



ENVIRONMENT IMPACT ASSESSMENT REPORT

for the

SEWAGE TREATMENT PLANT PROPOSED BY
THE
SALEM CITY MUNICIPAL CORPORATON



Engineering an Enriching Environment!!

ENVIRONMENT IMPACT ASSESSMENT REPORT

For the

**SEWAGE TREATMENT PLANT PROPOSED BY THE
SALEM CITY MUNICIPAL CORPORATON**

at

S.F. No: 102/1, 2, 3 & 4 of Anaimeadu Village, Salem Taluk and District

Environment Impact Assessment Report

And

Environment Management Plan

Prepared by



M/S. RAMKY INFRASTRUCTURE LIMITED

CHENNAI – 600029

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No part of this project shall be re-written or photo copied or transmitted to any other form without the written concurrence of the project executor M/s Ramky Infrastructure Limited.

1.0 Executive Summary

The Salem Municipal Corporation has proposed to implement an underground drainage scheme to collect the sewage generated from the urban population spread in 50 wards. For this purpose the Authority has divided the Municipal area into four major zones and proposed four different underground drainage systems with individual sewage treatment plants. One of the four zones, the Northern zone consists of 18 wards with a water supply of 89.43LPCD. This Sewage Treatment Plant with its collection and Conveyance system is designed for 135LPCD. The STP is proposed at Anaaimedu village for this zone is designed to treat 6MLD of sewage. The site for the STP is presently vacant in an extent of 1.05 acres.

The sewage collected by the proposed underground drainage system, will reach the site of the sewage Treatment Plant at Anaaimedu. The Plant is designed with double Pumping System at every Unit Operation to ensure the continuous operation at all time of the day. The Scheme includes Anaerobic Treatment system, using anaerobic microbial activity. The Raw sewage is received into inlet chamber. Toilet wastes from admin building are also collected into receiving sump. From the inlet chambers the sewage will pass through primary treatment units. The screened sewage is then passed through mechanical grit chamber for the removal of grids etc. The sewage is then allowed to flow into a closed Grass Reactor, where anaerobic activity is envisaged. Here anaerobic microbes will convert the degradable organic load in the sewage into Methane, carbon dioxide and water. The mixture of gaseous products ($\text{CH}_4 + \text{CO}_2$) will be fired through a flare stack to avoid atmospheric pollution. The anaerobically treated sewage will then be passed into a moving Bed Biological Reactor (MBBR) where the sewage is retained for aerobic treatment. Oxidation will occur in this process by giving air to sewage by means of rotary air blowers. The sewage from MBBR will be passed onto a lamella clarifier when the sewage will be allowed to settle in transient conditions. The microbial population will settle in form of Sludge in the hopper bottomed clarifier. Then clean supernatant liquid will pass on to the next operation. The clean sewage will be allowed to flow into a chlorine contact tank where it will be allowed to mix with pre calculated dosage of hypochlorite supplied from a tank. The pathogenic microbes will get destroyed in this unit operation and germ free sewage will pass out of this tank. Treated sewage water from chlorine contact tank finally mixed to Thirumanimutharu River by means of concrete open channel at a distance of 15 M.

But the final sludge from all the sedimentation will pump to centrifuge mechanism where the solid waste and centrate water being separated. This centrate water again directed into inlet chamber and the final solid sludge waste disposed from centrifuge will collected by trolley and then given to Municipal sludge carrying vehicle

This Environmental Impact Assessment (EIA) is to provide information on the potential negative and positive environmental and social impacts of the project. It also aims to make recommendations for the mitigation of the potential negative impacts and an enhancement of the positive ones. A field survey of the project site was conducted and potential environmental impacts of project activities were identified, assessed, and documented.

As per the World Bank policy, the project is categorized under F1. A proposed project is classified as Category F1, if it involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts. Hence an assessment study is mandatory as per the funding agency.

This Present report elucidates the existing environmental scenario of the project site and the predicted impacts due to installation of the proposed Sewage Treatment Plant. It evaluates the impacts during the pre construction, construction and operation phases of the project. Both positive and negative impacts are being considered and reported. The Environmental Management Plan (EMP) is also aimed at mitigating the possible adverse impact of the project and ensuring the existing environmental quality gets enhanced.

The potential ecological impacts identified in the operation of the Sewage treatment Plant are (i) Ground water pollution due to seepage of sewage in the various process tanks (ii) Poor soil quality due to discharge of sewage into land (iii) noise pollution from the operation of rotary equipments (iv) air pollution due to methane gas production

.All those potential impacts on the environment will be treated with most recent technology available in accordance with the relevant national and international legal frame work. The positive impacts that will be benefited from the project are basically the reduced impacts of raw sewage on environment such as land pollution, air pollution & ground water pollution and also with improved life standards due to satisfactory environmental protection. The project will contribute positively to water, land, and air and noise quality of the whole Anaamedu region by treating the raw sewage

A number of mitigation measures are provided against the adverse activities during the construction and operation phases of the project. Measures provided during the construction phase include control of noise pollutions from equipment and vehicles through proper inspection and maintenance, and use of noise suppressors or mufflers for equipment, control of air pollution from construction works and movement of vehicles through proper inspection and maintenance to reduce exhaust emissions, watering of unpaved roads, control of adverse impacts from construction debris by proper handling and immediate removal, control of water pollution through proper storage and handling of oil wastes and treatment of wastewaters at site, control of solid wastes through sanitary storage and frequent collection for sanitary disposal. Quality of air and water will be monitored on a regular basis where noise will be measured periodically. While during the operation phase, emphasis has been on the control of; inlet parameters of raw sewage which will be treated with the use of MBBR technology, air pollution which will be treated with gas flare system. In all phases

occupational health and safety will be carefully considered and controlled through continuous inspection to prevent disease and accidents, and workers will undergo an environmental and safety briefing on safety, sanitation measures, and emergency rescue procedures before development begins. Adequate sanitary facilities, potable water, and garbage bins will be provided. From the study findings, it has been concluded that the impacts of the proposed project are minor and easily mitigable.

2.0 Environmental Screening

Screening the essential aspects of the Project with reference to the Environmental features are of Primary significance. However, the Project site is in the Municipality Corporation limit, the general Environmental features are urban based features like offices, residences and commercial activities.

2.1 Environmental Screening Data

1. Name of the ULB & project	Sewage Treatment Plant (6MLD) RS No. 102/1, 2, 3 & 4, Anaimeedu Village, Salem TK, Salem DT.
2. Location map of project Component sites	Refer Fig.1 .Location Map
3. Distances of the features from the Project sites	Refer Fig 2. Distance of the Features & Table 1
4. In case of location in proximity to water bodies	Refer Table: 2
5. Disposal point for treated sewage Distance from STP	Thirumanimuthar River 15 m
6. Mode of Disposal of treated Sewage	Treated sewage will be disposed to Thirumanimutharu river which is 15M from the STP outlet by means of concrete open channel.
7. List of permissions from other Departments & Status:	Refer Table: 3
8. Available extent of land for green Belt around the sites	234 m ²

- | | |
|--|---|
| 9. Discharge point in case of Shutdown of facilities or in the event of sewage out falls.
(Confirm compliance to Condition of TNPCB | River Thirumanimuthar |
| 10. Details of current usage of Nearby water body/downstream Users | The River Thirumanimuthar carries the |
| 11. Date of public consultations Held/proposed. | Public consultation Conducted. Refer Annexure V |
| 12. Details of public objection if any | No objections are received from the public. |

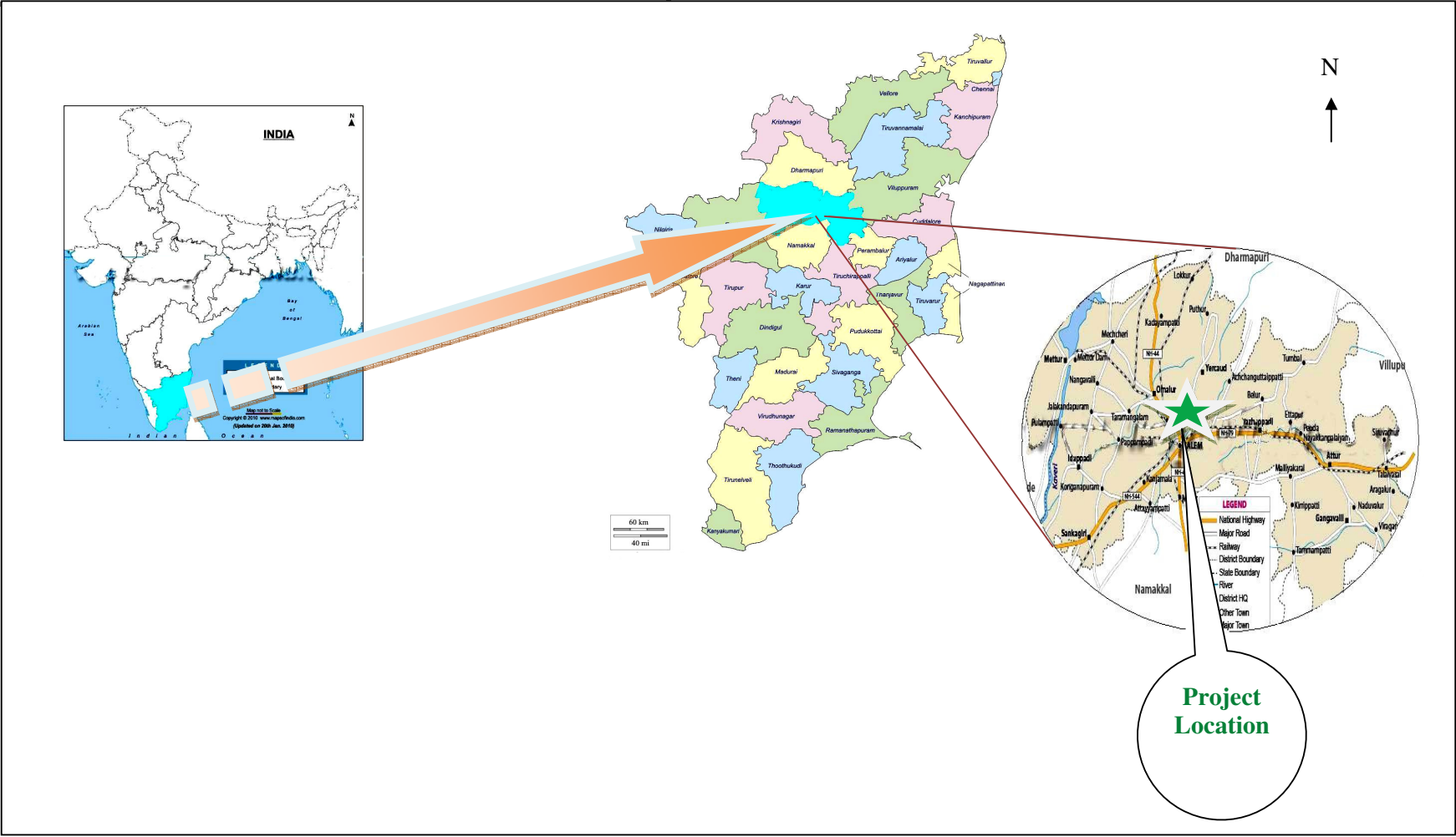


Figure 1 : Location Map

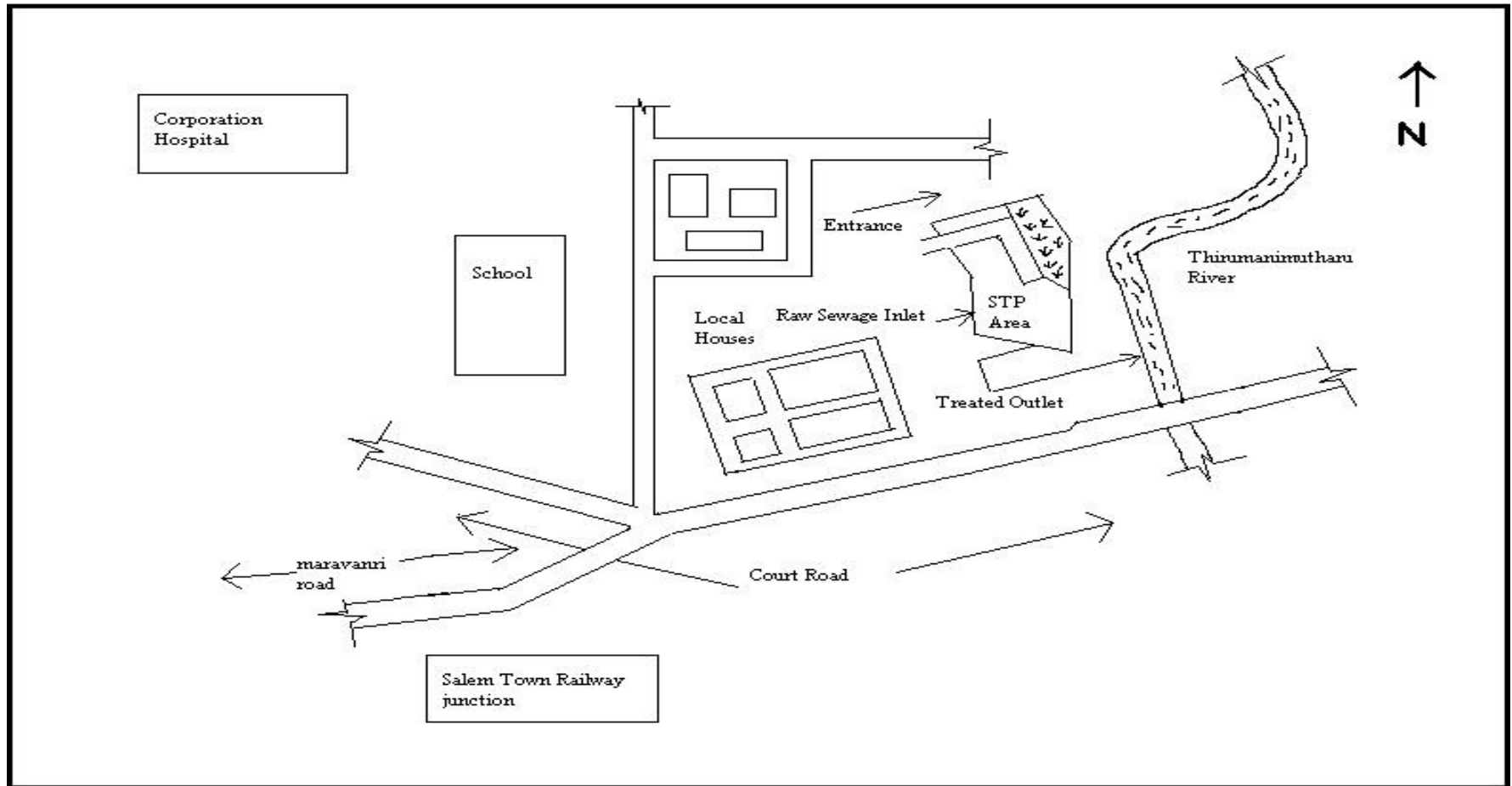


Fig 2: Location of features

Project component (LS,PS, STP, etc)	Total site Extent	Ownership details, alienation / acquisition status	Distance from the sub-project facilities				
			Drinking water sources (head works, intake well, etc)	Residences	Schools	Hospitals	Any other sensitive feature (specify viz river)
STP	1.04 acre	Government poramboke land, acquisition by Salem Municipality Corporation	There are no water resources, intakes within the Municipal area and near STP.	15M	0.55km	1.6km	River Thirumanimuthar is adjacent to the proposed site for STP. Presently the city's untreated sewage out falls into River Thirumanimuthar.

Table 1: Distance of the Features

Component	Total extent	Current Usage	Extent proposed for component	High Flood level (m)	Proposed Plinth level (m)
Sewage Treatment Plant	1.04 Acre	Vacant site (through which sewage flows)	1.04 Acre	925 feet (281.9m)	930 feet (283.5m)

Table 2: Proximity to Water Bodies

Type of Legislation	Location	Extent/ length	Proposed activity	Status of permission
(i) NOC/Consent from TNPCB for STP: (Tamil Nadu Pollution Control Board)	SF No: 102/1,2,3 & 4 Anaimeadu Salem TK	1.05 Acre	Treatment of Municipal Sewage	Obtained
(ii) NOC/Consent from PWD	SF No: 102/1,2,3 & 4 Anaimeadu Salem TK	15 M	Discharge of treated sewage into Thirumanimuthar river.	Obtained.

Table 3: List of Permissions & Status

3.0 Introduction

3.1 Introduction

The Salem Municipal Corporation has proposed to implement an underground drainage scheme to collect the sewage generated from the urban population spread in 50 wards. For this purpose the Authority has divided the Municipal area into four major zones and proposed four different underground drainage systems with individual sewage treatment plants.

One of the four zones, the Northern zone consists of 18 wards with a water supply of 89.43LPCD. This Sewage Treatment Plant with its collection and Conveyance system is designed for 135LPCD. The STP is proposed at Anaimedu village for this zone is designed to treat 6MLD of sewage.

The Municipal Sewerage collection network systems are implemented and the household sewage are collected and moved to the collection chamber of STP. The STP consists of various unit operations and processes to treat the raw sewage into the final treated effluent quality as per the stipulated standards. The project will have construction phase and operation phase impacts which have been assessed and the Environment Impact Assessment has been prepared.

3.2 Profile of Salem

Salem City Municipal Corporation is located at a distance of 340km from South West of Chennai City. The latitude of the town is 11°14' and 12° 53' N and the longitude of the town is 77° 44' and 78° 50' E. As per 2011 census, the population of Salem is 3016346.

Males constitute 51.83 % of the population and females 48.17 %. Salem has an average literacy rate of 57.50%.Population density of Salem is 573per sq.km.

3.3 Need for the Project

With the rapid growth of the population in Salem City Municipal Corporation, the lack of proper drainage system and sewage treatment facility has become an ever – larger problem for public and from environmental point of view. Therefore, Government has decided to provide an Sewage Treatment Plant at Anaimedu village, Salem district.

M/s. Ramky Infrastructure Limited has been assigned for Design, construction, erection and commissioning, startup and operation of the sewage treatment. In order to assess the impact of the proposed STP on the environment, M/s. Ramky Infrastructure Limited, Chennai studied the environmental scenario of the existing situation and the probable impacts that could arise from the proposed sewage treatment plant at Anaimedu. Suitable mitigation measures have also been suggested based on the impact assessment.

3.4. Salem Sewage Treatment Scheme

The Sewage Treatment Plant proposed at **S.F. No: 102/1, 2, 3 & 4 of Anaimedu Village, Salem TK in Salem District**. The site is within the Municipal Corporation area.

The Plant is intended to treat the Sewage generated from 18 wards in one part of the Salem Corporation Area. The sewage generated from the Households, Hotels, Restaurants will be collected by the Underground Sewage Collection System consisting of Trunk Sewer, laterals and sub laterals. The sewage collected through collection system reaches receiving chamber by 700 mm RCC Pipe.

The Sewage Treatment System is designed to handle a capacity of 6MLD continuously. The Plant is designed with double Pumping System at every Unit Operation to ensure the continuous operation at all time of the day. The Scheme includes the following aspects in the Treatment method.

- (i) A basic screening system to remove the coarse particles, Leaves, Papers, Fabrics etc.
- (ii) A Grit chamber system to remove sand, grid etc.
- (iii) A Anaerobic Treatment system to reduce the BOD and COD of the Sewage, using anaerobic microbial activity.
- (iv) An Aeration Treatment System to reduce the BOD and COD by aerobic microbes.
- (v) A Sewage Clarification System to settle and clarify the Sewage.
- (vi) A disinfection system for the selective destruction of pathogenic organisms.
- (vii) A Sludge Management system to remove the Sludge generated from the Sewage clarifier.

3.5 Need for EIA

Environmental Impact Assessment (EIA) is a study of the possible impacts that a proposed project may have on the environment, which may affect natural, social and economic aspects in and around the project area. The purpose of the assessment is to make the project proponent to enhance the environmental quality of the project site during planning and execution of the project. The International Association for Impact Assessment (IAIA) defines an Environmental Impact Assessment as "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made." As per the World Bank policy, the project is categorized under F1. A proposed project is classified as Category F1, if it involves investment of Bank funds through a financial intermediary, in subprojects that

may result in adverse environmental impacts. Hence an assessment study is mandatory as per the funding agency.

The proposed project is categorized under E1 (as per ESF of Tamil Nadu Urban Infrastructure Financial Services Limited, Chennai) since it includes sewerage network, pumping station and sewage treatment plant. Hence an EIA study is required for the proposed work. This Present report elucidates the existing environmental scenario of the project site and the predicted impacts due to installation of the proposed Sewage Treatment Plant. It evaluates the impacts during the pre construction, construction and operation phases of the project. Both positive and negative impacts are being considered and reported. The Environmental Management Plan (EMP) is also aimed at mitigating the possible adverse impact of the project and ensuring the existing environmental quality gets enhanced.

3.6 Objectives of This Report

The objectives of the report are

- To identify and assess any potential negative environmental and social impacts and to facilitate the planning of preventive and remedial measures.
- To identify possible environmental enhancements in the project setting and lay down the action plans.
- To develop a set of environmental monitoring and management plans compliant with the relevant codes, statutes & social norms.

3.7 Categorization of Project

The Project is categorized as an orange type category by the TNPC Board which implies that no toxic components are involved in the scheme.

4.0 Review of Environmental Legislation

4.1 TNUIFSL Policy Outline

The Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) has been set up to manage a Trust fund for Tamil Nadu Urban Development Fund (TNUDF). The trust has been established to manage urban infrastructure projects in Tamil Nadu. The deployment of funds will be on the basis of a management contract and will be managed by TNUIFSL. Eligible borrowers include Urban Local Bodies (ULBs), Statutory Boards, Public Undertakings and potential Private Investors. TNUIFSL has implemented projects by applying the Environmental and Social Frame work (ESF) with a view to develop projects with environment safeguard and prevailing laws on environment and on social policies. This UGSS is implemented with funds allotted by TNUIFSL under World Bank's TNUDF-III.

4.2 Categorization of Urban Infrastructure Projects

The urban infrastructure projects depending on location and the nature of project activities will have varying impacts on urban environment. The rigor of environmental assessment required to identify and mitigate the impacts largely depends upon the complexities of project activities.

The E1, E2 and E3 categories are defined as follows

E-1 projects are those wherein TNUIFSL foresees major environmental impacts thus necessitating Environmental Assessment Reports (EAR). A proposed project is classified as E1 if it is likely to affect sensitive environmental components (SEC) such as those mentioned in Table 1.2. Those projects/activities, which require environmental clearance as per the EIA notification published by Ministry of Environmental and Forest will also be categorized as E1. As per the guidelines in the ESF this STP project falls under E1 Category and hence this need for EIA report.

4.3 Review of Laws and Legislations

The Laws legislations and policies governing the Environmental protections are listed below.

- a) Constitutional Provisions
- b) Environmental Protection Act 1986
- c) EIA Notification
- d) Water Protection act 1974
- e) Air Protection act 1981
- f) Forest Conservation Act 1980
- g) Manufacture, Storage and Import of Hazardous chemicals act 1989

4.3.1. Constitutional Provisions

“The natural resources of the earth, including the air, water, land flora and fauna and especially representative sample of the nature ecosystem must be safeguard for the benefits of present and future generations through careful planning or management, as appropriate...Nature conservation including wildlife must therefore receive importance in planning for economic development". To comply with the principles of the Stockholm Declarations adopted by the International Conference on Human Environment, the Government of India, by the Constitution 42nd Amendment Act, 1976 made the express provision for the protection and promotion of the environment, by the introduction of Article 48-A and 51-A (g) which form the part of Directive Principles of State Policy and the Fundamental Duties respectively. The amendment provided for the following:

Article 48 A: By the Constitution (42nd Amendment) Act, Section 10 (w.e.f. 3.1.1977). Protection and improvement of environment and safeguarding of forests and wild life:- "The State shall endeavor to protect and improve the environment and to safeguard the forest and wildlife of the country".

Fundamental Duty**Article 51-A (g): By Constitution (42nd Amendment) Act, 1976. Section 11 (w.e.f. 3.1.1977)**

"It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures". Thus the Indian Constitution makes two fold provisions.

- (a) On the one hand, it gives directive to the State for the protection and improvement of environment.
- (b) On the other hand the citizens owe a constitutional duty to protect and improve natural environment.

