution Control Board, Chennai informed that all the relevant departments are requested to follow the standards prescribed for discharge of treated sewage into water bodies at Mega & Metropolitan Cities by the Hon'ble NGT order dated 30.04.2019 in O.A.No.1069/2018.

In the reference 2nd cited, the Law Officer, TWAD Board has been enclosed the Chairman, Tamil Nadu Pollution Control Board letter dated 10.08.2020, along with the court order as received from National Green Tribunal, New Delhi original Application No.829/2019, ordered dated 29.06.2020 and requested TWAD Board to furnish the action taken report on the subject mentioned in the above Hon'ble Court order. In which the following direction were given "All States/UTs through their concerned departments such as Urban/Rural Development, Irrigation & Public Health, Local Bodies, Environment, etc., may ensure formulation and execution of plans for sewage treatment and utilization of treated sewage effluent with respect

to each city, town and village, adhering to the timeline as directed by Hon'ble Supreme Court. STPs must meet the prescribed standards, including faecal coliform."

In this connection, all the Chief Engineers of TWAD Board is requested to follow the standards prescribed in the reference 1st cited & NGT orders dated 30.04.2019& 29.06.2020, for discharge of treated sewage into water bodies.

Encl: 1. reference 1st cited
2. the Hon'ble NGT order dated 30.04.2019, 29.06.2020.

17/10/2020

17/10/2020
for Managing Director,
TWAD Board, Chennai.

Endt No. J-Circulars/AE4/CE/VLR/2020/Dated: 22.10.2020

copy with enclosures is communicated to all the Superintending Engineers and the Executive Engineers of this office for information and requested to follow the Standards prescribed therein for the proposed and ongoing UGSS Schemes.

CHIEF ENGINEER (I/c)
TWAD BOARD, VELLORE-6

22/10/2020

Annexure 15

CHAIRMAN, TNPCB LETTER DT.24.01.2020 FOR FOLLOWING NGT ORDER

TAMILNADU POLLUTION CONTROL BOARD

From
Thiru.A.V.Venkatachalam, IFS
Chairman
Tamilnadu Pollution Control Board
76, Mount Salai, Guindy
Chennai – 600 032

To
Managing Director,
TWAD Board, 31,
kamarajar Salai,
Chepauk,
Chennai-600 005

Lr.No.TNPCB/LAW/LA-III/NGT/31499/2020-3 Dated: 24/01/2020

Sub: Environment Control – Tamilnadu Pollution Control Board –Standards prescribed for discharge of treated sewage into water bodies at Mega & Metropolitan Cities by the Hon'ble NGT order dated 30.04.2019 in O.A.No.1069/2018 – Instructions issued – Reg.

Ref: 1. The Hon'ble NGT order dated 30.04.2019 in O.A.No.1069 of 2018
2. Government Letter No.21355/EC.1/2019-4 dated 22.01.2020

*****

Whereas the Hon'ble NGT in its orders dated 30.04.2019 in O.A.No.1069 of 2018 ordered that

"Accordingly, we accept the report of the Expert Committee with the modification that the standards recommended for Mega and Metropolitan Cities will also apply to rest of the country. We also direct that the standards will apply not only for new STPs but also for existing/under construction STPs without any delay and giving of seven years time standards disapproved".

Also the same was communicated in the minutes of review meeting held on 03.01.2020 at 4.00PM under the chairmanship of the Chief Secretary, Govt. of Tamilnadu with line departments to review the environmental issues and remedial action around the Ambattur SIDCO Industrial estate for restoration of Korattur Lake vide reference 2nd cited above.

In this regard it is informed that all the relevant departments are requested to follow the standards prescribed for discharge of treated sewage into water bodies at Mega & Metropolitan Cities by the Hon'ble NGT order dated 30.04.2019 in O.A.No.1069/2018 (Copy enclosed).

Sl. No.	Industry	Parameters	Standards applicable to all mode of disposal (Mega and Metropolitan Cities)
1	Sewage Treatment Plants (STPs)	pH	5.5-9.0
		Bio-Chemical Oxygen Demand (BOD), mg/l	10
		Total Suspended Solids (TSS), mg/l	20
		Chemical Oxygen Demand (COD), mg/l	50
		Nitrogen Total, mg/l	10
		Phosphorus Total (For Discharge into Ponds, Lakes), mg/l	1.0
		Fecal Coliform (FC) (most Probable number per 100 millilitre, MPN/100mL	Desirable 100 Permissible 230

Note:

(i) Mega Metropolitan Cities have population more than 1 crore, Metropolitan Cities Population more than 10 Lakhs and Class-I population more than 1 Lakh.

