ENVIRONMENTAL ASSESSMENT FOR

DHARMAPURI MUNICIPALITY

MARCH 2011

BY

PURE ENVIRO ENGINEERING PVT. LTD.,

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PREFACE

Dharmapuri Municipality has proposed to establish a 4.86 MLD capacity Sewage Treatment Plant (STP) with Activated Sludge Process (ASP) at Dharmapuri Municipality. The Sewage Treatment Plant is designed based on Activated sludge process followed by disinfection system.

Dharmapuri district, which came into existence from 02.10.1965 is situated in the North western Corner of Tamil Nadu and is bounded by Tiruvannamalai and Villupuram Districts on the east, Salem District on the South, Krishnagiri District on the north and Kaveri river on the west. The total geographical area of Dharmapuri District is 4497.77 Sq Kms, i.e. 3.46% of TamilNadu. A Tank located in the Southeastern side of the project site is the biggest tank.

M/s. Pure Enviro Engineering Pvt Ltd., Chennai, have been retained by Dharmapuri Municipality, to undertake Environmental Assessment (EA) and preparation of an Environmental Management Plan (EMP) for various environmental components which are likely to be affected due to the construction and operation of the Sewage Treatment Plant. This report is based on the studies and observations made on the site details, Water, Soil, and Noise pollution sources, and suggestions of suitable control measures and Environmental Management Plan. The co-operation and assistance rendered by TWAD Board authorities in the preparation of this report is gratefully acknowledged.

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Dharmapuri Municipality has proposed to establish a 4.86MLD capacity Sewage Treatment Plant (STP) at Dharmapuri Municipality of Dharmapuri District in TamilNadu. The Sewage Treatment Plant is designed based on Activated sludge process followed by disinfection system.

Dharmapuri District, which came into existence from 02.10.1965 is situated in the North western Corner of TamilNadu and is bounded by Tiruvannamalai and Villupuram Districts on the east, Salem District on the South, Krishnagiri District on the north and Kaveri River on the west. It is located between latitudes N 11 47' and 12 33' and longitudes E 77 02' and 78 40'. The total geographical area of Dharmapuri District is 4497.77 Sq Kms, i.e. 3.46% of TamilNadu.

The district has hot and dry summer during the months of March to May and very cold and misty winter from November to February. The temperature varies from 17^0C to 37^oC. The Average annual rainfall is 850 mm. There is a vide variation among the blocks in terms of temperature and rainfall. The climatic conditions varies because of the vide variation in the topography. While the northern & western taluks lie around 1000 metre above mean sea level, the southern and eastern parts consisting of Dharmapuri, Pennagaram, Palacode, Harur and Uthangarai taluks lie at 450 metre above mean sea level. Of the three divisions, the Dharmapuri division consists of dry areas of Pennagaram and Harur. Even the Hogennakkal waterfall, which is situated in this part of the district, does not aid agriculture. The Krishnagiri division comprises fertile areas like Uthangarai, Kaveripattinam and Bargur blocks as it has a reservoir built across the Pennaiyar River.

1.2 OBJECTIVES

- To identify and assess any environmentally sensitive area and social impacts and to provide requisite measures to address these impacts
- To identify the opportunities for environmental enhancement in the project area and to provide the requisite guidance/plans in this regard
- To develop appropriate management plans and codes of practices for implementing, monitoring and reporting of the environmental mitigation and enhancement measures suggested.

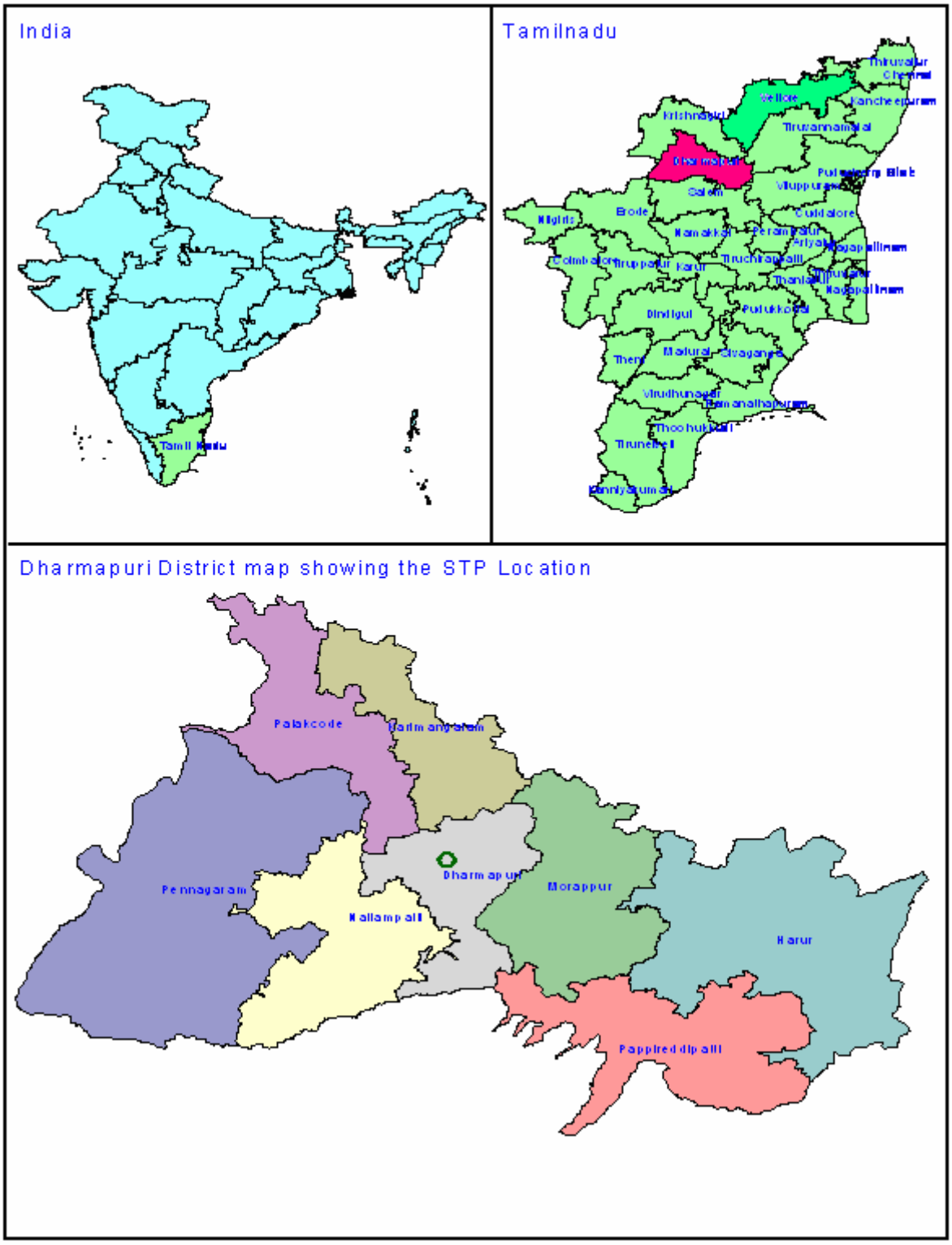

India
Tamil Nadu
Tamilnadu
Vellore
Kanchipuram
Salem
Erode
Cuddalore
Namakkal
Karur
Dindigul
Madurai
Theni
Virudhunagar
Thoothukudi
Tirunelveli
Kanniyakumari
Dharmapuri District map showing the STP Location
Palakcode
Pennagaram
Dharmapuri
Morappur
Kallampalli
Harur
Pappireddipalli

Figure 1.1 TN Districts map showing Dharmapuri

1.3 NEED FOR THE STUDY

Rapid urbanization has resulted in a significant impact on the environment. Now, all the concerned authorities have realized that development cannot be sustained unless the environment is protected. Therefore, most of the governments in the world have made it mandatory for project developers to carryout Environmental Assessment (EA) of their development project(s) and prepare Environmental Management Plans (EMPs) so that the environmental quality is protected.

The proposed project providing underground sewerage scheme to Dharmapuri Municipality involves establishment of STP and hence classified under E1 category as per ESF and necessitates carrying out EA for Dharmapuri Municipality and suggest environment management measures for mitigating the impacts, if any, from the project during various phases of construction and operation.

1.4 SCOPE OF THE STUDY

- To assess the effect on Land, Air, Water and Noise environment and measures proposed to counteract adverse effects
- To assess impact on wildlife (including birds) habitat in project area, if any;
- Assessment of impact on flora and fauna which would possibly be affected by the project and suggest plans for their conservation.
- To collect available water quality data; observe and analyze water quality at the project area and to collect information on known pollution sources in the area.
- To evaluate the impact of the project on public health, quality of life etc. during construction and after commissioning of the project.
- To assess impact on human settlements in project area, if any.
- To assess impact of project on existing and proposed infrastructure including roads and to identify measures for overcoming the same;
- Analysis of Census data for demographic profile
- Preparation of environmental monitoring plan for construction and operational phases.
- Identifying mitigatory measures.
- Preparation of sound Environment Management plan (EMP) outlining additional control technologies to be adopted for mitigation of adverse impacts. If any.

1.5 LEGAL, POLICY & INSTITUTION FRAME WORK

This section reviews the policies, regulations and administrative framework within which the project is to be implemented. The review includes the Environmental and Social framework of TNUIFSL, operational policies / directions of the World Bank and sector-specific environmental policies and regulations of the Govt. of India and Govt. of TamilNadu.

1.5.1 Water (Prevention and Control of Pollution) Act, 1974

These laws seek to control pollution of water and enhance the quality of water. Under this law, it is mandatory to obtain Consent to Establishment of STP and discharge of effluents and pay consent fees to Tamil Nadu State Pollution Control Board (TNPCB) for any municipal projects causing water pollution.

1.5.2 Air (Prevention and Control of Pollution) Act, 1981

This Act provides the prevention, control and abatement of air pollution. With a framework similar to the Water Act, the Air Act gave the central and state board's authority to issue consents to industries operating within designated air pollution control areas. States also prescribe emission standards for stationary and mobile sources.

1.5.3 Environment Protection Act, 1986 & Notifications

In order to create overarching national environmental legislation, the EPA articulates a policy for environmental protection covering air, water and land and provides a framework for Central Government coordination of Central and State Authorities established under previous laws, including the Water Act and Air Act. Under this umbrella Act, the Central Government must set National Ambient and Emissions Standards, establish procedures for managing hazardous substances, regulate industrial sitting, investigate and research pollution issues and establish laboratories and collect and disseminate information.

Among other relevant legislation, *the Public Liability Insurance Act (PLIA)* of 1991 mandates that business owners operating with hazardous substances take out insurance policies covering potential liability from an accident and establish Environmental Relief Funds to deal with accidents involving hazardous substances. *The National Environmental Appellate Authority Act* of 1997 requires the Central Government to establish an authority to hear appeals on area restrictions where operations will not be carried out or will be carried out with certain safeguard measures. In 2005, Parliament

enacted *the Right to Information Act* designed to promote greater transparency and accountability of the government and public participation in decision-making.

1.5.4 Environmental and Social Framework (ESF) & TNUDF

TNUIFSL has categorized urban infrastructure projects into three categories viz. E-1, E-2 and E-3. As per ESF, E1 projects require EA and approval of World Bank prior to implementation. The projects comply with the environmental resettlement and social standards set forth in the TNUDF's Environmental and Social Framework.

1.5.5 Operation Policy & Directorate of the World Bank

Operational Policy 4.01 (OP 4.01) is one of the ten safeguard policies of the World Bank, which provides the Environmental Impact Assessment (EIA) guidance for the lending operations. The OP 4.01 requires the borrower to screen projects upstream in the project cycle for potential impacts. Thereafter, an appropriate Environmental Assessment (EA) approach to assess, minimize / enhance and mitigate potentially adverse impacts is selected depending on nature and scale of project. The EA needs to be integrated in the project development process such that timely measures can be applied to address the identified impacts. The policy requires consultation with affected groups and NGOs to recognize community concerns and the need to address the same as part of EA.

1.5.6 Tamil Nadu Pollution Control Board (TNPCB)

The TNPCB has the mandate for environmental management at the state level, with emphasis on air and water quality. The board is responsible for:

- Planning and executing state-level air and water initiatives,
- Advising state government on air, water and industry issues,
- Establishing standards based on National Minimum Standards,
- Enforcing and monitoring of all activities within the State under the Air Act, the Water act and the Cess Act, etc.
- Conducting and organizing public hearings for projects as defined by the various Acts and as stipulated by the Amendment (April 1997) to the EIA Act; and, Issuing No-objection Certificates (NOC) for development projects defined in such a way as to include road projects.
- The Consent Order from the Tamil Nadu Pollution Control Board in pursuant to the Water (Prevention and Control of Pollution) Act of 1974, the Cess Act of 1977 and the Air (Prevention and Control of Pollution) Act of 1981.

- The State Pollution Control Board issues a Consent order after accepting the application for the project.

1.5.7 Noise Pollution Rules, 2000

Ministry of Environment and Forest (MoEF) Government of India considered it necessary to regulate and control noise and generating sources with the objective of maintaining the ambient air quality standards in respect of noise. Keeping this objective in mind MoEF enacted Noise Pollution (Regulation and Control) Rules, 2000 which regulates the increasing ambience of noise level in public places from various sources, inter-alia, industrial activity, construction activity, generator sets, loud speakers, public address systems, music systems, vehicular horns and other mechanical devices that have deleterious effects on human health and the psychological well being of the people.

1.5.8 National Archaeological sites prevention Acts

The Ancient Monuments and Archaeological Sites and Remains Act, 1958

In order to bring the legislation on par with constitutional provisions and providing better and effective preservation to the archaeological wealth of the country, The Ancient Monuments and Archaeological Sites and Remains Act 1958 (No 24 of 1958) was enacted on 28th August 1958. This Act provides for preservation of ancient and historical monuments and archaeological sites and remains of national importance, for regulation of archaeological excavations and for protection of sculptures, carvings and other like objects. Subsequently, the Ancient Monuments and Archaeological Sites and Remains Rules 1959 were framed. The Act along with Rules came into force with effect from 15 October 1959. This Act repealed The Ancient and Historical Monuments and Archaeological Sites and Remains (Declaration of National Importance) Act, 1951.

The Antiquities and Art Treasures Act, 1972

The Antiquities and Art Treasures Act 1972 (No. 52 of 1972) is the latest Act enacted on 9th September 1972 for effective control over the moveable cultural property consisting of antiquities and art treasures. The Act regulates export trade in antiquities and art treasures, provides for prevention of smuggling of, and fraudulent dealings in, antiquities, authorizes compulsory acquisition of antiquities and art treasures for preservation in public places and provides for certain other matters connected therewith or incidental or ancillary thereto. This Act was supplemented with The Antiquities and Art Treasure Rules 1973. The

Act and Rules have been in force with effect from 5th April 1976. This legislation repealed The Antiquities Export Control Act, 1947 (Act No. XXXI of 1947).

The Treasure Trove Act, 1878

The Indian Treasure Trove Act, 1878 (Act No. VI of 1878) was promulgated to protect and preserve treasure found accidentally but having the archaeological and historical value. This Act was enacted to protect and preserve such treasures and their lawful disposal. In a landmark development in 1886, James Burgess, the then Director General succeeded in prevailing upon the Government for issuing directions forbidding any person or agency to undertake excavation without prior consent of the Archaeological Survey and debarring officers from disposing of antiquities found or acquired without the permission of the Government.

Clearances Required from Competent Authority:

S.NO	Activity	Clearance Required.	Statutory Authority	Status	Responsibility
1.	Establishment of Proposed Sewage Treatment Plant	Consent To Establishment under Air and Water Act.	TamilNadu Pollution Control Board.	The Consent for Establishment has been obtained from TNPCB vides the Consent order no. DEE / HSR / 356 / CTE / 2009, dated: 06.01.2010 for the proposed Dharmapuri STP.	Pure Enviro Engg Pvt Ltd, Chennai
2.	Commissioning of Sewage Treatment Plant	Consent To Operate under Air and Water Act.	TamilNadu Pollution Control Board.	Consent To Operate will be obtained from TNPCB once it is ready for commissioning.	Pure Enviro Engg Pvt Ltd, Chennai.
3.	Disposal of treated sewage.	Permission for laying pipeline for disposal of	State Highway Authority	Permission will be obtained from State Highway authority.	TWAD Board.

		treated sewage.			

Apart from the above there is no other clearance / permission required from Competent Authority for the establishment of Proposed Sewage Treatment Plant.

1.6 METHODOLOGY

Any development activity in general is expected to cause impacts on surrounding environment at the project site during its implementation and operation phases, which can be both positive and negative. The nature and intensity of impacts on different components of environment depend on the type of project activities and geographical conditions of the study area. The impacts of the project activities on environmental components are quantified through Environmental Assessment (EA) studies within the impact zone of the project activities. Results of EA studies from the basis for the preparation of a viable EMP for mitigation of the adverse impacts. The EA studies for the underground sewerage system deals with detailed studies for various environmental components viz. air, noise, water, land, biological and socio-economic environment.

1.6.1 Study period

The EA study encompasses the area within 2 Km radius of the project. For preparation of EA report for the STP, the baseline data was collected during January, February and March 2010. The micro climatic parameters were recorded using automatic weather monitoring station for the study period. Wind speed, wind direction and relative humidity were recorded on hourly basis. Minimum & Maximum temperatures were also recorded during the study period.

Detailed design will commence in the first quarter of 2010 and it requires two months for completion. Construction of all elements will begin in the second quarter of 2010 and the treatment plant works will be completed with in 18 months.

1.6.2 COMPONENTS OF THE STUDY

1.6.2.1 Air Environment

The description of the existing air environment in and around the proposed project site is based on actual monitoring during January, February and March 2010. The concentrations of important air

pollutants like PM_{10}, $PM_{2.5}$, SO_2, NOx and CO at the study area are well within the permissible limits prescribed by Central Pollution Control Board (CPCB).

1.6.2.2 Noise Environment

The baseline noise levels in and around 2 km radius of the proposed project site were established inline with the Ambient Air Quality monitoring stations.

1.6.2.3 Water Environment

The baseline water environment in and around 2 Km radius of the proposed Project Site were established inline with the ISO 19001 Standards. Surface water plays major role in irrigation when compared to the ground water source. There is no major river system with in the 2 Km radius of the STP Site.

1.6.2.4 Land Environment

Soil samples were collected from the project site, not only at its immediate vicinity but also in the surrounding villages in study area. Physico-chemical properties of the soil were determined; information on land use pattern in the study area was also collected.

1.6.2.5 Ecosystem

Information on eco-system within the study area was collected from the State Agricultural and Forest departments. The important floral species native to the area is enumerated. A test check survey was also undertaken to judge the correctness of the data collected.

1.6.2.6 Socio-Economic Environment and Occupational Health

A field survey was conducted within study area of the site and the surrounding impact zone. The parameters selected under socio-economic component were demographic structure of the study area, provision of basic amenities, industries likely to come up in the study area, welfare facilities by the project proponent, safety training and management, community and occupational health hazards. Relevant information was collected from selected villages and analyzed.

1.6.2.7 Occupational Health

As adequate protective measure for pollution abatement will be taken, as described earlier, no occupational health problems are envisaged. However, periodic monitoring for prompt detection of any problem in this regard will be regularly carried out and addressed.

Periodical checks for workers and staff will be carried out to detect for any, occupational health problems and corrective measures will be taken promptly.

Besides, in order to reduce occurrence of epidemics like Malaria, Dengu Fever etc., fumigation practices will be adopted, as necessary, in the area. Publicity campaigns and medical camps will also be organized in nearby villages to create awareness about the importance of hygiene and cleanliness for preventing occurrence of epidemic diseases.

2. PROJECT DESCRIPTION

2.1 PROJECT BACKGROUND

The STP site for Dharmapuri Municipality is located at Settikarai Village, Dharmapuri Taluk, Dharmapuri District in Tamilnadu State. The site is located in the Northwestern side at a distance of 3.3 Km. the total area of the proposed site is 9.0 acres. The site selected is in a flat terrain.

The Administrative unit within 2 km radius zone comprises of parts of the following revenue villages in Dharmapuri Taluk, Dharmapuri district.

1) Dharmapuri Municipality
2) Hale Dharmapuri
3) Kuppur
4) Nalanahalli
5) Settikarai

The study area (2 Km Radius from the Proposed STP site boundary) lies in between N. Latitudes 12°07’30” and 12°10’00” and E. Longitude 78°09’00” and 79°11’50” and forms part of the Survey of India Toposheet Nos. 57 L-4. The Index plan of the study area is presented in Plate. The topomap showing the STP location and the administrative setup around 2 km radius from the project site is presented in Plate. Table 2.1 describes the salient features of the Dharmapuri District.

There is no sewerage system existing in Dharmapuri town. Sewage disposal is primarily through septic tanks. In general, it is discharged into the open street drains. Some soak pits of shallow depth and inadequate size are also in existence. These soak pits do not function properly and thereby allowing the sullage overflows. The street drains carrying sullage and sewage, are ultimately discharged in to water courses.

The sewage will be received through pumping main from the sewage pumping station of Dharmapuri town and shall be conveyed to the proposed STP. Out of 33 municipal wards only 19 wards are covered under this project and it is proposed to collect the sewage from 19 municipal wards (6000 house connection) through gravity to the Main pumping Station, from here it is pumped to STP site located at a distance of 1.2 km. The Sewage Treatment plant is designed for an average capacity of 4.86 MLD with peak factor of 2.25 generating peak flow of 10.94 MLD and the sewage will be treated by using Activated sludge process followed by disinfection system.