In protecting the natural environment Article 48-A is of immense importance today. The Government of India to accelerate the pace for environment protection

4.3.2. Environmental Protection Act 1986 and As Amended

The Environment (Protection) Act, popularly known as EP Act, is an umbrella legislation that supplements existing environmental regulations. Empowered by the EP Act, the Ministry of Environment & Forests (MoEF), Government of India has issued the following notifications regulating sitting of industry and operations, procuring clearance to establish industries and development of projects with appropriate EIA studies, coastal zone regulations and other aspects of environment care:

- Empowers the Government of India (section 6) to make rules to regulate environmental pollution by stipulating standards and maximum allowable limits to prevent air, water, noise, soil and other environmental pollutants
- Prohibits operations that emit pollutants in excess of standards (section 7)
- Regulates handling of hazardous substances and identifies persons responsible for discharges and pollution prevention (section 9)
- Section 17 deals with offences committed by Government Departments
- Formulated Environmental (Protection) Rules, 1986, Hazardous Wastes (Management and Handling) Rules, 1989 and Manufacture, Storage & Import of Hazardous Chemical Rules, 1989 in accordance with the sections 6, 8 and 25 of EP Act.

4.3.3. EIA Notification Dated 14th September, 2006.

- A new EIA notification was published on 14th September, 2006 for imposing certain restrictions and prohibitions on new projects or activities, or on the expansion or modernization of existing projects or activities based on their potential environmental impacts as indicated in the schedule to the notification, being undertaken in any part of India, unless prior environmental clearance has been accorded in accordance with the objectives of National Environment Policy as approved by the Union Cabinet on 18th May, 2006 and the procedure specified in the notification, by the Central Government or the State or Union territory Level Environment Impact Assessment Authority (SEIAA). The notification has listed out the Projects or activities requiring

prior environmental clearance under Category “A” and “B” based on the spatial extent of potential impacts and Potential impacts on human health and natural and manmade resources.

Establishment of STP's are not in that list of projects mentioned above. So they do not require Environmental Clearance from MoEF as per EIA notification.

4.3. 4. Water (Prevention and Control of Pollution) Act 1974

Water Act is the first environmental regulation that was introduced at the State and Centre levels, Pollution Control Boards to control / regulate environmental pollution in India. Amended twice in 1978 and 1988, the Act vests regulatory authority on the State Pollution Control Boards and empowers them to establish and enforce effluent standards for industries and local authorities discharging effluents. This provide for the prevention and control of water pollution besides maintaining and restoring of the wholesomeness of water. ‘Pollution’ means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance on health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

While considering our project, treated sewage will be discharged to the Thirumanimutharu River. So establishment and operation of STP requires consent of the Board for the establishment and for operation or process, as mentioned in section 25 of water act, 1974.

4.3.5. Air (Prevention and Control of Pollution) Act 1981 and Tamil Nadu Air (Prevention of Control of Pollution) Rules 1983

An Act to provide for the prevention, control and abatement of air pollution, for the establishment, with a view to carrying out the aforesaid purposes, of Boards, for conferring on and assigning to such Boards powers and functions relating thereto and for matters connected therewith.

In this project DG Set used as standby power source, while running of this Diesel Generator emissions will be produced by the combustion of fuel used in the DG set. So the establishment and operation of STP requires to obtain the consent of the State Pollution Control Board to establish or operate the plant as per Air act 1981, Section 21.

4.3.6. Forest Conservation Act 1980

Forest (Conservation) Act, 1980 was enacted to halt rapid deforestation and governments cannot de-reserve forest land or direct that it be used for non-forest purposes. Municipal projects with activities falling in reserved forest areas need a clearance from MoEF.

Our project site is not forest area so this is not applicable.

4.3.7. Manufacture, Storage and Import of Hazardous Chemicals Act 1989

These rules aim at providing control for the generation, storage and Import of hazardous chemicals. According to these rules, the user of hazardous chemicals has to perform the following and dispose the hazardous waste as mentioned in the rules. Identify the potential hazards of the chemicals and to take adequate steps for the prevention and control of such hazards. Develop or provide information about the chemical in the form of safety data sheet and Label the specified information on container of hazardous chemical and Chlorine used for disinfection of water is categorized as hazardous chemical as according these rules and usage of these chemicals above 10 tons per year attracts the provisions of these rules. Some of the water projects funded by TNUFSL could handle Chlorine above 10 tons per year and those projects will attract the provision of these rules.

Here we are not using hazardous chemicals. For disinfection we will use very less quantity of chlorine that is 8.6 kg/year only. This is less than 10 tons per year only. So this is not applicable.

Type of legislations	Regulation	Status
Consent to establish the STP required from TNPCB (Tamil Nadu Pollution Control Board)	Under Water Protection act 1974	Obtained
Consent operate the STP required from TNPCB (Tamil Nadu Pollution Control Board)	Under Water Protection act 1974	It will be obtained after completion of construction
Consent to establish the STP required from TNPCB (Tamil Nadu Pollution Control Board)	Air(Prevention and control of pollution) act 1981 and Tamil Nadu air (prevention and control of pollution) rules 1983	Obtained
Consent to operate the STP required from TNPCB (Tamil Nadu Pollution Control Board)	Air (Prevention and control of pollution) act 1981 and Tamil Nadu air (prevention and control of pollution)rules 1983	It will be obtained after completion of construction
NOC/Consent from PWD	Discharge of treated sewage into Thirumanimuthar river which under PWD.	Not yet obtained.

Table 4: Type of Legislations and status

4.4 Agencies Responsible For Project Implementation

The agencies responsible for the successful execution of the Project are shown in **Table**

S.No.	Agency	Responsibility
1.	Salem city corporation	Project Employer
3.	Ramky Infrastructure Limited	Executing the project plan. (Project contractor.)

Table 5: Agencies responsible for Project Implementation

4.4.1. Authority

Salem Municipal Corporation was formed in the year 1994 and has presently a total area of 91.34 square KM. The Corporation executes and maintains the fundamental infrastructure facilities to the public such as electrification, internal roads, water supply sanitation and solid waste Management. Out of these, the maintenance of the sanitary system plays a vital role in the corporation.

The corporation has proposed to advance a step ahead in sanitary management. Inclusion of domestic waste water Treatment Schemes in the sanitary system is of prime importance in present days. The Salem Municipal Corporation obtains water from Cauvery River at Mettur. Presently the water supply is done at the rate of 89.43 LPCD. After the implementation of the sewerage scheme the water supply will be 135 LPCD.

The Corporation has plans to implement sewage treatment schemes in four difference zones with underground sewerage system with individual treatment plants. Thus the total No. of wards covered under the four schemes will be 56 wards. The Sewage Treatment Plant proposed for this zone of the Municipal Corporation area in Anaivedu village alone is intended to treat six million liters of domestic waste water generated from the households and public amenities.

The Salem Municipality Corporation is the Authority to implement this Sewage Treatment Plant Project at Anaivedu Village and allotted the execution of the Project to M/S. RAMKY INFRASTRUCTURE LTD - CHENNAI.

4.4.2 The Executor

The Execution of the 6MLD Sewage treatment Plant at **Anaivedu** will be carried out by M/S. RAMKY INFRASTRUCTURE LTD – CHENNAI, as the work allotted by the Authority.

M/S. RAMKY INFRASTRUCTURE LTD is one the leading Technical organizations in the field of Environment Projects. Started two decades ago, the organization has ventured in different fields of Environment, such as construction of Sewage Treatment Plants, Municipal

solid Waste Management facilities and Bio-Medical Waste Management facilities at different parts of the State.

The organization not only executes the Projects but also maintains and operates the executed facilities. As such the Sewage Treatment Plant being executed for the Salem Municipal Corporation at Anaimeadu Village will be maintained and Operated for a period of Five years and then will be handed over to the Authority for further Maintenance.

In any Environmental Project, the organization implements the “State of the art” technology on par with any developed country.

The vision of the organization is to impress upon the fact to the Community that every Waste is worth Recycling and the mission is to implement this theme in diversified fields of Environment

5.0 Project Description

5.1. Project Proposal

Name of the Project	Designing, Providing, Constructing, Erection and Commissioning start up of Sewage treatment plant with selected modern Technology at Salem City Municipal Corporation in Salem District in Tamil Nadu on DBOT Basis.
Project Town	Anaimeadu Village, Salem District, Tamil Nadu.
STP Capacity	6 MLD
Technology used	Anaerobic and Aerobic microbial treatment
Project cost	7.92 Crores

5.2. Land Requirement

Salem Corporation consists of 60 wards categorized under 4 zones. Each zone has individual sewage treatment plant. Those details are given below.

Zone	Capacity	Area of Sewage Treatment Plant
Zone I	13 MLD	Vellakuttai
Zone II	44 MLD	Vandipettai
Zone III	35 MLD	Mankuttai
Zone IV	6 MLD	Anaimeadu

Table 6: land requirement for STP

The sewer length of 6MLD sewage treatment plant as follow as

1. 200mm to 375mm SWP pipe	39.780 km
2. 200mm to 700mm RCC pipe	5.056 km
	<hr/>
	44.836 km
3. Manhole depth varies 1.00m to 5.00m	1500 Nos.
4. HSC	
a. 100mm dia	43.200 m
b. 150mm dia	10800m

The Place allotted for the construction of Sewage Treatment Plant (6MLD) at Anaimeedu Village within the Salem Municipality Corporation is 1.05Acres. The extent of land is much limited and meticulous planning is required to accommodate the various components of the Treatment Plant within the allotted area. Hence the design of STP is done with a view to priorities the placement of various unit operations within the space available and also for the convenience of movement for the operations to operate the systems.

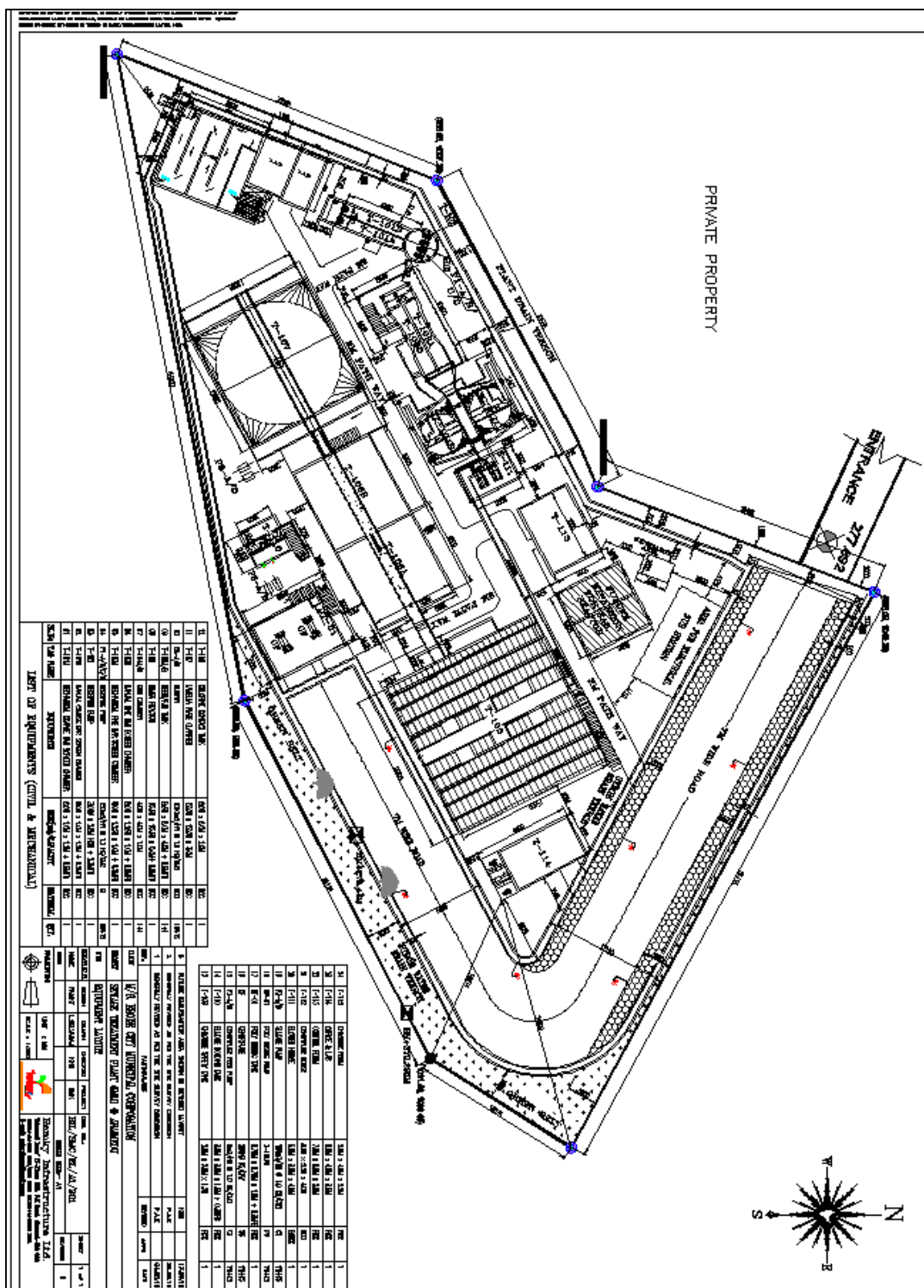
Presently sewage is flowing in the proposed site and joins in the river. There are residential houses, small temple, commercial joints, and State and Central Government offices are located within a radius of 250M from the proposed site. The surrounding features are existing urban structures and the proposed STP is designed so as not to disturb the existing everyday activities around.

The land is handed over by the Municipality to the Project executor for starting the construction works. The extent is 1.04 Acres. The Treated Sewage will be disposed into the Thirumanimuthar River.

Summary of area is given in below table.

Description	Area in (sq.m)
Total survey area	3645.55
Buildup area	1128.208
Future expansion	47.61
Balance are for construction	2235.732
Green Belt area	234

Table 7: Area allotted for STP at Anaimeedu



5.3. Process Description

At RAMKY we take utmost care to design, any Water, Sewage, Waste water and recycling system, to give required outputs at all the times. At each stage of design we are taking minute details into consideration, which can optimize the system.

We are offering the following treatment steps for achieving required product water quality.

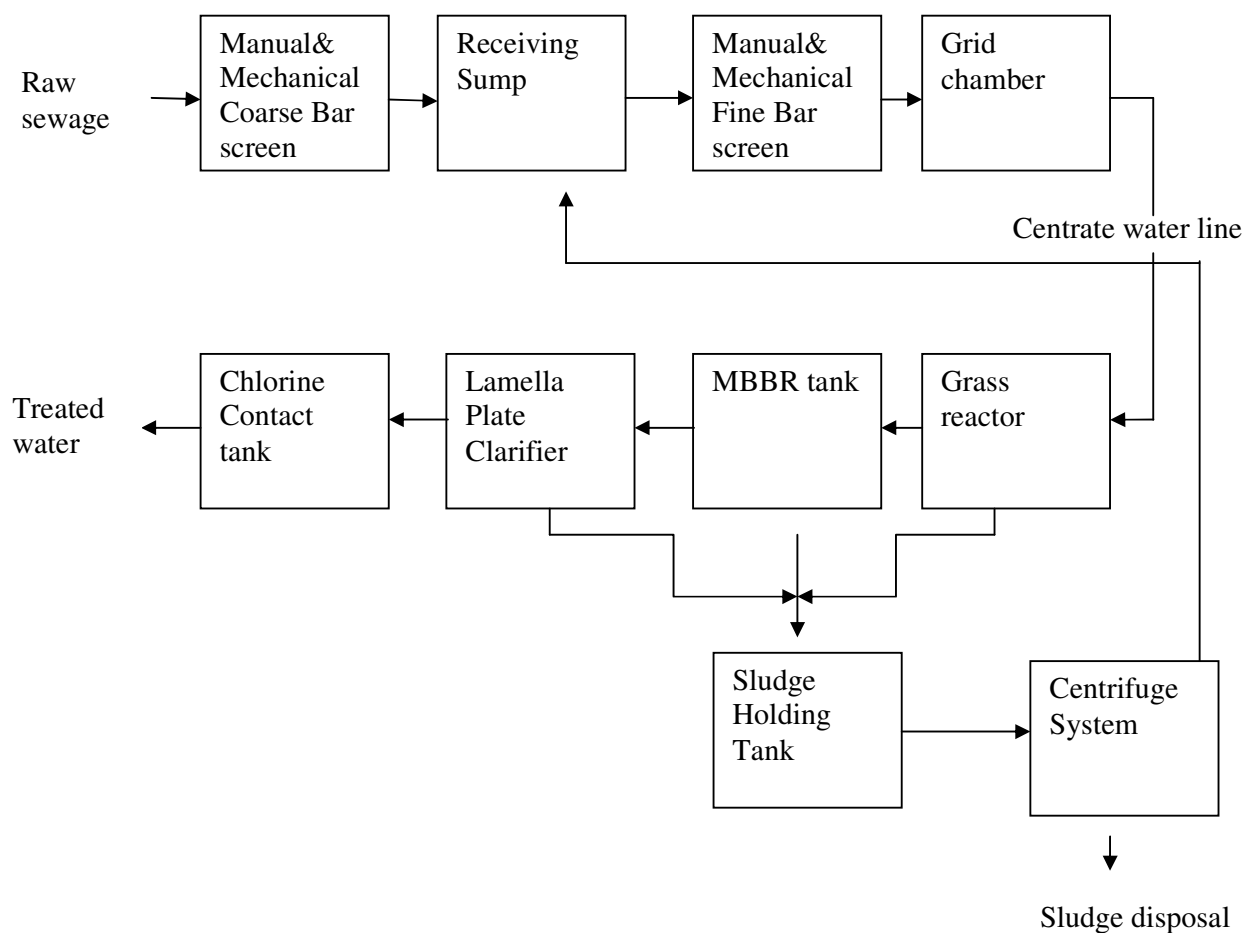


Fig 4: Process Flow Diagram

01. Primary Treatment
02. Grass (Gas Releasing Anaerobic Sludge System) Reactor
03. MBBR (Moving Bed Bio Reactor)
04. Sedimentation system

5.3.1. Treatment Methods & Disposal Systems

The Raw sewage is received into inlet chamber. Toilet wastes from admin building are collected into receiving sump. From the inlet chambers the sewage will pass through coarse

and fine screens chambers through sewage transfer pump. The screened water is then passed through mechanical grit chamber for the removal of grid

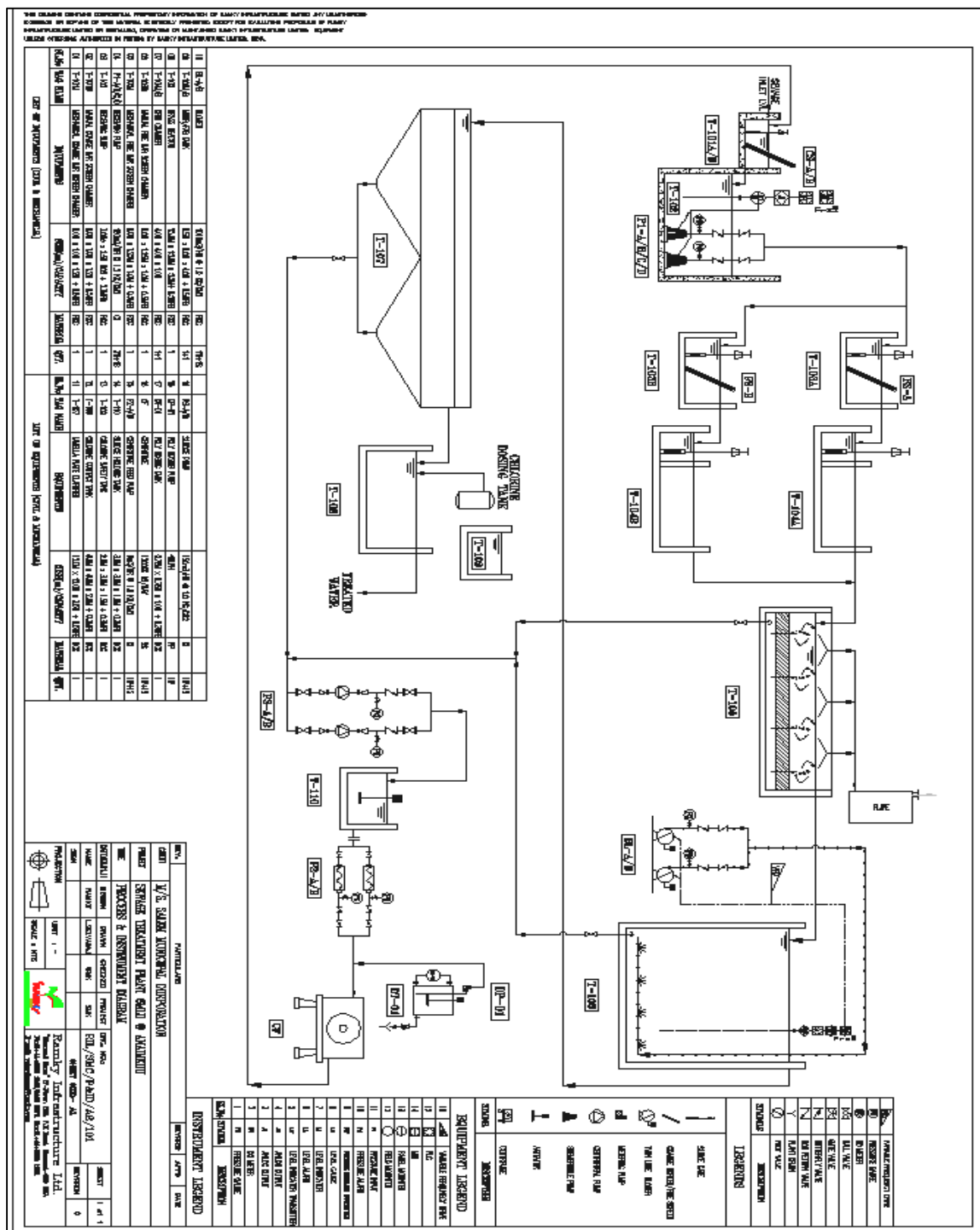


Fig 5: Treatment scheme, Process & Instrumentation Drawing

The sewage collected by the proposed underground drainage system, will reach the site of the sewage Treatment Plant at Anaimeadu. The Sewage will be allowed to pass through a sluice gate with coarse bar screen, and then flows into a receiving sump (T102). The sewage is then allowed to flow into a Grass Reactor (T105), where anaerobic activity is envisaged. Proper seeding of microbial inoculums will be done initially and during regular maintenance. The anaerobic microbes, Nitrobacteria and Nitrosamines, etc will convert the degradable organic load in the sewage into Methane, carbon dioxide and water. The mixture of gaseous products ($\text{CH}_4 + \text{CO}_2$) will be fired through a flare stack to avoid atmospheric pollution. This will be a closed Reactor.

The anaerobically treated sewage will then be passed into a moving Bed Biological Reactor (MBBR) (T 106) where the sewage is retained for aerobic treatment. The MBBR tank will have sufficient depth for the aerobic system to operate efficiently. Two air Blowers will blow air into the sewage through membranes placed at the bottom of the tank. These membranes will spew out millions of fine air bubbles into the sewage which travels through the sewage up wards until it escapes out at the surface of the liquid. During the course of travel through the sewage the oxygen in the bubbles will come into contact with the organic substrate and the aerobic microbes will oxidize the organics with the help of oxygen and convert it into CO_2 and H_2O . The more the number of fine bubbles, the faster will be the oxidation in the sewage.

The sewage from MBBR will be passed onto a lamella clarifier (T107) when the sewage will be allowed to settle in transients conditions. The microbial population will settle in from of Sludge in the hopper bottomed clarifier. Then clean supernatant liquid will pass on to the next operation.

The clean sewage will be allowed to flow into a chlorine contact tank where it will be allowed to mix with pre calculated dosage of hypochlorite supplied from a tank. The pathogenic microbes will get destroyed in this unit operation and germ free sewage will pass out of this tank.

Treated sewage water from chlorine contact tank finally mixed to Thirumanimutharu River by means of concrete open channel at a distance of 15 M. But the final water from all the sedimentation will pump to centrifuge mechanism where the solid waste and centrate water being separated. This centrate water again directed into inlet chamber and the final solid sludge waste disposed from centrifuge will collected by trolley and then given to Municipal sludge carrying vehicle.