(ii) All value in mg/l except for pH and Fecal Coliform.

(iii) These standards will be applicable for discharge into water bodies as well as for land disposal applications

(iv) These standards shall apply to all new STPs for which construction is yet to be initiated.

(v) The existing/under construction STPs shall achieve these standards within 7 Years from the date of notification

(vi) In case 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 100m away from discharge point, then norms for deep sea marine discharge shall be applied.

(vii) Reuse/Recycling of treated effluent shall be encouraged

(viii) State Pollution Control Boards/Pollution Control Committees may make these norms more stringent taking into account the local conditions.

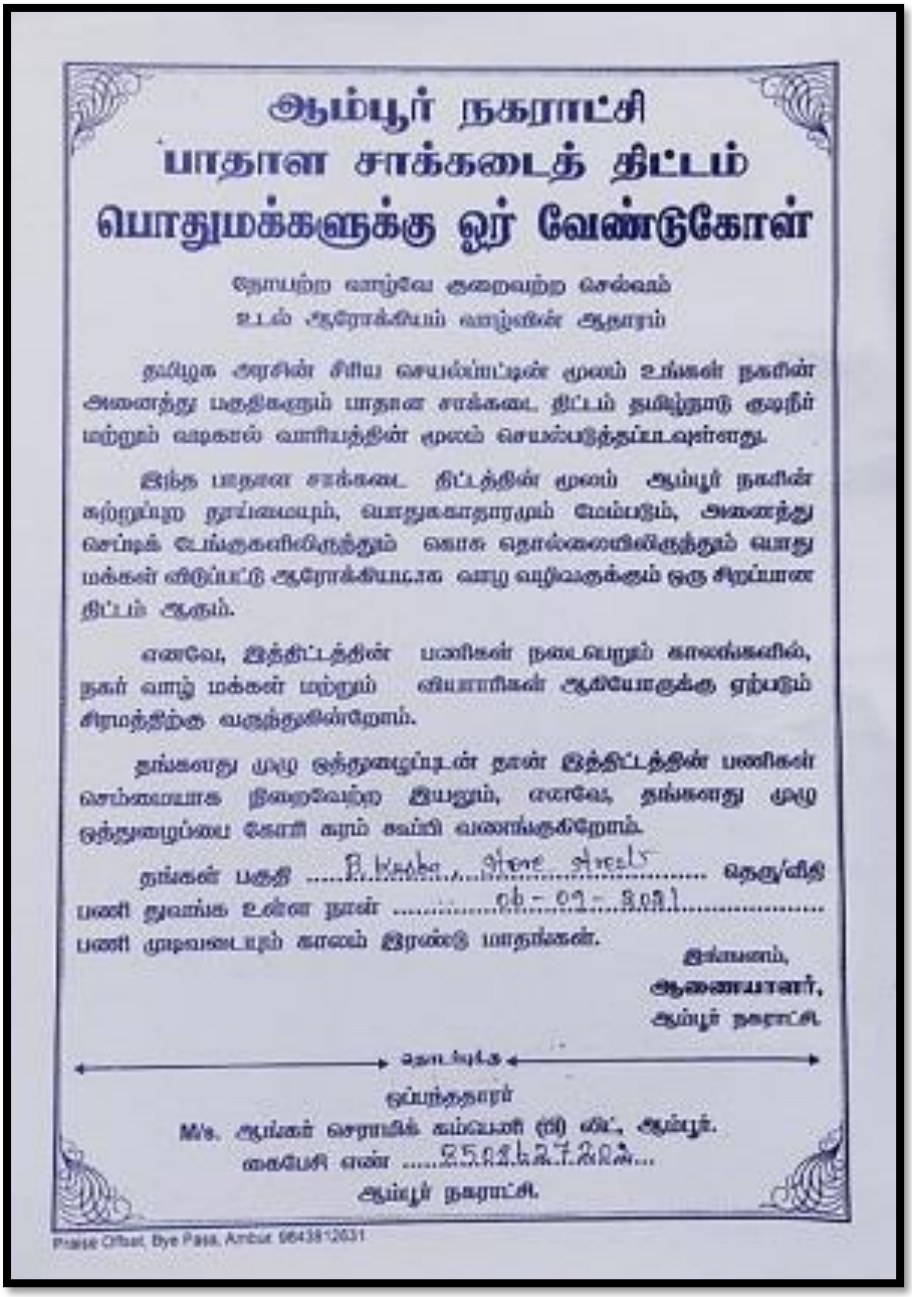
Encl: As above

Sd/-
Chairman

(Forwarded by Order)