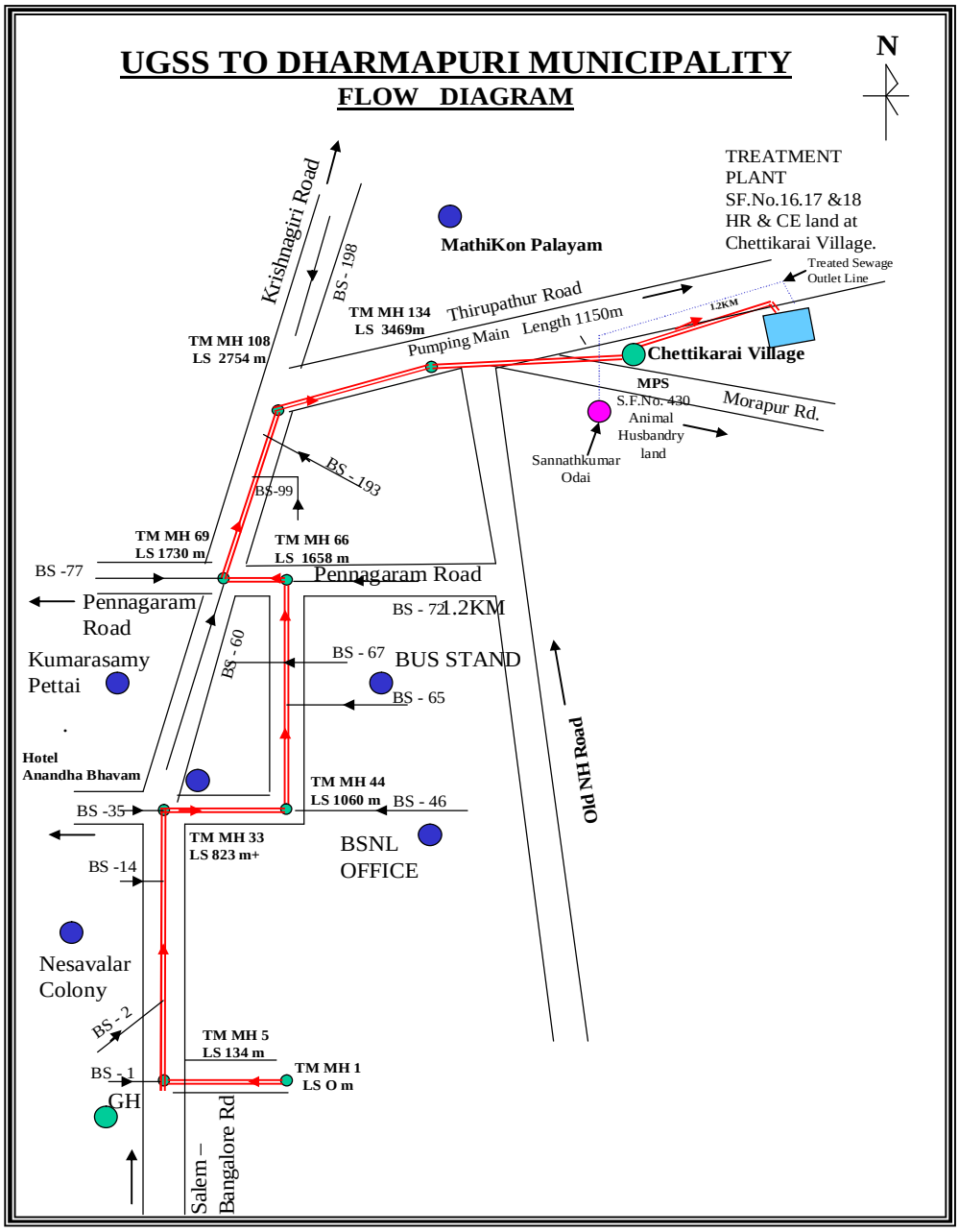


Figure 2.1 Flow Diagram

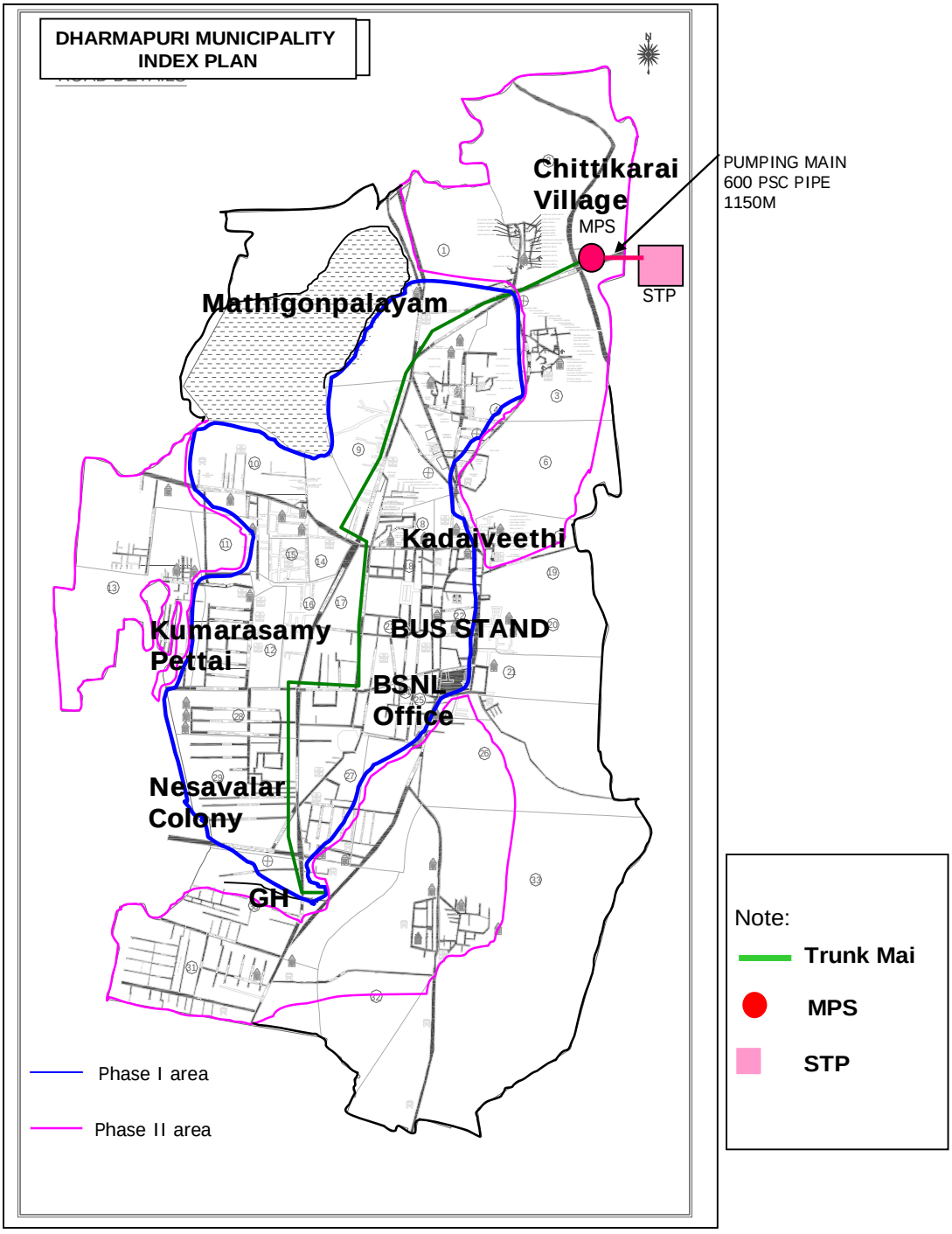


Figure 2.2 Index Plan

2.1.1 PROJECT PROPOSAL:

It is proposed to establish a Sewage Treatment Plant of capacity 4.86 MLD with Activated Sludge Process technology at a cost of Rs. 3,79,41,470/- for Dharmapuri Municipality at Settikarai Village, Dharmapuri Taluk, Dharmapuri District in an extent of 1.85 acres out of 9.0 acres.

2.2 SALIENT FEATURES

Table 2.1 Salient Details

Feature	Details	
Site Location	Dharmapuri Municipality, DharmapuriDistrict	
Site Latitude and Longitude		
North East Corner	**N 12º** 09**' 02.916"** **E 78º** 10**' 49.548"**	
North West Corner	**N 12º** 09**' 00.540"** **E 78º** 10**' 46.596"**	
South East Corner	**N 12º** 08" **59.964"** **E 78º** 10**' 59.964"**	
South West Corner	**N 12º** 09**' 03.7801"** **E 78º** 10**' 46.596"**	
Topography	Plain	
SOI Toposheet	57-L/4	
Above Mean Sea level in m	450-451 m above mean sea level	
Population of the project village	6278 as per 2001 Census	
Surrounding Villages (2 Km Radius)	*Name of Village*	*Population (2001)*
	Dharmapuri Municipality	64496
	Hale Dharmapuri	1010
	Kuppur	1130
	Nallanahalli	1017
Nearest City	Dharmapuri 3.3 Km	
Nearest Town	Dharmapuri 3.3 Km	
Nearest Highway	NH-7 17 km in the Western State highway – 300 m in Eastern side of the STP	
Nearest Railway line	3.3 Km in the Eastern side	
Nearest Railway station	Dharmapuri 3.3 Km	
Number of Villages Within 2 km radius	5(Full and Part)	

2.3 PROJECT LOCATION

The Sewage Treatment Plant is proposed to be located at the northwestern side of town within Municipal limits. The details of the identified land are given below:

Location	:	Dharmapuri Municipality
Present Usage	:	Unused Crop land
Area Available	:	9.0 acres
STP Area Requirement	:	1.85 acres (Proposed)
		1.85 acres (Expansion)
Greenbelt Area	:	1.5 acres
Ownership	:	Dharmapuri Municipality

Dharmapuri is located at 12°08'N 78°10'E12.13°N 78.17°E. It has an average elevation of 468 metres (1535 feet). It is situated in the northwestern corner of Tamil Nadu and is bounded by Tiruvannamalai and Viluppuram districts on the east, Salem district on the South, Krishnagiri district on the north and the river Kaveri on the west. It is located between latitudes N 11 47' and 12 33' and longitudes E 77 02' and 78 40'. The total geographical area of Dharmapuri district is 4497.77 km² which is 3.46% of Tamil Nadu.

2.4 PROJECT COST

The total project cost is estimated to be Rs. 2,92,20,000 (Detailed breakup is given in Table 2.2) and the total operation and maintenance cost is estimated to be Rs. 87,21,470 (Detailed breakup is given in Table 2.3).

Table 2.2 Project cost

S.No	Details	Amount (Rs.)
I	Capital cost:	
a.	Submission and acceptance of detailed designs, drawings and estimates	4,20,000
B	Hydraulic process design and layout of the plant	3,80,000
c	Structural design and construction drawing for primary units	2,60,000
D	Structural design and construction drawing for secondary units	4,30,000
E	Structural design and construction drawing for sludge handling, treatment arrangements unit and auxiliary units.	5,00,000
II	Submission and acceptance of detailed Environmental Assessment Report	3,20,000
III	Construction of the following components of the plant	
1.	Receiving Chamber	16,30,000
2.	Screening units	22,00,000
3.	De-griting units	23,50,000
4.	Distribution box & Bye-pass arrangement	4,35,000
5.	Primary and Secondary Units	1,35,00,000
6.	Chlorination Tank	10,50,000
7.	Sludge sump and Pump house	9,35,000
8.	Centrifuge House	17,30,000
9.	Administrative Building including Furniture and Laboratory Equipments	14,50,000
10.	Internal Roads, Pathways, Pavements, Storm water drainage	2,30,000
11.	Misc. Civil works like Fencing / Entry Gate, Retaining Wall, and Access	2,00,000
12.	Site Clearance, Disposal / Plot Development – Landscaping etc., Implementation of EMP	1,50,000
14.	Electrical works including (Bidder to specify various units)	10,50,000
Total (Rupees Two Crores, Ninety Two Lakhs and Twenty Thousand Only)		**2,92,20,000**

OPERATION AND MAINTANCE COST:

Table 2.3 O & M Cost (5 years)

S.No	Description	Amount (in Rs.)
1	Fixed cost (Man power, maintenance of all Civil Structures and entire plant House Keeping, all repairs including spares & Replacement, Oil & Grease cost)	63,10,000
2	Variable cost (except TNEB power charges, Diesel cost, Chlorine Dosage costs) other chemical consumable cost and safe disposal grit / sludge transportation to site	8,12,850
	i) Greenbelt	1,10,200
	ii) Safety training and emergency measures	3,47,450
	iii) Environmental Monitoring Plan during Operation Phase	4,11,500
3.	Trial Run Cost for 6 months	7,29,470
TOTAL (Rupees Eighty Seven Lakhs, Twenty One Thousand, Four Hundred and Seventy Only)		**87,21,470**

2.5 MANPOWER

The STP will have the following employees for its operation. Table 2.4 shows the total manpower requirement for Dharmapuri STP.

Table 2.4 Manpower

S.No	Description	Nos
1	Plant operator	2
2	Lab Chemist	1
3	Lab Assistant	1
4	Watchman / helper	2
5	Gardener / Farm Assistant	2

Note: 1. No labor below the age of 18 years shall be employed on the work.

2. The work shall be carried out on a 24 hr basis.

2.6 TECHNICAL DESCRIPTION OF THE PROJECT

2.6.1 SEWAGE TREATMENT & DISPOSAL

The Proposed Sewage Treatment Plant of capacity 4.86 MLD to be built in Dharmapuri Municipality. The Sewage Treatment Plant is designed based on Activated sludge process followed by disinfection system that will produce quality effluent after the treatment, before discharge into the Sanath Kumar Odai. The descriptions of each treatment unit employed in sewage treatment plant are discussed in this chapter.

The project has to be completed within 18 months and trial run for 6 months followed by 5 years of Operation and Maintenance Contract. The total area allocated at Dharmapuri for STP is 9 acres will be utilized for Construction of Sewage Treatment Plant.

2.6.1.1 Raw Sewage Characteristics

Table 2.5 Raw Sewage Characteristics

S.NO	PARAMETERS	VALUE
1	pH	7.18 - 7.24
2	BOD	250 - 275
3	COD	650 - 700
4	Oil & Grease	0.0002 - 0.0004
5	Total Suspended Solids	180 - 230
6	Total Kjeldahl Nitrogen (as N)	37 - 41
7	Ammonia Nitrogen (as N)	21.5 - 23.0
8	Total Phosphorus (as PO_4)	9.05 - 9.75
9	Chlorides	173 - 257
10	Fecal Coliform	106000 - 119000 MPN/100ml
11	Total Coliform	120000 - 128000 MPN/100ml
12	Sulphate	25 - 26

Note: All values are in mg/l except 1, 10, and 11.

2.6.1.2 Treated Sewage Standards

The treated sewage has to be disposed into natural drains. The table below lists the characteristics for discharge of treated sewage into inland waters.

Table 2.6 Characteristics of Treated Sewage

S.NO	PARAMETERS	VALUE
1	pH	5.5 – 9.0
2	BOD	< 20
3	COD	< 250
4	Oil & Grease	< 5
5	Total Suspended Solids	< 30
S.NO	**PARAMETERS**	**VALUE**
6	Nitrate Nitrogen (as NO_3)	≤ 5
7	Ammonia Nitrogen (as N)	< 50
8	Total Phosphorus (as PO_4)	< 5
9	Total Coliform	≤ 1000 no/100 ml

Note: All values are in mg/l except 1 & 9.

2.6.1.3 Treatment Technology & Treatment Plant Design Criteria

The treatment technology is based on Activated Sludge Process (ASP). Sewage will be given pre-treatment by screening and grit removal followed by biological treatment. Design of the pre-treatment units is done following the norms set in the CPHEEO Manual.

2.7 PROPOSED SEWAGE TREATMENT PLANT

2.7.1 General

The portion of the town considered to be benefited from 4.86 MLD Sewage treatment plant is fairly densely populated. Out of 33 municipal wards, it is proposed to cover 19 municipal wards under this project. Branch and lateral sewers will be provided in these wards, where necessary facilities for 6000 house connections will be provided.

2.7.2 Design Basis

Average flow is 4.86 MLD.

2.7.3 Detailed Proposals

2.7.3.1 Pretreatment Works

The pre-treatment works include

- Receiving chamber
- Coarse screen chamber
- Fine screen chamber
- Grit chamber

2.7.3.2 Receiving Chamber

The Domestic sewage from the town ship is collected in collection tank and pumped to the receiving chamber. At a head of 15 meters reaches the receiving chamber by means of pumping. Then the effluent flows through the coarse screen chamber by gravity.

2.7.3.3 Coarse Screen Chamber

From receiving chamber, the sewage flows by gravity in to the Coarse Screen for removal of suspended solids up to 25mm particle size. The application of the coarse screen is removal of coarse solids such as sticks, rags, and other debris in untreated municipal sewage by interception. Coarse screens are used to protect pumps, valves, pipelines, and other appurtenances from damage or clogging by rags and large objects. Manual and mechanical cleaning system will be used.

2.7.3.4 Fine Screen Chamber

The sewage free from floating solids flows to fine screen chamber by gravity were particle size up to 6 mm are removed. The materials that are retained on screens with openings of 6 mm include small rags, paper, plastic materials of various types, razor blades, grit, food waste, feces, etc. Angle of inclination is 40^0.

2.7.3.5 Grit Chamber

After removal of fine and coarse solids, the sewage having grit particles are removed in the grit chamber. Grit chamber is designed to remove grit, consisting of sand, gravel, cinders or other solid materials that have subsiding velocities or specific gravities substantially greater than those of the organic putrescible solids in wastewater. Grit removed particles are collected automatically through clarifier mechanism. Classifiers are provided in Square Horizontal-flow Grit chambers.

2.7.3.6 Primary Clarifier

The purpose of Primary Clarifier is to remove readily settleable solids. Nearly 15-20% of BOD reduction takes place. Primary Clarifier is of central driven assembly type, chain drive provided with tripping arrangement for accidental overloads with scrapper arms and blades of 0.05 RPM. Primary Clarifier is sand blasted, phosphated and given three coats of epoxy paint for non-corrosiveness.

2.7.3.7 Bio-Aeration Tank

Biological treatment in the Bioaeration tank is based on Activated Sludge Process. The objective of biological treatment is to remove organic matter, which contributes to BOD / COD. Biological waste treatment involves bringing the active microbial growth in contact with municipal sewage so that they can consume dissolved organic matter as food. A great variety of microorganisms play an important role. The Activated Sludge Process is based on low F/M ratio. Here the municipal sewage is made to contact with micro-organisms present in the form of flocculent biological mass, termed as Activated Sludge. During Bioaeration, the microorganisms multiply by assimilating part of the influent organic matter. These microorganisms in the presence of oxygen convert biodegradable organic matter into carbon dioxide, water, more cell material and other inert products. Activated sludge process involves decomposition of cellular substances involving the formation of water or participation of water molecules in organic oxidation and reduction reactions. Dehydrogenation takes place within the cell and hydrogen combines with molecular oxygen making it essentially an aerobic process.

The activated sludge process takes place in two phases. During the first phase of metabolism, the conversion of organic material to carbon dioxide, water and new cells takes place. During the second phase, endogenous respiration takes place, in which micro organisms consume their own cell material for energy. At the end only non-biodegradable residue is left.

BOD in municipal sewage is in the form of suspended solids and soluble organic material. When the municipal sewage is mixed with active biomass, several reactions take place. Suspended solids are enmeshed in biological flocs, colloidal solids are adsorbed on the plain interface and some soluble organics are adsorbed by enzymatic reaction and synthesized. Extra cellular enzymes first break down the colloids in order to be made available to the cell, so complete stabilization of these organics requires a longer Bioaeration time. During the endogenous phase, which is also known as extended Bioaeration; the biodegradable portion of suspended solids is oxidized. Oxygen is required in the activated sludge process for:

- Biological organic removal
- Endogenous respiration where cells lyses and releases oxidisable organic compounds.
- Chemical oxygen demand as measured by immediate oxygen demand.
- Nitrification reaction if required.
- Oxygen is also required to maintain the completely mixed condition in the reactor and to maintain a particular dissolved oxygen level in the Bioaeration tank.

The biomass is generally a flocculant and is quick to settle. It is separated from the aerated effluent in the Secondary clarifier and is recycled continuously to the Bioaeration tank as an essential feature of the process. The mixture of recycled sludge and municipal sewage is referred to as "Mixed Liquor". The recycling of sludge helps in the initial build up of a high concentration of active micro-organisms in the Mixed Liquor, which accelerates BOD removal. Once the required concentration of the micro-organisms in the mixed liquor is reached, regulating the quantity of sludge recycled and wasting the excess from the system prevent its further increase.

The Mixed Liquor Suspended Solids (MLSS) is generally taken as an index of the mass of active microorganisms in the Bioaeration tank. The Mixed Liquor Volatile Suspended Solids (MLVSS) value is also used as it eliminates the effect of inorganic matter. The MLSS concentration is maintained around 3000 - 4000 mg/ l, with the help of Return Sludge.

Basic requirement for biological treatment are:

a. Mixed population of active biomass.
b. Good contact between active biomass and wastewater.
c. Availability of sufficient oxygen.
d. Availability of sufficient nutrients.
e. Favorable environmental conditions like pH, temperature, contact time, absence of any material, which is toxic to microorganisms.

The purpose of return sludge arrangement is to maintain sufficient concentration of activated sludge in the Bioaeration tank, so that required degree of treatment can be achieved in the desired time interval. The return of activated sludge from the Secondary clarifier to the inlet of the Bioaeration tank is the essential feature of the process.

2.7.3.8 Secondary Clarifier

Settling in the Bio Clarifier assumes considerable importance in the Activated Sludge Process as the effective separation of the biological sludge is necessary not only for ensuring final effluent quality but also for return of adequate sludge to maintain the MLSS level in the tank. From the Bio clarifier, a part of the sludge is transferred to the Bioaeration tank through the Sludge sump. The excess sludge from the sludge sump is sent to the sludge thickener. Secondary Clarifier is of central driven assembly type, chain drive provided with scrapper arms and blades of 0.05 RPM. Secondary Clarifier is sand blasted, phosphate and given three coats of epoxy paint for non-corrosiveness.

2.7.3.9 Chlorination System

After biological treatment, the treated sewage is disinfected using chlorine gas. A gas chlorination system is considered to dose required quantity of chlorine in the treated chlorination system to maintain a Residual Chlorine of 0.2 mg/l.

2.7.3.10 Sludge Handling System

Centrifuge

The Bio sludge from primary and secondary clarifier is taken to respective Centrifuge Feed sump and then the sludge is pumped to sludge thickener. The Thickened sludge of 3% to 4% concentration is fed to 2 Nos of centrifuges for dewatering. The dried Sludge with a solid content of < 20% is disposed into the Municipal disposal yard. The cnetrate will be sent to supernatant collection sump and then pumped into bio aeration tank for further treatment.

2.7.3.11 Instrumentation And Control Philosophy

The Biological system based on Activated Sludge process will be fully controlled by PLC based PC system, which is a major factor in reducing operating costs. This also prevents mal operation of various set process parameters within the plant. All key functions like RAS, sludge wasting, aeration intensity, cycle time control, Decanting rate etc., are automatically controlled as well as data logged. Complete historical records of STP operation are available on the PC.

2.8 Efficiency of Treatment Components

Table 2.7 Efficiency of Treatment components in reduction of Pollution

S.No	Components	Parameters	Efficiency (%) Removal
1.	Bar Screen Chamber	Floating Suspended Solids	20 – 25
2.	Grit Chamber	Grit Particles	80 – 90
3.	Primary Clarifier	i) Settleable Suspended Solids ii) BOD iii) Scum	40 – 50 30 – 35 90 – 95
4.	Bio Aeration Tank	i) BOD ii) COD	90 – 95 80 – 85
5.	Secondary Clarifier	Suspended Solids	95 – 99
6.	Chlorine Contact Chamber	Total Coliform	95 - 99

2.9 TREATED SEWAGE DISPOSAL SYSTEM

The treated sewage will be disposed into sanath Kumar Odai, which is located at a distance of 1.2 Km away from the STP through R.C.C closed conduits.

It is proposed to lay a pipeline (300 mm dia) along the berm of Dharmapuri to Thirupathur Road at a depth of 2m below the ground Level to the culvert located in Arur road, from here it will reaches the Sanath kumar odai through gravity.

The topography of the ground is sloping towards the Sanath Kumar Odai in the western side of the STP. The Ground Level of the Disposal main is detailed below:

1. Average Ground Level of the STP site : 448.500 m
2. Ground Level at Sanath Kumar Odai : 447.250 m
3. The distance between the STP and the Sanath Kumar Odai : 1150 m

From the above, it is clear that the Ground Level difference between STP and Sannath Kumar is 1.25 m.

2.10 DETAILS OF SEWAGE & METHOD OF DISPOSAL

Disposal body	**:** Sanath Kumar Odai
Direction	**:** South West to STP Plant
Distance from the STP	**:** 1.2 Km
Mode of Disposal	: Closed Conduit.

Storage and Disposal of Biosludge

The dewatered biosludge (1 ton per day) from the centrifuge will be collected through jute bags/ Hessian. The sludge will be disposed into the Municipality common compost yard at Sathya Colony in Sogathur Panchayat which is located at a distance of 5km (South West - Towards Pennagaram road) from the STP site.

The Centrate from the Centrifuge will be sent to Supernatant Collection Sump and then pumped into Bio Aeration Tank for further treatment (Figure 2.5).

The waste generated from Grit chamber and screening unit will be disposed into Municipal Secure Landfill.

The Layout Showing the Disposal Point, Existing and Proposed Plan, Administrative Map, Digital Satellite Imaginary of the project site, P&I diagram and Hydraulic Profile for the Dharmapuri STP are shown in Figures 2.1, 2.2, 2.3, 2.4 and 2.5 respectively.