5.3.1. 1. Grit Collector

Influent Deflector

There will be furnished suitable number of adjustable steel deflectors for installation in the influent channel. Each deflector will be attached to an adjustable shaft and mounted in a sleeve type support embedded in the concrete influent channel cover. The deflector will uniformly distribute the influent flow across the collector compartment.

Effluent Weir

A Steel Epoxy covered weir with anchor bolts will be provided for installation across the effluent side of the collector compartment. After setting the proper elevation the weir will be grouted in place.

Mechanism Support

The drive unit will be a main worm gear and worm driven by a suitable motor and gearbox thru a chain drive. The main worm gear and worm will be enclosed in a Cast Iron housing so that all gears run in oil. The main gear housing will be bolted to the mechanism support. The Cast Iron worm gear will run on large diameter precision bearing races. The worm gear will be keyed to a steel center shaft. The worm shaft will be of hardened steel and running on roller bearings.

Lubrication

All gears and bearings shall run in an oil bath. Readily accessible lubricant fill and drainpipes with necessary fittings shall be provided.

Drive Control

The drive worm shaft shall be free to move horizontally within the limits afforded by a calibrated compression spring at the thrust end. The worm shaft movement shall be transmitted to the drive control by a pin contacting the cam support and cam shaft, thereby actuating the pointer. The pointer shall indicate relative torque load on a 0 to 100% graduated scale. Four cams and limit switches shall be included. Cams shall be independently adjustable over the full torque range. Two limit switches shall be shop-adjusted to sound an alarm and stop the drive motor at predetermined torque settings. Switches and cams shall be mounted in a weatherproof steel box having conduit terminal strips.

Centre Shaft

The rotating centre shaft will be amply sized with the upper end keyed to the main gear thru an adapter shaft. At the lower end a steel spider framework is used to support and drive the collecting arms.

Collector Arms

There will be two steel collector arms with steel raking blades arranged to move the settled grit to the tank periphery, into the hopper of the screw. Squeegees shall be in neoprene.

5.3.1.2. Grit Washer

The grit washer will comprise of a removable washing screw inclined at a slope of 6 in 12 and mounted in a steel galvanised trough. The helicoids SS304 flights will be welded to a heavy SS304 centre pipe shaft with solid steel stub shafts at both ends. The submerged bearing is of such design that entry of grit is prevented and incorporates arrangement for flushing of the bearing with lubricant.

Washing Screw

The washing screw will remove grit from the collector and raise it to a point of discharge from the Grit Separator. The washing screw shall be arranged with full pitch flights below low water level and half pitch above. Two lubricated bearings shall be provided for the washing screw. The bottom replaceable Bronze bearing shall be mounted inside the screw pipe shaft and rotate on a replaceable hardened steel spindle. Lubrication lines will extend upwards to the collector mechanism support top. The upper end of the screw is supported on a ball bearing mounted on the steel trough end and will carry the thrust load of the washing screw.

Screw Drive

The drive will consist of a speed reducer directly driven by a electric motor and the output of the reducer is connected to the screw shaft thru roller chain and sprocket arrangement.

5.3.1.3. Gas Releasing Anaerobic Sludge System Reactor ("GRASS")

GRASS™ Reactor - Gas Releasing Anaerobic Sludge System Reactor is the most energy efficient and space saving treatment for removing organic matter from effluent. It operates entirely as a suspended growth system and consequently utilizes no packing material.

It is basically a dense blanket of granular or flocculated sludge placed in a reactor, which is designed to allow the upward movement of waste water through the blanket. In GRASS Reactor, bacteria are immobilized by the process of the spontaneous aggregation of bacteria to dense compact granules with high activity and good settling characteristics. The changes occurring during digestion are complex and arise from activities of many different type of micro-organism. Complex organic matter is broken down to soluble compounds which are hydrolyzed, mineralized and gasified.

Sludge is conditioned so that it will give up water more readily and become relatively inoffensive. Sludge digestion results in considerable reduction in sludge volume for ultimate disposal, and methane, a valuable by-product may be recovered or flared or disposed in atmosphere in a suitable safe manner.

Advantages of Using Grass™ Reactor:

- ❑ Small footprint
- ❑ Low Energy requirement
- ❑ Needs little attention
- ❑ No smell problem, as it is enclosed
- ❑ After long shut down operation can be revived fast
- ❑ Less sludge production compared to conventional activated sludge, extended Aeration or simple ponding systems, for the same COD load reduction. Aerobic excess sludge may be digested in the anaerobic reactor, thus reducing the total sludge to be disposed from Anaerobic plus Aerobic stages.

5.3.1. 4. Moving Bed Bio-Reactor Treatment

MBBR Reactor

1. The Reactor is designed for completely mixed conditions. This is to ensure maximum Oxygen diffusion across the Bio film Boundary layer.
2. Depending on layout and foot print requirements, the tank can be designed for water depths up to 12 M.
3. Bio carrier fill percentage is optimised for each application in order to provide adequate Diffusion time, displacement of MLSS and sloughing effect.
4. The HRT of the effluent in the Reactor is typically between 1 to 2 hours

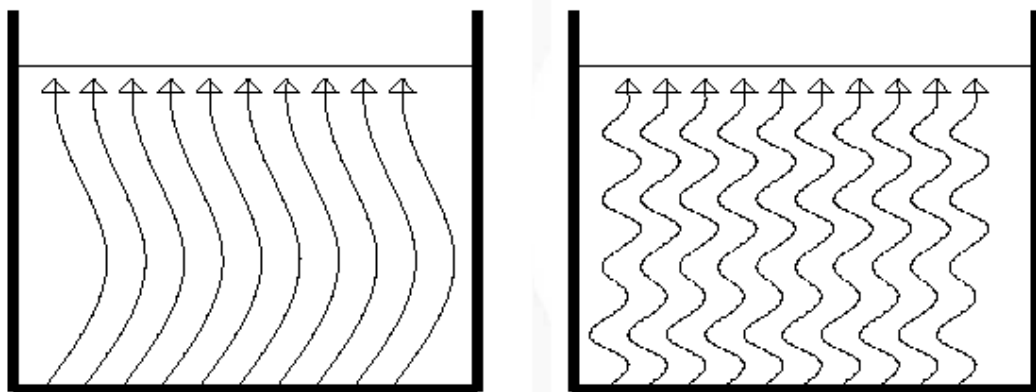


Fig 6: Bio Carrier filling degree

Advantages of the MBBR Technology

Compact

- Smaller Foot Prints
- Low Investment Cost

Robustness and Operational Reliability

- Tolerant to disturbances and shock loads.
- A separate equalisation tank is not required. N
- Quick recovery after upsets/stoppages
- No Clogging of reactors
- No risk of Sludge Bulking
- Simpler maintenance and operation. Dissolved Oxygen is required to be maintained at prescribed levels. Other parameters MLSS, F/M etc are not required to be monitored.

The Biomass growth is self sustaining and adjusts itself depending on incoming organic load

- No Sludge recirculation. The RAS line can be eliminated
- The bio carriers are long lasting and are guaranteed for a 15 year lifetime.

Flexibility

- Almost all shape of reactor can be utilized
- Possibility to utilize existing tanks for Bioreactors
- Easy to expand in future
- Can be upgraded from initial design – add more media



Fig 7: Bio Carrier Media K3

Use

Carrier media for bio film in biological wastewater treatment. For use in aerated or anoxic reactors, with tank and reactor equipment designed for carrier media.

Form and size

3 concentric tubes with internal spacing walls and external corrugated surface, with a nominal length of 10 mm and a nominal diameter of 25 mm.

Surface Area and Protected surface area for bio film growth

Surface area - 600 m²/m³. Protected surface area - 500 m²/m³ ± 1 %

Composition

High-density polyethylene based.

Density

For most applications the carrier exists in density range of 0.96. kg/dm³.

Service Life

The service life with normal use in a steel tank is more than 20 years and more than 15 years in a concrete tank with smooth walls. A rough concrete tank will wear the carriers and shorten the life expectancy. In concrete tanks, the rate of wear will depend on the aeration intensity and the roughness of the concrete. It is important that there are no sharp edges on the grid or other equipment in the reactor in order to avoid impact damage that can reduce service life.

Handling

The carriers are packed and shipped in bags containing 1.0 to 2.5 m³ carrier volume. When the carriers are emptied into the reactor, the reactor must already be filled with water and the aeration or mixing system must be running in order to avoid any impact damage to the carriers. Impact damages can be caused by a free fall of several meters and collisions with hard surfaces or other carriers. When filling, the suspended bags are usually simply cut open from the bottom with a knife. The carriers should be stored in the bags and the bags must not be stacked on one and another as the underlying carriers may be damaged by the extra weight. If the carriers have to be moved from one reactor to another, centrifugal pumps or pneumatic conveyors are not suitable and will cause carrier breakage. The carriers can be safely moved using an air lift pump or a belt conveyor.

5.3.1.5. Lamella Clarifier

Product Description

Lamella Clarifier is a compact, inclined plate type of clarifier. It is used for clarification of water, waste water and liquid having suspended and colloidal particles. Principle of Lamella Clarifier is based on settling under gravity, providing number of inclined plates to give large projected surface area.

Working Principle

The Lamella Clarifier provides a means of water clarification at a large saving of plant surface area. The clarifier consists of a series of inclined overlapping plates, which are arranged to form a separate sedimentation chamber or the cells between each pair of adjacent plates. The overlapping additive projected area of several plates is a factor of increased surface settling area proportioned to the number of plates used. Before entering to Lamella Clarifier, water is first fed to Flash Mixer and Flocculation Tank (FMFT). Chemicals like alum, ferric chloride, lime are added in flash mixer in which high-speed agitator is provided for proper mixing of chemicals in water. Water from flash mixer enters in flocculation chamber in which paddle type agitator is provided for gentle mixing. Polymer is added for flocculation of coagulated particles. Sufficient residence time is provided in this chamber for particles to become heavy before entering into Lamella Clarifier. Static mixer can replace the flash mixer. In such case, chemicals were added prior to static mixer. The zigzag vanes are provided in static mixer to do proper mixing of chemicals. The pre-treated feed stream enters the Lamella and transverses through feed ducts longitudinally, along each side of the Lamella

plates, through a bottomless distribution duct. The liquid/solid feed stream then enters each plate chamber near the bottom section of the plates and flows upward between them. As the feed stream moves upwards, solids settle downward by the plates descending a short distance onto the surface area provided by the plates. Solids continue to slide down the plate surfaces to a collection hopper. Near the top of each plate, water leaves each cell through a pair of circular openings in the adjustable weir plate located along each side of the clarifier. The weir plate should be set horizontally and in level so as to provide proper distribution of liquid through each circular opening. It should also be set at a height to provide a design water level below top of the tank. Sludge is periodically removed by opening the drain valve provided in the hopper bottom of the Lamella clarifier. The sizes of the various treatment units and designed criteria are enclosed in Annexure – I.

5.3.1.6. Gas Chlorinator

Working Principle

Motive Water (water at high pressure) passes through the injector to produce vacuum. This vacuum extends up to Automatic Vacuum Regulator (AVR). The chlorine gas supplied (from Tonnes / Cylinders or Chlorine Evaporators) under pressure is reduced to a lower pressure by Pressure Reducing Valve [PRV] and to a constant vacuum at the AVR. The gas under vacuum passes through a Gas or Rota meter and Flow Control Valve [FCV]. A Differential Pressure Regulator [DPR] is provided for Chlorinators above 6 Kgs/hr capacity, to control the pressure drop across the Flow meter and also to ensure accurate and steady flow of gas. The chlorine gas then gets mixed with the water at the injector and is discharged to the point of application. Safety Valves like Check Valve, Emergency Drain Valve, Pressure Relief Valve and Vacuum Relief Valve are provided in this System to make it safe for both Operating Personnel and Equipment's longevity.

Automatic Vacuum Regulator

- Normally closed and opens only when there is vacuum, thus regulating the flow of chlorine gas in a controlled manner.
- Exclusive design ensures minimal risk of handling chlorine gas under pressure.

Flow Meter

- Indicates directly the flow Chlorine gas in terms of Grams/kilograms Pounds consumed per hour.
- Made of Borosilicate glass and calibrated for 0.1, 0.2, 0.5, 1, 2,3,5,6 10, 15, 20, 25, 30, 40, 50, 75, 90, 110, 150, 200, 250 kgs/hr.
- Accuracy is +- 4% of indicated flow.
- Flow can be adjusted by a specially designed Flow Control Valve allied with the Flow meter.

Safety Valves

- The system is provided with Pressure Relief Valve. Vacuum Relief Valve, Check Valve and Emergency Drain Relief Valve.
- Ensures safety at all critical moments to both Men and Machinery.

5.3.1.7. Centrifuge

The centrifuge has to be installed on an elevated structure or on the first floor of a building so that solids discharged from the centrifuge can directly be collected in a truck / a trolley, kept below the centrifuge on the ground floor.

salient features / advantages of COCURRENT design which is used in this centrifuge over standard counter current design machine are provided below.

- Co-current machine the settling operation takes place uniformly trouble free, without any turbulence and with long settling distance and extended sedimentation time, the machine can be run at lower rpm, low “G” force thus saving the power consumption due to design factor.
- The liquid depth inside the bowl is more, as compared to shallow depth in counter current design and hence clear centrate.
- Longer beach and hence compact solids with low moisture.
- RPM is very low, wear and tear of moving parts are minimum.
- In our design, we are providing strip lining for the protection of bowl shell the conveyor scroll surface. Feed chamber and the solid and the solid discharge out let are lined with tungsten carbides towards wear protection ‘
- Poly electrolyte consumption will be less compared to competitive machine.
- Differential speed between the bowl and conveyor can be changed by changing the pulley at site, to control the dryness of cake.
- Central lubrication system for lubricating various bearing and lubrication is possible while the machine is on/ running.

5.3.2 Design of the Unit Operations (6mld STP at Anaaimedu, Salem)

The STP IS designed considering the sewage analysis report. The characteristics of the sewage collected in the scheme area were as follows:

S.NO	PARAMETERS	UNITS	VALUES
1.	BOD	mg/lit	236
2.	COD	mg/lit	452
3.	Total Suspended solids	mg/lit	220
4.	Total Kjeldahl Nitrogen	mg/lit	61

5.	Ammonia Nitrogen	mg/lit	50
6.	Total Phosphorous	mg/lit	5
7.	Sulphate	mg/lit	54
8.	Fecal Coliform	MPN / 100ml	10 ⁶
9.	Total Coliform	MPN / 100ml	10 ⁷
10.	Chlorides	mg/lit	200
11.	pH	-	6.2
12.	Oil & Grease	mg/lit	< 1

Table 8: Characteristics of sewage**5.3.3. Treated Water Quality**

S.NO	PARAMETERS	UNITS	VALUES
1.	BOD	mg/lit	< 20
2.	COD	mg/lit	< 250
3.	Total Suspended	mg/lit	< 30
4.	Nitrate Nitrogen	mg/lit	≤ 10
5.	Ammonia Nitrogen	mg/lit	< 50
6.	Total Phosphorous	mg/lit	≤ 5
7.	Total Coli form	mg/lit	≤ 1000 no/ 100ml
8.	pH	-	5.5 – 9
9.	Oil & Grease	mg/lit	≤ 5

Table 9: Treated water Quality

Description	Parameter	Inlet(mg/lit)	Outlet (mg/lit)	Removal Efficiency	Over all Removal Efficiency w.r.t raw sewage inlet
Grass Reactor	BOD	159	64	60%	60%
	COD	550	248	55%	55%
MBBR	BOD	64	<20	70%	92%
	COD	248	100	60%	78%
	TSS	170	30	83%	86%
Overall Efficiency					92 %

Table 10: Inlet & Outlet parameters of Sewage

The guaranteed quality provided in above shall be achieved subject to:

1. The feed quality is same as specified above. In case of any change in the quality of Feed water the same may have implications on operating parameters or on end results of the system.
2. The treatment plant is designed to tolerate some fluctuation in the input parameters and the system can work satisfactorily to achieve the limits established by the State Pollution Control Board.

6.0 Baseline Environmental Data

The baseline environmental studies help in assessing the existing environmental conditions of the study area and identifying the critical environmental attributes ,which would be monitored after implementation of the project .This would facilitate the comparison of the resultant environmental conditions in the post project scenario with the present day conditions and would help in preserving the environment without deterioration and safe guarding the interests of the study area .This chapter illustrates the description of the existing environmental status of the study area with reference to the prominent environmental attributes. The existing environmental setting is considered to adjudge the baseline conditions ,which are described with respect to various components of environment such as Air , Noise ,water and Land , Biological and Socio-economic environment.

The Present land use of the proposed site is vacant land and the land is owned by Salem Municipality and it is used to construct the sewage treatment plant of capacity 6 MLD and the extent of land is 1.04 Acres.

Presently sewage is flowing in the proposed site and joins in the river. There are residential houses located west to the site at a distance of 15 M. School and Corporation hospital were located in the west direction at 550 M and 1600 M distance. The surrounding features are existing urban structures and the proposed STP is designed so as not to disturb the existing everyday activities around.

During the field visits, the physical features and major activities were identified. Based on this, sampling locations for environmental quality monitoring were selected. Monitoring was carried out at these locations to assess the existing back ground environmental quality of the area. Ground water samples were taken at six different locations around the site at two places in Aishwarya Garden Ist Street, Aishwarya Garden IInd Street, Anaimeadu, Nandhavanam and Maravaneri. Air quality were checked adjacent Aishwarya Nagar, Weir constructed near Thirumanimuthar river & Inside Site. Soil samples are taken at three places and the details of testing and results are given in the annexure II.

Here, in this chapter the methodologies in testing procedures and results are listed as below.

6.1 Noise & Air

- The present noise levels are observed in the site and nearby area of the site. The results are seems to be below the Noise Standards in residential area.
- The Ambient Air Quality has been monitored around the surrounding areas of the site. At all location, the SPM values are found.

6.1.1. Methodology & Data

- The noise level in the site was measured during day time (between 6 AM to 6 PM) and during night time (between 6PM to 6 AM) with noise level meter and the average is found to be,

Day Time	:	34.12 dB
Night Time	:	16.78 dB

The city internal road passes on a bridge at about 10m from the proposed site and this area is prone for noise from road traffic. no other significant noise generators are located in vicinity. Observed noise level is below standards of residence noise level. After execution of the project, the operations of STP should not affect (or) exceed the standard limits 55 dB (daytime) & 45 dB (night time).Noise level will be monitored periodically for the safe level as given in the monitoring plan.

- The air quality was tested at three points,

1. High volume sampler at the adjacent aishwarya nagar
2. The weir constructed across river Thirumanimutharu
3. Inside the site

Suspended particulate matter was analyzed by weighing method of filter paper. The test was conducted for 6 hours of a single day and the level of SPM average concentration in ambient air was found to be 61 $\mu\text{g}/\text{m}^3$ which is less than standard limit 100 $\mu\text{g}/\text{m}^3$.

The value of SPM will not exceed the standard limit during operation of plant and it will be monitored for 3 seasons in a year.

6.2 Ground Water

The ground water samples are analyzed in and around the site, mainly the sampling source was bore well samples located near the site, as there were no major bodies located nearby. At all locations, pH values were in the range with agreeable colour, taste and odor.

6.2.1. Methodology & Data

Six Nos. of water samples were collected during the study period for Physicochemical after taking suitable precautions and analyzed as per Standard methods. Samples were collected for Chemical analysis as per procedure outlined in IS: 3025:P1:1999. Sterilized bottles were used for collection of water samples for bacteriological analysis, stored in icebox and

transported to the laboratory for the analysis. Parameters like pH; Temperature, BOD, Hardness, etc. were measured in the field while collecting the samples.

At all locations, pH values were in the range of 7.25 – 7.65 with agreeable color, taste and odor. Chloride and Sulphate values were in the range of 332 – 945 mg/l and 206 – 527 mg/l respectively. Hardness values were found to be in the range of 445– 1208 mg/l. Iron value was found to be within permissible limit ranging from 0.1 – 0.2 mg/l.

The ground water test report was attached and the parameters observed can be used as reference which will be periodically monitored and compared with future quality of ground water after operation of STP. Thus we can identify and analyze the impact of the treatment plant.

6.3 Soil

At all locations, pH ranges from 7.65 to 7.9. The Macro nutrients like Nitrogen, Phosphorus, Potassium and Micro nutrients like Iron, Manganese, Zinc were analyzed in all location in and around the site.

6.3.1. Methodology & Data

In order to assess the baseline status of soil quality of the project site and neighborhood, three sampling locations were selected. At each location, samples were collected using augers and analyzed for physical, micro and macro nutrient parameters. At all locations, pH ranges from 7.65 to 7.9. Nitrogen, Potassium and Phosphorus are found to be in the range of 1874 – 3005 Mg/kg, 535 – 655 Mg/kg and 692– 1219 Mg/kg respectively. Iron and Manganese was found to be in the range of 13511-17117 Mg/kg and 491 – 608 mg/kg.

The locations of sample taken and methods followed to testing of soil were briefly explained in Annexure II.

The observed soil quality will be compared with soil quality after execution and running of plant; from this we can ensure the negative & positive impacts of STP operation on soil quality. Refer Table: 14

7.0 Brief Description of Salem

Salem City Municipal Corporation is located at a distance of 340 km from South West of Chennai City. The location map of Salem city is enclosed in annexure. The city is surrounded by hills on the North, West and East. By virtue of its central location, Salem has become the meeting place of communication corridors via road as well as rail from North to South and from West to East traversing the state. The other important cities of TamilNadu viz. Trichy, Madurai, Coimbatore, Vellore etc., are at a distance varying from 140 to 250 km from Salem. Salem is well connected with the other cities both by rail & road, National Highways NH 7 and NH47 connects the Salem city with other parts of India. Salem is also an important Railway Junction in the Broad gauge rail network. River Thirumanimutharu flows right across the city. Hence the city is location on either bank of the river. Salem is also an important business center in Tamil Nadu. A number of Textile Industries, Sago Industries and

some Major Industrial units such as the Integrated Salem steel plant, Burn and Co., Dalmia Magnesite Ltd., Tamil Nadu Magnetite Ltd., is located here. Salem is also famous for Body building to Lorries, trucks and buses. Salem district is also having rich mineral deposits such as Magnetite, Bauxite, Iron ore and Limestone. An Underground sewerage scheme has been proposed for the City and the tendering work is in progress. It is proposed to provide a Sewage Treatment Plant at Anaimeadu (6 MLD) for treating the sewage generated from Zone IV of the City. The treated effluent is proposed to be let into the Thirumanimutharu river course.

7.1 Connectivity

Airport - The nearest airport to the anaimeadu is in Salem at a distance of near 28km.

Railway – The nearest railway station to the Anaimeadu is Salem Town Railway station at distance of 1 km. Distance of Salem Railway Station to the site is 9km.

7.2 Tourist Place in Salem

Yercaud
Namakkal
Erode
Hogenakkal
MM Hill

8.0 Predicted Impacts and Mitigation Measures

8.1. Introduction

When identifying the potential impacts of a new project on the existing environment, such as the proposed Sewage Treatment Plant at Salem, it is necessary that it should be measured against the existing baseline conditions. Construction of sewer line with sewage treatment plant and there after operation of this system, if undertaken without a proper understanding of the relationships inherent in environmental function, can be accompanied by disruptions to the environment, from which it may take a long time to regain equilibrium. In human terms, this may mean that generations must function in a debilitated environment and suffer many possible associated socio-economic hardships and financial losses. Some of the major environmental impacts of sewerage system include damage to local ecosystems, loss of productive agricultural lands, demographic change, accelerated urbanization, and introduction of disease.

The need of development and growth in the area must be matched with the conservation of the existing natural resources. In general, construction of a new sewage treatment plant will have a positive environmental impact on the town. It is expected to produce a long term improvement in public health of the residents Salem as well as to significantly reduce a source of chronic water pollution of an ecologically valuable portion if the water body where the sewage drains.

8.2 Impact Evaluation

8.2.1. Soil, Water and Air Environment

Any Project will have some impact on the surrounding Environment and it requires addressing the issues. The environmental impact and its management are to be assessed and planned to mitigate the possible issues.

8.2.2. Potential Impacts from the Proposed Project Activity

As the baseline data on the existing environmental facility are analyzed and recorded, the future impacts of the project are projected on the same environmental features.

This is an UGSS Project proposed for the sanitation of the city and its impact is quite obvious. They can be listed as;

8.2.3. Soil Quality & Ground water

The project will be constructed of “State of Art” technology without any changes of leakages or spillages in the project area. The treatment components will be built with reinforced cement a concrete (RCC) and Stainless steel unit which ensures no leakages in the tanks.