For Chairman

Annexure-16
PROJECT INFORMATION NOTICE



ஆம்பூர் நகராட்சி
பாதாள சாக்கடைத் திட்டம்
பொதுமக்களுக்கு ஓர் வேண்டுகோள்

நோயற்ற வாழ்வே குறைவற்ற செல்வம்
உடல் ஆரோக்கியம் வாழ்வின் ஆதாரம்

தமிழக அரசின் சீரிய செயல்பாட்டின் மூலம் உங்கள் நகரின் அனைத்து பகுதிகளும் பாதாள சாக்கடை திட்டம் தமிழ்நாடு குடிநீர் மற்றும் வடிகால் வாரியத்தின் மூலம் செயல்படுத்தப்படவுள்ளது.

இந்த பாதாள சாக்கடை திட்டத்தின் மூலம் ஆம்பூர் நகரின் சுற்றுப்புற நாய்மையும், வாழுகுகாதாரமும் மேம்படும், அனைத்து வீடுகளிலிருந்தும் வரக தொல்லைகளிலிருந்தும் வரு மக்கள் விடுபட்டு ஆரோக்கியமாக வாழ வழிவகுக்கும் ஒரு சிறப்பான திட்டம் ஆகும்.

எனவே, இத்திட்டத்தின் பணிகள் நடைபெறும் காலங்களில், நகர் வாழ் மக்கள் மற்றும் வியாபாரிகள் ஆகியோருக்கு ஏற்படும் சிரமத்திற்கு வருந்துகின்றோம்.

தங்களது முழு ஒத்துழைப்புடன் தான் இத்திட்டத்தின் பணிகள் செம்மையாக நிறைவேற்ற இயலும், எனவே, தங்களது முழு ஒத்துழைப்பை கோரி கரம் கூப்பி வணங்குகிறோம்.

தங்கள் பகுதி .....B.Kasba Street Area..... தெரு/வீதி
பணி துவங்க உள்ள நாள் .....06-02-2021.....
பணி முடிவடையும் காலம் இரண்டு மாதங்கள்.

இங்ஙனம்,
ஆணையாளர்,
ஆம்பூர் நகராட்சி

தொடர்புக்கு

ஒப்பந்ததாரர்
M/s. ஆங்கர் செராமிக் கம்பெனி (பி) லிட், ஆம்பூர்.
கைபேசி எண் .....9566263720.....
ஆம்பூர் நகராட்சி.