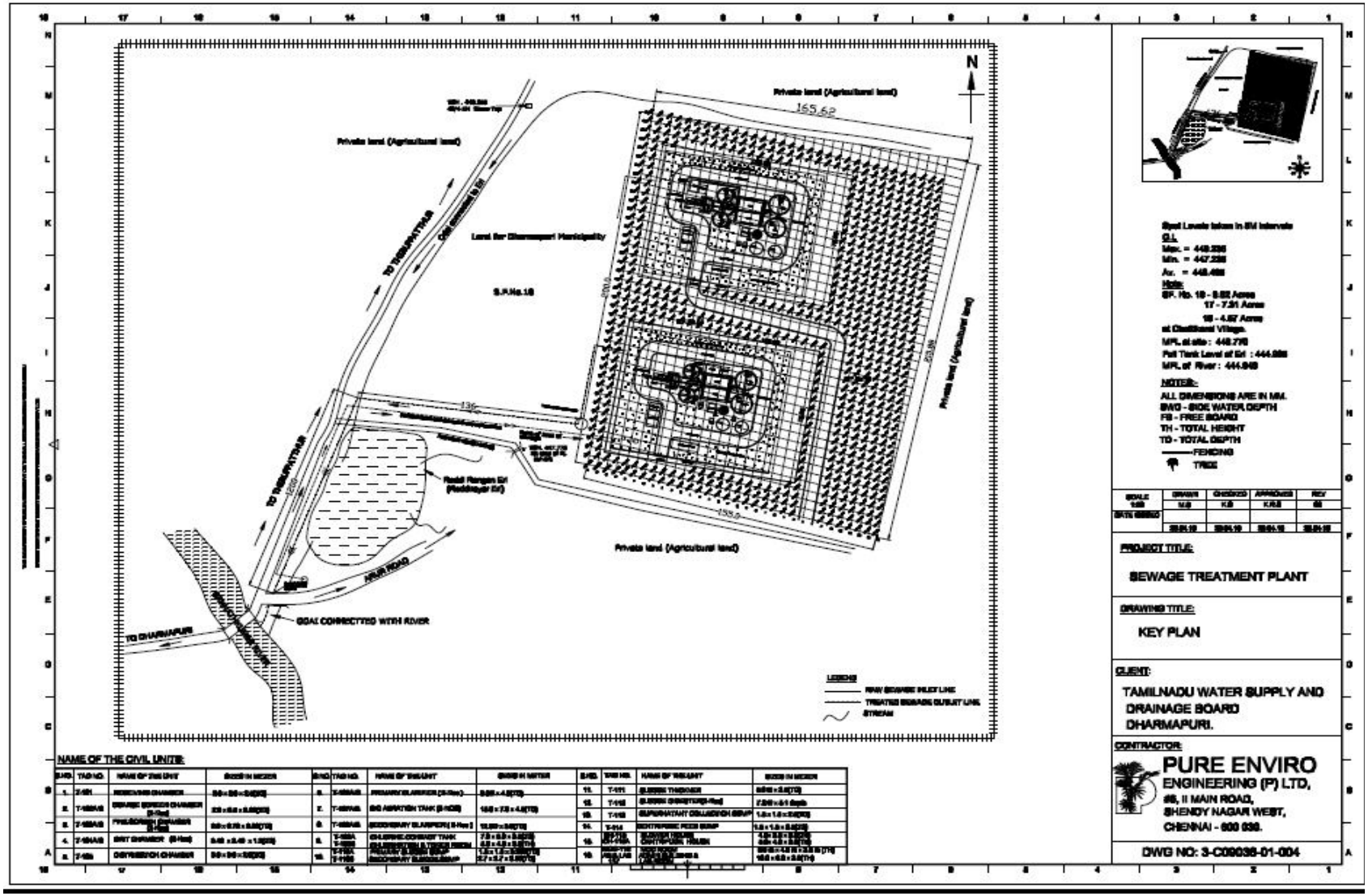


Figure 2.1 Layout Showing Disposal Point, Existing and Proposed Plan of the STP.

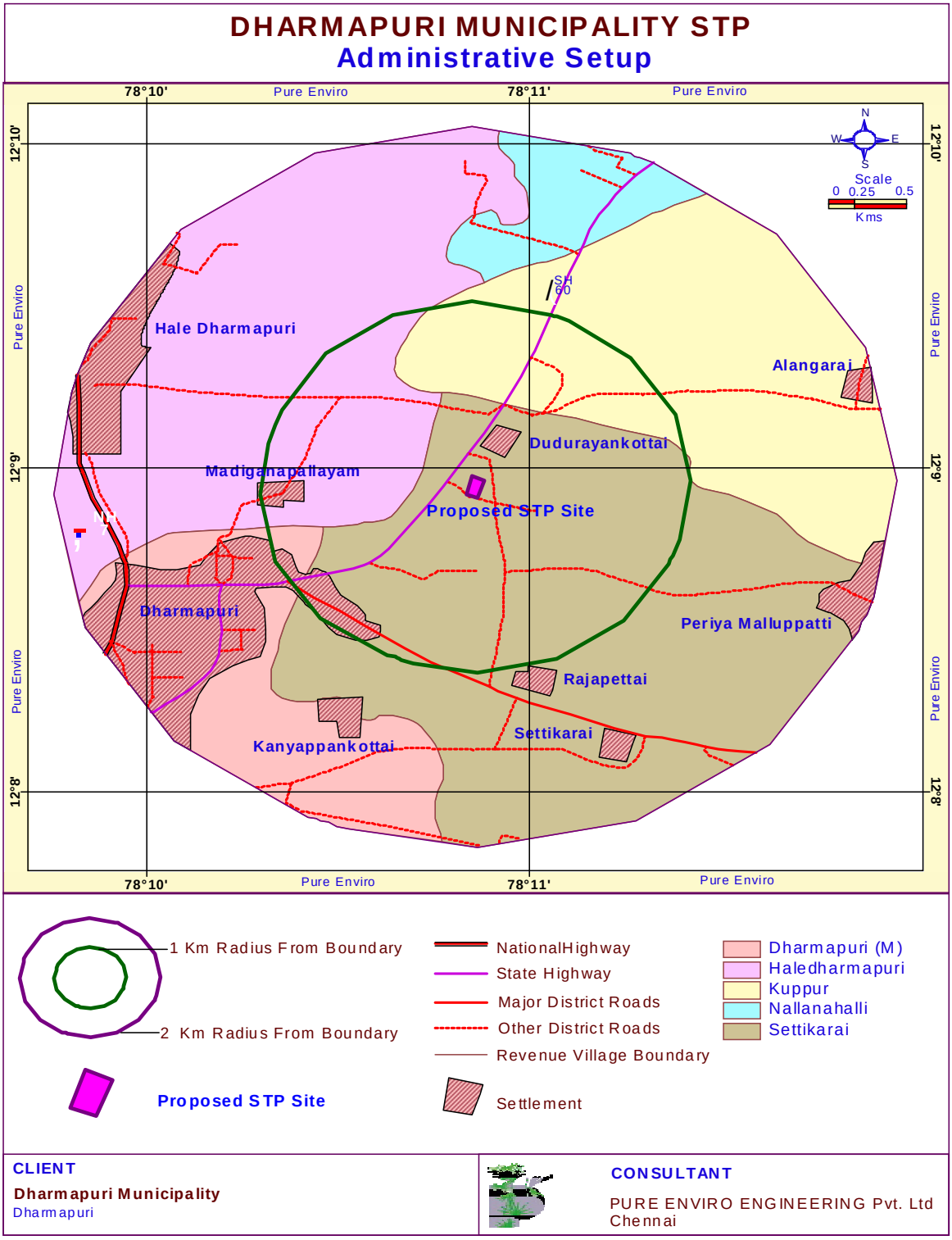


Figure 2.2 Administrative Map

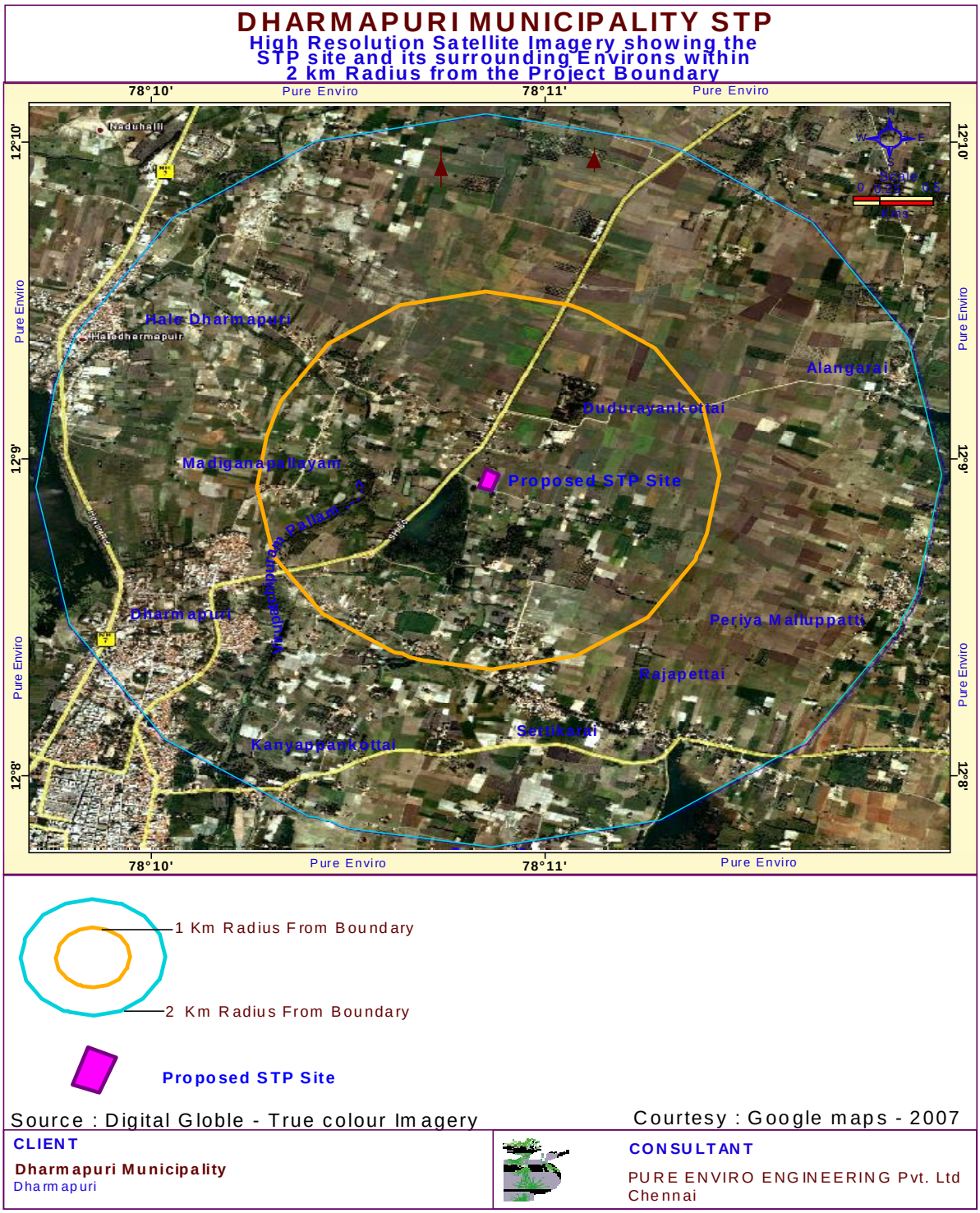


Figure 2.3 Digital image

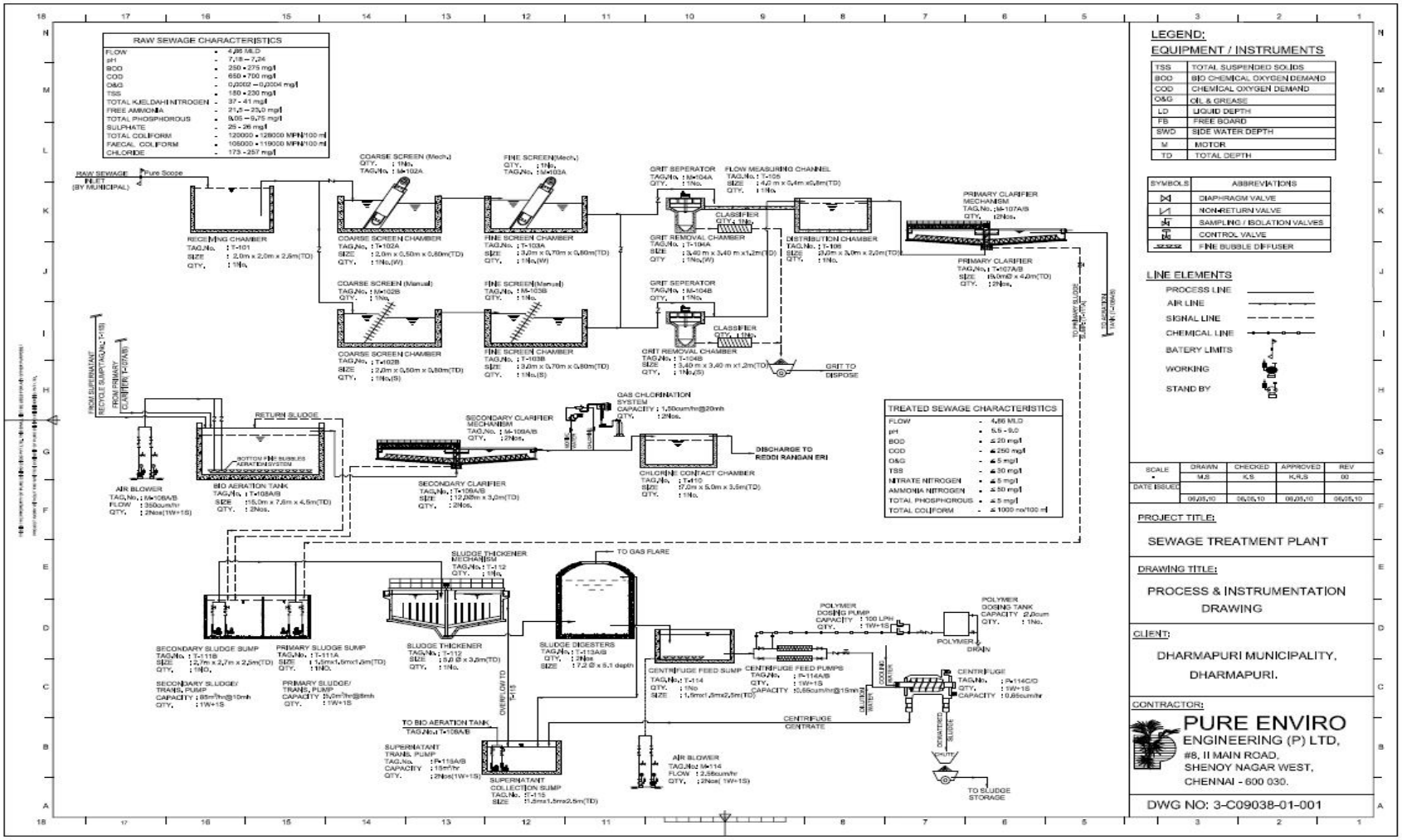


Figure 2.4 P&I Diagram

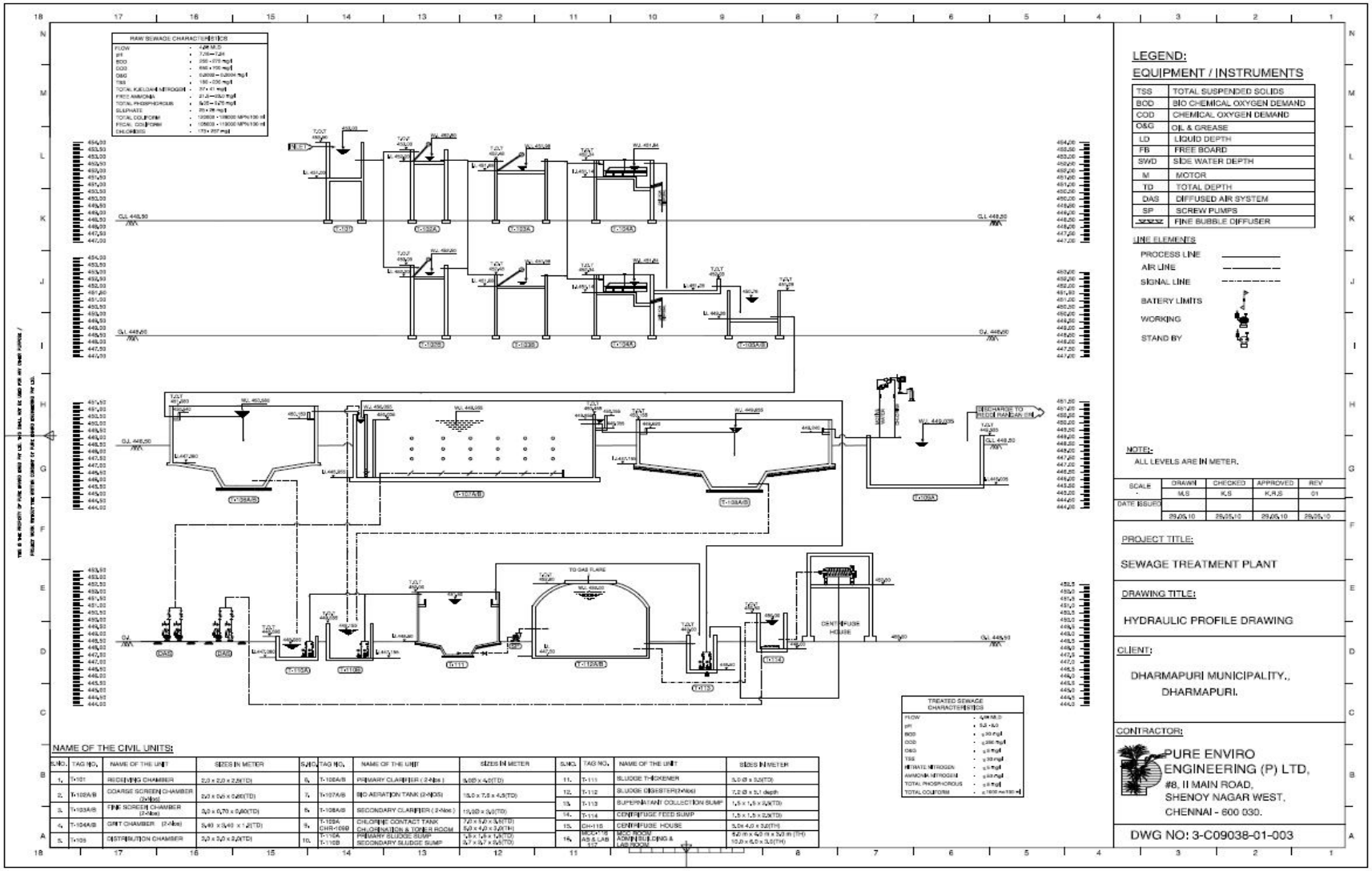


Figure 2.5 Hydraulic Profile Drawing

3. DESCRIPTION OF THE ENVIRONMENT

3.1 ENVIRONMENTAL PROFILE

The exact physical features in and around the proposed STP site of 1 Km radius is presented in Table 3.1 and Figure 3.1.

Table 3.1 Environmental Profile

Map No	Description of Environment identified around the STP site of 1 Km	Distance in Km w.r.t Project (Approx)	Direction w.r.t Project site
1	Cemetery at North side of bridge	2.1	SWW
2	Cemetery at south side of Bridge	2.2	SWW
3	Reddirangan Tank	0.5	SW
4	Dururayankottai Kottai Village	0.8	NNE
5	Male Stone Tiruvannamalai 100 Km	1.5	NNE
6	Primary School	1	NE
7	EB Sub Station	1	NEE
8	Gandhi palayam Water Tank	0.4	EES
9	Transformer Gandhipuram	0.7	EES
10	Tank	0.2	W
11	Road Junction	0.3	WWN
12	Gandhi Palayam (Residential)	0.1	ES

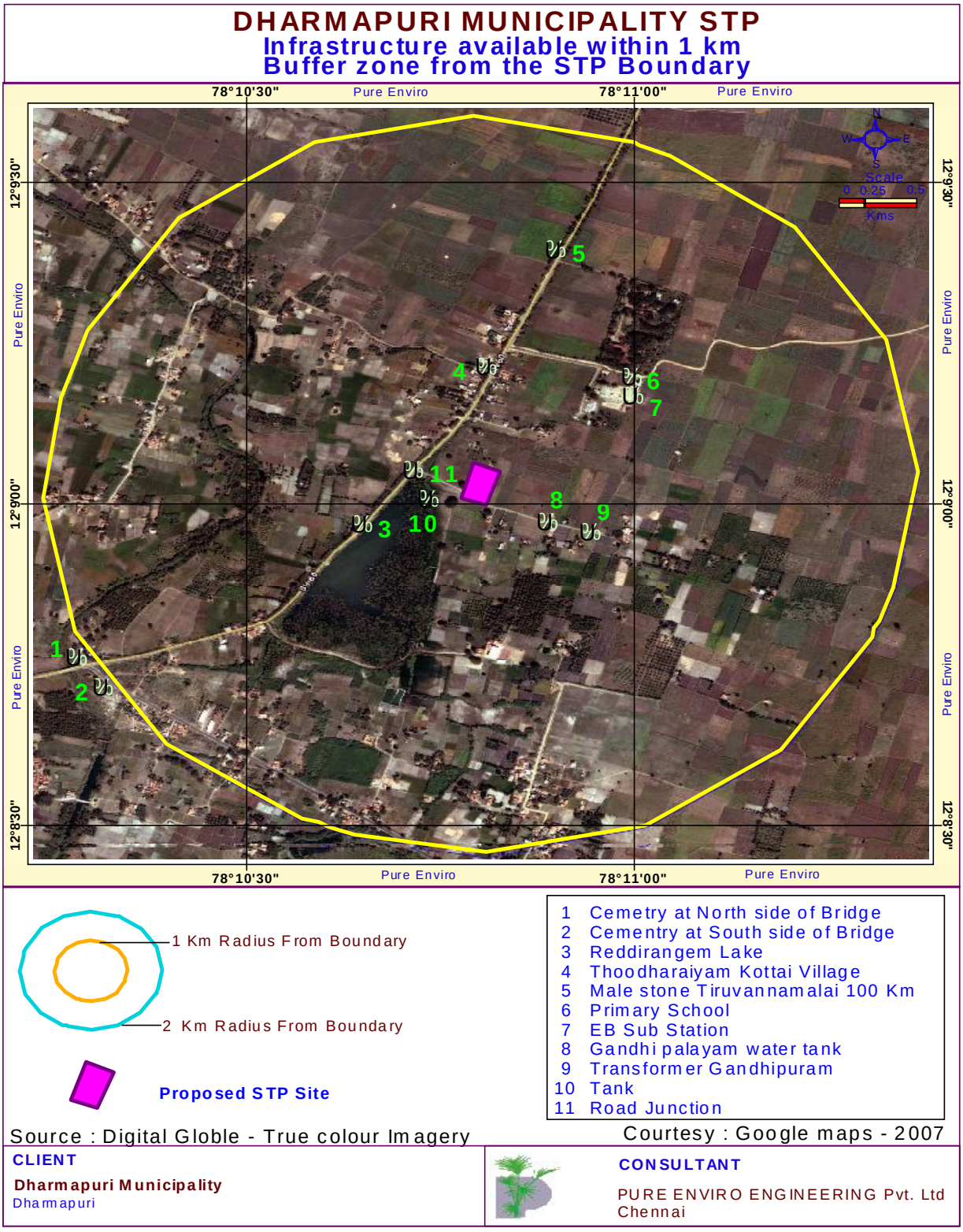


Figure 3.1 Surrounding details of the Project Site

3.2 SAMPLING LOCATIONS

Five sampling locations are selected for Air, Noise & Soil, whereas seven sampling location are selected for water including disposal point (Sanath Kumar Odai). All the samples are analyzed and results are shown in below chapter.

The Air, Noise, Water and Soil Sampling locations were selected based on the following criteria.

The Ambient air quality monitoring locations have been designed keeping in view the available climatological norms of predominant wind direction and wind speed of the area.

Basis of selecting the sampling stations

The following points were also taken into consideration in designing the network of sampling station

- Topography / Terrain of the study area
- Populated areas with in the study area of 2 km radius
- Residential and sensitive areas with in 2 km radius
- Representation of cross sectional distribution in downward direction

The latitude, longitude and distance of the sampling locations from the STP site are as Follows:

No	Location Name	Longitude	Latitude	Direction	Distance in Km
1	Project Site	78° 10' 50.228"	12° 9' 4.631"	-	-
2	Duduraiyankottai	78° 10' 57.151"	12° 9' 26.143"	North	0.8
3	Dharmapuri	78° 10' 27.217"	12° 8' 36.651"	Southwest	1
4	Madiganapalayam	78° 10' 17.487"	12° 9' 1.354"	East	0.95
5	Rajapettai	78° 10' 59.518"	12° 8' 26.685"	Southwest	1.15

Location 1: Project Site:

The location has been selected to assess the quality of air level in the core zone of the proposed STP site. As the site is open land, therefore no residential buildings in the vicinity. The location was away from the village road and did not experience any frequent vehicular

movement. The primary source of background levels of air pollutions could be the barren non-commercial activity.

Location 2: Duraiyankottai:

The sampling location is fixed in the downwind direction of the village Duraiyankottai and the proposed STP site and it is adjacent to the State Highway. There is no major activity in the village is fixed at north of the proposed STP site. The primary source of background level of air pollution is domestic / residential activity.