Hence the percolation of sewage into the ground will be reduced fully and hence will not have any impact on ground water. The details of analysis report of existing ground water are presented in this report (Annexure II & Annexure IV). The continuous monitoring of ground water & soil quality may be done periodically after the execution of the project. Refer: Table 8.6 EMP Table

8.2.4. Impact due to Disposal method

(i) Disposal of treated effluent:

There is no land discharge of treated sewage in this project. The treated sewage will be disposed into the Thirumanimuthar River by means of concrete lined open channel.

The River Thirumanimuthar is presently carrying the sewage generated from the Salem Municipality Area in untreated condition. This is continued throughout the year and hence there is no recipient water in the River, except during times of heavy rain fall in the catchments area. The flooding of the River lasts for a few hours and then recedes immediately. During such floods, the sewage from the city continues to flow into the River through the many out falls and hence the sewage gets diluted due to heavy rains.

And at all other times of the year, the River carries untreated sewage throughout the downstream of the river. The sewage thus flows in the river causing unhygienic conditions through the area it passes and percolates into the ground after it passes city limits.

After the implementation of the UGS Scheme, the treated sewage will be let into the River, which will improve the hygiene of the city.

To ensure this, a graphical trend of the ground water quality can be analyzed and recorded every year for the essential parameters starting from the base line quality data.

There is no proposal for the discharge of treated sewage on lands.

The possible aspects of the disposal of treated effluent are addressed.

- | | |
|--|---|
| 1. Quality of treated Effluent | The sewage will be treated to the Standards mentioned by the State Pollution Control Board. |
| 2. Recipient body Quality | River Thirumanimuthar is the recipient body where untreated sewage is flowing |
| 3. Changes in the recipient Body | After implementation of the UGSS, only treated sewage will be flowing into the River. The River which carries the untreated sewage, will carry treated sewage in future. The positive impacts of the discharging the treated sewage will be appreciated by the downstream people. |
| 4. Water intakes in the Downstream of Recipient body | There are no any River intake structures in the river since the River carries only raw sewage presently. The Municipal Corporation conveys water from Mettur Dam and supplies to the public through its distribution networks. Hence there is no issue on downstream drinking water source. |

(ii) Sludge Disposal

The sludge generated from the Treatment systems will be decanted through a centrifuge mechanism and the sludge cakes are collected and it ready for disposal by corporation. Centrate from the centrifuge will be recollected in the receiving sump again

8.2.5. Impact on Air/Odor

Sewage treatment based on anaerobic method using MBBR technology will produce methane gas generally. But in our project even possibility of generation of methane gas is very less because BOD value at MBBR is 64 mg/lit. And gas flare system used for firing of methane gas if produced. So there is no possibility of impact of methane gas to ambient air.

Emissions from Exhaust of DG set (Standby power option) have parameters within limit of prescribed APC measures by norms of TNPCB. New DG will be commissioned as per these conditions only and it doesn't exceed the limits. But after commissioning, during operation once in every year it was necessary to monitor the quality of the exhaust.

The sewage when stagnated at a point will become stale and will be a source of odours, due to putrefaction of organic matter.

In this STP the sewage entering into the facility is continuously subjected to treatment in various unit operations successively. There is no stagnation or storage of sewage.

Further the first treatment after screening the sewage will be an anaerobic treatment in closed RCC tank. The products of the "grass Reactor" will be a mixture of methane and CO_2 , which is fired in a flare stack. In this anaerobic treatment the odour from the sewage will be removed to significant level. Due to the successive aeration and chlorine contact treatments, the problem of odour is completely eliminated.

There are no changes of odour pollution due to the operation of this STP primarily due to the methods adapted in the treatment scheme.

8.3. Disposal of Treated Sewage

The treated sewage will be let out into the Thirumanimuthar River by open channel.

9.0 Environment Management Plan- (EMP)

M/S. RAMKY INFRASTRUCTURE LTD has a comprehensive Environment Management Plan in every scheme of its implementation.

In the case of the STP project proposed at **Anaimeedu, Salem**, the prime issues have been identified and the measures are addressed.

9.1. Study of the Impacts Due To Projects

The proposed site for the sewage Treatment Plant is a vacant site belongs to Salem Municipal Corporation. The site is full of wild growth of vegetation through which, part of the sewage flows through, before joining Thirumanimuthar River.

On the Eastern side of the proposed site, Thirumanimuthar is passing adjacent on the western side of the site, the habitation Aiswarya Nagar is located. On the Northern side, there is canal crossing sewage and a coconut grove is located. On the Southern side, there is a road bridge carrying road traffic is located.

On general observation the habitation Aiswarya Nagar adjacent to the project site is of much significance, since the habitation is at a distance of 10m.

The Project by itself is an Environmental Project intended for treating the domestic waste water generated from the community. It is a treatment facility and not a Manufacturing facility. There is no generation of trade effluent and no air emissions due to the operation of this facility.

This facility will remove the harmful factors in the sewage and renders a safe sewage which can be discharged safely into the Thirumanimuthar River which can be utilized for irrigation in the downstream of the River. It can be seen that River carries untreated sewage presently.

9.2. Mitigatory Measures - EMP

On studying the nature of the project, it is ascertained that there are no significant features which may affect the Environmental factors in the locality. However the baseline data on soil, Water Air and Noise levels are analyzed and recorded, for future monitoring of the Environmental conditions.

9.2.1. On soil

There is no discharge of sewage on soil. It is suggested that the soil characteristics at the Project site can be analyzed recorded at a certain periodicity.

At present the soil from the site area was collected and analyzed in the soil testing laboratory and the report of analysis is enclosed in Annexure – II.

9.2.2. On ground water Quality

Since the baseline data on ground water quality is already recorded, the water samples can be analyzed and the trend of various parameters may be recorded. Water samples can be

collected in the wells at a periodicity of once in six months and the values may be recorded graphically.

9.2.3. On Air Quality

There are no process air emissions due to the operation of this sewage treatment facility. The Diesel generator set will be box enclosed with proper exhaust pipe. Emissions from Exhaust of DG set (Standby power option) have parameters within limit of prescribed APC measures by norms of TNPCB. New DG will be commissioned as per these conditions only and it doesn't exceed the limits. But after commissioning, during operation once in every year it was necessary to monitor the quality of the exhaust

9.2.4. Odor control

The sewage when stagnated at a point will become stale and will be a source of odours, due to putrefaction of organic matter.

In this STP the sewage entering into the facility is continuously subjected to treatment in various unit operations successively. There is no stagnation or storage of sewage.

Further the first treatment after screening the sewage will be an anaerobic treatment in closed RCC tank. The products of the "grass Reactor" will be a mixture of methane and CO₂, which is fired in a flare stack. In this anaerobic treatment the odour from the sewage will be removed to significant level. Due to the successive aeration and chlorine contact treatments, the problem of odour is completely eliminated.

There are no changes of odour pollution due to the operation of this STP primarily due to the methods adapted in the treatment scheme.

9.2.5. Solid Waste management

There are two types of solid waste generated from this facility.

- (i) In primary the wild vegetation such as leaves, water hyacinth, medium & large floating and oversized material such as plastic rags, debris, weeds, paper, cloth, rags etc which gets trapped in the bar screen at the entry of sewage into the facility. Also particles escaped from screening units were separated in grit separator mechanism its ranges above 150 micron size.
- (ii) The sludge generated from the centrifuge will be in the form of sludge cakes.

The materials removed from bar screens and grit separator were collected and given to municipal along with centrifuge sludge.

The STP sludge can be disbursed to farmers to be used as manure. The sludge contains Organic nutrients and bacterial bio mass. Since both the Anaerobic and Aerobic systems are provided in the lamella clarifier the sludge will be a minimum quantity and hence easy to handle and dispose.

9.2.6. Pre Construction, Construction & Post construction Phase Impacts

Sl.No.	Potential Negative Impacts	Mitigation Measures	Time Frame	Responsible agencies
1.PRE-CONSTRUCTION STAGE				
1.1	Clearances	All clearance required for environmental aspects during construction shall be ensured and made available before start of work.	Before construction	Corporation concerned Departments & agency/ Ramky Infrastructure Ltd., Chennai.
1.2	Tree cutting	There is no tree cutting activity in site construction area.	Pre- construction & construction phase	Ramky Infrastructure Ltd., Chennai.
1.3	Utility Relocation	The common utilities like telephone cables, electric cables, electric poles, water pipelines, public water taps, etc will not be affected by construction and operation of the proposed STP site.	Pre-construction & Construction phase	Ramky Infrastructure Ltd., Chennai.
1.4	Baseline parameters	Baseline parameters have been recorded during the EA study and monitoring would be carried out as per plan provided.	Preconstruction, Construction and post construction phase	Ramky Infrastructure Ltd., Chennai.

1.5	Planning of temporary traffic arrangements.	There will be no major impact on Traffic due to the proposed project. And also it will not affect the roadways and pathways.	Pre-construction & construction phase	Prospective contractor/ Agencies
1.6	Disposal of treated waste water.	<p>i) Since the Consent to Establish has been obtained from TNPCB, the construction activity of STP will be started and operation activities for STP will be initiated only after obtaining Consent to Operate from TNPCB.</p> <p>ii) The quality of treated sewage will comply with the discharge standards for disposal into water body.</p> <p>iii) Performance standards will always be maintained, ensuring efficient working condition of treatment plant.</p>	Pre-construction & construction phase	Till O& M period (Upto 5 years)It was responsible by Ramky Infrastructure Ltd. ,after that Salem Municipal Corporation will be responsible.
1.7	Storage of materials	Pipes and other construction materials would be stored in the shed with asbestos roofing at vacant portion available in the STP site.	Pre-construction & construction phase	Ramky Infrastructure Ltd., Chennai.

1.8	Construction of labour camps	A Labour Camp was established within the STP site for temporary shelter to the labour deployed for construction activities.		Ramky Infrastructure Ltd., Chennai.
2.	CONSTRUCTION STAGE			
	Construction of Sewerage Treatment Plant			
2.1	Compensatory plantation of trees	There is no tree cutting involved. 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.	Preconstruction And construction	Ramky Infrastructure Ltd., Chennai.
2.2	Protection of top Soil & 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.	During construction	Ramky Infrastructure Ltd., Chennai.
2.3	Disposal of construction debris and excavated materials.	A suitable site should be identified for safe disposal, in relatively low lying areas, away from the water bodies, residential and agricultural fields etc., and got approved by the Engineer. Care should be taken that dumped material does not affect natural drainage system.	During construction	Ramky Infrastructure Ltd., Chennai.
2.4	Pollution from Fuel and Lubricants	i) All location and lay-out plans of such sites will be submitted prior to the	Construction and operation.	Ramky Infrastructure Ltd., Chennai.

		<p>establishment and will be approved by the Engineer.</p> <p>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.</p> <p>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 approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with MoEF and state PCB guidelines.</p>		
2.5	Contamination of ground water quality.	Does not contaminate the ground water, 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 construction and operation	Ramky Infrastructure Ltd., Chennai.
2.6	Water Pollution From construction wastes.	All precautionary measures will be taken all to prevent the wastewater generated during construction from entering into	During Construction	Ramky Infrastructure Ltd., Chennai.

		streams, water bodies or the irrigation system. All waste arising from the project is to be disposed off in the manner that is acceptable by the Engineer.		
2.7	Informatory Signs and Hoardings	Erection and maintenance of informatory, safety signs, boarding written in English and local language wherever required will be provided.	During construction	Ramky Infrastructure Ltd., Chennai.
2.8	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. 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	During construction	Ramky Infrastructure Ltd., Chennai.

		as per IS provision and to the satisfaction of the Engineer.		
2.9	Disposal of treated waste water.	i) The treated water quality will be complied with the standards of TNPCB before let out into the stream and necessary permission will be obtained from the concerned department. ii) Efficient working condition of treatment plant will be maintained.	Operation stage.	Ramky Infrastructure Ltd., Chennai.
2.10	Disposal of Sludge	Sludge generated by centrifuge can be collected from the blowdown of the machine and can be transferred to trolley/vehicles by corporation	Operation.	Salem Municipal Corporation
2.11	Labour camp & Facilities	A Labour Camp was established within the STP site for temporary shelter to the labour deployed for construction activities.	During pre-construction and construction	Ramky Infrastructure Ltd., Chennai./ Corporation
2.12	Safety Aspects	i) Adequate precautions will be taken to prevent the 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	During construction	Ramky Infrastructure Ltd., Chennai.

	<p>be provided to all the workers employed on mixing of materials like cement, concrete etc.</p> <p>iv) Welders protective eye shields will be provided to workers who are engaged in welding works.</p> <p>v) Earplugs will be provided to workers exposed to loud noise, and workers working in crushing, Compaction or concrete mixing operation.</p> <p>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.</p> <p>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.</p> <p>viii) We will not employ any person</p>		
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		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.		
2.13	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.	During construction	Ramky Infrastructure Ltd., Chennai.
2.14	Tree Protection	Existing Trees will not be disturbed during construction of STP. In site ,there are Two		
3.0	Environmental enhancement and special issues		Location	Implementing Agency
3.1	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	Project area	Ramky Infrastructure Ltd., Chennai.

		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.		
3.2	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	Ramky Infrastructure Ltd., Chennai.
3.3	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	Ramky Infrastructure Ltd., Chennai.
3.4	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	Ramky Infrastructure Ltd., Chennai.

3.5	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.	Project area	Ramky Infrastructure Ltd., Chennai.
3.6	Tree Protection,	<ul style="list-style-type: none"> • Giving due protection to the trees that fall in the shoulders /corridor of impact shall be the prime Focus during Construction/post construction • Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars, use of plate compactors near trees may also be considered where necessary 	Project area	Ramky Infrastructure Ltd., Chennai.

Table 11: Pre construction, Construction & Post Construction phase impacts

9.3. Provision for Future Expansion of the Scheme

The Sewage Treatment Plant is designed for a capacity of 6MLD. However, to accommodate a higher capacity considering the future expansion of the whole scheme in the locality, provisions are made in the following treatment units so as to treat a capacity of 8 MLD.

(i) Grass Rector .

This rector is the core unit of the entire treatment system. The system of the rector is designed for a maximum safe flow rate of 562m³/hr which permits the expansion of treating 8MLD of sewage.

(ii) FAB / Moving Bed Bio – Reactor Plant.

For accommodating a future expansion in this unit the space requirement is considered and provision is made as such.

The above two aspects can accommodate a future expansion in this STP, to treat a total of 8MLD. The other treatment units, pumps & accessories can be operated for a total of 8MLD.

9.4. Details on Individual Units with Material Data & Safety Aspects.

We considered the SS material as per the tender which is as follows.

Sl.No.	Equipment Name	Parts particular	MOC
1.	Manual bar Screen	Fine & Coarse bar screen	Stainless Steel(SS)
2.	Mechanical bar screens.	All parts of screen including fixed bars, raking mechanism, screen frame and guide rails and discharge chute.	SS
3.	Grit separator	Discharge screw and Weirs	SS
4.	Submersible pump	Impeller, Foundation bolts, Wire rope for lifting and guide rail wire	SS
5.	Polyelectrolyte Agitator	Impeller shaft.	SS
6.	Poly dosing Pump	Head assembly.	SS
7.	FAB/MBBR Tank	Air grid pipes	SS
8.	FAB/MBBR Reactor	Media retaining screen.	SS
9.	Centrifuge	Wetted parts	SS

Table 12: Material Data

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.

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).

Safety in equipments

1. Level switch is provided in sewage transfer pump to avoid bursting of pump coil due to no load.
2. Level Switch and Limit switch is provided in Mechanical Fine & Coarse bar screen to avoid overload and no load.
3. Limit switch is provided in Centrifuge to avoid overload and no-load.
4. Safety valve is provided in Air Blower for any pressure drop occur in blower.
5. In Grid Separator Motor tripping arrangement is provided in drive system when rack arm was loaded.
6. In Lamella plate clarifier tripping arrangement is provided of rack arm drive motor.
7. Shall take all required precautions to prevent danger from all electrical equipments.
8. In gas flare system, Pressure switches are provided to control the pressure in the pipelines and flare systems.

Sl. No.	Description	Qty	Process issue	Remedial	Mechanical issues	Remedial measures	Remarks	Personal protective Equipments
1.	Manual Coarse bar screen	1	Nothing expected if routine manual cleaning practiced	Periodical cleaning Shall be done.	Nothing Expected		Manual Screens will be used when either of mechanical coarse or fine screen break down or conveyor breakdown	High-vis jacket or vest, hard hat, water proof safety boots, gloves, dust mask, ear protectors and safety glasses.
2	Manual Fine bar screen	1	Nothing expected if routine manual cleaning practiced	Periodical cleaning Shall be done.	Nothing Expected		Manual Screens will be used when either of mechanical coarse or fine screen break down or conveyor breakdown	High-vis jacket or vest, hard hat, water proof safety boots, gloves, dust mask, ear protectors and safety glasses.
3	Mechanical coarse bar screen	1	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 cylinders, frequently check the spring		
					Gear unit for any damage, loose connection or if any circuit breakers has tripped.	Repair/replace gear unit correct the connections/reset the circuit breaker.	Manual screens will be used when the mechanical screen under maintenance.	High-vis jacket or vest, hard hat, water proof safety boots, gloves, dust mask, ear protectors and safety glasses.
4	Mechanical fine bar screen	1	Clogging of screen	Periodical clg. Shall be done	Low oil level due to oil leakage.	Tighten the connections and/or change the hoses. Exchange the seals of cylinders, frequently Check the spring.		

					Gear unit for any damage, loose connection or if any circuit breakers has tripped.	Repair/replace gear unit correct the connections/reset the circuit breaker.	Manual screens will be used when the mechanical screen under maintenance.	High-vis jacket or vest, hard hat, water proof safety boots, gloves, dust mask, ear protectors and safety glasses.
5	Grid Chamber	2	Carryover of grit	Remove grits 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, hard hat, water proof safety boots, gloves, dust mask, ear protectors and safety glasses.
6	Grass reactor	1	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, hard hat, water proof safety boots, gloves, dust mask, ear protectors and safety glasses.
			Methane gas	Monitoring	Improper	Regular		

		1	leakage	pressure level and valve positions of the Flaring system	functioning of pressure switches and safety valves.	Monitoring of safety valve & pressure switch functioning and proper lubrication		
7	MBBR	1	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, hard hat, water proof safety boots, gloves, dust mask, ear protectors and safety glasses.
8	Chlorinator	1	Excessive/Less dosing of Chlorine	The operators should be careful in administering calculated doses accurately	Leakage of Chlorine gas form cylinder	Regular preventive maintenance is as follows 1. Daily inspection of all chlorine cylinders. 2. Ammonia bottle with dipping torch to check for chlorine leaks. 3. Chlorine cylinders storage building should be well ventilated.		High-vis jacket or vest, hard hat, water proof safety boots, gloves, dust mask, ear protectors, safety glasses. And emergency eye wash and shower.

9	Centrifuge feed pump	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, hard hat, water proof safety boots, gloves, dust mask, ear protectors and safety glasses.
10	Poly dosing pump	1				Frequently Checking the suction strainer and discharge head.		
11	Sludge pump	2 (1W +1S)			Pump Failure due to wear and tear of stator, rotor, bearing, shaft	Routine maintenance such as glad packing, impeller & shaft alignment with	Standby unit will be used during maintenance	High-vis jacket or vest, hard hat, water proof safety boots, gloves, dust mask, ear

					and pump choking. Fluctuation in power	adequate spare at site.		protectors and safety glasses.
12	Centrifuge	2 (1W +1S)			Centrifuge failure due to wear and tear of decanter shaft bearings	Regular preventive maintenance such as lubrication, topping of oil and alignment check to be done.		High-vis jacket or vest, hard hat, water proof safety boots, gloves, dust mask, ear protectors and safety glasses.
13	DG	1		Power failure			DG set will be operated during power failure. Preventive Maintenance is 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.	High-vis jacket or vest, hard hat, water proof safety boots, gloves, dust mask, ear protectors and safety glasses.

							Shutdown periods. 4. Daily check the fuel level.	
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Sl. No.	Description	Issue	Preventive measures
1	Grass Reactor	Overflow	In case the problem occurs in Grass Reactor at that time the water is bypass from grit separator to MBBR tank. Refer Fig 7.
2	MBBR tank	Overflow	The MBBR tank have problem means we will bypass Grass Reactor to Grit Separator. Refer Annexure

3	Sewage Treatment Plant	Unexpected plant shut down	At the time of unexpected shut down we will do the minimum pretreatment and bypass the sewage water from grit separator to drain trench which is directed to Thirumanimuthar river. Refer Fig 8. Due to this bypass activity, overflow of all process tanks can be avoided and maintenance of mechanical equipments like blowers & pumps can be carried out without stagnation of sewage. For maintenance work it will take 3-4 hours to complete. During that time the Biological process will not affect. After completion of maintenance work the system will startup immediately.
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Table 13: Preventive Measures & Remedial Activities

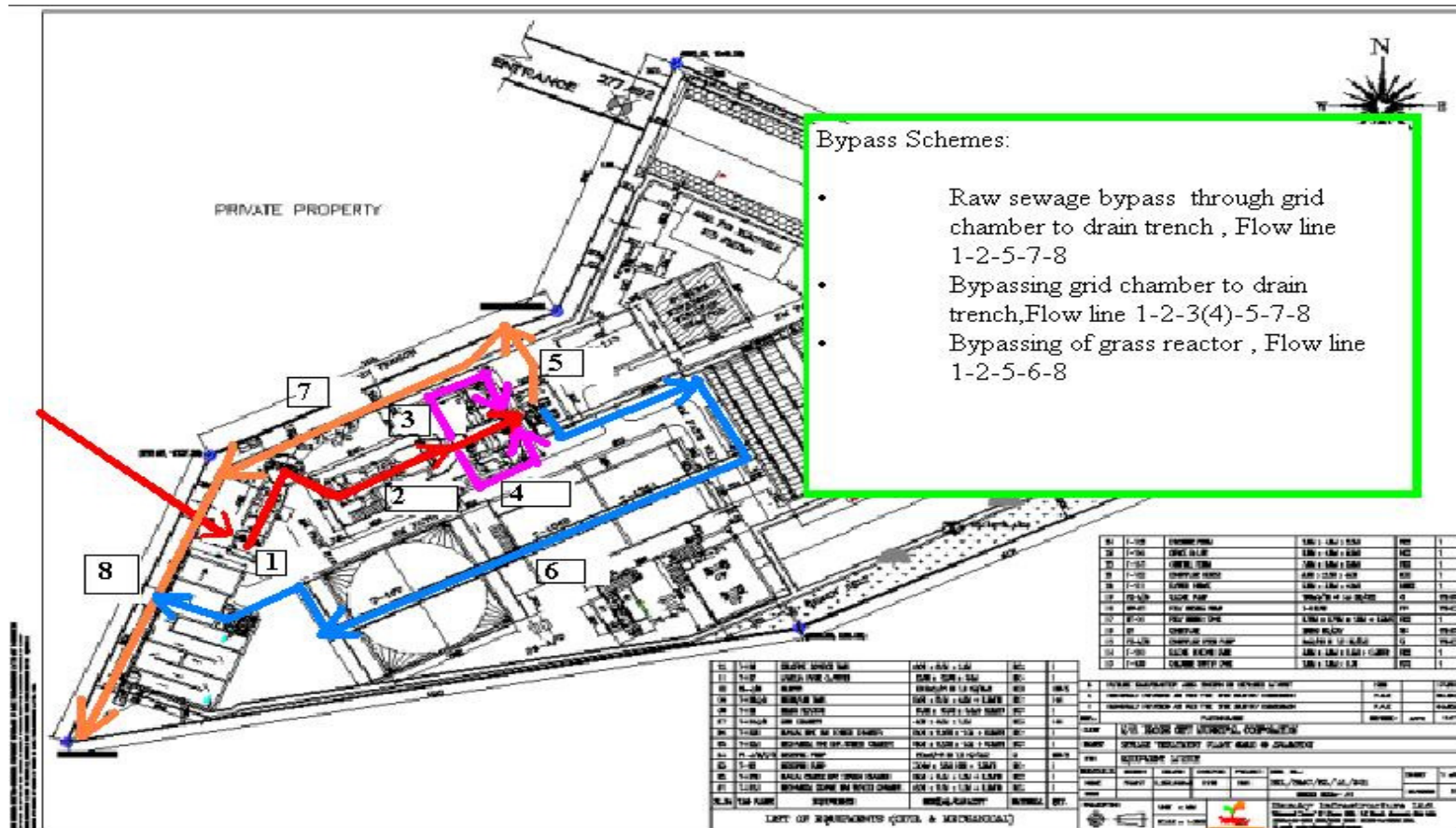


Fig 8: Bypass Arrangement

9.5. Greenbelt Development Plan

The total area available for this facility is 1.05 acre amidst Municipality Corporation area. Out of this area, the internal road, various treatment units, electrical room, Diesel Generator, operations control room etc are to be provided. Every square foot is carefully utilized to accommodate the units of the sewage treatment Plant and no place is left unutilized.