Praise Offset, Bye Pass, Ambur 9843812031

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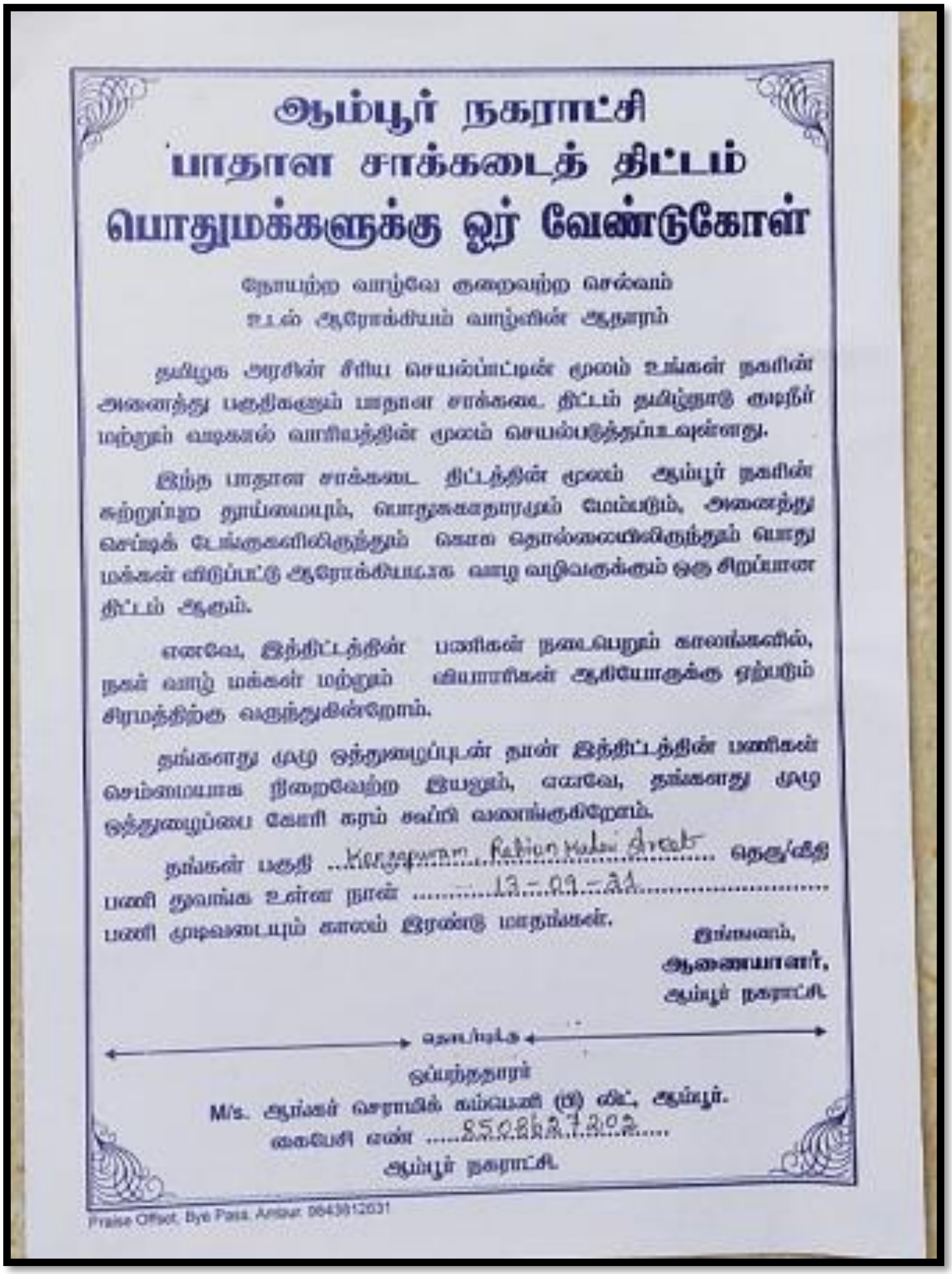
Annexure-16
PROJECT INFORMATION NOTICE



ஆம்பூர் நகராட்சி
பாதாள சாக்கடைத் திட்டம்
பொதுமக்களுக்கு ஓர் வேண்டுகோள்

நோயற்ற வாழ்வே குறைவற்ற செல்வம்
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தமிழக அரசின் சீரிய செயல்பாட்டின் மூலம் உங்கள் நகரின் அனைத்து பகுதிகளும் பாதாள சாக்கடை திட்டம் தமிழ்நாடு குடிநீர் மற்றும் வடிகால் வாரியத்தின் மூலம் செயல்படுத்தப்படவுள்ளது.

இந்த பாதாள சாக்கடை திட்டத்தின் மூலம் ஆம்பூர் நகரின் சுற்றுப்புற தூய்மையும், பொதுசுகாதாரமும் மேம்படும், அனைத்து செப்டிக் டேங்குகளிலிருந்தும் கொசு தொல்லையிலிருந்தும் பொது மக்கள் விடுபட்டு ஆரோக்கியமாக வாழ வழிவகுக்கும் ஒரு சிறப்பான திட்டம் ஆகும்.

எனவே, இத்திட்டத்தின் பணிகள் நடைபெறும் காலங்களில், நகர் வாழ் மக்கள் மற்றும் வியாபாரிகள் ஆகியோருக்கு ஏற்படும் சிரமத்திற்கு வருந்துகின்றோம்.

தங்களது முழு ஒத்துழைப்புடன் தான் இத்திட்டத்தின் பணிகள் செம்மையாக நிறைவேற்ற இயலும், எனவே, தங்களது முழு ஒத்துழைப்பை கோரி கரம் கூப்பி வணங்குகிறோம்.

தங்கள் பகுதி ...Kerzapuram Rahim Halai Street... தெரு/வீதி
பணி துவங்க உள்ள நாள் ......13-09-21......
பணி முடிவடையும் காலம் இரண்டு மாதங்கள்.

இங்ஙனம்,
ஆணையாளர்,
ஆம்பூர் நகராட்சி.

தொடர்புக்கு

ஒப்பந்ததாரர்
M/s. ஆங்கர் செராமிக் கம்பெனி (பி) லிட், ஆம்பூர்.
கைபேசி எண் ....8508627202....
ஆம்பூர் நகராட்சி.

Praise Offset, Bye Pass, Ambur. 9843812631