Location 3: Dharmapuri:

The sampling location is at Dharmapuri which is situated at southwest direction from the proposed STP site. Since the location is situated in the urban environment, lot of vehicular emission and other residential activity influence the quality of ambient air. The primary source of background level of air pollutions could be urban residential and urban commercial activity.

Location 4: Madiganapalayam:

The sampling location is situated in the eastern side of the proposed STP Site. It is located in the semi-urban environment and in the upwind direction. As the location is in the down wind direction of Dharmapuri, the activity that takes place in the urban environment reflects in the sampling results. The primary source of background level of air pollutions could be predominantly residential activity.

Location 5: Rajapettai:

The location is situated in the southern side of the proposed STP site. It is located very adjacent to the State highways. The primary source of the background level of air pollution could be the rural residential activity and vehicular movement.

For the noise monitoring locations the above has been considered. Water sampling locations were collected based on the availability of the bore wells / open wells in the area.

Geological environ has been considered for the collection of Soil sample collection. The sampling location is also selected to study the soil pollution due to urbanization.

The sampling stations were collected within 2 Km around the project site and there are no sensitive areas found nearby.

3.3 MICROMETEROLOGY

3.3.1 Temperature

The maximum temperature recorded during the monitoring period was 38 °C whereas the minimum temperature recorded was 27°C. On an average the daily temperature varied between 18°C and 32°C. The average diurnal variation and daily maximum and minimum temperatures recorded are presented in Figure 3.1.

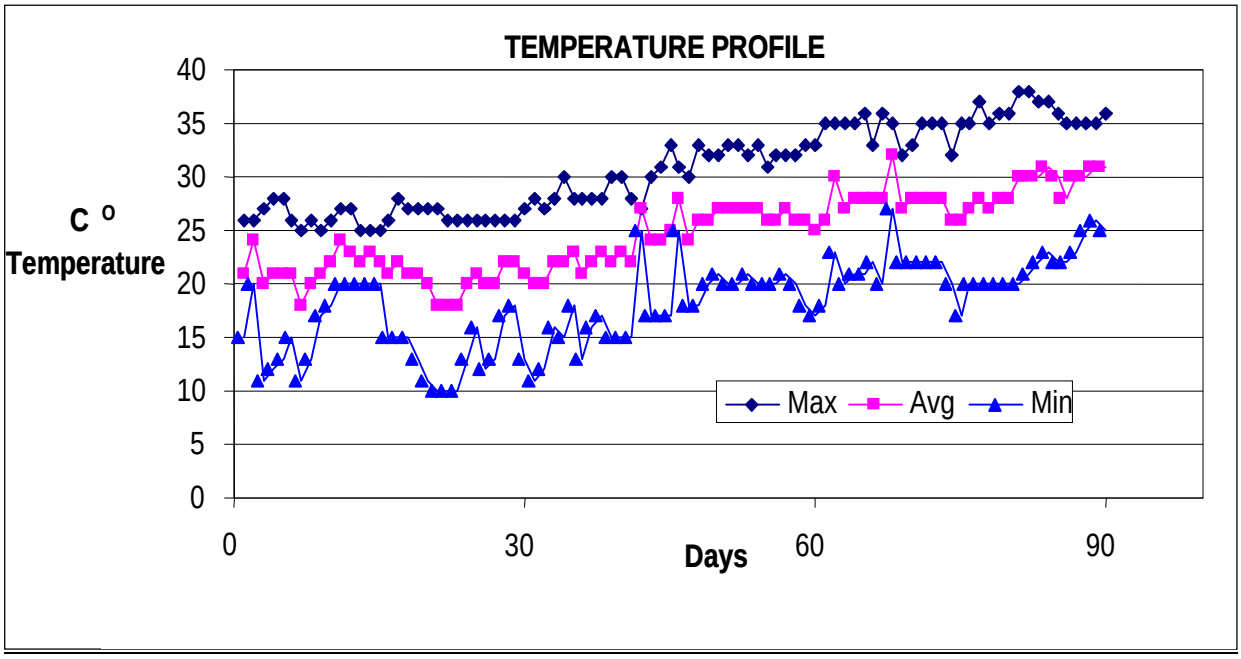


Figure 3.2 Diurnal Variation and Maximum and Minimum Temperatures Recorded at Project site

3.3.2 Rainfall

Dharmapuri Rain gauge station, which is located within the study area of 2 km radius. The 70 years normal annual rainfall in the area is around 903.6 mm. The study area receives fairly good amount of rainfall during South west monsoon. The season wise normal rainfall for the Dharmapuri rain gauge station is furnished in the below Table.

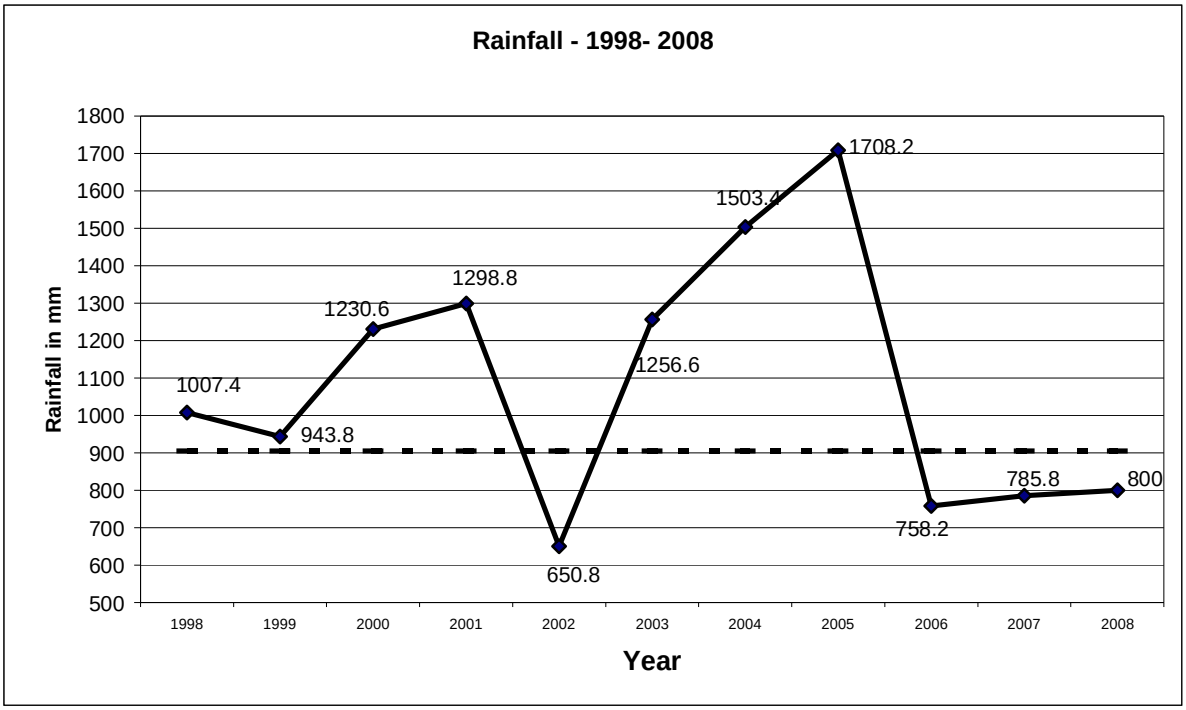
Rain gauge station	Jan – May (Transitional Period)	June – Sep (South West Monsoon)	Oct – Dec (North East Monsoon) -	Annual Normal
Dharmapuri	219	370.5	314.1	903.6

Source: Revenue Department, Dharmapuri

Around 45 % of the rainfall occurs during Southwest monsoon and the remaining rainfall occurs during Northeast and Transitional period.

The probability of occurrence of normal rainfall over the study area has been studied. It is observed that the chances of receiving normal annual rainfall are in the range of 30 to 35 % over the entire study area.

The yearly rainfall data (1998-2008) of Dharmapuri rain gauge station collected from the State Government department is presented below in the form of graph.



The above rainfall graph indicates that there is deficit rainfall during the years 2002, 2006, 2007, and 2008. During 2005, The Dharmapuri rain gauge station received 1708.2 mm of rainfall, which is very high rainfall occurred for the past 10 years.

3.3.3 Relative Humidity

The maximum relative humidity recorded during the monitoring period was 79% and minimum relative humidity recorded was 30% and the average relative humidity varying between 47% and 61%. The daily maximum, minimum and average relative humidity recorded during the monitoring period is presented in Figure 3.3.

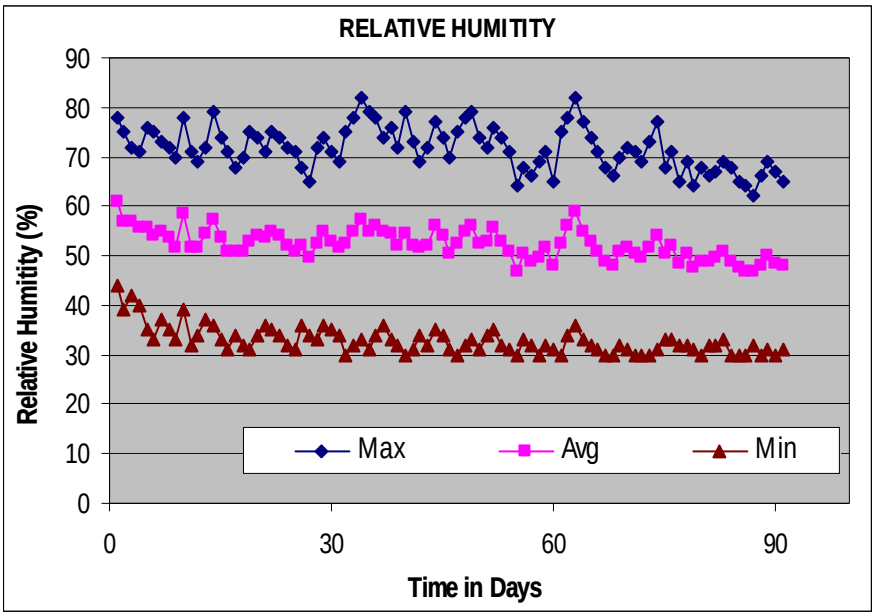


Figure 3.3 Maximum and Minimum Relative Humidity Recorded at Project Site

3.3.4. Wind Speed & Direction

The predominant wind direction recorded during January, February and March was NE and predominant wind speed was in the range of 6 – 19 Kmph. The wind rose diagram for 8.30 hrs and 17.30 hrs are shown in Figure 3.4 a and 3.4 b.

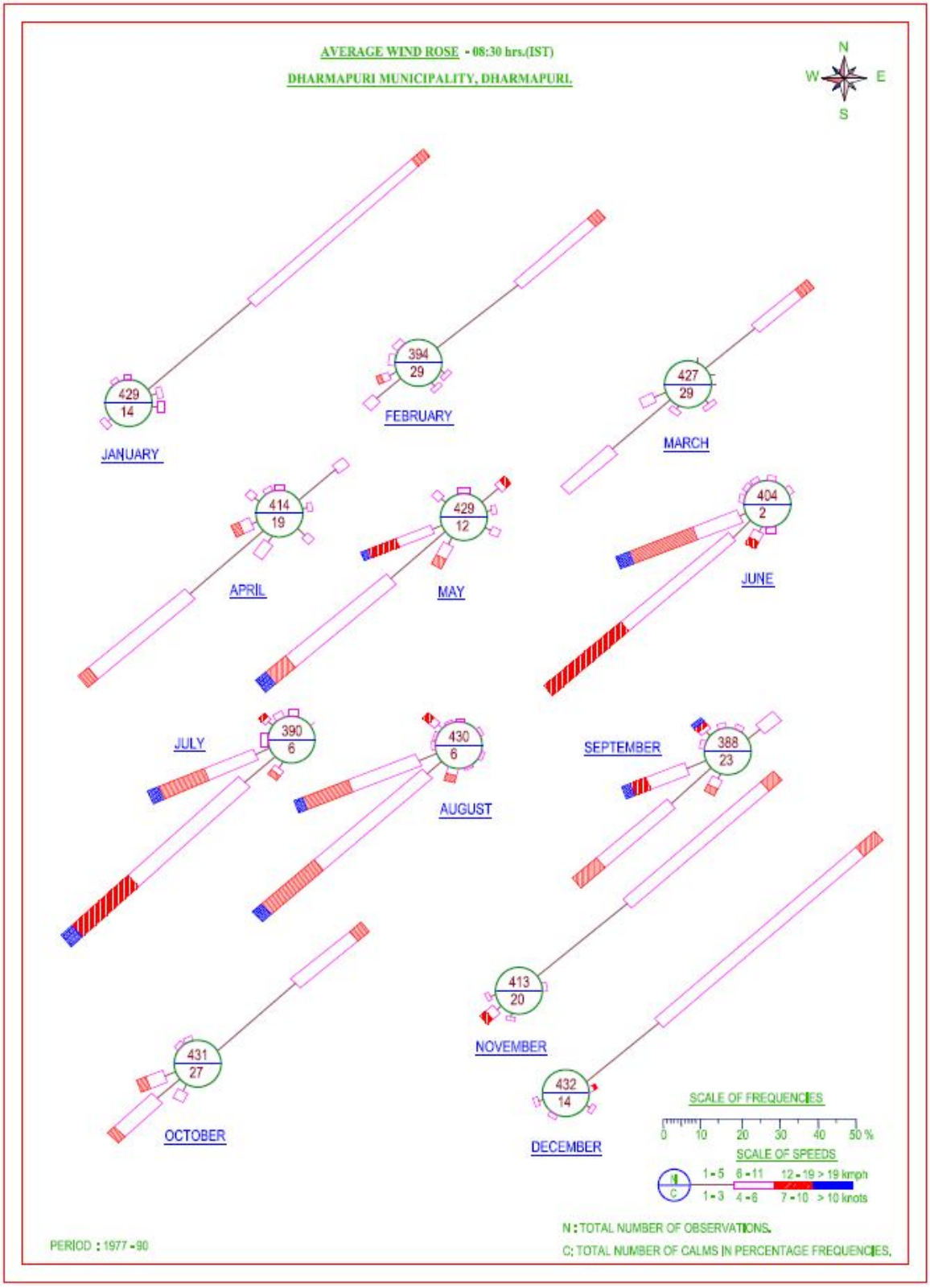


Figure 3.4 a: Wind Rose (8.30 hrs)

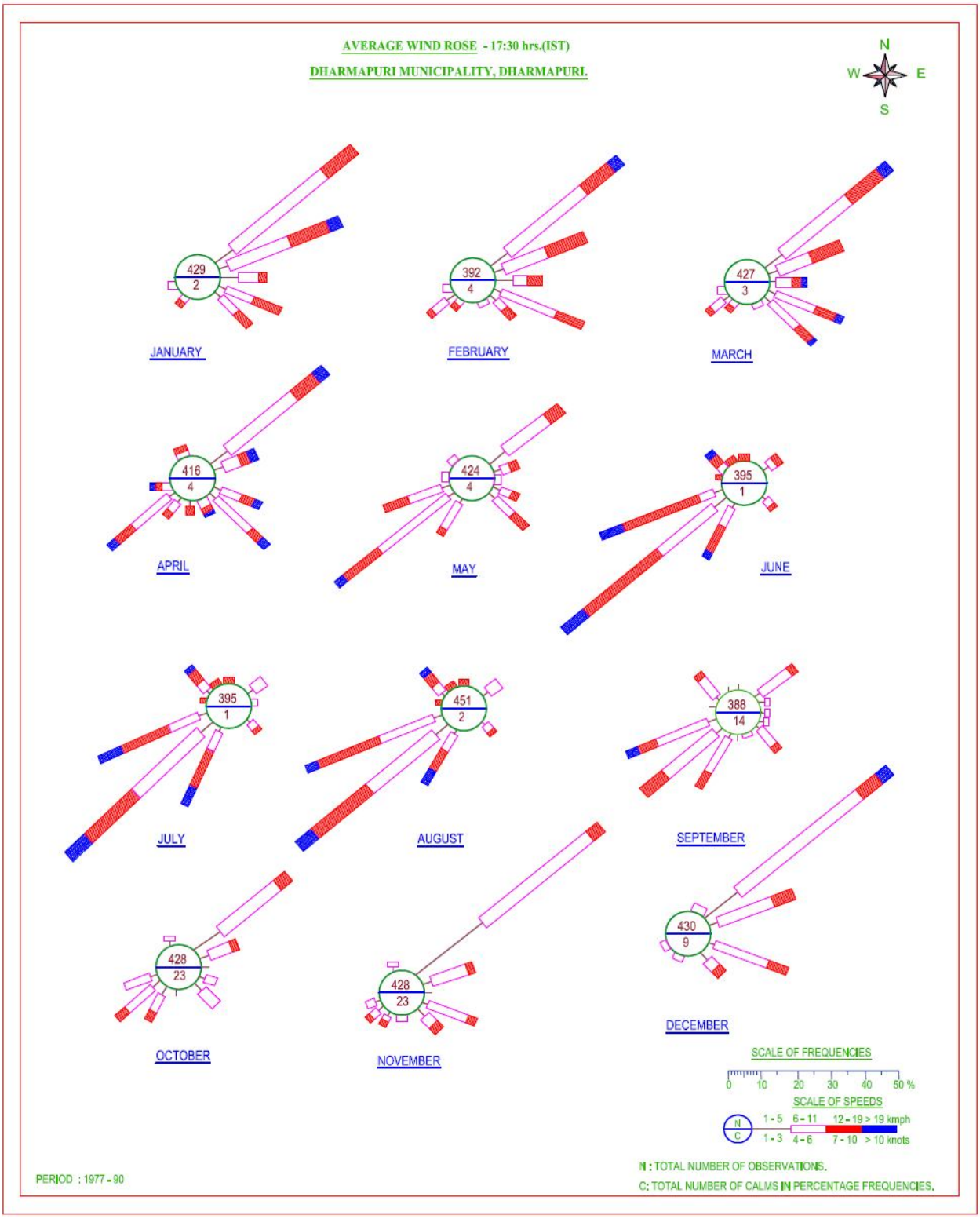


Figure 3.4 b: Wind Rose (17.30 hrs)

3.4 AIR ENVIRONMENT

3.4.1 Ambient Air Quality (AAQ)

The Ambient Air Quality (AAQ) status with respect to the study zone of 2 km radial distance from the plant site formed the baseline information over which the predicted impacts due to the proposed project were determined based on which the Environmental Management Plan (EMP) was prepared. The baseline status of the ambient air quality can be assessed through a scientifically designed ambient air quality monitoring network based on the following considerations:

1) Meteorological conditions on synoptic scale
2) Topography of the study area
3) Representations of regional background levels
4) Representation of plant site
5) Representation of cross sectional distribution in the downward direction
6) Influences of the existing sources if any are to be kept at minimum
7) Inclusion of major distinct villages to collect the baseline status
8) The assessment of the impacts on air environment from the proposed activity was carried out using ambient air quality data monitored during the study period.

a. Monitoring Location and Methodology

To establish the existing baseline status of air quality in and around the STP site, a network of five AAQ sampling locations was selected within 2 km aerial distance. The locations were decided on the basis of meteorological data and the topography of the area. Further, a monitoring location was selected at the project site to get the baseline status of the air quality within 2 Km around the project site.

The AAQ sampling locations and their direction with respect to the project site are given in Table 3.2 and the monitoring locations are shown in Figure 3.5.

Table 3.2 Sampling Locations

Stn. Code	Station Name	Distance from Site (Kms.) Approx.	Direction w.r.t site (Approx.)
1	Project Site	-	-
2	Dudurayankottai	0.8	NNE
3	Dharmapuri	1.0	WWS
4	Madiganapallayam	0.95	W
5	Rajapettai	1.15	SSE

Concentrations of Particulate Matter (PM10 & $PM_{2.5}$), sulphur dioxide (SO_2) and oxides of nitrogen (NO_x) were measured at these locations on 24 hourly bases. Samples were analysed in the laboratory using the methods given below. The methods of sampling and analysis were based on IS 5182 and methods recommended by the Central Pollution Control Board (CPCB) (under MoEF notification dated14th September 2006) for PM_{10} , $PM_{2.5}$, SO_2, NO_x, and CO as given below:

Table 3.3 Methods of Sampling

S. No	Parameter	Technique
1	Particulate Matter (PM_{10} & $PM_{2.5}$)	PM_{10} Particulate Sampler & Fine Particulate Sampler (Gravimetric method)
2	Respirable Particulate Matter	Respirable Dust Sampler (Gravimetric method)
3	Sulphur Dioxide	Modified West and Gaeke
4	Nitrogen Oxide	Jacob & Hochheiser

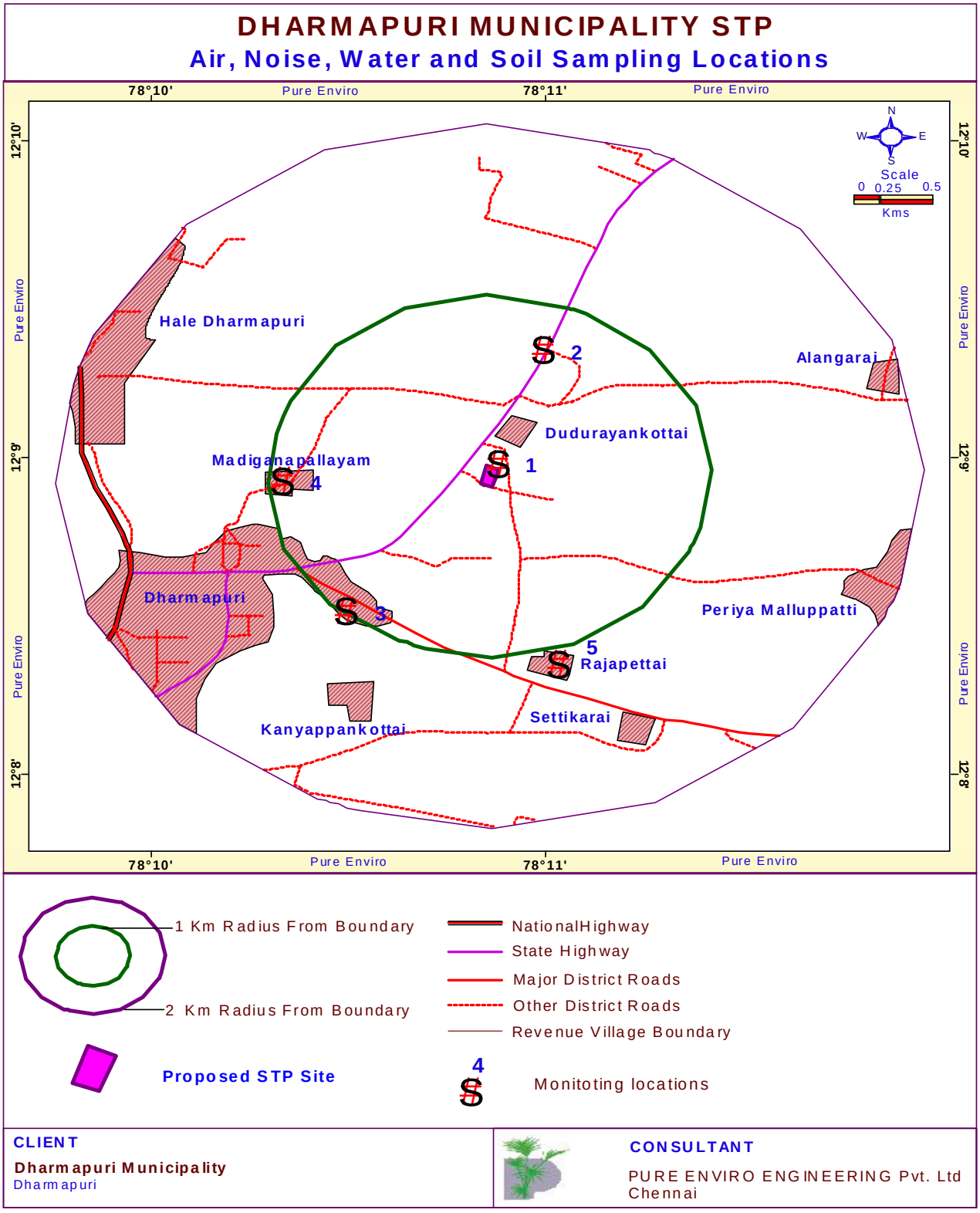


Figure 3.5 Sampling Locations

b. Results and Discussions

The existing ambient air quality at the identified locations and the corresponding standards are presented in Table 3.3. The table below, lists maximum, 98th percentile, minimum and mean values of concentrations of all the parameters monitored.