However the trees already in existence in the site area will be maintained. Ornamental plant species will be grown in the premises of the facility to render a pleasant appearance and a good housekeeping will be maintained. A clean, odor – free environment will be maintained in the facility.

We allotted the green belt area that is 234m². We are planning to grow Neem trees in that green belt area and the distance between the trees are 10m (Ref Fig 9.). And then, out of STP area but in corporation land, trees are available near primary treatment area. These trees will help in reduction & control of odor from the primary treatment area. (Ref Fig 9.) Protection of these trees from cutting of them in future is advisable to prevent from air pollution near the residential area.

Properly designed green belt would help in mitigating the vehicular and noise pollution to a significant degree. Greenbelt will be developed around the proposed unit with the objectives of attenuating noise levels and creating aesthetic environment. The preparation for the green belt plantation, such as conditioning of the soil, land scaping etc., will be carried out before the monsoon sets in .The major green belt plantation will be taken up during the rainy season. Monitoring the green belt in daily basis and implement the necessary measures ensuring the enrichment of nutrients to trees thorough the bio fertilizers, water requirements, pesticides for the infected trees and clean the fallen leaves and planting the requirement of trees accordingly will lead better protection from Air & Nose Pollutants.

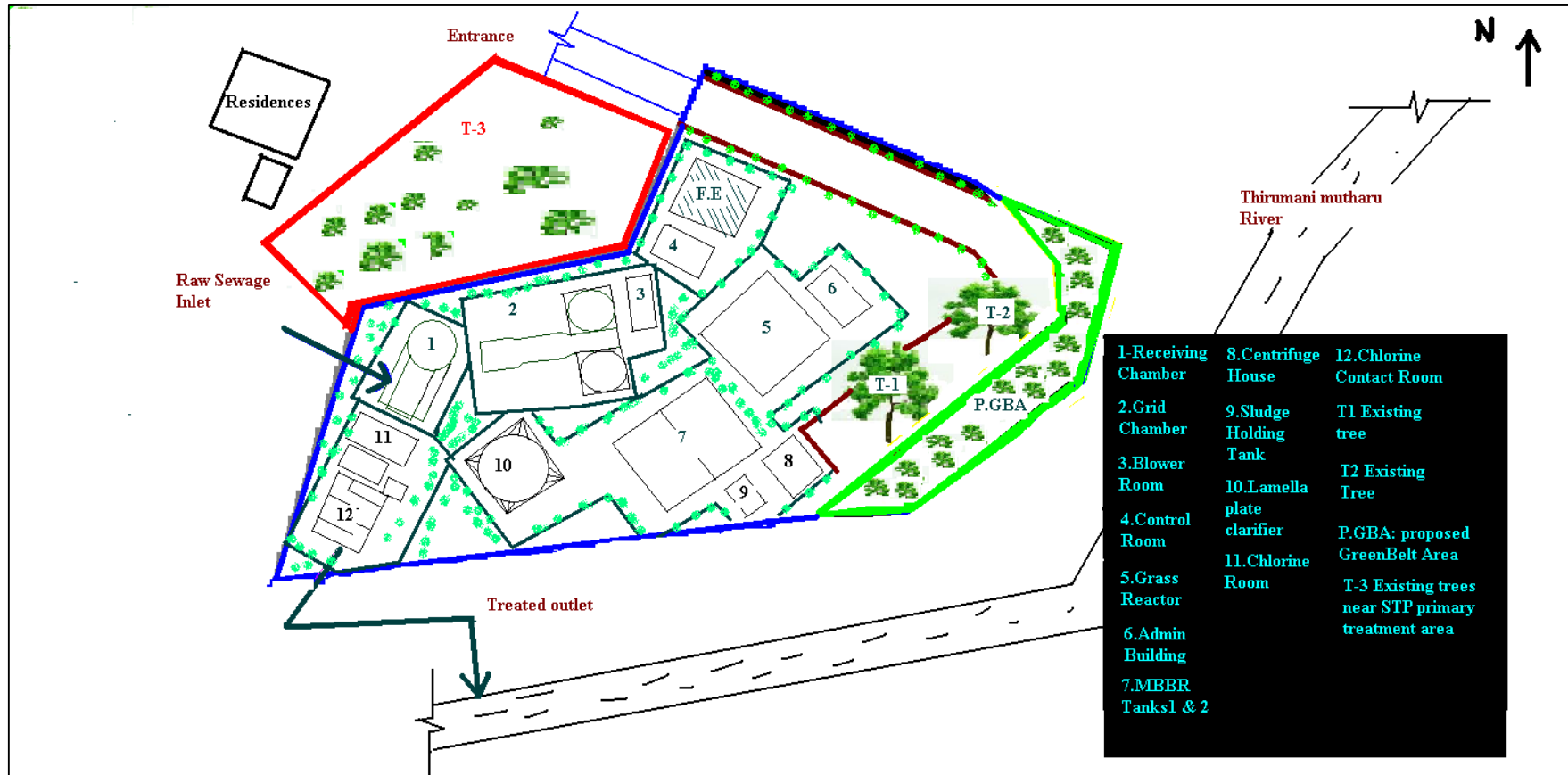


Fig 9: Green Belt Development Plan

9.6. Monitoring Plan

Sl.No	Description	Location	Frequency of Monitoring	Funds Allocation/5 year
1	Sewage Water	At the Inlet & outlet of STP	Daily basis by the proponent and once in month by approved laboratory	2 Locations x Once in month x 12 Month x 5 years x 1500 rupees = <u>Rs. 1,80,000.00</u>
2	Ground Water	Aishwarya Garden Ist street, Aishwarya Garden IInd street, Aishwarya Garden Ist Street, Anaimeedu, Nandhavanam , maravaneri	Once in 3 Months at 6 Locations	6 Locations x Once in 3 month (4 times/year) x 5 years x 1500 rupees = <u>Rs.1,80,000.00</u>
3	Soil Test	3 Locations: Refer : Annexure II	Once in Year at 3 Locations	3 Locations x Once Year x 5 years x 7000 rupees = <u>Rs. 105000.00</u>
4	Noise	1m distance from the Blower 15m distance in west direction from Blower 1m distance from Centrifuge 1m distance from sludge transfer Pump	Once in three Months at 4 Locations	4 Locations x Once in 3 month (4 times/year) x 5 years x 500 rupees = <u>Rs. 40,000.00</u>
5	Air Quality	High volume sampler adjacent Aishwarya Nagar, Weir constructed near Thirumanimuthar river & inside site	Three times per year	3 Locations x 3 times/year x 5 years x 1000 rupees = <u>Rs.45,000.00</u>
6	DG Set Exhaust Monitoring	Monitoring of Exhaust smoke	Once in Year at exhaust smoke of DG	Once in year x 5 years x 1000 rupees = <u>Rs.5000.00</u>
Total				Rs.5,55,000.00

Table 14: Environmental Monitoring Plan

9.7 Cost Estimation

Cost for Environmental measures & planning are shown in the below table. We have provided 3.0 % of the Total project value as the capital investment and recurring expenses for Environmental Management plan.

Sl.No	Operation & Maintenance Expenditures	Capital cost /Year(Rs)	Recurring Expenses/year(Rs)	Recurring Expenses/ 5 year (Rs)	Total cost/5 year(Rs)
1	Monitoring Plan	1,11,000.00	1,11,000.00	5,55,000.00	6,66,000.00
2	Green belt & Development	20,000.00	5,000.00	75,000.00	90,000.00
3	Safety training Program & Personal Protective Equipments	600,000.00	80,000.00	4,00,000.00	10,00,000.00
4	Health Monitoring	200,000.00	75,000.00	3,75,000.00	5,75,000.00
Total					Rs.23,31,000.00

Table 15: Compliance Matrix

9.8 Compliance Matrix

Sl.No.	Condition	Status
1.	Standby arrangement for all critical components like pumps, blowers etc.	Standby provided for receiving sump pump, sludge pump, blower, centrifuge, centrifuge feed pump and also for dosing pumps
2	Necessary safety measures like gas leak detecting system, safety kit etc.	Provided. Refer chapter 8.5
3.	25 % of land area acquired by the unit shall be utilized for green belt with trees planted at the rate of 400trees/hect. The corporation shall develop green belt of 25m width all around the proposed STP.	We allotted 234 sq.m areas for green belt. We planned to grow neem trees at a distance of 10m.
4.	The corporation shall provide rain water harvesting facilities wherever possible to increase the recharge of ground water.	Rain water harvesting arrangement will be provided.
5.	The STP operation shall not lead to any public compliant	During construction, construction activities will be done without affecting environment conditions and public. And also process equipments and operations designed with all safety measures required.
6.	The corporation shall install Electro Magnetic flow meter with computerized recording system at Inlet/Outlet of STP.	As per tender document we will provide Pharsall Flume with ultrasonic flow meter for flow measurement.

7.	The operation of STP shall not give rise to any objectionable odour.	During operation there is no chances of rise in odour.because, all process scheme designed which does not lead for any stagnation of sewage. Methane gas produced in the GRASS reactor is very low and is combusted by gas flare system.
8.	Manual cleaning of effluent tanks must be avoided and mechanical means must be adopted. Accumulation of sludge in effluent tanks must be avoided.	Considered.
9.	The corporation shall declare the land for a radius of 100meters as no development activities in consultation with DTCP.	Salem Municipal Corporation will take care.
10	No flooding of treated/untreated effluent is permitted in the STP area.	Bypass arrangement provided in case of any unexpected plant shutdown or maintenance. So there is no possibility of flooding of treated/untreated effluent.
11	The quality of treated sewage shall be got analyzed regularly once in month and report shall be furnished to TNPCB	Quality of treated outlet and inlet will be monitored on daily basis. And monthly once the characteristics of treated sewage will tested by approved laboratory and the report will be submitted to TNPCB
12	The corporation shall provide necessary storm water drain in and around the sewage treatment plant site and ensure that there will not be any water logging.	Around STP area, there is provision made for drain collection during rainy season and flood by means of concrete lined channel.
13.	Uninterrupted power supply to the sewage treatment plant to operate continuously. The corporation shall	Diesel generator set is provided for the operation of full plant without

	have standby power supply to the STP.	interruption during power failure.
14	The sludge from the centrifuge is in un digested form. It should be properly handled and disposed off after stabilization. The STP sludge shall be used for green belt development.	Sludge from centrifuge mechanism will be collected for disposal of it by means of trolley or vehicles by corporation.
15.	The screening waste collected from the fine screen and grit removal unit shall be properly collected and disposed.	Salem Municipal Corporation will take care.
16.	The corporation shall have line data on ground quality at least in 6 locations around the STP site in consultation with District Environmental Engineer, TNPCB and periodically monitor the ground water quality in the same locations once in six months. The complied data shall be furnished to District Environmental Engineer once in a year.	Six location ground water quality is analyzed and the report is attached Refer Annexure IV
17.	Provide compound wall on all sides STP area	Around STP compound wall will be provided.
18.	The corporation shall provide APC measures as proposed to DG set so as to achieve AAQ/emission standards prescribed by the board.	DG set which will be commissioned to be tested as per APC measures. And the exhaust smoke measure will be conducted once in every year.

Table 16: Compliance Matrix

10.0 Summary & Conclusion

The Sewage Treatment Plant is designed and executed to treat 6MLD of sewage generated from plant of the Salem Municipality Corporation. Latest Technology is adopted in the design of the scheme and the execution will be done without much impact on the Environmental factors. With the available space for a plant of this capacity, RAMKY INFRASTRUCTURE LTD has taken it as a challenge to accommodate and complete the project without impact on the Environment in the vicinity.

Basically the Project itself is a sanitary scheme, which is intended to ensure a hygienic condition in the city area. Obviously the implementation of the Sewage scheme will have a much positive impacts in the improvement of the Environmental Aspects in the area.

The Ground Water quality in the total scheme area will be improved since the percolation of sewage is totally avoided after the implementation of the scheme.

The odour nuisance presently prevailing due to some stagnant packets of sewage in the zone area will be eliminated since there will not be any stagnation after the Project.

There is no significant change in the Air Quality since there is no dust emission or gaseous emission in the process. Since the product gases of anaerobic treatment unit will be flared up in the flare stack, no gases will be allowed to mix with atmosphere.

The Project after implementation will be maintained for 5 years by M/s. RAMKY INFRASTRUCTURE LTD which ensures perfection in the maintenance and operation systems. The Project ensures a much better Environment in the urban area of Salem Municipality.

The mitigatory measures can be reviewed periodically for continuous improvement after completion of the Project.

ANNEXURE – I

THE SIZES OF VARIOUS TREATMENT UNITS AND DESIGN CRITERIA

SCOPE OF CIVIL WORKS AS PER THE TENDER LAYOUT:

S.No.	Qty.	Description
1.	1 No.	Receiving Sump of size 2.5m x 2.5m x 3.152m in RCC below the ground level
2.	4 No.	Screen chamber to suit Manual, Automatic Fine and Coarse screen for size 2.0m x 0.65m x 1.0m in RCC above the ground level
3.	1 No.	Grit chamber of size 4.0m x 4.0m x 1.0m in RCC above the ground level
4.	1 No.	Grass Reactor of size 15.6m x 15.6m x 6.0m in RCC above the ground level
5.	1 No.	MBBR tank of size 5.52m x 5.52m x 5.0m + 0.5m FB in RCC above the ground level
6.	1 No.	Lamella Clarifier of size 12m x 12m x 3.5m Ht in RCC above the ground level
7.	1 No.	Chlorine contact tank of size 8.0m x 8.0m x 2.0m in RCC above the ground level
8.	1 No.	Safety tank for chlorinator of size 2.0m x 3.0m x 1.5m in RCC above the ground level
9.	1 No.	Centrifuge house of size 4.0m x 3.0m x 4.0m height in RCC
10.	1 No.	Blower house of size 5.0m x 3.0m x 4m head room in RCC
11.	1 No.	Control Room of size 7.0m x 5.0m x 4.0m head room in RCC
12.	1 No.	Office Room of size 6.0m x 4.0m x 4m height head room in RCC
13.	1 No.	Gas chlorinator room of size 4.0m x 4.0m x 5.0m Head room in RCC
14.	1 Lot.	Compound wall for the boundary along with MS gate
15.	1 Lot.	Approach Road as per our layout
16.	1 No.	Sludge holding tank of size 3.5m x 3.5m x 1.5m + 0.5m FB in RCC above the ground level
17.	1 No.	Poly dosing tank of size 0.75m x 0.75m x 1.0m + 0.3m FB in RCC above the ground level.
18.	1 Lot.	Equipment foundation for all the pumps, motors and individual unit operation.

ANNEXURE – II**Soil Test Report****KM****FOUNDATION CONSULTANTS**

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e-mail: kmuthukrishnaiah@gmail.com*Dr. K. MUTHUKRISHNAIAH*

[Formerly Professor & Head of the
Department of Ocean Engineering, IIT Madras]

No. KMFC/ Ramky/WaterChennai/Salem/633
Date. 07.03.2011

**REPORT ON
SUBSOIL INVESTIGATION AND RECOMMENDATIONS FOR SUITABLE
TYPE OF FOUNDATION FOR THE PROPOSED CONSTRUCTIONS AT SALEM
CORPORATION, ANAAMEDU, SALEM**

1. INTRODUCTION

Soil investigation bore holes and continuous cone penetration tests were made on 27.02.2011 for the proposed Constructions at Salem Corporation, Anaamedu, Salem..

Results of the soil investigation and recommendations for suitable type of foundation for the proposed constructions are presented in this report.

2. FIELD INVESTIGATION

Three bore holes and three continuous cone penetration tests were made by M/s. Geo Consultants, Chennai at locations shown in Fig.1. The bore holes were made using auger and representative soil samples were collected from the bore holes at every 0.3 m depth intervals. The bore holes were made up to either 6 m depth below the existing ground level (EGL) or up to a hard stratum, whichever is earlier. The diameter of the bore holes was 150 mm.

Ground water table was met with at a depth of 2.1 m only in Bore hole 2: not met with in the other two bore holes, during boring.

Continuous Cone Penetration Tests (CPT) were conducted near each bore hole location. The cone penetration tests consist of driving a 25 mm diameter cone, by a 10 kg drop weight with a free fall of 500 mm. The cone tests were conducted right from EGL, continuously up to either 6 m depth below EGL or up to a hard stratum, whichever is earlier. The number of blows for every 50 mm penetration was recorded. The number of blows for each 300 mm penetration is termed as "Cone Penetration Resistance" (CPR). Correlations developed between the CPR and SPT (Standard Penetration Test) show that the CPR is about 1.8 times the SPT value.

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The results of the cone penetration tests are presented in Tables 1 & 2. Table-1 gives the number of blows for every 50 mm penetration, in all the tests. Table-2 gives the CPR values in all the tests. The equivalent SPT values are also presented in Table- 2.

A comparison of visual identification of soil samples collected from the three bore holes with the results of the three cone penetration tests is given in Tables-3.

The logs of the bore holes are presented in Figs. 2 to 4. The CPR values and the equivalent SPT values are also shown along side the bore logs. The depth of ground water table is also shown in the log of Bore Hole 2.

3. LABORATORY SOIL TESTING

The representative soil samples collected from the bore holes were visually identified, and classification and identification tests (Liquid and Plastic Limit tests on clayey soil samples and Grain Size Analysis of sandy and gravelly soil samples) were conducted. The results are presented in Tables 4 to 6.

Chemical analysis was carried out on the ground water sample collected from bore hole 2 and the results are presented in Table-7.

4. SUBSOIL CONDITIONS

The data presented in Figs. 2 to 4 and Tables 1 to 6 shows the following subsoil conditions.

- (i) The subsoil consists of sand or clayey sand or sandy clay of very low plasticity, the thickness of the soil being 1.35 m at Bore Hole 1 location; 2.1 m at Bore Hole 2 location; 0.4 m at Bore Hole 3 location. At Bore Hole 2 & 3 locations, the sandy soil is loose and the sandy clay is soft up to a maximum depth of 1.2 m; very stiff/ hard in the remaining thickness. At Bore Hole 1 location, the sandy soil is medium dense or dense.
- (ii) Very hard stratum (weathered and disintegrated rock) then occurs at 1.35 m depth at Bore Hole 1 location; 2.1 m depth at Bore Hole 2 location; 0.4 m depth at Bore Hole 3 location.

5. GROUND WATER TABLE

At the time of soil investigation (27.02.2011), Ground water table was met with at a depth of 2.1 m in BH-2; not met with in BH-1 & BH-3, during boring.

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6. CHEMICAL COMPOSITION OF GROUND WATER

The results of chemical analysis of the water samples presented in Table-7 show that:

- (i) the ground water is neutral (pH value between 6 and 8).
- (ii) the chloride content is less than the permissible upper limit of 500 mg/l. for use of ground water for mixing in concrete for RCC, as per IS: 456-2000. Therefore, in terms of chloride content in the ground water, **the ground water is suitable for mixing concrete for RCC.**
- (iii) the sulphate content is slightly more than the permissible upper limit of 400 mg/l for use of ground water for mixing in concrete, as per IS: 456-2000. Therefore, in terms of sulphate content, **the ground water is not suitable for mixing concrete for RCC.**
- (iv) the sulphate content (expressed as SO_3) comes under Class-2 of "Requirements for concrete exposed to sulphate attack", as per IS:456-2000, Table-4. For this Class, the requirements are:

Ordinary Portland cement or Portland slag cement or Portland pozzolana cement can be used with a minimum cement content of 330 kg/ m^3 of concrete and with a maximum free water: cement ratio of 0.5

or

supersulphated cement or sulphate resisting portland cement can be used with a minimum cement content of 310 kg/ m^3 of concrete and with a maximum water-cement ratio of 0.50.

7. ANALYSIS FOR SUITABLE TYPE OF FOUNDATIONS

Taking into account:

- (i) The subsoil consists of sand or clayey sand or sandy clay of very low plasticity, the thickness of the soil being 1.35 m at Bore Hole 1 location; 2.1 m at Bore Hole 2 location; 0.4 m at Bore Hole 3 location, the sandy soil being loose and the sandy clay is soft up to a maximum depth of 1.2 m; very stiff/hard in the remaining thickness at Bore Hole 2 & 3 locations; the sandy soil being medium dense or dense at Bore Hole 1 location, followed by
- (ii) Very hard stratum (weathered and disintegrated rock) at 1.35 m depth at Bore Hole 1 location; 2.1 m depth at Bore Hole 2 location; 0.4 m depth at Bore Hole 3 location, and
- (iii) Ground water table was met with at a depth of 2.1 m; not met with in BH-1 & BH-3, during boring (27.02.2011),

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Either individual column footings or raft foundation are recommended for the proposed constructions.

Excavation shall be made up to the very hard stratum (weathered & disintegrated rock) for each and every column footing or for raft foundation, irrespective of the importance of the column or the loading on the column. The depth at which the very hard stratum (weathered & disintegrated rock) occurs will be in the order of 0.4 m to 2.1 m below the ground level which existed at the time of soil investigation.

In case the depth at which the very hard stratum (weathered & disintegrated rock) occurs varies significantly with in the size of any column footing, PCC may be placed in the portion where the depth is larger, to arrive at a level surface for casting the RCC footing.

After thorough compaction of the bottom of excavation, a layer of clean sand, 100 mm thickness, shall be placed. The sand cushion layer shall be at least 150 mm wider on each of the four sides of the column footing/ raft foundation. The sand cushion layer shall be watered and well compacted.

PCC for the column footings/raft foundation can be laid on the sand cushion layer.

A safe bearing capacity of 50 t/m² is recommended for the design of the column footings/raft foundation. However, the width of any column footing shall not be less than 1 m.

At the time of excavation for foundations, if ground water table occurs within the recommended depth of excavation for foundations, sumps may be made to an additional depth of 0.3 m at one or more corners of the foundation pits of column footings/raft foundation and the water collected in the sumps may be bailed out. At the time of laying the sand cushion layer, the bottom of excavation shall be relatively dry (not slushy). Dewatering shall be maintained until that part of the concrete in the foundations, which comes below the ground water table level, sets.

The excavated sand or clayey sand or sandy clay of very low plasticity can be used for back filling of foundations. Back filling shall be done in layers of not more than 150 mm thickness. Each 150 mm thick layer shall be watered and well compacted (mere spreading the back fill material for back filling is not adequate. Layered compaction shall be done for back filling).

GUIDELINES FOR FILL MATERIAL AND GUIDELINES FOR FILLING TO RAISE THE GENERAL GROUND LEVEL

If it is proposed to raise the ground level by filling, relatively inert material such as sand or gravel shall be used to raise the general ground level. The percentage of fines (grain size less than 0.075 mm) shall not exceed 20%. The liquid limit shall not exceed 30% and the plasticity index shall not exceed 10%. The fill material shall be free from contamination from decomposed organic matter and harmful chemical.

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Filling shall be done in layers of not more than 150 mm thickness, each layer. Each layer shall be well compacted at about the optimum moisture content of the fill soil. Compaction may be monitored by taking field density measurements at the rate of at least one test for every 750 square metres * of area compacted. At least 95% of the maximum dry density obtained in the laboratory Standard Proctor compaction test (as per IS: 2720, Part VII-1980, Methods of test for soils, Determination of water content-dry density relation using light compaction, Second Revision) shall be achieved in the field.

- * Reference: Handbook of Quality control for construction of roads and runways, second revision, Indian Roads Congress, Special Publication – 11, Pages 18 & 19, Tables 2.1 & 2.2

Table 2.1 Control Tests on Borrow Materials

S. No	Test	Test Method	Minimum desirable frequency
1.	Gradation [@] / Sand-content	IS : 2720 Part IV-1965	1-2 tests per 8000 m ³ of soil
2.	Plasticity index	IS : 2720 Part V-1970	-do-
3.	Standard Proctor Test	IS : 2720 Part VII-1965	-do-
4.	CBR on a set of 3 specimens **	IS : 2720 Part XVI-1965	One test per 3000 m ³
5.	Deleterious constituents	IS : 2720 Part XXVII-1968	As required
6.	Natural moisture content	IS : 2720 Part II – 1973 (Second Revision)	One test per 250 m ³ of soil

[@] If specifications call for such tests.