Table 3.3 Ambient Air Quality Monitoring Results
(24 hour average concentrations in µg/Nm³)

Location/ Parameter	Max	Min	98th percentile	Mean	NAAQ Standard
A-1 Project Site					
PM_{10}	102	68	96.4	85	100
$PM_{2.5}$	35	23	33	29	60
SO_2	12	8	8.3	10	80
NO_X	16	10	7.3	13	80
CO	BDL	BDL	BDL	BDL	2
A-2 Dudurayankottai					
PM_{10}	96	64	83.2	80	100
$PM_{2.5}$	33	22	29	28	60
SO_2	11	5	8.2	8	80
NO_X	17	10	7.6	13.5	80
CO	BDL	BDL	BDL	BDL	2
A-3 Dharmapuri					
PM_{10}	74	60	93.2	67	100
$PM_{2.5}$	25	21	32	23	60
SO_2	12	8	8.8	10	80
NO_X	15	10	7.9	12.5	80
CO	BDL	BDL	BDL	BDL	2
A-4 Madiganapallayam					
PM10	104	82	98.6	93	100
$PM_{2.5}$	36	28	34	32	60
SO_2	14	9.0	9.1	11.5	80
NO_X	24	15	8.1	19.5	80
CO	0.5	0.1	0.49	0.3	2
A-5 Rajapettai					
PM_{10}	80	58	72.1	69	100
$PM_{2.5}$	28	20	25	24	60
SO_2	12	6	8.2	9	80
NO_X	17	10	7.2	13.5	80
CO	BDL	BDL	BDL	BDL	2

3.5 NOISE ENVIRONMENT

The baseline noise levels in and around 2 km radius of the proposed project site were established inline with the Noise Standards. Noise monitoring was carried out at following locations given in the Table 3.4.

Table 3.4 Noise Monitoring Locations

Stn. Code	Station Name	Distance From Site (Kms.) Approx.	Direction w.r.t site (Approx.)	Selection criteria
N-1	Project Site	-	-	Residential Area
N -2	Dururayankottai	0.8	NNE	Residential Area
N -3	Dharmapuri	1.0	WWS	Residential Area
N -4	Madiganapallayam	0.95	W	Residential Area
N -5	Rajapetti	1.15	SSE	Residential Area

Noise levels were monitored using a calibrated portable noise level recorder on an hourly basis for 24 hours, once at each location. Levels of noise monitored during 6 AM to 9 PM were considered for the day noise levels and those monitored during 9 PM to 6 AM were considered for night noise levels. Day and night L_{eq} values were computed based on the monitored noise levels and are presented in Table 3.5.

Table 3.5 Ambient Noise Monitoring Results

Stn. Code	Location	L_{day}, dB (A)		L_{night} dB (A)	
		Noise level	Standard	Noise level	Standard
N-1	Project Site	49.5	55	41.6	45
N-2	Dururayankottai	53.5	55	43.5	45
N-3	Dharmapuri	52.0	55	42.3	45
N-4	Madiganapallayam	54.0	55	41.5	45
N-5	Rajapetti	51.5	55	40.7	45

Noise levels were found to be within the prescribed limits for all the locations. This is attributed due to the continuous traffic flow on the road throughout the day.

3.6 WATER ENVIRONMENT

3.6.1 Surface water

Surface water plays major role in irrigation when compared to the ground water source. There is no major river system with in the 2 Km radius of the STP Site. A Tank location in the Southwestern side of the site is the biggest tank. A stream namely Virupatchipuram Pallam is flows in the western side of the site at a distance of 0.5 Km. The stream flows towards north.

Sanath Kumar Odai:

The Streams and Reddirangan Tank are seasonal. There is no perennial river in this area. Only the over flow of Reddirangan Tank flows towards the Sanathkumar Odai. The surplus of Reddy rangan odai flows in to Virupakshipallam stream located in the west of the project site and Sanath Kumar Odai. The Sanathkumar Odai and Virupatchipuram pallam is dry but the water flow occurs only during the Monsoon period and it's being used only for Agricultural purpose because of non availability of water.

a) Drainage:

The flow direction and flow accumulation of the study area clearly indicates the control of the structural features on the river system. From the STP site the surface water flows towards eastern side and joins with river Virupatchipuram Pallam. Only the over flow of Reddirangan Tank flows towards the Sanathkumar Odai. The treated sewage will be disposed directly to the Sanathkumar Odai. Hence, there will be not any flow of treated sewage into the Reddirangan Tank.

Table 3.6 Quality of Surface Water Collected from Tank located in SW of the STP Site

S.No	Parameter	Method	Result
1	pH 25° C	APHA 21st Edn. 4500 H^+ B	7.9
2	Temperature	APHA 21st Edn. 2550 B	28°C
3	Colour	APHA 21st Edn. 2120 B	8 Hazen
4	Electrical Conductivity @25° C	APHA 21st Edn. 2510 B	1260 µmhos/cm
5	Turbidity	APHA 21st Edn. 2130 B	5.6 NTU
6	Total Dissolved Solids	APHA 21st Edn. 2540 C	980 mg/L
7	Total Hardness as $CaCO_3$	APHA 21st Edn. 2340 C	430 mg/L
8	Calcium as Ca	APHA 21st Edn. 3500 Ca B	21.4 mg/L
9	Magnesium as Mg	APHA 21st Edn. 3500 Ma B	17.1 mg/L
10	Phenolphthalein Alkalinity as $CaCO_3$	APHA 21st Edn. 2320 B	Nil
11	Methyl Orange Alkalinity as $CaCO_3$	APHA 21st Edn. 2320 B	320 mg/L
12	Total Alkalinity as $CaCO_3$	APHA 21st Edn. 2320 B	320 mg/L
13	Chloride as Cl	APHA 21st Edn. 4500 Cl B	180 mg/L
14	Sulphate as SO_4	APHA 21st Edn.4500 So_4 E	135 mg/L
15	Iron as Fe	APHA 21st Edn.3500 Fe E	0.3 mg/L
16	Silica as SiO_2	APHA 21st Edn.4500 SiO_2 D	24 mg/L
17	Phosphate as PO_4	APHA 21st Edn.4500 P D	5.2 mg/L

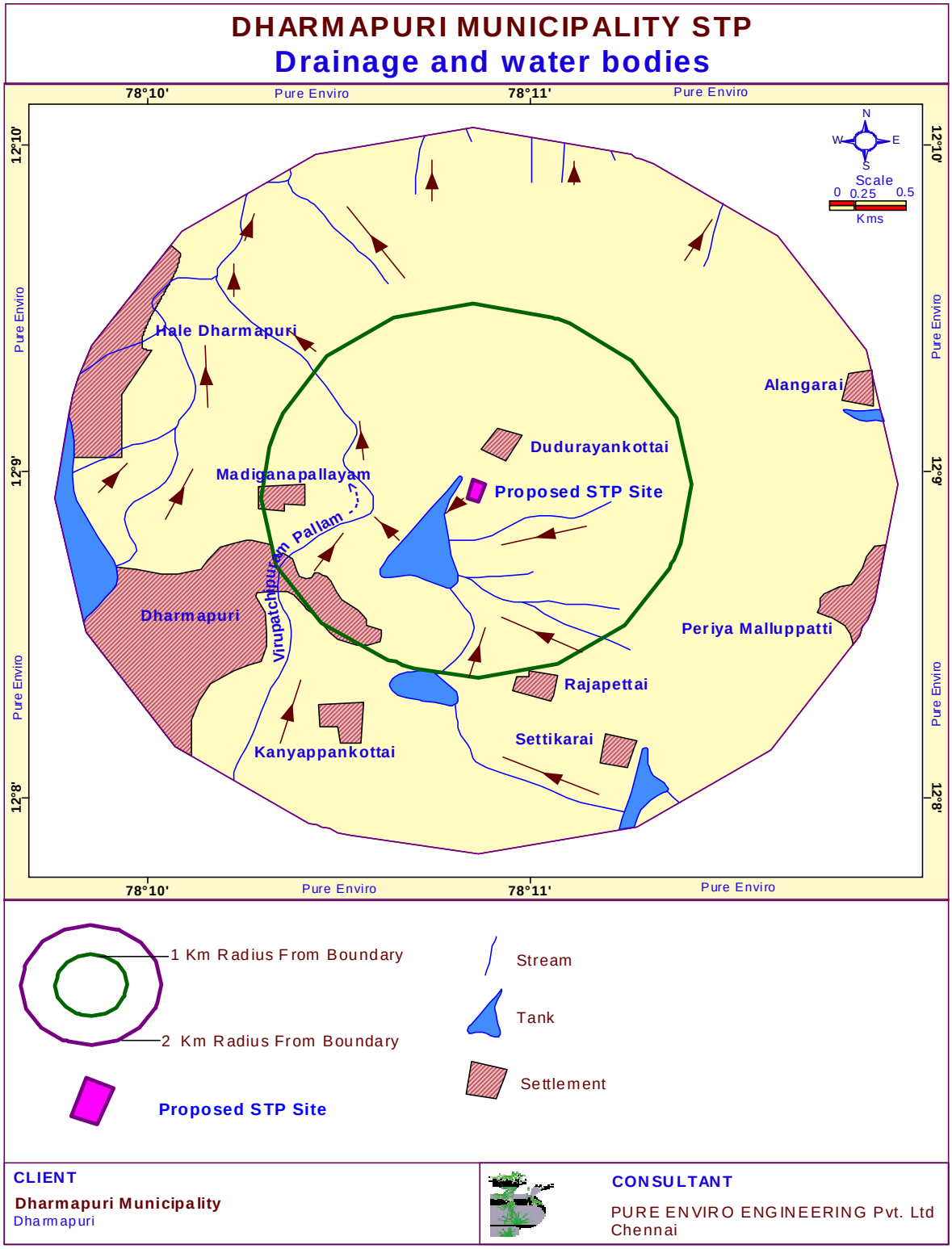


Figure 3.6 Drainage and Water Bodies

3.6.2 Ground water

The ground water in the study area occurs under water table condition. The water level in the in and around the project site is around 7-9 m below ground level and in the Northern and Southern part of the STP site the ground water level is more than 9 m.

3.6.3 Baseline Water quality

Detailed water quality assessment is necessary in areas where there is intensive ground water development, Industrialization and urbanization as it is also subjected to qualitative changes in the environment around. Quality of water is influenced considerably by the quality of its source and occurrence. In order to describe and assess the impact on water quality by the proposed project, ground water and surface water samples at 7 locations were collected with in the 2 km radius and tested for physical and chemical parameters. Apart from the above, in 5 locations the Total Dissolved Solids concentration were checked using hand held standard TDS can tester and pH tester (EUTECH Instruments).

a. Sampling and Analysis

Initially, reconnaissance survey was carried out to identify suitable water sample collection locations. During the reconnaissance survey on site TDS and pH ware tested and the locations were captured using GPS. While selecting the sampling locations for detailed hydrogeochemical analysis the following were given much importance.

- Those water bodies on which human activities could have an impact, either by utilizing water or by discharging effluents.
- Water abstraction and utilization by domestic users.

Seven water sources were selected for sampling for ground water. The location and source of water samples collected are given in Table 3.5.

Table 3.7: Water Sampling Locations

Location Code	Sampling Location	Source	Direction w.r.t plant site
W1	Project Site	Bore well	-
W2	Dururayankottai	Bore well	NNE
W3	Dharmapuri	Bore well	WWS
W4	Madiganapallayam	Well	W
W5	Rajapetti	Bore Well	SSE
W6	Reddirangan Tank	Tank	S
W7	Sanathkumar odai	Stream	SW

Samples were collected in sterilized bottles. The bottles were first rinsed with the sample water and then filled. Physical and chemical parameters were analyzed as per the standard methods. The sampling and analysis of water was carried out as described in Standard Methods of Water and Waste Water Analysis (APHA). The current status of the Sanathkumar Odai is dry but the water flow occurs only during the Monsoon period and that stream is not used by any purpose.

Detailed water quality testing was under taken in 5 of wells and the water sample has also been collected in Reddi Rangan tank and Sanath Kumar Odai. The results are presented in Table 3.8.

b. Results and Discussions

Table 3.8 Water Sampling Results

S.No	Parameters	Unit	W 1	W 2	W 3	W 4	W 5	W 6	W 7	IS- 10500 - 1991 Limit
1	pH	-	7.7	7.5	7.4	7.4	7.2	8.1	7.8	6.5 – 8.5
2	Colour (Visual)	Hazen	NIL	NIL	NIL	NIL	NIL	NIL	NIL	25
3	Conductivity		1251	1242	1230	1228	1221	490	445	NS
4	Turbidity	NTU	NIL	NIL	NIL	NIL	NIL	4	6	10
5	Total Dissolved Solids	mg / l	970	962	958	950	943	355	328	2000
6	Total Alkalinity as $CaCO_3$	mg / l	247	244	242	241	239	110	45	600
7	Chlorides as Cl^-	mg / l	178	175	170	168	164	38	26	1000
8	Nitrates as NO^{3-}	mg / l	2.00	1.00	1.00	1.00	1.00	4.5	3	100
9	Sulphate as SO_4^{2-}	mg / l	134	132	130	126	124	35	4	400
10	Fluoride as F^-	mg / l	BDL	BDL	BDL	BDL	BDL	0.01	0.02	1.5
11	Iron as Fe^{2+}	mg / l	0.2	0.18	0.16	0.16	0.16	0.28	0.16	1.0
12	Total Hardness as $CaCO_3$	mg / l	318	315	313	310	306	55	48	600
13	Calcium as Ca^{2+}	mg / l	21.0	20.8	20.5	20.2	20.1	26	20	200
14	Magnesium as Mg^{2+}	mg / l	17.0	16.6	16.3	16.1	16.0	15	13	100
15	Zinc as Zn^{2+}	mg / l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	15
16	Hexavalent Chromium as Cr^{6+}	mg / l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
17	Nickel as Ni^{2+}	mg / l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NS
18	Copper as Cu^{2+}	mg / l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.5

Discussion:

- In general the ground water quality of the study area is good and most of the parameters are with in the permissible limits of IS 10050 requirements.
- The maximum and minimum values of TDS recorded during the study period are 970 and 328 mg/L respectively.
- The ground water quality during the rainy season may be good in the slightly higher TDS concentration areas due to recharge of the aquifers.
- The rapid assessment of ground water quality of the project site indicates that this area is free from ground water quality threat.
- The water quality of sanath kumar odai is well within the prescribed standard but its being used only for Agricultural purpose because of non availability of water.

3.7 LAND ENVIRONMENT

3.7.1 Physiography

Physiographically, the study area can be classified into plain land. The notable stream of the study area is Virupatchipuram Pallam stream flows from South to North confluences with Semmandankuppam Ar.

The physiography of the study area is presented in Figure – 3.7.

3.7.2 Topography

The general elevation of the study area ranges from 441 m to 464 m above MSL. The elevation contour indicates the area is sloping towards Northwest. The high relief is notices in Southwestern side of the study area. The project site is located relatively elevated area (450m).

3.7.3 Geology

The STP Site is located in the Epicote Hornblende gneiss (Hard rock). The other rock type includes Nephiline Syenite and Chearnockite. The Epidote Hornblende gneiss occupies major par of the study area of 2 km radius from the STP site.

The Geology of the study area is presented in Figure 3.8.

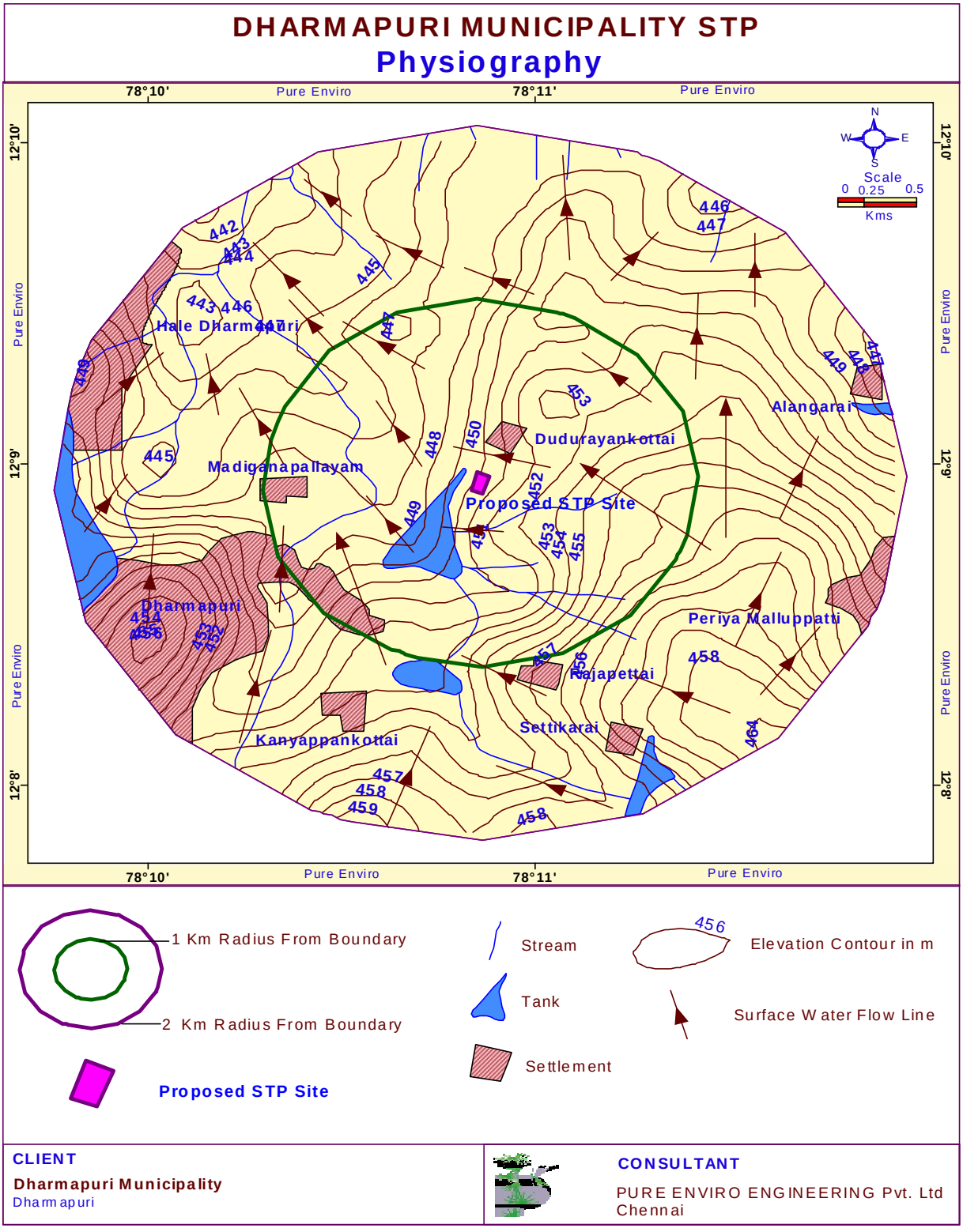


Figure 3.7 Physiography of the study area

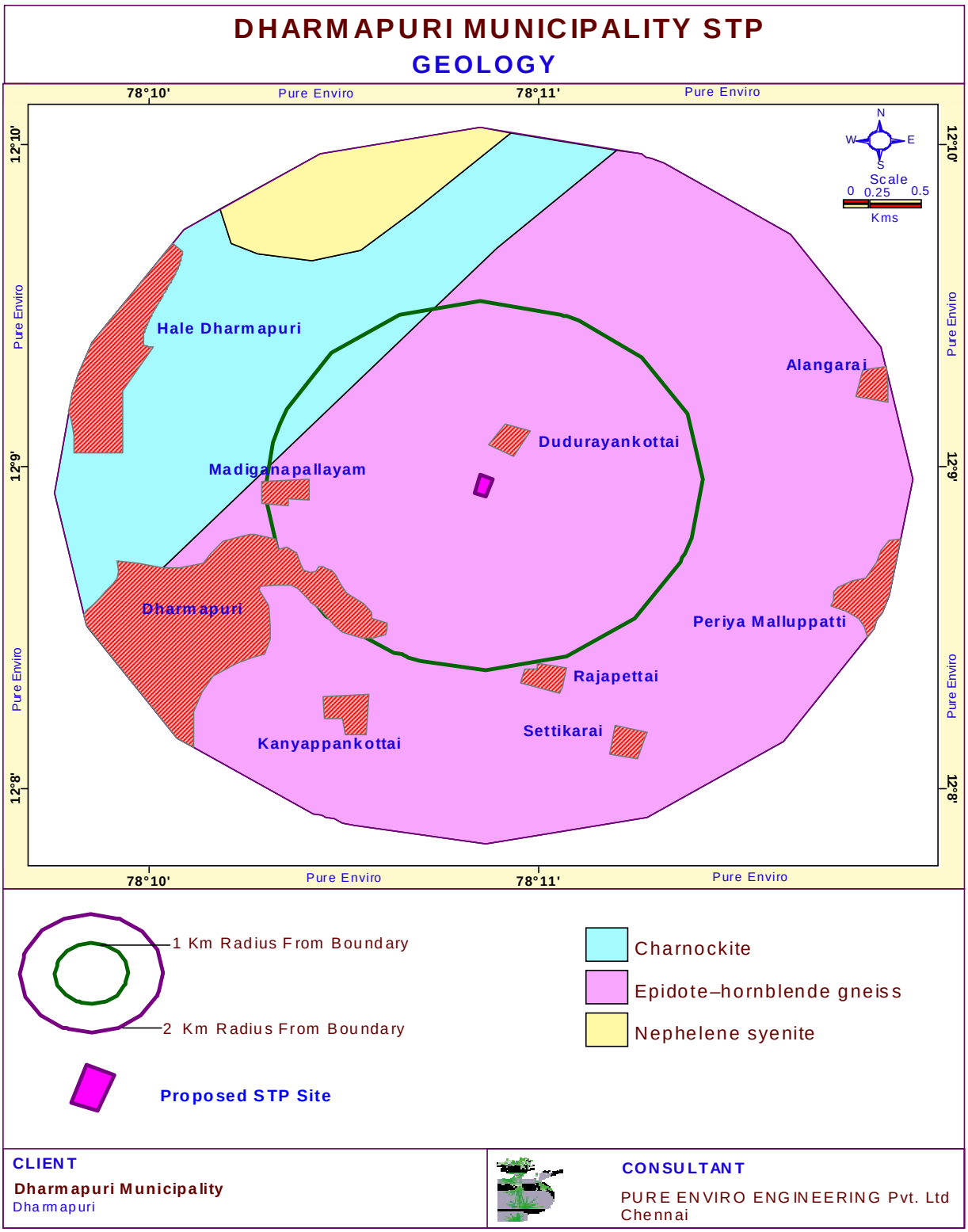


Figure 3.8 Geological formation of the study area

3.7.4 Land use

Land use information of an area in the form of map and statistical data are very vital for spatial analysis, planning, management and utilization of land for agriculture, forestry, urban and industrial planning. The level of spatial classification is classed under 4 categories. They are Level 1 with 1:1 million scale, Level 2 with 1:250,000 scale, Level 3 with 1:50,000 scale and level with 1:25,000 or larger scale. The cost and availability of data and purpose for which the land use classification is to be taken up is important for taking up the level of classification. In the present study Level 3 classification is made which is fairly a good classification of urban and industrial planning. However level 4 classifications is the ultimate for all kind of planning and management. Owing to the exorbitant cost and time of obtaining the Satellite Data from the concerned agencies, the present land use classification has been restricted to level 3.

For the preparation of land use map IRS P6 LISS-III Satellite data has been procured from NRSA, Hyderabad. At most care has been taken to select the cloud free satellite data. The recent data dated 19-June-2009 digital has been taken for the preparation of land use mapping. Visual interpretation technique has been adopted for land use classification based on the interpretation keys suggested in the guidelines of NNRMS, Bangalore.

The land use of the study area reflects the socio-economic conditions of the people in addition to the natural environmental factors. The factors controlling the land use pattern of the area are landforms, slope, shape of the land, soil, natural resources and natural and man made hazards. In the hills of the study area there is no dense vegetation. Vegetation consists of thorny bushes and shrubs. The uncultivable area includes barren and non-cultivable waste.

The Crop land occupies 59 percentage of the study area. The fallow land occupies in the eastern side of the STP Site, which occupies about 28 % of the Study area; Figure 3.9 describes the land use surrounding the STP Site.

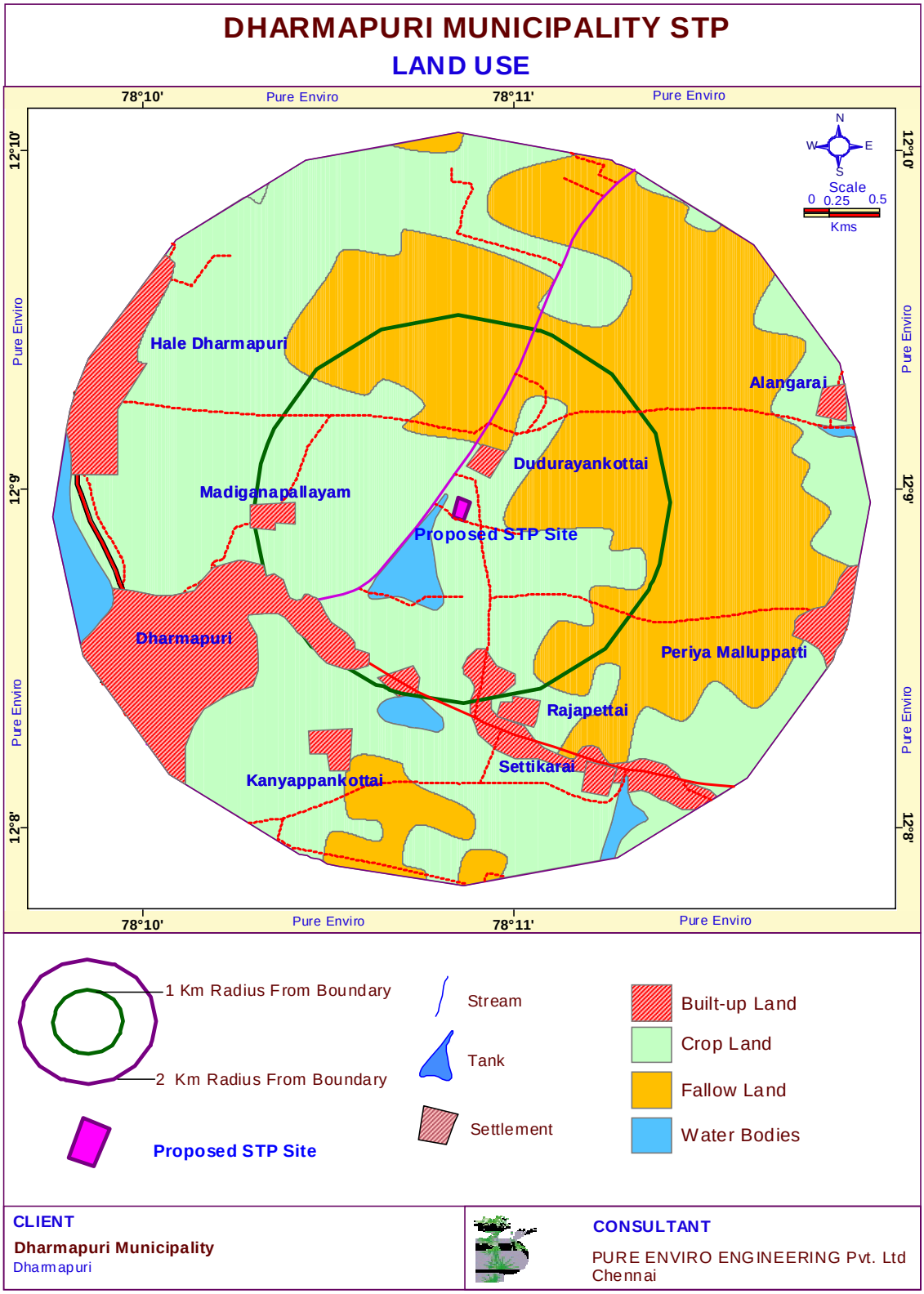


Figure 3.9 Land Use of the study

3.8 SOIL

a) Soil Type

Soil type and its fertility of an area are essential to plan for cropping. Soils are primarily derived from parent rocks. The colour, texture and mineral content are normally used to classify the soils. The soils in the study area are classified into 3 types. They are as follows. The soil map of the study area is prepared based on the *National Bureau of Soil Survey and Land use Planning, Nagpur* is presented in Figure 3.10.

S. No	Soil Classification
1	Deep, moderately well drained, calcareous clayey soils
2	Moderately deep, moderately well drained, calcareous, cracking soils
3	Shallow, well drained, calcareous, clayey soils

Moderately deep, moderately well drained, calcareous, cracking soils occupy 48 % of the study area. The STP Site lies in the same soil.

b) Soil quality

To assess the soil quality in the study area, soil sample was collected and analyzed for physical and chemical parameters as per the standard methods. The sampling locations are given in Table 3.7.

Table 3.9 Soil Sampling Locations

Stn. Code	Station Name	Distance From Site (Kms.) Approx.	Direction w.r.t site (Approx.)	Selection criteria
S-1	Project Site	-	-	Residential Area
S-2	Dururayankottai	0.8	NNE	Residential Area
S-3	Dharmapuri	1.0	WWS	Residential Area
S-4	Madiganapallayam	0.95	W	Residential Area
S-5	Rajapetti	1.15	SSE	Residential Area

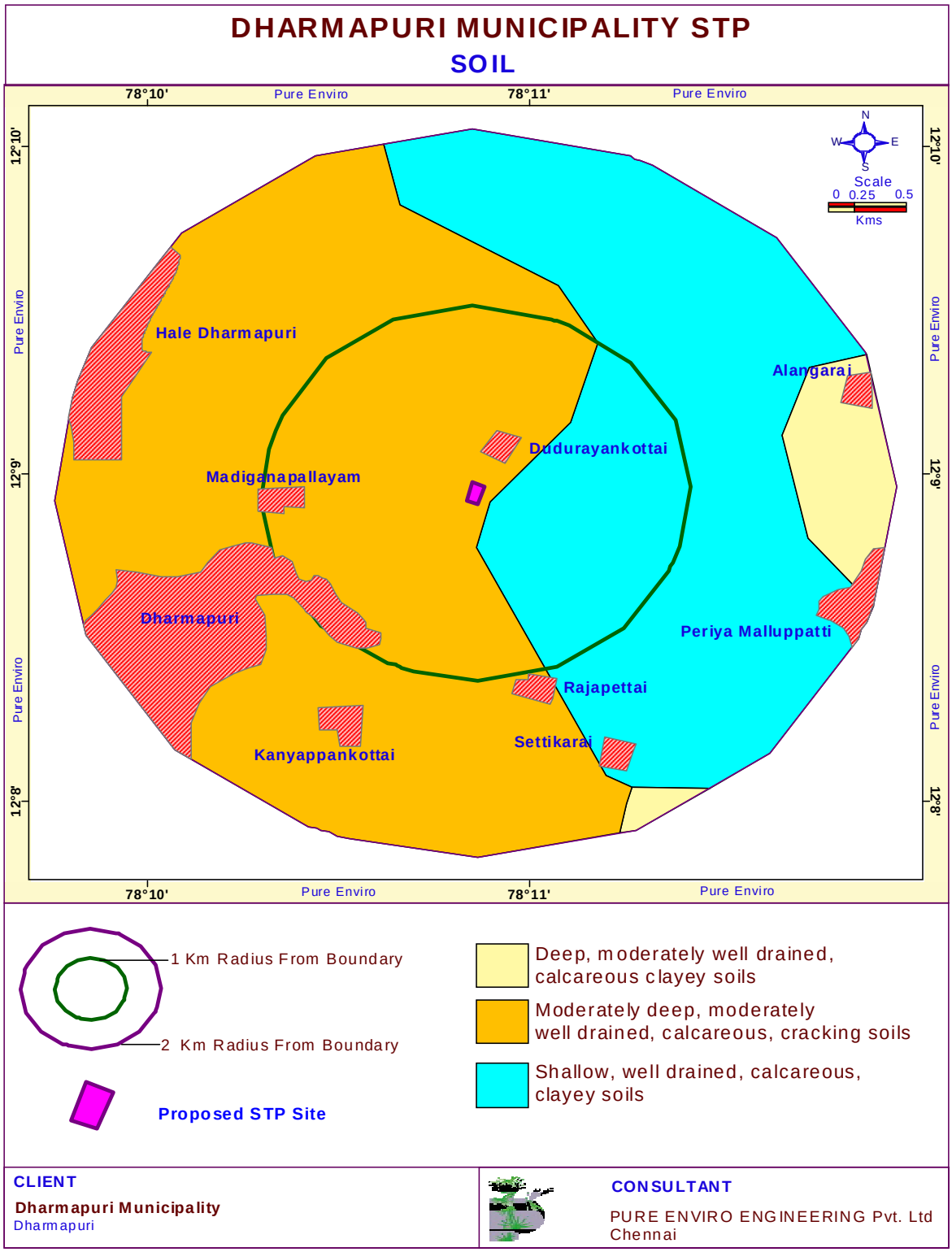


Figure 3.10 Soil

Table 3.10 Soil Analysis Results

S.No	Parameter	S1	S2	S3	S4	S5
1	pH @ 25° C(1:10 ratio)	7.1	7.2	7.3	7.5	7.6
2	Electrical Conductivity @25° C (µmhos/cm)	1320	1328	1334	1360	1382
3	Moisture Content (%)	22.2	22.9	23.2	21.6	21.0
4	Calcium carbonate (%)	24.1	24.8	25.5	25.7	26.1
5	Organic Carbon (%)	0.24	0.23	0.22	0.21	0.20
6	Chloride as Cl (mg/kg)	1100	1151	1208	1521	1450
7	Sulphate as SO_4 (mg/kg)	689	725	741	858	831
8	Sodium absorption ratio (m.eq)	4.12	5.15	6.0	5.8	6.10
9	Phosphorus as P (mg/kg)	9.2	10.5	10.9	14.3	13.0
10	Potassium as K (mg/kg)	110	124	138	160	142
11	Sodium as Na (mg/kg)	136	150	200	298	243
12	Iron as Fe (mg/kg)	0.5	0.3	0.2	0.2	0.1
13	Aluminium as Al (DL:0.1 mg/kg)	BDL	BDL	BDL	BDL	BDL
14	Manganese as Mn (mg/kg)	110	108	120	142	140
15	Cadmium as Cd (mg/kg)	0.9	0.86	0.87	0.80	0.81
16	Cobalt as Co (mg/kg)	7.2	7.0	6.8	6.6	6.0
17	Copper as Cu (mg/kg)	8.8	7.2	7.3	8.2	7.8
18	Chromium as Cr (mg/kg)	7.9	7.6	7.8	8.0	7.8
19	Lead as Pb (mg/kg)	16.3	16.0	15.4	15.0	13.3
20	Nickel as Ni (mg/kg)	15.2	14.8	14.6	14.9	13.1
21	Zinc as Zn (mg/kg)	9.4	9.6	9.3	8.8	7.6
22	Arsenic as As (DL:0.1 mg/kg)	BDL	BDL	BDL	BDL	BDL
23	Mercury as Hg DL:0.1 mg/kg)	BDL	BDL	BDL	BDL	BDL
24	Total Kjheldal Nitrogen as N (mg/kg)	225	229	235	240	228

BDL: Below Detectable Limit.

3.9 BIOLOGICAL ENVIRONMENT

The existing Flora and Fauna in the study area is mentioned below. As per Botanical Survey of India records and available published literature pertaining to the study area and current detailed study of project site, no threatened, endangered and rare plant species were observed from the study area. No reserve forest, protected forest, turtle breeding ground, elephant and /or tiger reserve is within 2 Km radius of the project site.

Flora

Some of the common plant species found in the study area are *Hibiscus rosasinensis, Zizyphus mauritiana, Delonix regia, Cassia marginata, Tamarindus indica, Cassia auriculata, Terminalia catappa, Eucalyptus sp., Acacia auriculiformis* etc.

Fauna

Calotes versicolor, Chamaeleon zeylanicus, Felis chaus, Funambulus palmarum, Macaca radiate, Naja naja, Vipera russelli, Hemidactylus maculates are some of the existing fauna in the study area.

3.10 SOCIO-ECONOMIC ENVIRONMENT

Review of secondary data (District Census Statistical Handbooks - 2001) with respect to population, occupation structure and infrastructure facilities available for 10 km radius study area. As per 2001 census the study area had a total population of Dharmapuri district is 1295182, male population is 670520 and the female population is 624662.

4. ENVIRONMENTAL IMPACT ANALYSIS

The following impact analyses were done for this project.

a. Impact on Construction Phase

b. Impact on Operation Phase

4.1 IMPACT ON CONSTRUCTION PHASE

The construction phase impacts are expected to be minimal. During construction, following activities among others are considered to be important towards development of impact.

a. Site preparation

b. Excavation and back filling

c. Mixing of concrete and mortar

d. Concrete construction

e. Road construction

f. Clean up operations

S.No	Impact	Mitigation
1	**Air Environment** a. Particulate matter emissions from excavation, construction material handling, transportation of materials. b. Vehicle emissions of SO_2 and NOx from construction machinery and from DG Sets.	High level curtains will be provided all around the site to control dust spreading beyond the site. Sprinkling of water at regular intervals to control dust on the paved areas will be practiced.
2	**Water Environment** Water consumption for construction activities.	Water for construction purpose will be purchased from private water suppliers.
3	**Noise Environment** Vehicular noise, DG sets and Constructional activities.	Ear muffs and plugs will be given to operators near noise generating sources. Noise attenuation with sound proof insulation for noise generating sources.
4	**Land Environment** Construction activities such as clearing, cutting, filling and levelling. Minimum Expected quantity of Soil Excavation. Glass, wood, waste cutting rod and others.	The excavated soil will be refilled & the remaining will be used as filling material for laying roads and pavements. Glass, wood, waste cutting rods will be sold to TNPCB authorized recyclers.

4.1.1 Transportation

Construction does not involve any heavy construction equipment. Transportation of raw material through trucks will not affect traffic in the main roads.

4.1.2 Biological Conditions

The site selected is devoid of trees. The only vegetation covered on land is grass, which will be disturbed and some part will be lost in construction activity. Some trees / shrubs will be planted for green cover.

4.1.3 Community Structure

Community structure will be benefited by generation of employment during the construction period.

4.2 IMPACT ON OPERATIONAL PHASE

The major impact of any STP operation is the discharge of treated sewage. However the sewage satisfying quality as per TNPCB after treatment will be fit for letting off into the Sanath Kumar Odai. The sludge will be removed from the sludge thickener and will be used as manure. Thus, the provision of Sewerage System will improve the overall environment of the town and improve the public health of the community.

In the operational phase, the important activities contributing to environmental impacts, either adverse or beneficial are as follows:

a. Consumption of water

b. Consumption of power

c. Waste discharge and control

d. Odour control measures

e. Employment personnel

4.2.1 Air Environment

There will be no air emissions generated from the Sewage Treatment Plant.

4.2.2 Water Environment

In the operational phase, since the sewage generated from the Dharmapuri Municipality will be treated in the proposed STP, it will only improve the water environment.

4.2.3 Downstream

The treated sewage is discharged into Sanath Kumar Odai, which is 1.2 Km away from the STP site and there is no take off points as source of drinking water.

The two benefits that would arise from the discharge of treated STP water are:

1) Increasing the ground water level due to the discharge of treated sewage to the Sanath Kumar Odai.
2) The flow in the Sanath Kumar Odai would be increased due to the discharge of treated STP water that would intensify the down-stream agricultural activity. The current status of the Sanath Kumar Odai is dry but the water flow occurs only during the Monsoon period.

4.2.4 Noise Impact

There will not be any installation of heavy noise generating machinery in the STP area. Thus, the noise level will be within the permissible limit for residential areas prescribed by TNPCB and no impact will be envisaged.

4.2.5 Landuse

The land selected for STP is a crop land and presently land is not used for agriculture or any other use. Hence, it is ideal for setting up the underground sewerage system.

4.2.6 Flora & Fauna

The floral studies in and around the study area were conducted to know the frequency of plants and the presence of any endemic, endangered plants around the site. To know about the vegetation types, study was carried out covering 10 Kms radius around the project site. No endangered species of flora were found in the study area.

No endangered species of fauna, no reserve forest, protected forest, turtle breeding ground, elephant and /or tiger reserve is within 2 km radius of the project site.

4.2.7 Safety

Systematic safety management practices will be carried out to provide safe working conditions. Personal protective equipments will be supplied to the workers at work place.

4.2.8 Occupational Health

Proper care will be taken in regard to occupational safety and health of the workers involved in the O&M of STP. Every action will be taken to protect the workers from sewage related diseases (typhoid, paratyphoid, cholera, dysenteries, Infectious hepatitis).

5. ENVIRONMENTAL MANAGEMENT PLAN

5.1 OBJECTIVES

The Environmental Management Plan (EMP) addresses the requirements for successfully mitigating the likely adverse impacts and identifies the post project monitoring requirements needed for the successful implementation of the suggested mitigation measures. The institutional arrangements needed for implementing the mitigation measures and conducting post project monitoring have been identified in the form of a monitoring plan. Mitigation measures are being suggested for those project activities, which have been found to have major or moderate environmental impacts. The recommended mitigation measures will be implemented in close co-ordination with TWAD Board.

5.2 EMP FOR CONSTRUCTION PHASE IMPACTS

5.2.1 Managing Impact on Vegetation

There will not be any Ecological Impact such as Tree cutting due to establishment of STP / Laying of a pipeline for the disposal of Treated Sewage from STP outlet to Sanath Kumar Odai (1.2 km).

5.2.2 Precautionary Measures

There is no activity of tree cutting for the proposed STP. Hence, no need to implement the precautionary measures to mitigate the impacts due to clearing of vegetation during the construction phase.

5.2.3 Compensatory Measures

There will not be any Tree cutting due to construction activity of STP / Laying of pipeline for the disposal of Treated Sewage from STP outlet to Sanath Kumar Odai (1.2 km). Hence, there is no need to get permission for felling trees from the competent authority. However a greenbelt of width 15 m is proposed in the all directions as an enhancement / mitigation measure.

5.2.4 MANAGEMENT OF NOISE IMPACTS

Sources of noise pollution during the construction of the facility is from the plant and machinery comprising of mainly bull dozers, Front end loaders, standby generators, and other heavy earth machinery used in construction in addition to the vehicular movement within the project boundary.

The potential impacts on the Noise environment envisaged from the proposed facility are outlined below:

Potential Noise Sources
◆ Site Preparation ◆ Heavy Earth moving equipment at site ◆ Soil compaction by vehicles ◆ Construction Activity ◆ Vehicle Movement

Following precautionary measures are recommended for the management of noise impacts

- To minimize the impact, construction operations in residential and sensitive areas will be restricted to between 7.30 a.m and 6.00 p.m.
- Prior information will be provided if the blasting is significant.
- Operators of heavy machinery and workers in near vicinity will be provided with ear plugs and other protective measures for safety.

5.2.4.1 Managing Impacts due to movement of Construction Machinery

- Precautionary measure will be adopted in order to avoid adverse impacts due to traffic congestion
- The most suitable route for delivery and haul equipment with due consideration for load limits, traffic pattern and the character of the area traversed should be selected
- Traffic controls and diversions, marked with signs, lights and other measures (flags) will be provided. This is necessary to minimize confusion and ensure public safety. Police and fire departments should be informed before any route is closed. Also routes should not be closed until an alternative road is identified
- Prospective contractor should follow the prescribed safe, legal laid limits of all bridges and surface roads that may be traversed by the heavy equipment to be used at the project site.

Table 5.1 Noise level During Construction Phase

S.No	Source	L_{day}, dB (A)	L_{night} dB (A)
Constructional phase			
1	Site Preparation	54	45
2	Heavy Earth moving equipment at site	60	50
3	Soil compaction by vehicles	55	49
4	Construction Activity	58	48
5	Vehicle Movement	56	47

5.2.5 MANAGING IMPACT OF AIR POLLUTION

Construction activities and the consequent transportation activities add to the air pollution in the region. Impact of the air pollution will be moderate and short term at sewage pumping stations, STPs and while laying sewer lines.

5.2.5.1 Precautionary Measures

- It is recommended that the construction equipment, machinery and diesel engines be maintained in good condition so as to reduce emissions
- Dust should be controlled by sweeping and sprinkling with water. Mud will be washed from all construction equipment and vehicles prior to hauling on roads
- Trucks carrying dust and sand to and fro to the construction site will be covered or wetted in accordance with the construction specification prescribed to minimize release of dust.

5.2.6 FACILITY FOR WORKERS

Within the plant site about 5-10 families will be camping during construction phase. The base emanating such as toilet, drinking water, electricity, health and safety gadgets will be provided.

1. Clean drinking water will be provided to all workers.
2. Adequate number of decentralized latrines and Urinals will be provided to construction workers.
3. Guarding all parts of dangerous machinery.
4. Precautions for working on machinery.
5. Ensuring that walking surfaces or boards at height are of sound construction and are provided with safety rails or belts.

6. Protective equipment will be provided, helmets etc.
7. Fire extinguishers and buckets of sand to be provided in the fire-prone area and elsewhere to prevent the fires.
8. Sufficient and suitable light will be provided during nighttime.

The Safety practices for both construction and operation phases, Emergency Preparedness Plan, Fire extinguishers at the site during Operation Phase and Occupational Health and Safety of Workers are mentioned in the following sections.

5.2.7 INSTALLATION OF PUMPING STATION

The land to be alienated for locating the pump house is open land without squatters or structures, or trees or crops. There are no project affected persons (PAPs). The possible environmental issues are (a) Noise (b) Smell.

The pump house is located sufficiently away from the dwelling areas. Adequate care would be taken to ensure that the noise levels of the pumps and motors are within permissible limits. Trees will be planted around the pump houses to reduce the noise. Spillage of sewage in the pump house will be avoided to ensure that there is no bad smell emanating from the area. UGSS are responsible for Main Pumping Station.

5.2.7.1 Laying of Pumping Main

Pumping main will be laid along the beam of the road. The possible environmental issue is leakage from the pipeline leading to smell and soil/water contamination. During installation pipeline would be tested to ensure that there would be no leakage. The pumping main will be inspected at regular intervals and any leakages noticed will be attended at the earliest notice. The pumping main will be maintained by TWAD Board.

5.3 EMP FOR OPERATIONAL PHASE IMPACTS

The recommended measures needed to minimize and mitigate the construction and operational phase impacts are discussed. The approach adopted has been to recommend mitigation measures of two types (i) Precautionary measures and (ii) compensatory measures, where applicable. In most of the cases, however, the recommended mitigation measures are precautionary in nature.

5.3.1 Impacts on Noise Environment

Sources of noise pollution during the operation of the facility are from the Vehicular movement and proposed STP operations like blowers, pumps and motors. CPCB Standard Limit for day and night is 45 to 55 dB (A). During construction and operation phase, Noise level in the STP site may be slightly high shown in Table 6.2.

The potential impacts on the Noise environment envisaged from the proposed facility are outlined below:

Phase	Potential Noise Sources
Operational	◆ Vehicle movement ◆ Proposed STP operations ◆ DG Set

5.3.1.1 Noise impacts and required mitigative measures

In operational stage, one DG set of capacity 50 KVA will be installed with inbuilt acoustic enclosure as per the CPCB guidelines.

Table 5.2 Noise level in the STP site during Operation Phase

S.No	Source	L_{day}, dB (A)	L_{night} dB (A)
Operational Phase			
6	Vehicle movement	53	40
7	Blowers	54	43
8	Pumps and Motors	59	45
9	DG Set	75	70

5.3.1.2 Technical Specification for Acoustic Enclosure

The acoustic enclosure will be of free standing, floor mounting type integral with the DG set. The enclosure will be provided with rugged heavy-duty structural steel base frame with chequered plate flooring on which the DG set is to be mounted. The enclosure will be prefabricated factory – built and modular in construction, so that it can be easily assembled at site around the DG set. The enclosure will consist of acoustically treated panels housed in rugged steel frames, which

will be bolted together to form the body of the enclosure. Sliding doors will be provided, on either side, which will also be acoustically treated, thereby providing easy access to the DG set while minimizing the operating space requirements. The construction of the acoustic enclosure will be such that with both the acoustic doors open on the either side, full access is available to the engine and attenuator. For fresh air inlet into the system a parallel baffle air inlet silencer will be provided. Additionally, to augment the fresh air inlet requirements, a forced air ventilation duct with associated silencer will be provided above the alternator. For hot air discharge, an acoustic discharge plenum will be provided in front of the engine radiator, for discharge of hot air into the surroundings through a parallel baffle air outlet silencer. The enclosure will have suitable openings in the roof module for exhaust piping. Acoustic enclosure Designed to meet stringent MoEF/ CPCB norms of 75 dBA at 1mtr at 75% load under free field conditions.