** For purposes of design only, unless otherwise specified.

Table 2.2 Tests for Compaction Control

S. No	Test	Test Method	Minimum desirable frequency
1.	Moisture content just before compaction	IS : 2720 Part II-1973 (Second Revision)	2-3 tests per 250 m ³ of loose soil
2.	Dry density of compacted layer	IS : 2720 Part XXVIII-1966	Generally, one test per 1000 m ² of compacted area for the body of the embankment, to be increased to one test per 500-1000 m ² of compacted area for top sub grade layers, i.e., top 500 mm portion of the embankment.

9. SUMMARY OF RECOMMENDATIONS FOR SUITABLE TYPE OF FOUNDATION

On the basis of the results of the soil investigation carried out, the following are recommendations for suitable type of foundation for the proposed Constructions at Salem Corporation, Anaamedu, Salem.

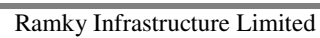
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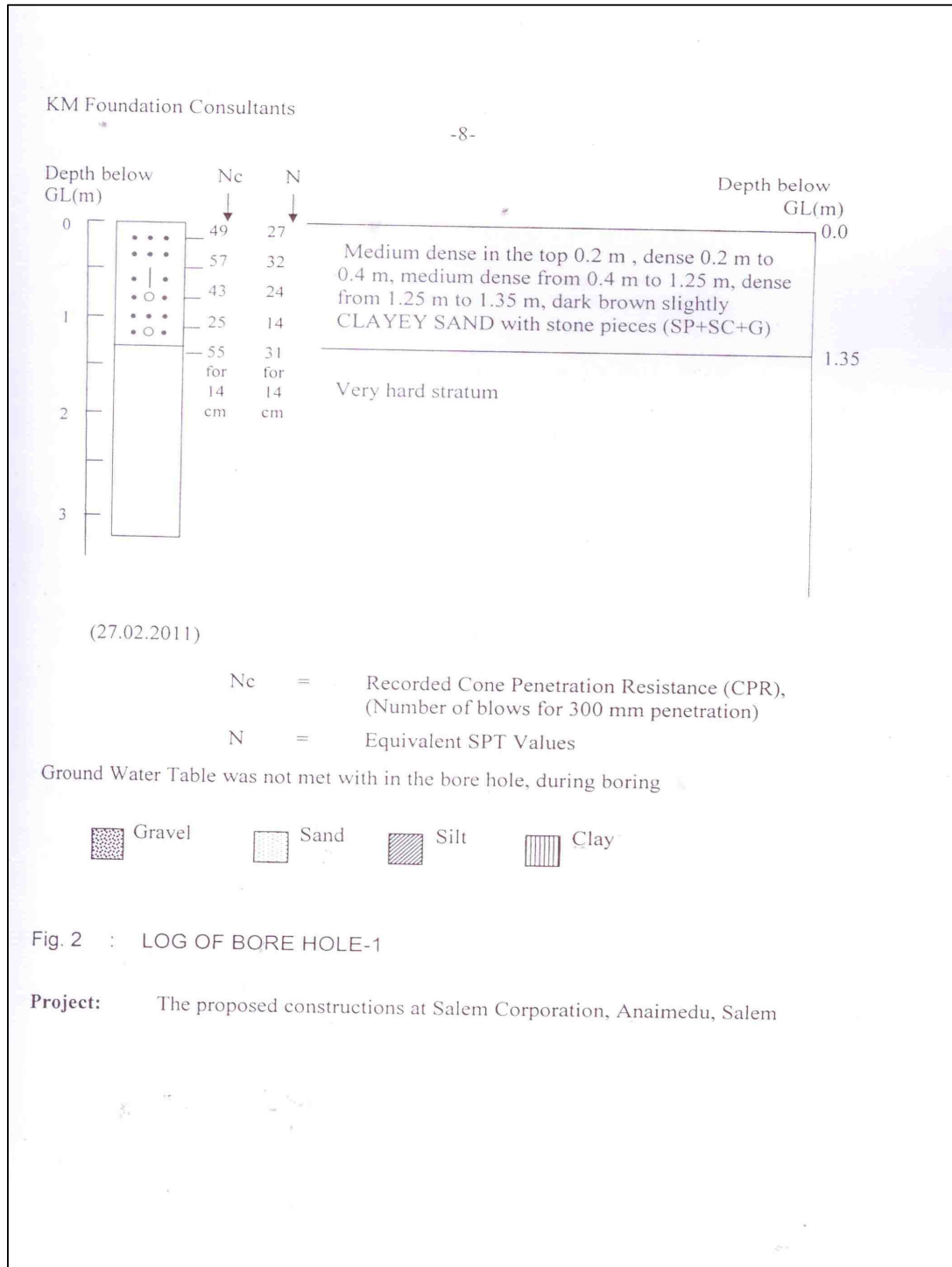
-6-

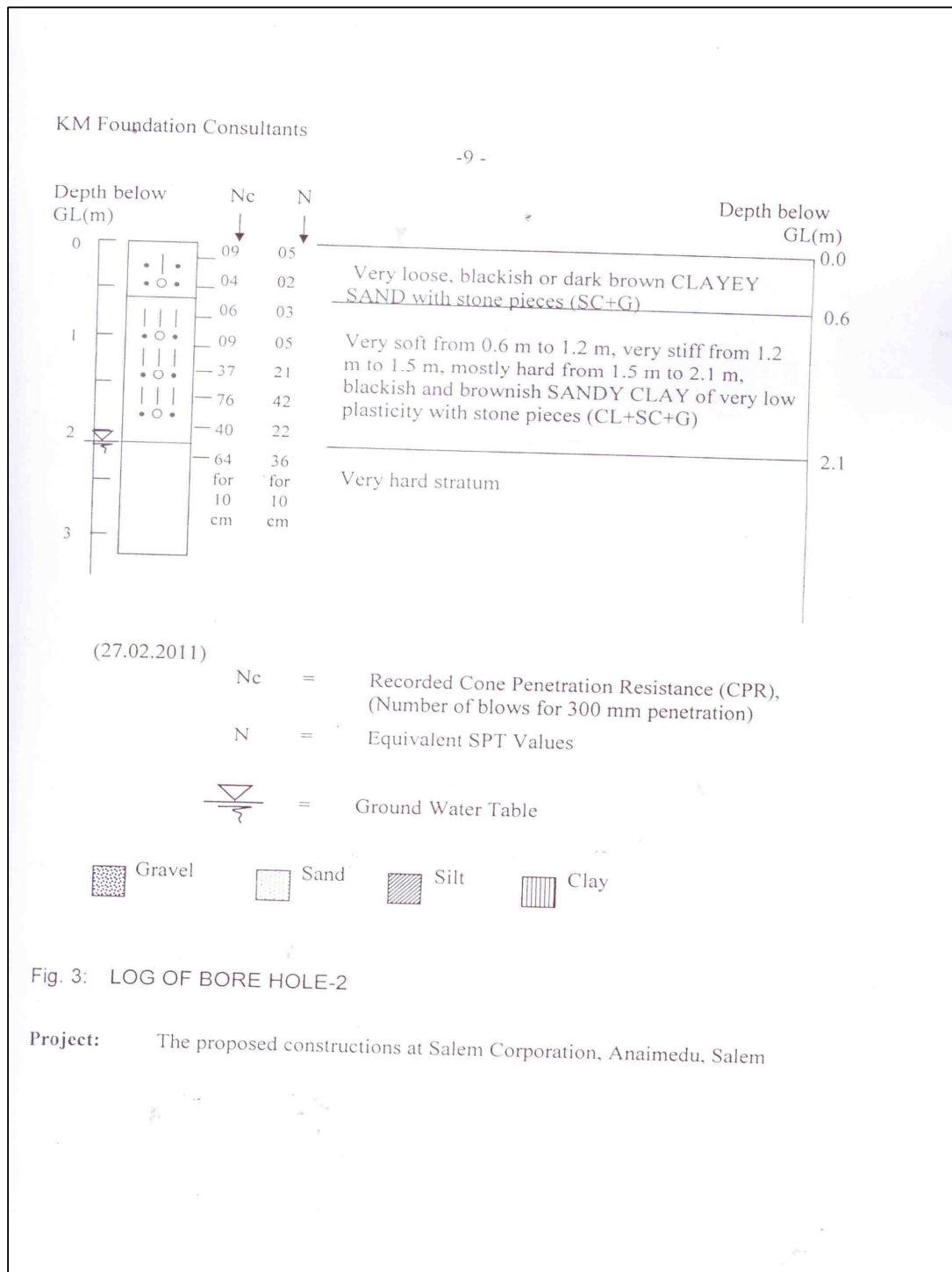
- (i) **Individual column footings or raft foundation** are recommended for the proposed constructions.
- (ii) Excavation shall be made up to the very hard stratum (weathered & disintegrated rock) for each and every column footing or for raft foundation, irrespective of the importance of the column or the loading on the column. The depth at which the very hard stratum (weathered & disintegrated rock) occurs will be in the order of 0.4 m to 2.1 m below the ground level which existed at the time of soil investigation.
- (iii) In case the depth at which the very hard stratum (weathered & disintegrated rock) occurs varies significantly with in the size of any column footing, PCC may be placed in the portion where the depth is larger, to arrive at a level surface for casting the RCC footing.
- (iv) After thorough compaction of the bottom of excavation, **a layer of clean sand, 100 mm thickness**, shall be placed. The sand cushion layer shall be at least 150 mm wider on each of the four sides of the column footing/ raft foundation. The sand cushion layer shall be watered and well compacted.
- (v) PCC for the column footings/raft foundation can be laid on the sand cushion layer.
- (vi) **A safe bearing capacity of 50 t/m²** is recommended for the design of the column footings/raft foundation. However, the width of any column footing shall not be less than 1 m.
- (vii) At the time of excavation for foundations, if ground water table occurs within the recommended depth of excavation for foundations, sumps may be made to an additional depth of 0.3 m at one or more corners of the foundation pits of column footings/raft foundation and the water collected in the sumps may be bailed out. At the time of laying the sand cushion layer, the bottom of excavation shall be relatively dry (not slushy). Dewatering shall be maintained until that part of the concrete in the foundations, which comes below the ground water table level, sets.
- (viii) The excavated sand or clayey sand or sandy clay of very low plasticity can be used for back filling of foundations. Back filling shall be done in layers of not more than 150 mm thickness. Each 150 mm thick layer shall be watered and well compacted (mere spreading the back fill material for back filling is not adequate. Layered compaction shall be done for back filling).
- (ix) Guide lines for fill material and filling are given in Sl. No. 8 above.
- (x) The results of chemical analysis of ground water sample collected from bore hole 2 show that the sulphate content is slightly more than the permissible limit for use of ground water for mixing concrete. Therefore, **the ground water is not suitable for mixing concrete. Class-2 "Requirements for concrete exposed to sulphate attack"**, as per IS: 456-2000, Table-4 applies to the concrete in the foundations which comes in contact with the ground water. These requirements are to be complied with **for concrete in the foundations which comes in contact with ground water.**

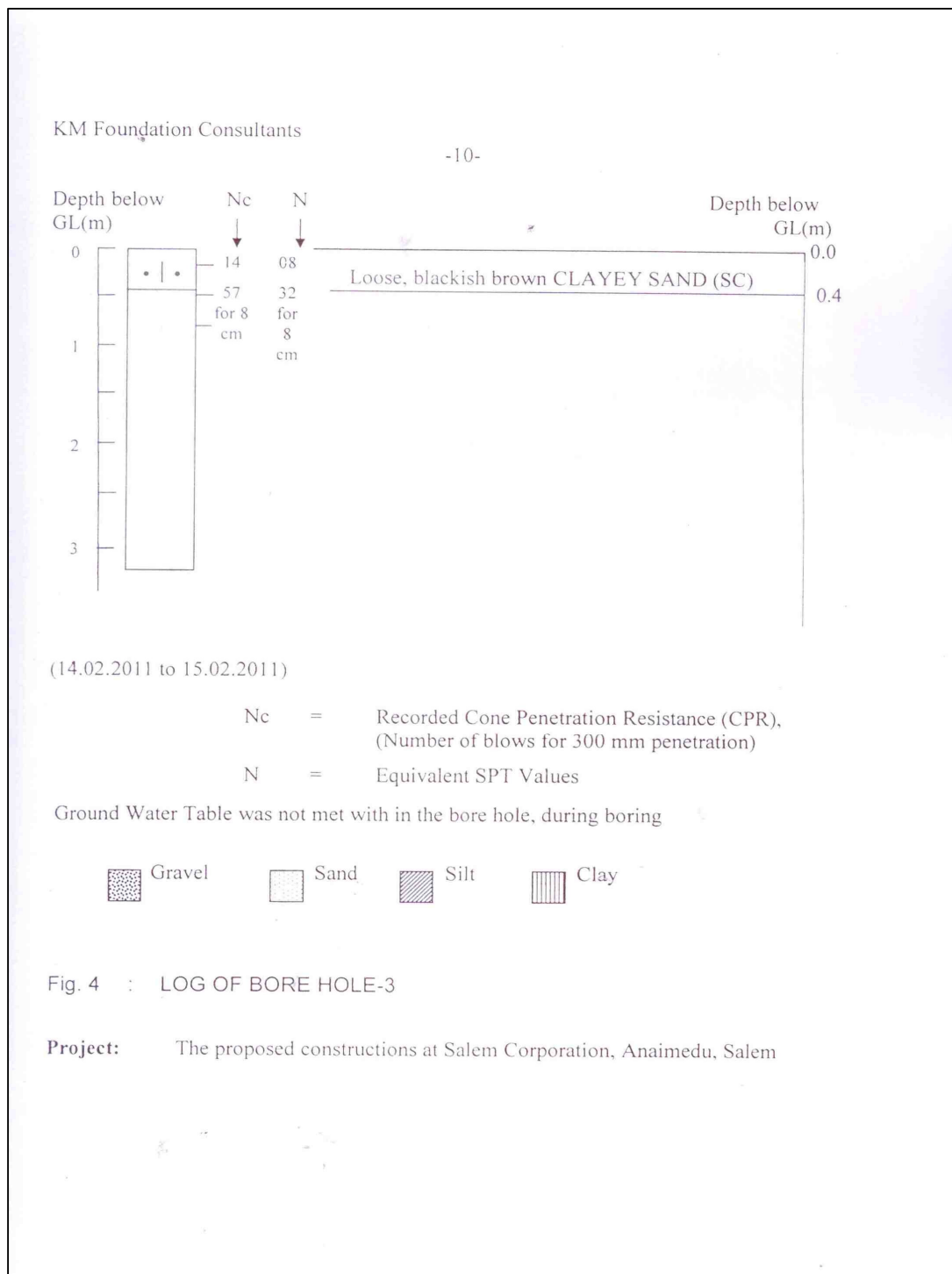


(Prof. Dr. K. Muthukrishnaiah)
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TABLE 1: RESULTS OF CONE PENETRATION TESTS
(No. OF BLOWS FOR EVERY 50 mm PENETRATION)

Project : The proposed constructions at Salem Corporation, Anaamedu, Salem

Depth (m)	CPT-1	CPT-2	CPT-3
0.00-0.05	1	1	3
0.05-0.10	3	4	3
0.10-0.15	4	2	2
0.15-0.20	8	2	2
0.20-0.25	10		2
0.25-0.30	23		2
0.30-0.35	21	1	22
0.35-0.40	13		35 for 3 cm*
0.40-0.45	6		
0.45-0.50	6	1	
0.50-0.55	5	1	
0.55-0.60	6	1	
0.60-0.65	6	1	
0.65-0.70	4		
0.70-0.75	6	1	
0.75-0.80	8	1	
0.80-0.85	10	1	
0.85-0.90	9	2	
0.90-0.95	7	1	
0.95-1.00	5	2	
1.00-1.05	4	2	
1.05-1.10	3	1	
1.10-1.15	2	1	
1.15-1.20	4	2	
1.20-1.25	3	5	
1.25-1.30	17	5	
1.30-1.35	35 for 4 cm*	6	
1.35-1.40		6	
1.40-1.45		7	
1.45-1.50		8	
1.50-1.55		12	
1.55-1.60		13	
1.60-1.65		13	
1.65-1.70		14	
1.70-1.75		12	
1.75-1.80		12	
1.80-1.85		9	
1.85-1.90		10	
1.90-1.95		9	
1.95-2.00		10	
2.00-2.05		6	
2.05-2.10		6	
2.10-2.15		29*	
2.15-2.20		35 *	

* Very hard stratum

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Table 2: **COMPARISON OF RESULTS OF CONE PENETRATION TESTS
(No. OF BLOWS FOR EVERY 300 mm PENETRATION)**

Project : The proposed constructions at Salem Corporation, Anaimeedu, Salem.

Depth (m)	Cone Penetration Resistance (CPR) = No. of blows for 300 mm penetration			Equivalent SPT Values		
	CPT-1	CPT-2	CPT-3	CPT-1	CPT-2	CPT-3
0.0-0.3	49	09	14	27	05	08
0.3-0.6	57	04	57 for 8 cm*	32	02	32 for 8 cm*
0.6-0.9	43	06		24	03	
0.9-1.2	25	09		14	05	
1.2-1.5	55 for 14 cm*	37		31 for 14 cm*	21	
1.5-1.8		76			42	
1.8-2.1		40			22	
2.1-2.4		64 for 10 cm*			36 for 10 cm*	
2.4-2.7						
Date of test	27.02.2011					

* Very hard stratum

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Table-3: COMPARISON OF SUBSOIL CONDITIONS AND CONE PENETRATION RESISTANCE IN THE THREE BORE HOLES

Project : The proposed constructions at Salem Corporation, Anaamedu, Salem.

Date of Soil investigation: 27.02. 2011 Ground Water Table: was not met with in all the bore holes, during boring

Depth (m)	Visual identification of soil sample Bore Hole-1	CPT-1	Visual identification of soil sample Bore Hole-2	CPT-2	Visual identification of soil sample Bore Hole-3	CPT-3
GL	Dark brown slightly clayey sand with stone pieces (SP+SC+G)		Blackish clayey sand with stone pieces (SC+G)		Blackish clayey sand or sandy clay of very low plasticity (SC+CL)	
0.3	-do- with more stone pieces (SP+SC+G)	49	Dark brown -do-	09	Slightly blackish brown clayey sand (SC)	14
0.6	-do-	57	Blackish sandy clay of very low plasticity with stone pieces (CL+SC+G)	04		57 for 8 cm*
0.9	-do- about 50% stone pieces (G+SP+SC)	43	-do-	06		
1.2	-do- about 10% stone pieces (SP+SC+G)	25	Blackish and brownish -do-	09		
1.5		55 for 14 cm*	-do-	37		
1.8			-do- low plasticity (CL+SC+G)	76		
2.1			-do-	40		
2.4				64 for 10 cm*		

* Very hard stratum

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Table-7: RESULTS OF CHEMICAL ANALYSIS OF GROUND WATER SAMPLE

Project : The proposed constructions at Salem Corporation, Anaimeadu, Salem.

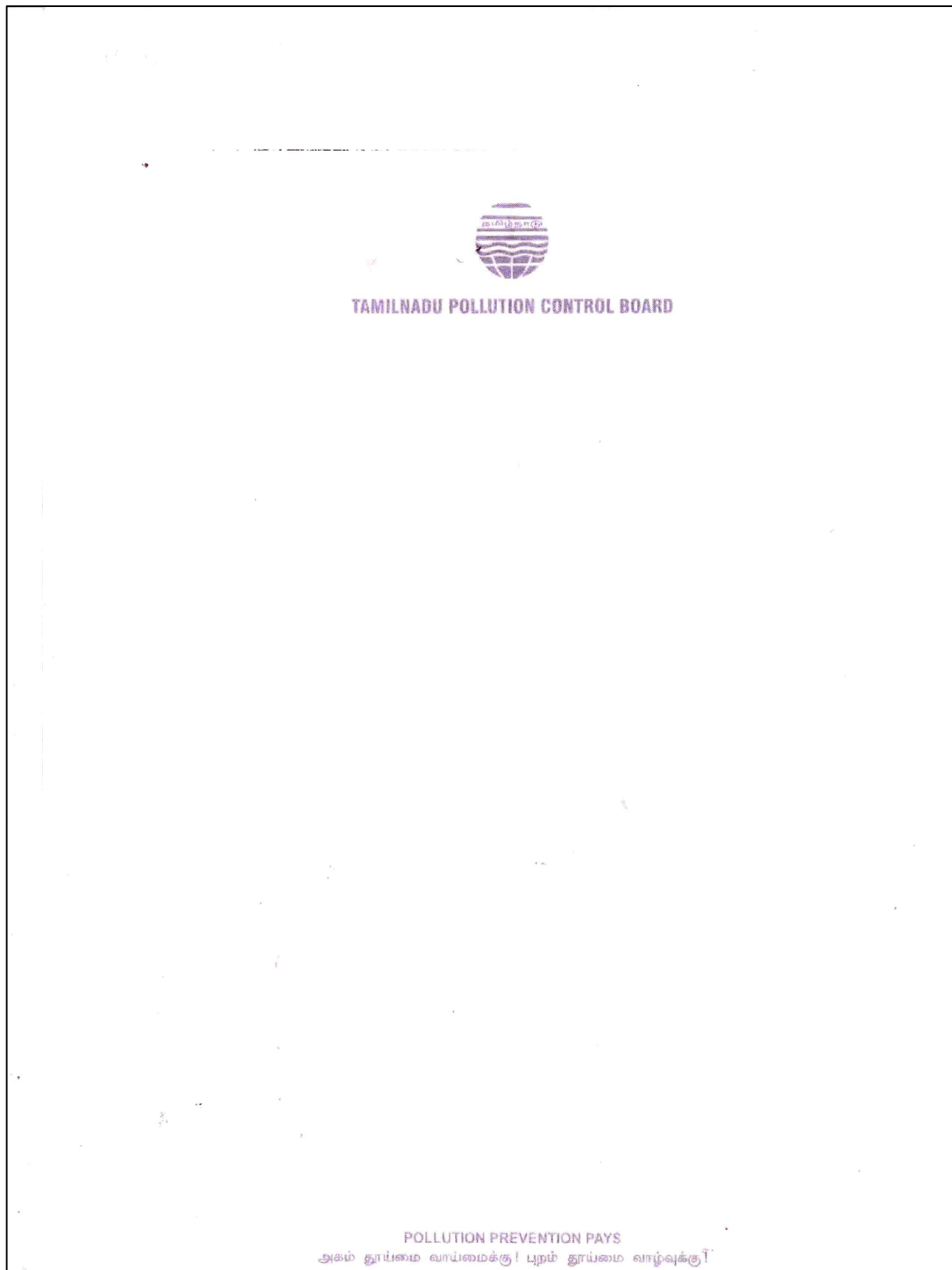
Bore Hole No.	Depth (m)	pH	Chloride content (mg / l)	Sulphate content expressed as SO ₃ (mg/l)
02	2.1	7.10	479	464

Sl.No	Parameter	S1	S2	S3
1	pH @ 25° C	7.65	7.90	7.81
2	Aluminum as Al (mg/Kg)	1931	2367	2466
3	Cadmium as Cd (mg/Kg)	BDL (D.L.1.0)	BDL (D.L.1.0)	BDL (D.L.1.0)
4	Chromium as Cr (mg/Kg)	24.4	26.7	26.8
5	Copper as Cu (mg/Kg)	13.9	48.8	35.3
6	Iron Fe (mg/Kg)	16263	17117	13511
7	Zinc Zn (mg/Kg)	12.1	27.6	21.1
8	Manganese as Mn (mg/Kg)	491	491	608
9	Nickel as Ni (mg/Kg)	13.8	10.9	15.3
10	Lead as Pb (mg/Kg)	BDL (D.L.1.0)	BDL (D.L.1.0)	BDL (D.L.1.0)
11	Calcium carbonates as CaCO ₃ (%)	0.95	1.32	1.49
12	Arsenic as As (mg/Kg)	BDL (D.L.1.0)	BDL (D.L.1.0)	BDL (D.L.1.0)
13	Mercury as Hg (mg/Kg)	BDL (D.L.1.0)	BDL (D.L.1.0)	BDL (D.L.1.0)
14	Cobalt as Co (mg/Kg)	BDL (D.L.1.0)	BDL (D.L.1.0)	BDL (D.L.1.0)
15	Chloride Cl (mg/Kg)	59	71	64
16	Sulphate. So ₄ (mg/Kg)	26	11	23
17	Moisture Content	22.14	21.94	24.70
18	Potassium as K (mg/Kg)	535	607	655
19	Sodium Na (mg/Kg)	771	855	759
20	Phosphorus as P (mg/Kg)	1219	1016	692
21	Total Organic Carbon (%)	3.88	3.48	3.09
22	Electrical Conductivity @ 25° C Micromhos/cm	121	174	162
23	Sodium absorption ratio	0.678	0.77	0.84
24	Total Kjeldal Nitrogen	1874	2515	3005

Result on dried basis.

BDL: Below Detection Level

D.L: Detection Limit

ANNEXURE- III**• TNPCB CONCENT (AIR)**

By Registered Post with Acknowledgement Due
(This document contains 5 Pages)



TAMILNADU POLLUTION CONTROL BOARD

CONSENT ORDER NO. : DEE/SLM/Estt-0091/A/2011, DATED : 26.08.2011.

Proceedings No. : F. SLM0578/OM/DEE/TNPCB/SLM/A/2011, dated. 26.08.2011

Sub : Tamil Nadu Pollution Control Board - Consent for Establishment -M/s. ANAIMEDU
SEWAGE TREATMENT PLANT, S.F.No.102/1,2,3,4, HASTHAMPATTI Village,
SALEM Taluk, Salem District, - For the establishment or take steps to establish
the industry under Section 21 of the Air (Prevention and Control of Pollution) Act,
1981, as amended in 1987 (Central Act, 14 of 1981)- Reg.

Ref : 1. Your Application No.01353, dated.18.01.2008
2. DEE I.R. No. : F.SLM0578/ OM/DEE/ SLM/2011, dated.20.07.2011.
3. Minutes of the XVth ZLCCC meeting held on 20.08.2011

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

The Commissioner,
Salem Corporation
M/s. ANAIMEDU SEWAGE TREATMENT PLANT

(hereinafter referred to as 'The Applicant') authorizing him to establish or take steps to establish
the industry in the site mentioned below:

S.F. No.102/1,2,3,4
HASTHAMPATTI Village
SALEM Taluk
Salem District

This Consent to establish is valid for two years or till the industry obtains consent to operate
under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981, as amended in 1987
whichever is earlier subject to special and general conditions enclosed.

District Environmental Engineer
Tamil Nadu Pollution Control Board
Salem

POLLUTION PREVENTION PAYS

அகம் தூய்மை வாய்மைக்கு! புறம் தூய்மை வாழ்வுக்கு!

**TAMILNADU POLLUTION CONTROL BOARD**

(2)

To

The Commissioner,
Salem Corporation,
Fort, Salem 636 001.

Copy to

1. The Commissioner
SALEM Corporation
SALEM Taluk
Salem District

2. Copy submitted to the Member Secretary, Tamil Nadu Pollution Control Board, Chennai for
favour of kind information.

3. Spare

POLLUTION PREVENTION PAYS

அகம் தூய்மை வாய்மைக்கு! புறம் தூய்மை வாழ்வுக்கு!



TAMILNADU POLLUTION CONTROL BOARD

(3)

SPECIAL CONDITIONS

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

Sl. No.	Description	Quantity
a	Main Products manufactured:	
1.	Sewage treatment Plant Facility to treat sewage generated from part of Salem Corporation Area	6 MLD

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


Sl. No.	Source of Emission	APC measures to be provided	Point of Discharge- Stack height (in metres)	Additional facilities to be provided	Maximum discharge in cubic metre/hr.
1.	D.G. Set 1000Kva	Stack with Acoustic measure	5	Acoustic measures	

3. Additional conditions.

1. The Corporation shall provide APC measures as proposed to DG set so as to achieve AAQ/Emission standards prescribed by the Board.
2. The Corporation shall provide necessary safety measures like safety kit, chlorine gas leak detecting system with alarm, Body wash, Eye wash etc for handling chlorine gas cylinders.
3. 25% of the land area acquired by the unit shall be utilized for green belt with trees planted at the rate of 400trees/Hect.
4. The Corporation shall provide rain water harvesting facilities wherever possible to increase the recharge of ground water.
5. The STP operation shall not lead to any public complaint.

POLLUTION PREVENTION PAYS

அகற் தூய்மை வாய்மைக்கு! புறத் தூய்மை வாய்மைக்கு!



TAMILNADU POLLUTION CONTROL BOARD

(4)

6. The operation of Sewage Treatment Plant shall not give rise to any objectionable odour.

7. The Corporation shall ensure that 100 metres around the Sewage Treatment Plant site shall be declared as no-development zone and green belt shall be developed in this zone. A minimum of 25 m width of green belt must be developed with tall trees all around the Sewage Treatment Plant site to attenuate odour nuisance. A thick green belt shall also be developed all side so as to arrest noise and odour nuisance to the residents.

8. The Corporation shall comply with all the conditions specified in the NOC.


District Environmental Engineer
Tamil Nadu Pollution Control Board
Salem

POLLUTION PREVENTION PAYS
அகம் தூய்மை வாய்மைக்கு! புறம் தூய்மை வாழ்வுக்கு!



TAMILNADU POLLUTION CONTROL BOARD

(5)

GENERAL CONDITIONS

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

 District Environmental Engineer
Tamil Nadu Pollution Control Board
Salem

POLLUTION PREVENTION PAYS

அகம் தூய்மை வாய்மைக்கு! புறம் தூய்மை வாழ்வுக்கு!

TNPCB CONCENT (WATER)

By Registered Post with Acknowledgement Due
(This document contains 6 Pages)



TAMILNADU POLLUTION CONTROL BOARD

CONSENT ORDER NO. : DEE/SLM/0091 /W/2011, DATED : 26 .08.2011

Proceedings No. : F.SLM0578/OM/DEE/TNPCB/SLM/W/2011 dated.26 .08.2011

Sub : Tamil Nadu Pollution Control Board - Consent for Establishment -

M/s. ANAIVEDU SEWAGE TREATMENT PLANT, S.F.No.102/1,2,3,4,
HASTHAMPATTI Village, SALEM Taluk, Salem District- For the
establishment or take steps to establish the industry under Section 25 of
the Water (Prevention and Control of Pollution) Act, 1974 as amended in
1988 (Central Act 53 of 1988) - Reg.

Ref : 1. Your Application No.0497, dated.18.01.2008
2. DEE I.R. No. : F.SLM0578/OM/DEE /SLM /2011, dated.20.07.2011.
3. Minutes of the XVth ZLCCC meeting held on 20.08.2011

Consent to establish or take steps to establish is hereby granted under Section 25 of the Water
(Prevention and Control of Pollution) Act, 1974, as amended in 1988 (Central Act 53 of 1988)
(hereinafter referred to as 'The Act') and the Rules and Orders made there under to

The Commissioner,
Salem Corporation
M/s. ANAIVEDU SEWAGE TREATMENT PLANT


(hereinafter referred to as 'The Applicant') authorizing him to establish or take steps to establish
the industry in the site mentioned below:

S.F. No.102/1,2,3,4
HASTHAMPATTI Village
SALEM Taluk, Salem District

This Consent to establish is valid for two years or till the industry obtains consent to operate
under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974, as amended in
1988 whichever is earlier subject to special and general conditions enclosed.

District Environmental Engineer
Tamil Nadu Pollution Control Board
Salem

ஆகும் தூய்மை வாய்மைக்கு! புறம் தூய்மை வாழ்வுக்கு!


TAMILNADU POLLUTION CONTROL BOARD

(2)

To
The Commissioner,
Salem Corporation,
Fort, Salem 636 001.

Copy to

1. The Commissioner
SALEM Corporation
SALEM Taluk
Salem District
2. Copy submitted to the Member Secretary, Tamil Nadu Pollution Control Board, Chennai for
favour of kind information.
3. Spare

POLLUTION PREVENTION PAYS
அகம் தூய்மை வாய்மைக்கு! புறம் தூய்மை வாழ்வுக்கு!



TAMILNADU POLLUTION CONTROL BOARD

SPECIAL CONDITIONS

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

Sl. No.	Description	Quantity
a	Main Products manufactured:	
1.	Sewage treatment Plant Facility to treat sewage generated from part of Salem Corporation Area	6 MLD

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

Outlet No.	Description of Outlet	Maximum daily discharge in KLD	Point of disposal
1	Sewage	6000	River Thirumanimutharu

3. The unit shall provide Sewage Treatment Plant as indicated below.

Nature of Effluent	Sl. No.	Components of ETP	Nos.	Dimensions (in metres)
(1)	(2)	(2)	(3)	(4)
Sewage	1	Septic tank	1	3.0x2.0x2.0
	2	Receiving Sump	1	2.50x2.50x3.152
	3	Screen Chamber	4	2.0x0.65x1.0
	4	Grit Chamber	1	4.0x4.0x1.0
	5	Grass Reactor	1	15.6x15.6x6.0
	6	MBBR Tank	1	5.52x5.52x5.0
	7	Lamella Clarifier	1	12.0x12.0x3.5
	8	Chlorine Contact Tank	1	8.0x8.0x2.0
	9	Safety tank for chlorinator	1	2.0x3.0x1.5
	10	Sludge holding tank	1	3.5x3.5x1.5
	11	Poly dozing tank	1	0.75x0.75x1.0

4. Additional conditions.

1. The Corporation shall provide septic tank for the sewage and shall connect the overflow to the Receiving well of STP.
2. The Corporation shall install full fledged Sewage Treatment plant as proposed so as to satisfy the discharge standards prescribed by the Board before commissioning.

POLLUTION PREVENTION PAYS

அகம் தர்ப்பை வர்ப்பைக்கு! புறம் தர்ப்பை வாழவுக்கு!



TAMILNADU POLLUTION CONTROL BOARD

(4)

3. The Corporation shall have standby arrangement for all critical components like pumps, blowers, Aerators etc to ensure continuous and smooth functioning of STP.
4. The Corporation shall provide necessary safety measures like safety kit, chlorine gas leak detecting system with alarm, Eye wash etc for handling chlorine gas cylinders.
5. 25% of the land area acquired by the unit shall be utilized for green belt with trees planted at the rate of 400trees/Hect.
6. The Corporation shall provide rain water harvesting facilities wherever possible to increase the recharge of ground water.
7. The STP operation shall not lead to any public complaint.
8. The Corporation shall install Electro Magnetic flow meter with computerized recording system at Inlet/ Outlet of STP.
9. The operation of Sewage Treatment Plant shall not give rise to any objectionable odour.
10. Manual cleaning of effluent tanks must be avoided and mechanical means must be adopted. Accumulation of sludge in effluent tanks must be avoided.
11. The corporation shall declare the land for a radius of 100 metres as a no development activities in consultation with DTCP.
12. The corporation shall develop green belt of 25 metres width all around the proposed Sewage Treatment Plant.
13. No flooding of treated / untreated effluent is permitted in the Sewage Treatment Plant area.
14. The quality of treated sewage shall be got analyzed regularly once in a month and report shall be furnished to Tamilnadu Pollution Control Board.
15. The corporation shall provide necessary storm water drain in and around the Sewage Treatment Plant site and ensure that there will not be any water logging.
16. The corporation shall provide uninterrupted power supply to the Sewage Treatment Plant to operate continuously. The corporation shall have stand by power supply for operation of Sewage Treatment Plant.
17. The sludge from the centrifuge is in un-digested form. It should be properly handled and disposed off after stabilization. The STP sludge shall be used for green belt development.

POLLUTION PREVENTION PAYS

அகம் தூய்மை வாய்மைக்கு! புறம் தூய்மை வாழ்வுக்கு!



TAMILNADU POLLUTION CONTROL BOARD

(5)

18. The screening waste collected from the fine screen and grit removal unit shall be properly collected and disposed.
19. The corporation shall have line data on ground quality atleast in 6 location around the Sewage Treatment Plant site in consultation with District Environmental Engineer, Tamilnadu Pollution Control Board and periodically monitor the ground water quality in the same locations once in six months. The complied data shall be furnished to the District Environmental Engineer once in a year.
20. The corporation shall provide compound Wall on all sides Sewage Treatment Plant area.
21. The Corporation shall comply with all the conditions specified in the NOC.

d
w/r

District Environmental Engineer
Tamil Nadu Pollution Control Board
Salem

POLLUTION PREVENTION PAYS

அகம் தூய்மை வாய்மைக்கு! புறம் தூய்மை வாழ்வுக்கு!



TAMILNADU POLLUTION CONTROL BOARD

(6)

GENERAL CONDITIONS




1. The above consent to establish cannot be construed as consent to operate and the unit shall not commence the operation without obtaining the Consent to operate.
2. The industry shall make a request for grant of consent to operate at least thirty days before the commissioning of trial production.
3. The unit shall construct compound wall around the boundary of the unit.
4. Samples of water from the wells or any other nearby water sources have to be taken by the unit and get them analyzed by the Board Laboratory to develop base line data to assess the existing water quality.
5. The unit shall provide an alternate power source along with separate energy meter for the Effluent Treatment Plant to ensure continuous operation of the Effluent Treatment Plant.
6. The consent does not authorize or approve the construction of any physical structures or facilities, or the undertaking of any work in any natural watercourse.
7. Any change in the details furnished in the conditions has to be brought to the notice of the Board and got approved by the Board, before obtaining consent to operate under the said Act.
8. The unit has to comply with the provisions of Public Liability Insurance Act, 1991 to provide immediate relief in the event of any hazard to human beings, other living creatures/plants and properties while handling and storage of hazardous substances (if applicable).
9. Consent to operate will not be issued unless the unit complies with all the conditions of consent to establish.
10. In case there is any change in the management, the unit shall inform the change with relevant documents immediately.

 District Environmental Engineer
Tamil Nadu Pollution Control Board
Salem

POLLUTION PREVENTION PAYS

அகம் தூய்மை வாய்மைக்கு! புறம் தூய்மை வாழ்வுக்கு!

ANNEXURE -IV**Ground water Sample Test Report**

  		Italab Salem Private Limited An ISO 9001 : 2008 Certified Laboratory	
REGD OFFICE 4-A (New 36) Rajaji Road Salem 636 007 Tamil Nadu Tel 0427 2319264, 2312089 Fax 0427 4030113 Mobile 98940 31046 e-mail : italabsalem@bsnl.in italabsalem@airtelmail.in			

CERTIFICATE OF ANALYSIS		No.
		CER/1197
Lab Memo No : APR/874	Sample No : JUN/83	Date : 10/06/2011



Sample Submitted by party
Received by us on : 03/06/2011

We hereby certify that a sample described as : **WATER**
 Received from : **M/s. RK ENVIRO CARE, ERODE**
 With the following marks : **Sample:1**

Quantity : **About 2 Ltr**
 Analyzed on received basis and the results are obtained as follows:

PARAMETERS	RESULTS
1 pH	7.65
2 Appearance	Clear Colourless Liquid
3 Colour	< 5Hazen unit
4 Turbidity	1NTU
5 Odour	Odourless
6 Total Suspended Solids	4.10mg/l
7 Total Dissolved Solids	1470mg/l
8 Electrical conductivity.	2580micromhos/cm
9 Total Hardness as CaCO ₃	445mg/l
10 Permanent Hardness as CaCO ₃	210mg/l
11 Temporary Hardness as CaCO ₃	235mg/l
12 Calcium Hardness as CaCO ₃	159mg/l
13 Magnesium Hardness as CaCO ₃	285mg/l
14 Carbonate Hardness as CaCO ₃	445mg/l
15 Non-Carbonate Hardness as CaCO ₃	NIL
16 Total Alkalinity as CaCO ₃	597mg/l
17 Phenolphthalein Alkalinity as CaCO ₃	NIL
18 Carbonate Alkalinity as CaCO ₃	NIL






Total No Of Determination :






Checked by  Analyst	For Italab Salem Private Ltd.,  Senior Chemist
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BIS RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY.
 ASSOCIATES :
 ITALAB PVT LTD. MUMBAI * CHENNAI * KOLKATA * VIZAG * BELLARY JAMNAGAR * ITALAB (GOA) PVT LTD GOA * MANGALORE * ITALAB (JAPAN) LTD., JAPAN * POHANG (S.KOREA)






All work is carried out to the best of our ability, however, without any responsibility on our part and without affecting in any way the contractual rights of our principals. Our report is limited to the test samples identified herein. This report is strictly confidential. Its use for publicity, arbitration or as evidence in legal disputes is strictly forbidden.

 <small>ISO 9001:2008 QMS-K08193</small>	 <small>QM-032</small>	 Since 1948 <small>Industrial Testing & Analytical Laboratories Surveyors Samplers & Analysts</small>	Italab Salem Private Limited An ISO 9001 : 2008 Certified Laboratory <small>REGD OFFICE 4-A (New 36) Rajaji Road Salem 636 007 Tamil Nadu Tel 0427 2319264, 2312089 Fax 0427 4030113 Mobile 98940 31046 e-mail : italabsalem@bsnl.in italabsalem@airtelmail.in</small>
CERTIFICATE OF ANALYSIS			No. CER/1197
Lab Memo No : APR/874		Sample No : JUN/83	Date : 10/06/2011
We hereby certify that a sample described as : WATER Received from : M/s. RK ENVIRO CARE, ERODE With the following marks : Sample:1			Sample Submitted by party Received by us on : 03/06/2011
Quantity : About 2 Ltr Analyzed on received basis and the results are obtained as follows:			
PARAMETERS		RESULTS	
19 Bi-Carbonate Alkalinity as CaCO ₃		597mg/l	
20 Calcium as Ca ⁺		63mg/l	
21 Magnesium as Mg ⁺		69mg/l	
22 Chlorides as Cl ⁻		332mg/l	
23 Sulphates as SO ₄ ⁻		314mg/l	
24 Silica as SiO ₂		21.0mg/l	
25 Iron as Fe		0.10mg/l	
26 Hydroxide Alkalinity as CaCO ₃		NIL	
27 Free CO ₂		NIL	
28 Free Chlorine as Cl ₂		NIL	
29 Fluoride as F ⁻		1.5mg/l	
30 BOD at 27°C for 3 days Incubation		NIL	
>>>>End of the report<<<<			
Total No Of Determination : 30 [Thirty Only.]			
Checked by  Analyst		 For Italab Salem Private Ltd.,  Senior Chemist	
<small> RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY. ASSOCIATES : LAB PVT LTD, MUMBAI ★ CHENNAI ★ KOLKATA ★ VIZAG ★ BELLARY JAMNAGAR ★ ITALAB (GOA) PVT. LTD GOA ★ MANGALORE ★ ITALAB (JAPAN) LTD., JAPAN ★ POHANG (S.KOREA) work is carried out to the best of our ability, however, without any responsibility on our part and without affecting in any way the contractual rights of our principals. report is limited to the test samples identified herein. This report is strictly confidential. Its use for publicity, arbitration or as evidence in legal disputes is strictly forbidden. </small>			

  		Italab Salem Private Limited An ISO 9001 : 2008 Certified Laboratory REGD OFFICE: 4-A (New 36) Rajaji Road Salem 636 007 Tamil Nadu Tel 0427 2319264, 2312089 Fax 0427 4030113 Mobile 98940 31046 e-mail : italabsalem@bsnl.in italabsalem@airtelmail.in	
CERTIFICATE OF ANALYSIS			
No.		CER/1198	
Lab Memo No : APR/874	Sample No : JUN/84	Date : 10/06/2011	
We hereby certify that a sample described as : WATER Received from : M/s RK ENVIRO CARE, ERODE With the following marks : Sample : 2		Sample Submitted by party Received by us on : 03/06/2011	
Quantity : About 2 Ltr Analyzed on received basis and the results are obtained as follows:			
PARAMETERS		RESULTS	
1 pH		7.25	
2 Appearance		Clear Colourless Liquid	
3 Colour		< 5Hazen unit	
4 Turbidity		1NTU	
5 Odour		Odourless	
6 Total Suspended Solids		< 1mg/l	
7 Total Dissolved Solids		1685mg/l	
8 Electrical conductivity		2810micromhos/cm	
9 Total Hardness as CaCO ₃		689mg/l	
10 Permanent Hardness as CaCO ₃		302mg/l	
11 Temporary Hardness as CaCO ₃		387mg/l	
12 Calcium Hardness as CaCO ₃		235mg/l	
13 Magnesium Hardness as CaCO ₃		453mg/l	
14 Carbonate Hardness as CaCO ₃		689mg/l	
15 Non-Carbonate Hardness as CaCO ₃		NIL	
16 Total Alkalinity as CaCO ₃		691mg/l	
17 Phenolphthalein Alkalinity as CaCO ₃		NIL	
18 Carbonate Alkalinity as CaCO ₃		NIL	
Total No Of Determination :			
Checked by  Analyst		For Italab Salem Private Ltd.,  Senior Chemist	
BIS RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY.			
ASSOCIATES : ITALAB PVT LTD, MUMBAI * CHENNAI * KOLKATTA * VIZAG * BELLARY JAMNAGAR * ITALAB (GOA) PVT LTD GOA * MANGALORE * ITALAB (JAPAN) LTD., JAPAN * POHANG (S.KOREA)			
All work is carried out to the best of our ability, however, without any responsibility on our part and without affecting in any way the contractual rights of our principals. Our report is limited to the test samples identified herein. This report is strictly confidential. Its use for publicity, arbitration or as evidence in legal disputes is strictly forbidden.			

  		Italab Salem Private Limited An ISO 9001 : 2008 Certified Laboratory REGD OFFICE 4-A (New 36) Rajaji Road Salem 636 007 Tamil Nadu Tel 0427 2319264, 2312089 Fax 0427 4030113 Mobile 98940 31046 e-mail : italabsalem@bsnl.in italabsalem@airtelmail.in	
CERTIFICATE OF ANALYSIS		No. CER/1198	
Lab Memo No : APR/874	Sample No : JUN/84	Date : 10/06/2011	
We hereby certify that a sample described as : WATER Received from : M/s. RK ENVIRO CARE, ERODE With the following marks : Sample : 2		Sample Submitted by party Received by us on : 03/06/2011	
Quantity : About 2 Ltr Analyzed on received basis and the results are obtained as follows:			
PARAMETERS		RESULTS	
19 Bi-Carbonate Alkalinity as CaCO ₃		691mg/l	
20 Calcium as Ca ⁺		94mg/l	
21 Magnesium as Mg ⁺		110mg/l	
22 Chlorides as Cl ⁻		438mg/l	
23 Sulphates as SO ₄ ⁻		332mg/l	
24 Silica as SiO ₂		23.5mg/l	
25 Iron as Fe		0.10mg/l	
26 Hydroxide Alkalinity as CaCO ₃		NIL	
27 Free CO ₂		NIL	
28 Free Chlorine as Cl ₂		NIL	
29 Fluoride as F ⁻		1.7mg/l	
30 BOD at 27°C for 3 days Incubation		0.20mg/l	
>>>>End of the report<<<<			
Total No Of Determination : 30 [Thirty Only.]			
Checked by  Analyst		 For Italab Salem Private Ltd.,  Senior Chemist	
BIS RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY ASSOCIATES : ITALAB PVT LTD, MUMBAI ★ CHENNAI ★ KOLKATTA ★ VIZAG ★ BELLARY JAMNAGAR ★ ITALAB (GOA) PVT. LTD GOA ★ MANGALORE ★ ITALAB (JAPAN) LTD., JAPAN ★ POHANG (S.KOREA) All work is carried out to the best of our ability, however, without any responsibility on our part and without affecting in any way the contractual rights of our principals. Our report is limited to the test samples identified herein. This report is strictly confidential. Its use for publicity, arbitration or as evidence in legal disputes is strictly forbidden.			