Design Features of Acoustic Enclosure:

Accessories:

- Silencer suitably optimized to meet stringent sound emission standards laid down by MoEF / CPCB
- Base rail with integral fuel tank (285 liters capacity) is provided with drain plug, air vent, inlet and outlet connection, level indicator, manhole etc.
- 2 x 12 V dry, uncharged batteries with connecting leads and terminals

Acoustic enclosure:

- Specially designed to meet stringent MoEF/ CPCB norms of 75 dBA @ 1mtr at 75% load under free field conditions
- Designed to have optimum serviceability
- Air inlet louvers specially designed to operate at rated load even at 50^0C air inlet temp.
- Made on special purpose CNC machines for consistency in quality and workmanship
- Powder coated for long lasting service life and superior finish
- With UV resistant powder coating, can withstand extreme environments
- Use of stainless steel hardware
- Insulation material meets exacting IS 8183 specs for better attenuation

5.3.2 MANAGING IMPACT OF AIR POLLUTION

Construction activities and the consequent transportation activities add to the air pollution in the region. Impact of the air pollution will be moderate and short term at sewage pumping stations, STPs and while laying sewer lines.

5.3.2.1 Precautionary Measures

- It is recommended that the construction equipment, machinery and diesel engines be maintained in good condition so as to reduce emissions
- Dust should be controlled by sweeping and sprinkling with water. Mud will be washed from all construction equipment and vehicles prior to hauling on roads
- Trucks carrying dust and sand to and fro to the construction site will be covered or wetted in accordance with the construction specification prescribed to minimize release of dust.

5.4 SAFETY PRACTICES

During the Plant Construction

1. All personnel in the construction area to wear safety gears such as shoes, helmets, hand gloves.
2. All personnel working at height to wear Safety belt clinged on to nearby permanent support system
3. Approved scaffold materials will be used during construction
4. All Construction will be carried out after necessary approvals from the respective Municipal authority. Deviations shall be recorded and notified to concern parties for approval before construction.
5. The person who works in the welding areas of the pipeline will be provided with goggles, welding shield, and gloves etc, as protective measures.
6. Electrical workers who undertake works in electrical cabeling, transformer erection, high tension poles erection areas will be provided with electrical hand gloves, gum boots etc as preventive safety measures.
7. During erection of underground pipelines and tank surface connecting areas, proper work Permit will be given and approved by Project Manager and then the work will be

executed.

During the Plant Operation:

1. All O&M personnel will be provided with Personal Protective Equipments (PPE) for protection from hazardous or harmful substances. PPE includes gloves, face shields, goggles, helmets and other protective shields and barriers.
2. Standard operating procedures will be provided for the workers involved in the O&M of STP and the same procedure will be followed for routine and preventive maintenance.
3. All storage tanks will be covered with RCC cover slab with Access man holes and steps for maintenance access. Necessary ventilation facilities are provided for non-accumulation of obnoxious gases. Also aeration is provided in the storage tanks.
4. All process tanks are provided with walkway slab all around with handrails.
5. A safety officer nominated by the contractor in approval of the municipal authority will give regular safety training to work force in a monthly or quarterly basis in a year.
6. All the employees who work in STP site will be given safety training and they will be allowed to operate STP.
7. A good practice of safety is maintained by way of a safety week once in six months and awareness programmes will be conducted once in six months.

5.4.1 EMERGENCY PREPAREDNESS PLAN:

Preventive measures

1. Employees will be trained on how to report an emergency. This may includes the activation of pull alarms or notifying the facility security center. Consideration must be given to methods of notifying local agencies such as the fire department. The Employees will be reporting to the Project Manager of the site in case of emergency.

2. All emergency phone numbers should be identified, listed in the emergency preparedness plan, and posted. Emergency phone numbers should include any facility numbers, local agencies, and any emergency-facility personnel. Consideration should also be given to recovery of operations.

3. Operators must know their specific procedures when an emergency arises by giving training at regular intervals. Safe shutdown procedures for equipment should be established to prevent equipment damage and additional hazards. Evacuating employees to a safe location is a top priority.

4. The emergency preparedness plan should be a working document used for training and practice. The plan must be updated to reflect any changes in the workplace. It should be done by plant in charger or O & M engineer.

5. Employees must understand the hazards of flammable and combustible materials and proper handling procedures.

6. Only approved piping, containers, tanks, and rooms designed, safeguarded, and constructed specifically for the storage and handling of flammable and combustible liquids, including waste solvents, should be allowed for use.

7. All use and storage locations of flammable and combustible materials and wherever danger could be caused by ignition must be identified and posted with appropriate "NO SMOKING" signage. Management must ensure that all personnel adhere to the posted safety warnings.

8. Safety shoes or boots with non-slip soles will be provided to the workers at site.

9. Personal protective equipment and chemical resistant clothing to avoid exposure of skin or eyes to corrosive and/or polluted solids, liquids, gases or vapors.

10. No employees will be allowed to mix chemicals without the supervision of a qualified chemist or project manager.

11. Safety instructions regarding the storage, transport, handling or pouring of chemicals will be strictly followed.

12. Electrical equipment for safety before use will be checked; verified that all electric cables are properly insulated.

13. Extreme care will be taken when handling highly corrosive agents such as liquid or gaseous chlorine, concentrated acids or alkalis, or when toxic gases may be emitted from the reagents, etc.

14. The workers will not be allowed to smoke, eat or drink in areas where chemical or biological contamination may be expected.

15. All workers will undergo periodic examinations by occupational physician to reveal early symptoms of possible chronic effects or allergies.

5.4.2 COMPONENT BASED SAFETY MEASURES FOR O & M STAFFS:

5.4.2.1 Safety Measures for the Persons working in the Inlet Screening/ Grit Area.

1. Operation staff must wear high-vis jackets at all times when working in the area.
2. All PPE (gloves, ear protectors, safety boots, waterproof overalls, etc.) must be worn.
3. Wearing of hard-hat is recommended.
4. Spillages must be cleaned up immediately.
5. The area should be kept clean and clutter free.
6. Be aware of who is in the area/buildings - challenge and enforce the safety rules.
7. Note location of fire fighting equipment and alarm points.
8. Note the location of First Aid boxes and other help information.
9. Hands and exposed skin areas should be washed with the anti-bacterial soaps.
10. No smoking - follow welfare procedures.
11. Report poor housekeeping to the Plant Supervisor.
12. Drive work vehicles slowly and safely. Be aware of pedestrians and other vehicles.
13. Training – Safe Pass, Chemical Awareness, First-Aid, Fire

PPE Required:

High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses (standard)

Operating the screens

For the operation and servicing of the inlet screen units

Hazards Identified:

1. Noise
2. Mechanical hazards
3. Biological contamination
4. Electrical shock risk (maintenance)
5. Hot surfaces on motors
6. Sharp objects in screenings

Persons at Risk:

Staff, Fitter, Contractors

Control Measures:

1. Before commencing start-up procedures check that maintenance is not being performed.
2. Wear gloves and face protection
3. Replace all safety covers/inspection hatches.
4. Inexperienced operatives must be supervised.
5. Do not attempt work you are not trained for. E.g. electrical work is to be performed by the Electrician.
6. Tie back loose clothing and long hair.
7. Fix ladders securely. Never work from a ladder.
8. Be aware of who is in the building - challenge and enforce the safety rules.
9. Note location of fire fighting equipment.
10. No smoking - follow welfare procedures.
11. Report all faults, unusual occurrences immediately to Plant Supervisor.
12. Training – Safe Pass, Chemical Awareness, Fire.

PPE Required:

High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors and safety glasses.

Other Hazards Considered Low Risk

1. Electrical shock risk during normal operation of equipment
2. Poor housekeeping
3. Inexperienced operators
4. Contractor awareness

5.4.2.2 Work in the Generator Room:

For the operation and maintenance of the stand-by generator

PPE Required:

High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, and safety glasses.

Other Hazards Considered Low Risk:

1. Electrical shock risk during normal operation of equipment
2. Toxic gas generation e.g. carbon monoxide from engines
3. Mechanical hazard (except during maintenance)
4. Burns from hot engine
5. Acid spill from batteries
6. Working from height over engine
7. Fire risk – mechanical

5.4.2.3 Work in the MCC area:

For persons involved in the operation and maintenance of the MCC control panels

Hazards Identified:

1. Noise
2. Trip & Falls
3. Openings in ground level ducts
4. Low height objects
5. Fire risk – electrical

Persons at Risk:

Staff, Fitter, Contractors

Control Measures:

1. Before commencing start-up procedures check that maintenance is not being performed.
2. Replace all safety covers/inspection hatches.

3. Inexperienced operatives must be supervised.
4. Do not attempt work you are not trained for. E.g. electrical work is to be performed by the Electrician.
5. Tie back loose clothing and long hair.
6. Fix ladders securely. Never work from a ladder.
7. Be aware of who is in the building - challenge and enforce the safety rules.
8. Note location of fire fighting equipment.
9. No smoking - follow welfare procedures.
10. Report all faults, unusual occurrences immediately to Plant Supervisor.
11. Training - Safe Pass, Chemical Awareness, Fire.

PPE Required:

High-vis jacket or vest, hard hat, safety boots, gloves, dust mask, ear protectors, safety glasses.

Other Hazards Considered Low Risk:

1. Electrical shock risk during normal operation of equipment
2. Security and vandalism
3. Poor housekeeping
4. Inexperienced operators
5. Annually 2 of 2
6. Contractor awareness

5.4.2.4 Working in the Primary Tank

For persons entering and working in the Collection tank Area

Hazards Identified:

1. Drowning Risk
2. Fall from Height
3. Biological contamination
4. Trips and Falls

Persons at Risk:

Staff, Fitter, Contractors, Visitors.

Control Measures:

1. Before commencing start-up procedures check that maintenance is not being performed.
2. Wear correct PPE.

3. Note location of life buoys.
4. Fix ladders securely. Never work from a ladder.
5. Use harness or other safety measures if entering a tank.
6. Do not walk on scraper bridge unless necessary.
7. Training – SafePass

PPE Required

High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors and safety glasses.

5.4.2.5 Work in the Air Blower Building:

For the operation and servicing of the air blower units

Hazards Identified:

1. Noise
2. Mechanical hazards
3. Hot surfaces on motors
4. Electrical shock risk (maintenance)
5. Housekeeping
6. Oil spillages
7. Slips & trips

Persons at Risk

Staff, Fitter, Contractors

Control Measures

1. Before commencing start-up procedures check that maintenance is not being performed.
2. The wearing of ear protection is mandatory when working in the air blower building.
3. Replace all safety covers/inspection hatches.
4. Inexperienced operatives must be supervised.
5. Do not attempt work you are not trained for. E.g. electrical work is to be performed by the Electrician.
6. Tie back loose clothing and long hair.
7. Be aware of who is in the building - challenge and enforce the safety rules.
8. Note location of fire fighting equipment.
9. No smoking - follow welfare procedures.

10. Report all faults, unusual occurrences immediately to Plant Supervisor.
11. Fix ladders securely. Never work from a ladder.
12. Noise monitoring to be conducted annually.
13. Clean up spills immediately. Dispose of oil and rags safely - waste rags, etc. can pose a fire risk.
14. Tidy up tools and other equipment such that it does not pose a trip hazard.
15. Training - SafePass, Chemical Awareness, Fire.

PPE Required:

High-vis jacket or vest, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors and safety glasses.

Other Hazards Considered Low Risk:

1. Electrical shock risk during normal operation of equipment
2. Poor housekeeping - trip hazards
3. Contractor awareness

5.4.2.6 Safety Measures for the Persons working in the Bio Aeration Tank/ Primary and Secondary Clarifiers/ Sludge Thickener Area.

1. Operation staff must wear high-vis jackets at all times when working in the area.
2. All PPE (gloves, ear protectors, safety boots, waterproof overalls, etc.) must be worn.
3. Wearing of hard-hat is recommended.
4. Note the location of First Aid boxes and other help information.
5. Training – SafePass
6. Fix ladders securely. Never work from a ladder.
7. Use harness or other safety measures if entering a tank.

PPE Required:

High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses (standard)

5.4.2.7 SAFE HANDLING OF CHLORINE

Moving:

- Use a properly balanced hand truck with clamp or chain to move full chlorine cylinders.
- Never use a chain, rope sling or magnetic device to lift chlorine cylinders.
- Use a suitable lifting beam in combination with a hoist or crane of at least two tons capacity to lift chlorine ton containers.
- Never move chlorine containers without valve outlet cap (s) and protection hood in place.

Storing:

- Store all chlorine containers, full or empty in a clean, well-ventilated fire-resistant area, away from all heat sources and segregated from other compressed gas containers.
- Keep area free of trash to avoid fire hazard. Avoid sub-surface storage area.
- Store full and empty containers separately.
- Provide a suitable gas mask for every employee involved with chlorine handling.
- Provide suitable respiratory protective equipment at the outside of chlorine rooms, near the entrance, and at several other locations if chlorine is used wide area.
- Inspect all such equipment at regular intervals and after each use.

Fire:

- Move chlorine containers immediately from fire areas.
- If they cannot be moved notify fire-fighting personnel that chlorine containers are in the fire area.
- Apply water to cool containers that cannot be moved provided no chlorine is escaping keep all unauthorized persons a safe distance away.

Emergency precautions:

- Hold head high, as the chlorine concentration is greatest at floor level.
- Keep mouth closed.
- Avoid deep breathing and gasps caused by coughs.
- Seek safety.

5.4.2.8 Fire extinguishers at the site during Operation Phase

CO_2 based fire extinguishers of suitable capacity and numbers will be provided at the site near the substation, PMCC/MCC and control rooms before start of work. The fire extinguishers will be fully updated before the operation phase. These fire extinguishers will be installed in such a manner that their use is facilitated in case of fire emergency. First aid kit will also be provided containing all the materials, medicines necessary for treatment of cuts, wounds, burns etc. The materials in the kit will be checked and replenished periodically.

5.4.3 OCCUPATIONAL SAFETY AND HEALTH:

Infectious diseases are serious potential health hazards at Sewage Treatment Plant. Some general recommendations for the prevention of disease include:

1. Wear heavy-duty rubber gloves (especially if the hands are out or have open sores) and boots that are not water absorbent and are resistant to punctures.
2. Wear protective clothing including goggles, if there is any chance of wastewater spraying into the air.
3. Change uniforms or other protective clothing that is visibly soiled or contaminated as soon as possible.
4. Work clothes should be separated from other household laundry and washed in the hot water cycle.
5. Shower before changing into clean clothing and shoes to be worn home. Workplace bathrooms, showers, and locker facilities should be clean, well-maintained, adequately supplied with soap, towels or hand driers.

Wash hands frequently, with soap and water after coming in contact with wastewater and hands should also be washed at the end of the work shift.

Table 5.3 Environmental Management Plan for Pre-Construction Phase

S.No	Potential Negative Impacts	Mitigation measures	Responsible agencies
1	Clearances	The Consent for Establishment has been obtained from TNPCB vide the Consent order no. DEE / HSR / 356 / CTE / 2009, dated: 06.01.2010 for the proposed Dharmapuri STP.	Pure Enviro Engg Pvt Ltd in consultation with the concerned departments.
		Permission for laying pipeline for disposal of treated sewage from STP site to Disposal point (1.2 Km) will be obtained from State highway Authority.	TWAD Board
		The Permission for crossing of the canal will be obtained from the concerned authority according to the field condition, if it is necessary.	TWAD Board
2	Tree cutting	i) The proposed STP site identified is an unused crop land and does not involve tree cutting. Hence, there is no activity of tree cutting for the proposed STP site. ii) For laying line of treated effluent disposal also there is no tree cutting activity.	Pure Enviro Engg Pvt Ltd.
3	Baseline parameters	Baseline parameters have been recorded during the EA study and monitoring would be carried out as per plan provided.	Pure Enviro Engg Pvt Ltd
4	Planning of temporary traffic arrangements	There will be no impact on traffic due to the proposed project since the proposed STP site is located near to roadways and also it will not affect the roadways and pathways.	Pure Enviro Engg Pvt Ltd

5	Storage of materials	Pipes and other construction materials would be stored in the vacant portion available in the STP site.	Pure Enviro Engg Pvt Ltd
6	Construction of labor camps	i) All relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labor camps would be followed. ii) The camp is constructed with in the proposed STP site at safe zone. iii) Necessary living accommodation and ancillary facilities in functional and hygienic manner as approved by the Engineer will be carried out. iv) All temporary accommodation will be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. The sewage system for the camp will be planned and adequate health care will be provided for the work force. iv) The layout of the construction camp and details of the facilities to be provided will be prepared and got approved by the engineer. The Labor camp will be provided within the STP site, Hence there is no impact on surrounding infrastructure and other sensitive land uses like schools, hospitals etc.	Pure Enviro Engg Pvt Ltd

Table 5.4 Environmental Management Plan for Construction Phase - Sewage Treatment Plant

1	Compensatory plantation of trees	There is no tree cutting involved, however as four rows of trees are planned along the periphery of the STP site. In case any tree cutting arises compensatory plantation of twice the number of trees felled will be done in the vacant land available in the STP site.	Pure Enviro Engg Pvt Ltd
2	Protection of top soil and Environmental enhancing	The top soil will be protected and compacted after completion of work. Top soil from the STP area will be stored in stock piles and used for gardening purposes.	Pure Enviro Engg Pvt Ltd
3	Disposal of construction debris and excavated materials.	The excavated materials are stored at site right now, which will be reused for leveling of road and land.	Pure Enviro Engg Pvt Ltd
4	Laying Pipeline for Treated Sewage	It is proposed to lay a pipeline (300 mm dia) for 1.2 km along the berm of Dharmapuri to Thirupathur Road at a depth of 2m below the ground Level to the culvert located in Arur road, from here it will reaches the Sanath kumar odai through gravity.	Pure Enviro Engg Put Ltd & TWAD Board.
5	Pollution from Fuel and Lubricants	i) All location and lay-out plans of such sites will be submitted prior to the establishment and will be approved by the Engineer. ii) We ensure that all vehicle / machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. iii) We will arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to Engineer) and	Pure Enviro Engg Pvt Ltd

		approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with MoEF and state PCB guidelines. iv) Engineer will certify that all arrangements comply with the guidelines of PCB/MoEF or any other relevant laws.	
6	Contamination of ground water	I. Contamination of ground water quality is not envisaged as the raw sewage will be collected in closed Conduit and the pumping main will be inspected and at regular intervals and any leakages noticed will be attended at the earliest notice. The pumping main will be responsible for TWAD Board.	Pure Enviro Engg Pvt Ltd
7	Water pollution from construction wastes	All precautionary measures will be taken to prevent the wastewater generated during construction from entering into streams or the irrigation systems. All waste arising from the project will be disposed off in the manner that is acceptable by the Engineer.	Pure Enviro Engg Pvt Ltd
8	Impact of surrounding areas	To avoid the problems of foul smell polluted air, insects, noise pollution and other problems buffer zones will be provided in the form of green belt around the STP site.	Pure Enviro Engg Pvt Ltd
9	Informatory signs and hoardings	Erection and maintenance of informatory, safety signs, hoardings written in English and local language wherever required will be provided.	Pure Enviro Engg Pvt Ltd
10	Risk from Electrical Equipment(s)	All required precautions will be taken to prevent danger from electrical equipment and ensure that i) No material will be stacked or placed as to cause danger or inconvenience to any person or the public.	Pure Enviro Engg Pvt Ltd

		ii) All necessary fencing and lights will be provided to protect the public in construction zones. All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer.	
11	Labor camp and facilities	Setting up of labour camp will be done as per the procedures. Adequate potable water facilities, sanitation and drainage etc in conformity with the Indian Labour Laws will be ensured. i) The location layout and basic facility provision of each labour camp will be submitted to Engineer prior to the construction. ii) The construction will commence only upon the written approval of the Engineer. iii) Uncontaminated water will be supplied to labours for drinking cooking and washing purposes. iv) Sufficient quantity of potable water (as per IS) will be supplied in every work place / labour camp site at suitable and easily accessible places and regular maintenance of such facilities. v) The sewage system for the camp will be designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take places. Adequate water supply will be provided in all toilets and urinal.	
12	Safety aspects	i) Adequate precautions will be taken to prevent the	Pure Enviro Engg Pvt

		accidents and from the machineries. All machines used will confirm to the relevant Indian Standards code and will be regularly inspected by the PIA. ii) Where loose soil is met with, shoring and strutting will be provided to avoid collapse of soil. iii) Protective footwear and goggles will be provided to all the workers employed on mixing of materials like cement, concrete etc. iv) Welders protective eye shields will be provided to workers who are engaged in welding works. v) Earplugs will be provided to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation. vi) All necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, masks etc., to workers and staffs will be provided. We will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No.62 as far as those are applicable to this contract. vii) We make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers Act, 1996 are adhered to. viii) We will not employ any person below the age of 14 years for any work and no women will be employed on the work of painting with products containing lead in any form.	Ltd
13	First Aid	The following arrangements will be made for the workers:	Pure Enviro Engg Pvt Ltd

		i) A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the factories Rules in every work zone. ii) Availability of suitable transport at all times to take injured or sick persons to the nearest hospital.	
14	Implementing TNPCB conditions	The conditions stipulated by the TNPCB in the Consent to Establish for the proposed STP will be implemented.	Pure Enviro Engg Pvt Ltd
15	Environmental Monitoring Plan	Baseline parameters have been recorded during the Construction Period and monitoring would be carried out as per the provided in Table. 6.6.	Pure Enviro Engg Pvt Ltd, Chennai.

Table 5.5 Environmental Management Plan for Operation Phase - Sewage Treatment Plant

S. No	Potential Negative Impacts	Mitigation measures	Time frame	Responsible agencies
1	Odour Nuisance **Main Source:** Receiving Chamber Bio-Aeration Tank Sludge Sump.	Treatment System is designed in such a way that, there will not be any stagnation of waste water in the receiving chamber The Bio-Aeration tank will be in live condition, the sewage will be treated and only excess digested bio-sludge will be let out to the Centrifuge unit thereby avoiding the offensive odour. Green belt will be developed around the STP site for control of odour nuisance to the surrounding areas. Odour absorbing plant species will be incorporated in the green belt.	During Operation	Pure Enviro Engg Pvt Ltd
2.	Noise **Main Source:** DG set and Blowers Motors and Pumps	➢ Inbuilt acoustic enclosure will be provided for the DG set and silencer, air release valve, design of down stream equipments for blowers. ➢ The motors and pumps are selected in such a way that the noise level will be in the range of 40 – 55 dB. ➢ Ear plugs and Ear muffs will be provided for the workers near noise generating sources. ➢ Thick canopy type of trees will be planted to attenuate noise any arising from the STP.	During Operation	Pure Enviro Engg Pvt Ltd, Chennai.

3.	Disposal of treated Sewage	I. The treated Sewage quality will be complied with the standards of TNPCB before letting out into the stream and necessary permission will be obtained from the concerned department. II. As suggested by TNPCB, the treated sewage will not be disposed off into Reddirangan Eri and the treated sewage will be disposed into Sanath Kumar Odai located at a distance of 1.2 Km away from the STP site in West direction. III. Efficient working condition of treatment plant will be maintained. Stream water and other water bodies receiving STP discharge will not be polluted.	During construction	Pure Enviro Engg Pvt Ltd - do – - do -
4	Disposal of sludge	The sludge will be disposed into the Municipality common compost yard at Sathya Colony in Sogathur Panchayat which is located at a distance of 5km (South West - Towards Pennagaram road) from the STP site. The Centrate from Centrifuge will be sent to supernatant collection sump and then pumped into bio aeration tank for further treatment.	During operation	Pure Enviro Engg Pvt Ltd & TWAD Board.
5	Disposal of Waste Generated from Grit Chamber and Screening Unit.	The waste generated from Grit chamber and screening unit will be disposed into Municipal Secure Landfill.	During Operation	Pure Enviro Engg Pvt Ltd, Chennai.
6.	Contamination of ground water	(i) Contamination of ground water quality is not envisaged as the treated water quality will comply with the standards laid down by PCB for disposal onto river. ii) The sludge arising from the treatment plant would be dried and disposed off by the TWAD Board periodically. ii) Regular monitoring of the treated sewage quality and ground water quality in the nearby areas will be done and ensure compliance with PCB standards.	During operation	Pure Enviro Engg Pvt Ltd, Chennai.

7	Occupational Safety and Health	First Aid: The following arrangements will be made for the workers: i) A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the factories Rules in every work zone. ii) Availability of suitable transport at all times to take injured or sick persons to the nearest hospital. Safety aspects: Adequate precautions will be taken to prevent the accidents and from the machineries. The safety training program will be provided to all workers to avoid accident. The workers should wear the necessary PPE's as provided in section 5.4 of this EA Report.	During operation	Pure Enviro Engg Pvt Ltd & TWAD Board.
6.	Greenbelt Development Plan	Greenbelt will be developed around the STP site covering 1.5 acres of the total area. Greenbelt of width 15 m is proposed in all the directions as an enhancement / mitigation measure.	During Operation	Pure Enviro Engg Pvt Ltd, Chennai.
7.	Environmental Monitoring Plan	Environmental Monitoring Plan during the Operation Phase will be carried out as per the plan provided in Table 6.6.	Operation Phase	Pure Enviro Engg Pvt Ltd, Chennai.

Table 5.6 Environmental Enhancement and Special Issues

S.No	Environmental enhancement and special issues		Location	Implementing Agency
1	Flora and Chance found Fauna	We ensure that reasonable precaution will be taken to prevent workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. If any wild animal is found near the construction site at any point of time, it will be immediately reported to the nearby forest officer and appropriate steps / measures will be taken in consultation with the forest officials.	Project area	Pure Enviro Engg Pvt Ltd
2	Chance Found Archaeological Property	i) STP site does not fall under the sensitive area. ii) All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered will be dealt with as per provisions of the relevant legislation. Care will be taken to prevent the workmen from removing and damaging any such article or thing.	Project area	Pure Enviro Engg Pvt Ltd
3	Monitoring of environment parameters	i) Seasonal monitoring of Air, Water, Noise and Soil quality will be done. ii) The parameter will be monitored according to Environmental Monitoring Plan.	Project area	Pure Enviro Engg Pvt Ltd

4	Sensitive Areas	i) The dust and noise impacts due to vehicle movement during construction and their effectiveness will be checked and minimized with precautionary measures.	Project area	Pure Enviro Engg Pvt Ltd
5	Clearing of construction of camps and restoration	Site restoration plans will be prepared for approval by the engineer. On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site will be left clean and tidy.	During construction period	Pure Enviro Engg Pvt Ltd
6	Tree Protection, Tree Planting	i) Due protection will be given to the tree that might fall in the shoulders / corridor of impact. ii) Construction of Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars, use of plate compactors near trees will be provided wherever necessary. iiii) Re-plantation of atleast twice the number of trees cut will be carried out along the project area. Planting of trees along the entire stretch of road will be carried out as an enhancement measure. iv) Growth and survival of trees planted will be monitored at least for period of 3 years. Survival status will also be reported on monthly basis to Engineer	Corridor of Impact	Pure Enviro Engg Pvt Ltd

Table 5.7 Environmental Monitoring Plan

AIR QUALITY MONITORING	
Project stage	Pre-Construction, Construction & Operation Phase
Parameter	PM_{10}, $PM_{2.5}$, SO_2, NOx, CO, Pb and Odour.
Sampling method	Use method specified by CPCB for sampling analysis
Standards	Air (Prevention and Control of Pollution) Rules, CPCB, 1994
Frequency	Once before start of work & once every season of the year during construction period and at two locations, Four times per year (Alternatively in School and Gandhi Palayam) during operation period.
Duration	Continuous 24 hours or for 1 full working day
Monitoring stations	Two stations – 1. STP boundary in the downwind direction 2. Primary School at a distance of 1 Km away from the STP (NE) and Gandhi Palayam at a distance of 0.1 Km. (Alternatively in School and Gandhi Palaym)
Measures	Wherever air pollution parameters increase above specified standards, additional measures as decided by the TNPCB will be adopted.
Implementation	Will be implemented through approved monitoring agencies
Supervision	Implementing agency
WATER QUALITY MONITORING	
Project stage	Pre-Construction, Construction & Operation Phase
Parameter	pH, TDS, SS, Total Hardness, Fluoride, Chloride, Iron - During Pre-Construction & Construction. pH, BOD, COD, TDS, SS, Total Hardness, Fluoride, Chloride, Iron Oil & grease - During Operational Phase.
Sampling method	Grab sample collected from source and analysis as per Standard methods for examination of water and wastewater (APHA).
Standards	Indian standards for Inland Surface Water (IS: 1226, 1982) and for Drinking water (IS: 10500, 1991).
Frequency	Once before start of work & Once every season of the year during construction and Monthly once in a year at outlet of the STP and every

	season of the year at one location (surface water) and at one location two times per year (ground water) during operation period.
Duration	Grab sampling
Monitoring stations	1. Outfall of the STP site (Sanath Kumar Odai) 2. Fresh Water Virupachipuram pallam Stream and Reddirangan Eri (Alterntively) 3. Ground water Nearest bore well
Measures	At locations of increase in water pollution, all inflow channels will be checked for pollution loads and channel delivering higher pollution loads will be terminated from disposal into the water source and other methods of disposal will be adopted.
Implementation	Will be implemented through approved monitoring agencies
Supervision	Implementing agency
NOISE LEVEL MONITORING	
Project stage	Pre-Construction and Operational phase
Parameter	Noise level on dB (A) scale noise levels on dB (A) scale
Special Guidance	• Free field at 1m from the equipments whose noise levels are being determined • Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement
Standards	MoEF Noise Rules, 2000
Frequency	Once every season (except monsoon) during construction period at two locations and 4 times per year during operation period.
Duration	Readings will be taken at 15 seconds interval for 15 minutes every hour and then averaged.
Monitoring stations	1. Project site, 2. Nearest residential area (Gandhi Palayam) and School. (Alternatively in School and Gandhi Palayam)
Measures	Increase of noise levels causing disturbance to the sensitive receptors,

	mitigative measures as suggested in the EMP will be carried out.
Implementation	Will be implemented through approved monitoring agencies.
Supervision	Implementing agency.
SOIL QUALITY MONITORING	
Project stage	Pre - Construction and Construction
Parameter	Monitoring of Pb and Oil & Grease
Sampling method	Sample of soil collected to be acidified and analyzed using absorption spectrometer.
Standards	Threshold for each contaminant set by IRIS database of USEPA until national standards are promulgated.
Frequency	During the pre-monsoon and post monsoon seasons for the construction and operation period.
Duration	Grab sampling
Monitoring stations	At one location in the point of disposal or where the dried Sludge is used.
Measures	Land disposal of treated sewage will be avoided to restrict any contamination of soil.
Implementation	Will be implemented through approved monitoring agencies.
Supervision	Implementing agency.

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

5.4.4 Formats for reporting

Formats for reporting / monitoring the progress / parameters achieved will be finalized accordingly.

5.4.5 Environmental Compliance Report

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

Table 5.8 ISSUE BASED REMIDIAL MEASURES:

S.NO	ISSUE	POSSIBLE CAUSE	SUGGESTED ACTION
1.	Intermittent Surging of flow	High intermittent pumping rates.	Adjust pumping rates to keep close to rates of flow or install or adjust baffling to reduce inlet velocity and to have effective across the width of tank.
2.	Unusual or Excessive screenings	Increase in domestic sewage.	Clean screens more often and report
3.	Bubbles rising in tanks	Septic conditions	Report and empty tank completely as soon as possible.
4.	Sludge pipes Choke	Sludge so thick / Sludge contains grit	Clean more often Clean grit chamber more often.
5.	Odour	1. Receiving Chamber 2. Bio-Aeration Tank 3. Sludge sump.	Greenbelt will be developed around the STP site for control of odour nuisance to the surrounding areas.
6	Noise	4. DG set and Blowers 5. Motors and Pumps	➢ Inbuilt acoustic enclosure will be provided for the DG set and silencer, air release valve, design of down stream equipments for blowers. ➢ The motors and pumps are selected in such a way that the noise levels will be in the range of 40 – 55 dB.

			➢ Ear plugs and Ear muffs will be provided for the workers near noise generating sources. ➢ Thick canopy type of trees will be planted to attenuate noise any arising from the STP.

Table 5.9 Operation & Maintenance Check List for STP ASP Method

S. NO	DESCRIPTION OF UNIT	QTY (Nos)	PROCESS ISSUE	REMEDIAL MEASURES	MECHANICAL ISSUES	REMEDIAL MEASURES	REMARKS	PERSONAL PROTECTIVE EQUIPMENTS
1	Manual Screens	2	Clogging of Screen	Periodical cleaning shall be done.	-	-	Manual screens will be used when either of mechanical coarse or fine screen break down or conveyor breakdown	High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses
2	Mechanical Screen	2	Clogging of Screen	Periodical cleaning shall be done.	Low oil level due to oil leakage	Tighten the connections and/or change the hoses. Exchange the seals of cylinder	Manual screens will be used when the mechanical screens under maintenance.	High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses
					Gear unit for any damage, Loose connection or if any circuit breaker has tripped.	Repair/replace gear unit, Correct the connections/reset the circuit breaker.		

3	Grit Separator	2 (1W+ 1S)	Carryover of grit	Remove grit more frequently	Mechanical failure takes place in Gear box	Regular preventive maintenance such as lubrication, topping of oil and alignment check to be done.	Standby unit will be used during maintenance	High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses
					Gear unit for any damage, Loose connection or if any circuit breaker has tripped.	Repair/replace gear unit, Correct the connections/reset the circuit breaker.		
4	Primary Clarifier	2	Excessive floating matter in the outlet	Repair / Replace the Sum box	Mechanical failure takes place in Gear box	Regular preventive maintenance such as lubrication, topping of oil and alignment check to be done.	Keep in stock essential spares and take one unit out of service in the event of break down	High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses
5	Bio Aeration Tank	2	Excessive / less MLSS Concentration.	The MLSS concentration in the aeration tank can be regulated by controlling the rate of sludge	-	_		High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety

				return based on SVI determined experimentally.				glasses
6	Secondary Clarifier	2	Floating of Sludge	Regulating the Return Sludge	Mechanical failure takes place in Gear box	Regular preventive maintenance such as lubrication, topping of oil and alignment check to be done.	Keep in stock essential spares and take one unit out of service in the event of break down	High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses
7	Sludge Thickener	1			Mechanical failure takes place in Gear box	Regular preventive maintenance such as lubrication, topping of oil and alignment check to be done.		High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses
8	Sludge Digester	2 (1W+ 1S)	Fluctuation in sludge temperature	Pump large quantities of thin sludge at high rate for cooling	-	-		High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear

								protectors, safety glasses
9	Centrifuge	2 (1W+ 1S)	-	-	Pump Failure due to wear and tear of impeller, bearing, shaft and pump choaking. Fluctuation in power.	Routine maintenance such as glad packing, impeller & shaft alignment with adequate spare at site.	Standby unit will be used during maintenance	High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses
10	Primary Sludge Transfer Pumps	2 (1W+ 1S)	-	-	Pump Failure due to wear and tear of impeller, bearing, shaft and pump choaking. Fluctuation in power	Routine maintenance such as glad packing, impeller & shaft alignment with adequate spare at site.	Standby unit will be used during maintenance	High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses
11	Return/Excess Sludge Transfer Pumps	2 (1W+ 1S)	-	-	Pump Failure due to wear and tear of impeller, bearing, shaft and pump choking. Fluctuation in	Routine maintenance such as glad packing, impeller & shaft alignment with adequate spare at site.	Standby unit will be used during maintenance	High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear

					power			protectors, safety glasses
12	Digester recirculation pumps	2 (1W+ 1S)	-	-	Pump Failure due to wear and tear of impeller, bearing, shaft and pump choking. Fluctuation in power	Routine maintenance such as glad packing, impeller & shaft alignment with adequate spare at site.	Standby unit will be used during maintenance	High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses
13	Centrifuge feed pumps	2 (1W+ 1S)	-	-	Pump Failure due to wear and tear of impeller, bearing, shaft and pump choaking. Fluctuation in power	Routine maintenance such as glad packing, impeller & shaft alignment with adequate spare at site.	Standby unit will be used during maintenance	High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses
14	Blower for Aeration Tank	3 (2W+ 1S)	-	-	Mechanical failure takes place in Motor & Blower	Regular preventive maintenance such as lubrication, topping of oil and alignment check to be done.	Standby unit will be used during maintenance	High-vis jacket or vest, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors and safety

								glasses.
15	Blower for Sludge mixing	2 (1W+ 1S)	-	-	Mechanical failure takes place in Motor & Blower	Regular preventive maintenance such as lubrication, topping of oil and alignment check to be done.	Standby unit will be used during maintenance	High-vis jacket or vest, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors and safety glasses.
16	Chlorinator	2 (1W+ 1S)	Excessive / Less dosing of Chlorine	The operator should be careful in administering calculated doses accurately.	Leakage of Chlorine gas from cylinder.	Regular Preventive maintenance such as 1. Daily inspection of all chlorine Cylinder. 2. Ammonia should be kept handy for checking for leaks. 3. Chlorine cylinders storage building should be well ventilated.	Standby unit will be used during maintenance	High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, safety glasses

17	Power interruption / failure		-	-	Power failure	DG set will be operated during power failure. Preventive Maintenance are as follows: 1. Inspected daily to maintain safe and reliable operation. 2. Daily check the engine oil level. 3. Daily check the coolant level during shutdown periods. 4. Daily check the fuel level.		High-vis jacket or vest, waterproof overalls, standard overalls, hard hat, safety boots, gloves dust mask, ear protectors, and safety glasses.

6. ENVIRONMENTAL ENHANCEMENT MEASURES

The following Enhancement Measure is encountered to overcome the environmental impact so far studied in the previous chapters.

- Greenbelt development
- Cost Estimate for Environmental Management Plan

6.1 GREENBELT DEVELOPMENT

The total land allotted for Dharmapuri STP is 9.0 acres in which 3.7 acres will be used for Sewage Treatment plant and green belt will be developed around the STP covering an area of 1.5 acres, 4 rows of tree will be planted and the distance between the trees will be 5 meters and the distance between the rows will be 2.5 m, the predominant wind direction recorded during study period was North East and hence, the thick plantation will be in northern direction of proposed project site.

GREEN BELT DESIGN

Distance between rows	:	3 m
Distance between trees	:	5 m
Rows of plant provided	:	4 rows in all directions.
Greenbelt width	:	15 m
Total green belt area	:	1.5 acres
Total number of plants	:	120

- A comprehensive greenbelt plan shall be implemented to improve the ecological condition.
- The trees in subsequent rows will be interspaced and the trees of subsequent rows be selected in such a way that the canopy is sloping.
- Additional rows of trees will be planted as an enhancement measure within the site wherever possible, especially in the predominant wind direction.

The total trees after the implementation of this plant will be around 120 trees. This will be more than compensate for the loss of green cover and will serve the important environmental objectives of the dust and fumes capture, noise attenuation and wind barrier while also improving the aesthetics.

- The proposed green belt will be integrated with the existing plantation and locally available and sustainable species shall only be chosen for plantation;
- Green belt development will be taken up along with the consumption work so that plantation will grow to adequate height by the time of plant commissioning. Thus, greenbelt will be effective in containing the pollutants due to the plant operations.

The main purpose of green belt development is to contribute to the following factors:

1. To attenuate noise level generated from the plant;
2. To improve the aesthetics of the plant area;
3. To trap the vehicular and fugitive dust emissions;
4. To act as a pollution sink for gaseous emissions;
5. To maintain ecological balances;
6. To prevent soil erosion and to protect the natural vegetation;
7. To utilize the treated effluents.

A) Planned Species for Green Belt

While selecting the plant species for the proposed green belt, the following points have been taken in to consideration:

1. Should be a fast growing type;
2. Should have a thick canopy cover;
3. Should be perennially green;
4. Should be preferably of native origin; and
5. Should have large leaf area index.

B) Recommended Species for Plantation

Based on climate and soil characteristics of the study areas, some species are recommended for plantation. The climate of the region is tropical, where there is medium rainfall as well as extreme heat and soil temperature is very high in summer. Hence, in order to have a ground cover, some fast growing species which do not require watering have been recommended for mass plantation.

The below mentioned species not only resist water stress but also covers the ground quickly and also have wider soil adaptability. For protecting the environment from dust, temperature, chemicals, emissions the following species have been recommended.

Table 6.1 Suggested Plant Species for Greenbelt development

S.NO	SCIENTIFIC NAME	COMMON NAME	LOCAL NAME
1	*Eucalyptus*	Gum Tree	Tailamaram
2	Polyalthia longifolia	Ashoka tree	Ashokamaram
3	Prunus amygdalus	Badam tree	Badam maram
4	*Aegle marmelos*	Bel	Vilvam maram
5	*Azadirachta indica*	Neem	Vepa maram
6	*Ficus religiosa*	Pipal	Arasu maram
7	*Pongamia pinnata*	Pungam	Pungam maram

The above given suitable trees will be planted in consultation with the local body at the time of implementing green belt operation.

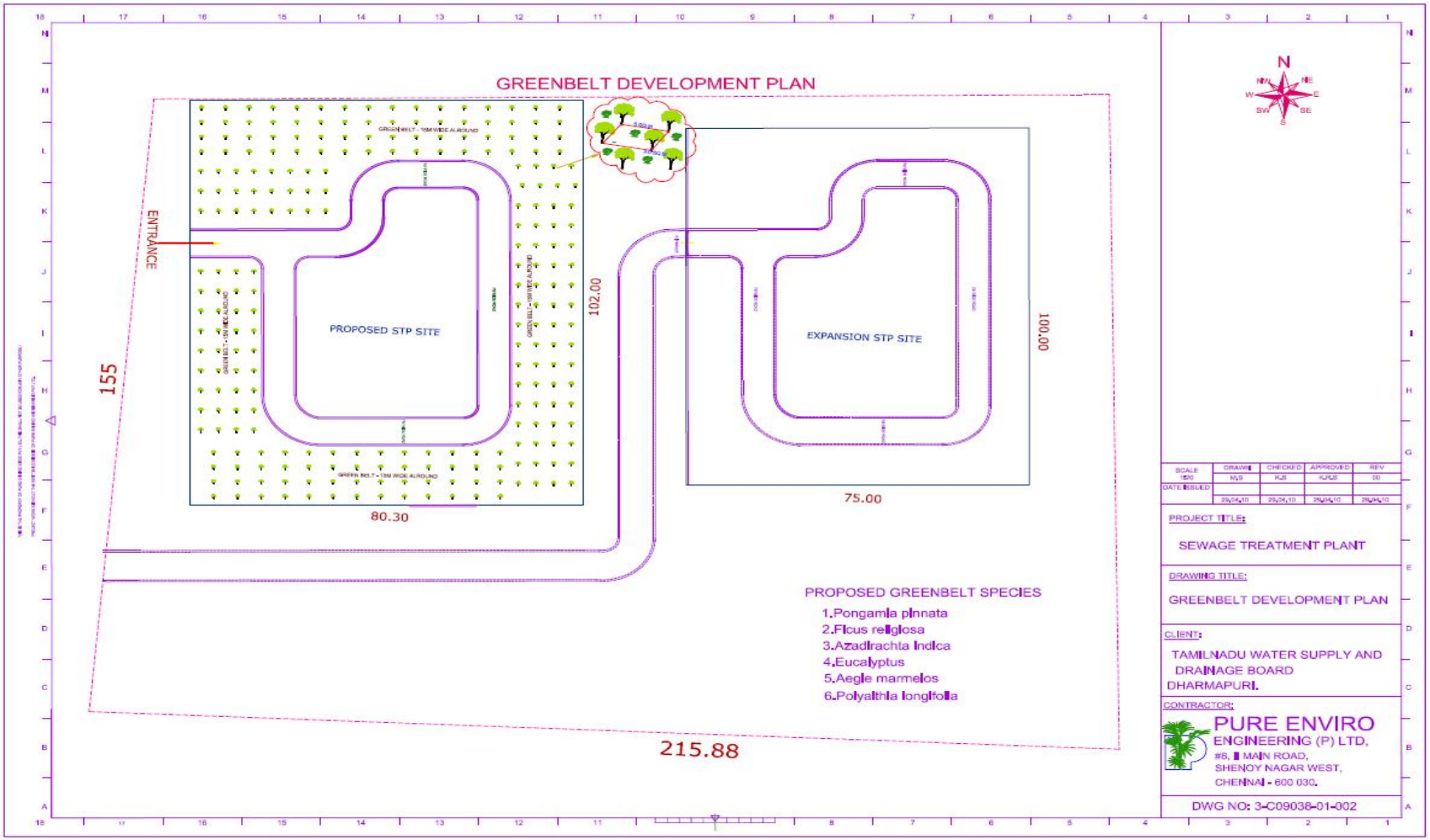


Figure 6.1 Greenbelt

Table 6.2 Cost Estimate for Environmental Management Plan

S. No	Description	Monitoring locations	Monitoring Station	Frequency of monitoring	Cost / sample(Rs.)	Total Amount (Rs.)
Cost estimation of Environmental monitoring during Construction Phase (per year)						
1	Air Quality Monitoring	2	2 (Project site & School)	4	2000	16,000
2	Water Quality Monitoring	2	2 (Sanath Kumar Odai & Nearest Bore Well)	4	1800	14,400
3	Noise Level Monitoring	2	2 (Project site & School)	4	800	6,400
4	Soil Quality Monitoring	1	1 (Sanath Kumar Odai)	1	2500	2500
5	Mobilization charges				25,000	
Total (Rupees Sixty Four Thousand and Three Hundred Only)						**64,300**
Cost estimation of Environmental Monitoring during Operation Phase (per year)						
1	Air Quality Monitoring	2	2 (Project site & School / Nearest Residential Area)	4	2000	16,000
2	Water Quality Monitoring • Outfall of STP • Fresh Water • Ground water	 1 1 1	 Outfall of STP Alternatively in Virupachipuram pallam & Reddirangan Eri. Nearest Bore Well in Agricultural Land.	 12 4 2	 1800 1800 1800	 21,600 7200 3600
3	Soil Quality Monitoring	1	1 (Sanath Kumar Odai or sludge disposal point/ Agricultural Land)	1	2500	2,500
4	Noise Level Monitoring	2	2 (Project site & School/ Nearest Residential Area)	4	800	6,400
5	Mobilization charges				25,000	
Total (Rupees Eighty Two Thousand and Three Hundred Only)						**82, 300**

Table 6.3 Cost Estimation for Greenbelt Development

S.No	Description	Cost per tree (Rs.)	Total amount (Rs.)
1	120 trees plantation	85.00	10,200
2	Maintenance		20,000
Total (Rupees Thirty Thousand Two Hundred Only)			**30,200**

7. CONCLUSION

The proposed Sewage Treatment Plant (STP) to be built in Dharmapuri is a large scale facility that will ultimately treat all the sewage from the sewered areas of Dharmapuri Township. The proposed STP is an Activated Sludge Process that will produce quality effluent after the treatment, before discharge into the Sanath Kumar Odai. The proposed site is located on the Northwestern side of the Dharmapuri town. The nature of the proposed system will prevent the production of odour and sludge thus making the facility little nuisance to the surrounding communities. The entire STP project has been conceived, planned and developed as a pollution control-cum-resources recovery measure following the direction of TNPCB. The project will therefore contribute significantly positive impact on the prevailing environment. In addition this project envisages the following:

1. The clean and healthy environment of the town and the socio economic health conditions of the public will improve by the implementation of such project.
2. The sub surface water quality within the Municipality and as well as downstream of the Sanath Kumar Odai after the STP will get improved and it will be more useful for cultivation.
3. The project envisages more cost benefit ratio due to least maintenance and more revenue to the Municipality by selling the sludge cakes as manure used for agricultural purposes.

All possible environment aspects have been adequately assessed and necessary control measures have been formulated to meet statutory requirements. Thus, implementing the proposed project will not have any appreciable negative impacts. With proper maintenance and environmental monitoring, the facility is not expected to have any adverse effects on the surrounding communities.