 		 <p>Since 1948</p> <p>Industrial Testing & Analytical Laboratories Surveyors, Samplers & Analysts</p>	Italab Salem Private Limited An ISO 9001 : 2008 Certified Laboratory REGD OFFICE 4-A (New 36) Rajaji Road Salem 636 007 Tamil Nadu Tel 0427 2319264, 2312089 Fax 0427 4030113 Mobile 98940 31046 e-mail : italabsalem@bsnl.in italabsalem@airtelmail.in
CERTIFICATE OF ANALYSIS		No. CER/1199	
Lab Memo No : APR/874	Sample No : JUN/85	Date : 10/06/2011	
We hereby certify that a sample described as : WATER Received from : M/s. RK ENVIRO CARE, ERODE With the following marks : Sample : 3		Sample Submitted by party Received by us on : 03/06/2011	
Quantity : About 2 Ltr Analyzed on received basis and the results are obtained as follows:			
PARAMETERS	RESULTS		
1 pH	7.51		
2 Appearance	Clear Colourless Liquid		
3 Colour	< 5 Hazen unit		
4 Turbidity	1 NTU		
5 Odour	Odourless		
6 Total Suspended Solids	< 1 mg/l		
7 Total Dissolved Solids	1470 mg/l		
8 Electrical conductivity	2536.0 micromhos/cm		
9 Total Hardness as CaCO ₃	495 mg/l		
10 Permanent Hardness as CaCO ₃	210 mg/l		
11 Temporary Hardness as CaCO ₃	285 mg/l		
12 Calcium Hardness as CaCO ₃	159 mg/l		
13 Magnesium Hardness as CaCO ₃	336 mg/l		
14 Carbonate Hardness as CaCO ₃	495 mg/l		
15 Non-Carbonate Hardness as CaCO ₃	NIL		
16 Total Alkalinity as CaCO ₃	576 mg/l		
17 Phenolphthalein Alkalinity as CaCO ₃	NIL		
Total No Of Determination :			
Checked by  Analyst	For Italab Salem Private Ltd.,  Senior Chemist		
BIS RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY			
ASSOCIATES : ITALAB PVT LTD. MUMBAI * CHENNAI * KOLKATTA * VIZAG * BELLARY JAMNAGAR * ITALAB (GOA) PVT LTD GOA * MANGALORE * ITALAB (JAPAN) LTD., JAPAN * POHANG (S.KOREA)			
All work is carried out to the best of our ability, however, without any responsibility on our part and without affecting in any way the contractual rights of our principals. Our report is limited to the test samples identified herein. This report is strictly confidential. Its use for publicity, arbitration or as evidence in legal disputes is strictly forbidden.			

  		Italab Salem Private Limited An ISO 9001 : 2008 Certified Laboratory REGD OFFICE 4-A (New 36) Rajaji Road Salem 636 007 Tamil Nadu Tel 0427 2319264, 2312089 Fax 0427 4030113 Mobile 98940 31046 e-mail : italabsalem@bsnl.in italabsalem@airtelmail.in	
CERTIFICATE OF ANALYSIS		No. CER/1199	
Lab Memo No : APR/874	Sample No : JUN/85	Date : 10/06/2011	
We hereby certify that a sample described as : WATER Received from : M/s. RK ENVIRO CARE, ERODE With the following marks : Sample : 3		Sample Submitted by party Received by us on : 03/06/2011	
Quantity : About 2 Ltr Analyzed on received basis and the results are obtained as follows:			
PARAMETERS	RESULTS		
18 Carbonate Alkalinity as CaCO ₃	NIL		
19 Bi-Carbonate Alkalinity as CaCO ₃	576mg/l		
20 Calcium as Ca+	63mg/l		
21 Magnesium as Mg+	81mg/l		
22 Chlorides as cl-	378mg/l		
23 Sulphates as SO ₄ -	206mg/l		
24 Silica as SiO ₂	24.5mg/l		
25 Iron as Fe	0.12mg/l		
26 Hydroxide Alkalinity as CaCO ₃	NIL		
27 Free CO ₂	NIL		
28 Free Chlorine as cl ₂	NIL		
29 Fluoride as F-	1.3mg/l		
30 BOD at 27°C for 3 days Incubation	NIL		
>>>>>End of the report<<<<<			
Total No Of Determination : 30 [Thirty Only.]			
Checked by  Analyst		For Italab Salem Private Ltd.,  Senior Chemist	
BIS RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY ASSOCIATES : ITALAB PVT LTD. MUMBAI ★ CHENNAI ★ KOLKATTA ★ VIZAG ★ BELLARY JAMNAGAR ★ ITALAB (GOA) PVT LTD GOA ★ MANGALORE ★ ITALAB (JAPAN) LTD., JAPAN ★ POHANG (S.KOREA) All work is carried out to the best of our ability, however, without any responsibility on our part and without affecting in any way the contractual rights of our principals. Our report is limited to the test samples identified herein. This report is strictly confidential. Its use for publicity, arbitration or as evidence in legal disputes is strictly forbidden.			

 ISO 9001:2008 No. QMS-K08193	 Industrial Testing & Analytical Laboratories Surveyors, Samplers & Analysts	Italab Salem Private Limited An ISO 9001 : 2008 Certified Laboratory REGD OFFICE 4-A (New 36) Rajaji Road Salem 636 007 Tamil Nadu Tel 0427 2319264, 2312089 Fax 0427 4030113 Mobile 98940 31046 e-mail : italabsalem@bsnl.in italabsalem@airtelmail.in
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CERTIFICATE OF ANALYSIS		No. CER/1200
Lab Memo No : APR/874	Sample No : JUN/86	Date : 10/06/2011

Sample Submitted by **party**
Received by us on : **03/06/2011**

We hereby certify that a sample described as : **WATER**
Received from : **M/s. RK ENVIRO CARE, ERODE**
With the following marks : **Sample : 4**

Quantity : **About 2 Ltr**
Analyzed on received basis and the results are obtained as follows:

PARAMETERS	RESULTS
1 pH	7.31
2 Appearance	Clear Colourless Liquid
3 Colour	20 Hazen unit
4 Turbidity	5 NTU
5 Odour	Odourless
6 Total Suspended Solids	18.0 mg/l
7 Total Dissolved Solids	2395 mg/l
8 Electrical conductivity	4129.0 micromhos/cm
9 Total Hardness as CaCO ₃	1208 mg/l
10 Permanent Hardness as CaCO ₃	440 mg/l
11 Temporary Hardness as CaCO ₃	768 mg/l
12 Calcium Hardness as CaCO ₃	444 mg/l
13 Magnesium Hardness as CaCO ₃	764 mg/l
14 Carbonate Hardness as CaCO ₃	890 mg/l
15 Non-Carbonate Hardness as CaCO ₃	318 mg/l
16 Total Alkalinity as CaCO ₃	890 mg/l
17 Phenolphthalein Alkalinity as CaCO ₃	NIL
18 Carbonate Alkalinity as CaCO ₃	NIL

Total No Of Determination :






Checked by Analyst	 For Italab Salem Private Ltd., Senior Chemist
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
BIS RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY






ASSOCIATES :
 ITALAB PVT LTD, MUMBAI * CHENNAI * KOLKATTA * VIZAG * BELLARY JAMNAGAR * ITALAB (GOA) PVT. LTD GOA * MANGALORE * ITALAB (JAPAN) LTD., JAPAN * POHANG (S.KOREA)


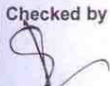


All work is carried out to the best of our ability, however, without any responsibility on our part and without affecting in any way the contractual rights of our principals. Our report is limited to the test samples identified herein. This report is strictly confidential. Its use for publicity, arbitration or as evidence in legal disputes is strictly forbidden.

 ISO 9001:2008 No. QMS-K08193	 QMS-032	 Since 1948	Italab Salem Private Limited An ISO 9001 : 2008 Certified Laboratory REGD OFFICE 4-A (New 36) Rajaji Road Salem 636 007 Tamil Nadu Tel 0427 2319264, 2312089 Fax 0427 4030113 Mobile 98940 3104 e-mail : italabsalem@bsnl.in italabsalem@airtelmail.in
CERTIFICATE OF ANALYSIS			No. CER/1200
Lab Memo No. APR/874	Sample No. JUN/86	Date : 10/06/2011	
We hereby certify that a sample described as WATER Received from : M/s. RK ENVIRO CARE, ERODE With the following marks : Sample : 4			Sample Submitted by party Received by us on : 03/06/2011
Quantity : About 2 Ltr Analyzed on received basis and the results are obtained as follows:			
<u>PARAMETERS</u>	<u>RESULTS</u>		
19 Bi-Carbonate Alkalinity as CaCO ₃	890mg/l		
20 Calcium as Ca ⁺	177mg/l		
21 Magnesium as Mg ⁺	185mg/l		
22 Chlorides as Cl ⁻	945mg/l		
23 Sulphates as SO ₄ ⁻	280mg/l		
24 Silica as SiO ₂	23.8mg/l		
25 Iron as Fe	0.20mg/l		
26 Hydroxide Alkalinity as CaCO ₃	NIL		
27 Free CO ₂	NIL		
28 Free Chlorine as Cl ₂	NIL		
29 Fluoride as F ⁻	1.2mg/l		
30 BOD at 27°C for 3 days Incubation	0.50mg/l		
>>>>End of the report<<<<			
Total No Of Determination : 30 [Thirty Only.]			
Checked by	For Italab Salem Private Ltd.,		
			
Analyst	Senior Chemist		
BIS RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY			
ASSOCIATES :			
ITALAB PVT LTD. MUMBAI * CHENNAI * KOLKATTA * VIZAG * BELLARY JAMNAGAR * ITALAB (GOA) PVT. LTD. GOA * MANGALORE * ITALAB (JAPAN) LTD., JAPAN * POHANG (S. KOREA)			
All work is carried out to the best of our ability, however, without any responsibility on our part and without affecting in any way the contractual rights of our principals. Our report is limited to the test samples identified herein. This report is strictly confidential. Its use for publicity, arbitration or as evidence in legal disputes is strictly forbidden.			

 		 <p>Since 1948</p> <p>Industrial Testing & Analytical Laboratories Surveyors, Samplers & Analysts</p>	Italab Salem Private Limited An ISO 9001 : 2008 Certified Laboratory REGD OFFICE 4-A (New 36) Rajaji Road Salem 636 007 Tamil Nadu Tel 0427 2319264, 2312089 Fax 0427 4030113 Mobile 98940 31046 e-mail : italabsalem@bsnl.in italabsalem@airtelmail.in
CERTIFICATE OF ANALYSIS		No. CER/1201	
Lab Memo No : APR/874	Sample No : JUN/87	Date : 10/06/2011	
We hereby certify that a sample described as : WATER Received from : M/s. RK ENVIRO CARE, ERODE With the following marks : Sample: 5		Sample Submitted by party Received by us on : 03/06/2011	
Quantity : About 2 Ltr Analyzed on received basis and the results are obtained as follows:			
PARAMETERS		RESULTS	
1 pH		7.45	
2 Appearance		Clear Colourless Liquid	
3 Colour		< 5Hazen unit	
4 Turbidity		1NTU	
5 Odour		Odourless	
6 Total Suspended Solids		1.10mg/l	
7 Total Dissolved Solids		1830mg/l	
8 Electrical conductivity.		3065micromhos/cm	
9 Total Hardness as CaCO ₃		776mg/l	
10 Permanent Hardness as CaCO ₃		320mg/l	
11 Temporary Hardness as CaCO ₃		456mg/l	
12 Calcium Hardness as CaCO ₃		220mg/l	
13 Magnesium Hardness as CaCO ₃		556mg/l	
14 Carbonate Hardness as CaCO ₃		776mg/l	
15 Non-Carbonate Hardness as CaCO ₃		NIL	
16 Total Alkalinity as CaCO ₃		848mg/l	
17 Phenolphthalein Alkalinity as CaCO ₃		NIL	
18 Carbonate Alkalinity as CaCO ₃		NIL	
Total No Of Determination :			
Checked by  Analyst		For Italab Salem Private Ltd.,  Senior Chemist	
BIS RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY			
ASSOCIATES : ITALAB PVT LTD, MUMBAI ★ CHENNAI ★ KOLKATTA ★ VIZAG ★ BELLARY JAMNAGAR ★ ITALAB (GOA) PVT. LTD GOA ★ MANGALORE ★ ITALAB (JAPAN) LTD., JAPAN ★ POHANG (S.KOREA)			
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 		 Since 1948 Industrial Testing & Analytical Laboratories Surveyors, Scientists & Analysts	Italab Salem Private Limited An ISO 9001 : 2008 Certified Laboratory REGD OFFICE 4-A (New 36) Rajaji Road Salem 636 007 Tamil Nadu Tel 0427 2319264, 2312089 Fax 0427 4030113 Mobile 98940 31046 e-mail : italabsalem@bsnl.in italabsalem@airtelmail.in
CERTIFICATE OF ANALYSIS			
Lab Memo No : APR/874		Sample No : JUN/87	No. CER/1201
		Date : 10/06/2011	
		Sample Submitted by party Received by us on : 03/06/2011	
We hereby certify that a sample described as : WATER Received from : M/s. RK ENVIRO CARE, ERODE With the following marks : Sample: 5			
Quantity : About 2 Ltr			
Analyzed on received basis and the results are obtained as follows:			
<u>PARAMETERS</u>		<u>RESULTS</u>	
19 Bi-Carbonate Alkalinity as CaCO ₃		848mg/l	
20 Calcium as Ca ⁺		88mg/l	
21 Magnesium as Mg ⁺		135mg/l	
22 Chlorides as Cl ⁻		658mg/l	
23 Sulphates as SO ₄ ⁻		247mg/l	
24 Silica as SiO ₂		19.0mg/l	
25 Iron as Fe		0.15mg/l	
26 Hydroxide Alkalinity as CaCO ₃		NIL	
27 Free CO ₂		NIL	
28 Free Chlorine as Cl ₂		NIL	
29 Fluoride as F ⁻		1.4mg/l	
30 BOD at 27°C for 3 days Incubation		1.20mg/l	
>>>>End of the report<<<<			
Total No Of Determination : 30 [Thirty Only.]			
Checked by  Analyst	 For Italab Salem Private Ltd.,  Senior Chemist		
BIS RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY ASSOCIATES : ITALAB PVT LTD, MUMBAI * CHENNAI * KOLKATTA * VIZAG * BELLARY JAMNAGAR * ITALAB (GOA) PVT. LTD GOA * MANGALORE * ITALAB (JAPAN) LTD., JAPAN * POHANG (S.KOREA)			
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 		 <p>Since 1948</p> <p>Industrial Testing & Analytical Laboratories Survivors Samplers & Analysts</p>	Italab Salem Private Limited An ISO 9001 : 2008 Certified Laboratory REGD OFFICE 4-A (New 36) Rajaji Road Salem 636 007 Tamil Nadu Tel 0427 2319264, 2312089 Fax 0427 4030113 Mobile 98940 31046 e-mail : italabsalem@bsnl.in italabsalem@airtelmail.in
CERTIFICATE OF ANALYSIS			No. CER/1202
Lab Memo No : APR/874	Sample No : JUN/88	Date : 10/06/2011	
We hereby certify that a sample described as : WATER Received from : M/s. RK ENVIRO CARE, ERODE With the following marks : Sample:6			Sample Submitted by party Received by us on : 03/06/2011
Quantity : About 2 Ltr Analyzed on received basis and the results are obtained as follows:			
PARAMETERS		RESULTS	
1 pH		7.39	
2 Appearance		Clear Colourless Liquid	
3 Colour		< 5 Hazen unit	
4 Turbidity		1 NTU	
5 Odour		Odourless	
6 Total Suspended Solids		2.08 mg/l	
7 Total Dissolved Solids		2260 mg/l	
8 Electrical conductivity		3896.0 micromhos/cm	
9 Total Hardness as CaCO ₃		536 mg/l	
10 Permanent Hardness as CaCO ₃		220 mg/l	
11 Temporary Hardness as CaCO ₃		316 mg/l	
12 Calcium Hardness as CaCO ₃		160 mg/l	
13 Magnesium Hardness as CaCO ₃		376 mg/l	
14 Carbonate Hardness as CaCO ₃		536 mg/l	
15 Non-Carbonate Hardness as CaCO ₃		NIL	
16 Total Alkalinity as CaCO ₃		785 mg/l	
17 Phenolphthalein Alkalinity as CaCO ₃		NIL	
18 Carbonate Alkalinity as CaCO ₃		NIL	
Total No Of Determination :			
Checked by  Analyst		For Italab Salem Private Ltd.,  Senior Chemist	
BIS RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY ASSOCIATES : ITALAB PVT LTD, MUMBAI * CHENNAI * KOLKATTA * VIZAG * BELLARY JAMNAGAR * ITALAB (GOA) PVT. LTD GOA * MANGALORE * ITALAB (JAPAN) LTD., JAPAN * POHANG (S.KOREA)			
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CERTIFICATE OF ANALYSIS		No. CER/1202	
Lab Memo No : APR/874	Sample No : JUN/88	Date : 10/06/2011	
We hereby certify that a sample described as : WATER Received from : M/s. RK ENVIRO CARE, ERODE With the following marks : Sample:6		Sample Submitted by party Received by us on : 03/06/2011	
Quantity : About 2 Ltr Analyzed on received basis and the results are obtained as follows:			
PARAMETERS		RESULTS	
19 Bi-Carbonate Alkalinity as CaCO ₃		785mg/l	
20 Calcium as Ca ⁺		64mg/l	
21 Magnesium as Mg ⁺		91mg/l	
22 Chlorides as Cl ⁻		514mg/l	
23 Sulphates as SO ₄ ⁻		527mg/l	
24 Silica as SiO ₂		24.0mg/l	
25 Iron as Fe		0.15mg/l	
26 Hydroxide Alkalinity as CaCO ₃		NIL	
27 Free CO ₂		NIL	
28 Free Chlorine as Cl ₂		NIL	
29 Fluoride as F ⁻		1.4mg/l	
30 BOD at 27°C for 3 days Incubation		0.20mg/l	
>>>>>End of the report<<<<<			
Total No Of Determination : 30 [Thirty Only.]			
Checked by  Analyst		For Italab Salem Private Ltd.,  Senior Chemist	
			
BIS RECOGNISED ASSAYING & HALLMARKING CENTRE FOR GOLD & GOLD JEWELLERY		ASSOCIATES : ITALAB PVT LTD. MUMBAI * CHENNAI * KOLKATTA * VIZAG * BELLARY JAMNAGAR * ITALAB (GOA) PVT. LTD. GOA * MANGALORE * ITALAB (JAPAN) LTD., JAPAN * POHANG (S.KOREA)	
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ANNEXURE -V

Public Consultation/Public Hearing

The public hearing / public consultation were conducted on 15.02.2007 at Salem City Municipal Corporation by the Corporation. The Municipal Commissioner, Municipal Engineers were present during the meeting. Public conference at Salem Corporation Office detailed the need to provide drainage and sewage treatment at Vellakuttai, Mankuttai, Anamedu and Vandipettai to the public of Salem Corporation. The public meeting in this office announced early on 4/11/07 in Daily Thanthi as per the advertisement attached in Annexure - 7. The Corporation members, media reporters and public in various localities were participated on the above 4 places to provide the drainage and sewage treatment plant. Majority of public interested and accepted the corporation decision. The minutes of meetings are informed to media persons, and the same has been reported in the media as shown in the Annexure -VI.

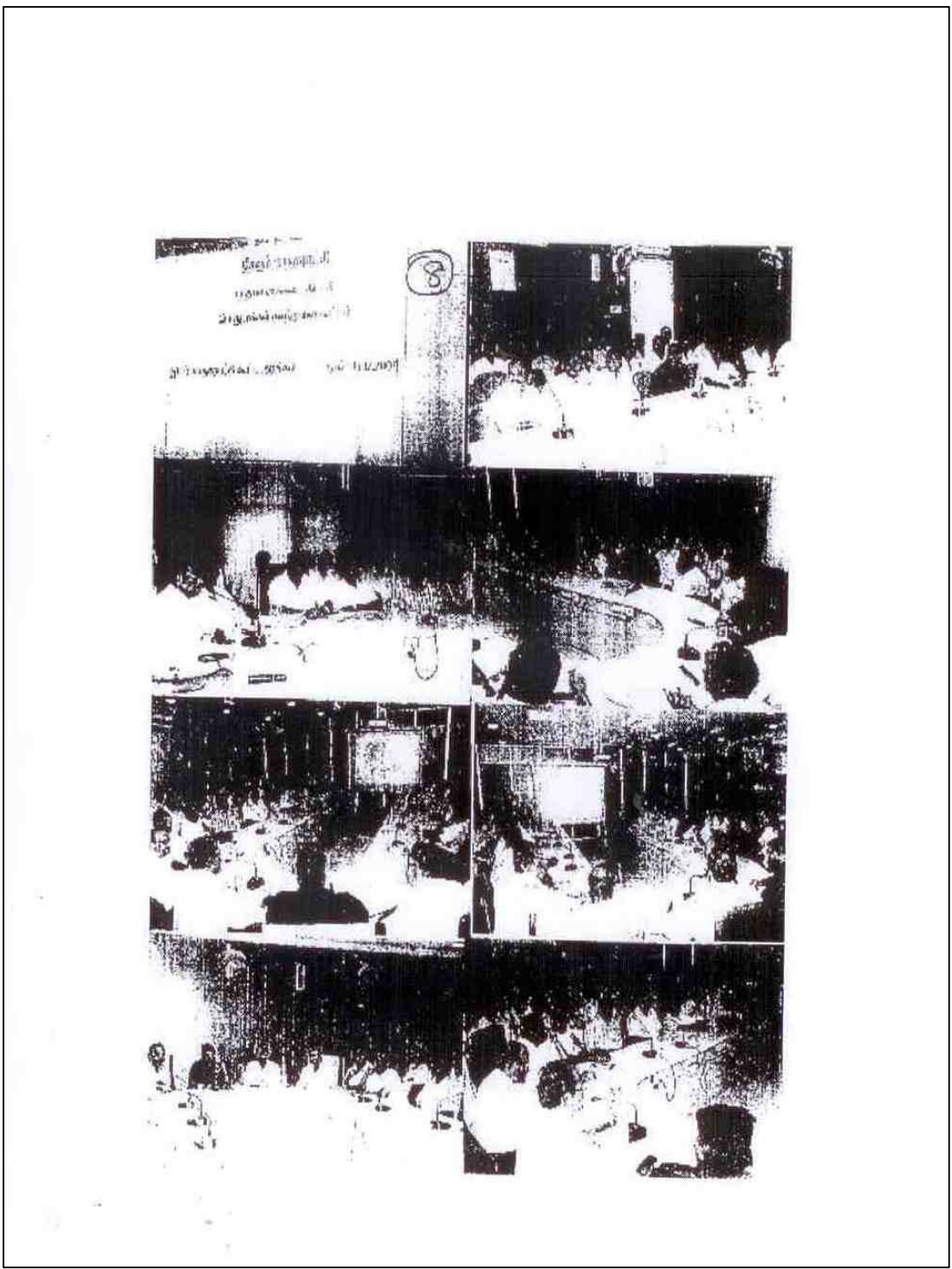
DINATHANTHI NEWSPAPER PUBLICATION DATED 14.11.2007

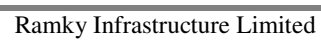
சேலம் மாநகராட்சி

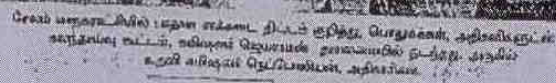
பாதாள சாக்கடை திட்டம்

சேலம் மாநகராட்சியின் பகுதிகளில் நிறைவேற்றப்பட்ட உள்ள பாதாள சாக்கடை திட்டத்தின் கீழ் புதிய தெழில் நடப்பதுடன் கூடிய நவீன கழிவுநீர் சுத்திகரிப்பு நிலையங்கள் மாநகரின் வெள்ளக்குட்டை, வண்டிப்பேட்டை, மான்குட்டை மற்றும் அணைமேடு ஆகிய நான்கு இடங்களில் அமைக்க உத்தேசிக்கப்பட்டுள்ளது. மேற்படி பகுதிகளில் புதிய தெழில் நடப்பதுடன் கூடிய நவீன கழிவுநீர் சுத்திகரிப்பு நிலையங்கள் அமைத்தல் தொடர்பாக பொதுமக்களது கருத்தினை அறிய 15.12.2007 அன்று காலை 11.00 மணி அளவில் மாநகராட்சி மைய அலுவலகத்தில் உள்ள கூட்ட அரங்கத்தில் பொதுமக்களுடன் ஒரு கலந்தாலோசனை கூட்டம் நடத்தப்பட உள்ளது. எனவே மேற்படி கூட்டத்தில் சம்மந்தப்பட்ட பகுதி பொதுமக்கள் கலந்து கொண்டு தங்களது கருத்துக்களை தெரிவிக்குமாறு கேட்டுக்கொள்ளப்படுகிறது.

ஆணையருக்காக,
சேலம் மாநகராட்சி.





[illegible]

