1. Land Environment

S. No.	Information	Details with source of Information data
1.1	Will the existing land use get significantly altered from the project that is not consistent with the surroundings? (Proposed land use must conform to the approved Master Plan / Development Plan of the area. Change of land use if any and the statutory approval from the competent authority are submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.	Existing land use does not alter due to this project. The present land use of the project site is Grazing land as per the approved land use plan by Directorate of Town and Country Planning. The land use map of 5 Km radius is shown in Figure 2.3, page 33 of the conceptual plan. The Topo plan showing all the features, road connectivity and drainage map are given in Page 34-36 of the Conceptual Plan. The Contour Map of the site is shown as Figure 2.7, Page 37 of the Conceptual plan.
1.2	List out all the major project requirements in terms of the • Land area • Built up area • Water consumption • Power requirement • Connectivity • Community facilities, parking needs etc.	Residential Building Comprising of 32 blocks (32 Dwelling Units/Block). • 33820 Sq.m • 37754.88Sq.m (F.S.I – 1.12) • 704 KLD • 1200 KVA • Gudapakkam Bus Stop – 0.67 km (NNW), Vepampattu Railway Station – 3.8 km (N), Sevvapet Railway Station – 5.1 km (NW). • The Community facilities, parking needs provided for the project site is incorporated in Page No 36 of the Conceptual plan.
1.3	What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing land use, disturbance to the local ecology)	The project is the construction of slum tenements. This is provided with open space, provision for parking and landscaping internally itself. Adequate mitigation measures have been adopted to reduce the negative impacts due to the project during the Construction.

1.4	Will there be any significant land disturbance resulting in erosion, subsidence & instability? (Details of soil type, slope analysis, vulnerability to subsidence, seismicity etc may be given).	• The site has good load bearing capacity. • The site receives only moderate amount of rainfall during monsoon. Rainwater will be captured through rainwater harvesting lines. Roof rain water harvesting facilities has been provided. Storm Water Drains are also provided all along the compound wall. • Surrounding area is not waterlogged and there is no instability. Soil is supportive for green belt development and also for building construction. • The site falls under Zone III of seismic zone classification. The building is an earthquake resistant structure. • Geo-technical investigation report is enclosed in the **Annexure II.**
1.5	Will the proposal involve alteration of natural drainage systems? (Give details on a contour map showing the natural drainage near the proposed project site)	There is no alteration in the natural drainage system due to the project development as the site is almost a flat terrain. The natural slopes are utilized for the collection & conveyance of the sewage. The storm water network has been provided inside the project. Rain water will be collected during monsoon period through storm water drain and will be drained into rain water sump and rain water harvesting trench / pits. There is no alteration of natural drainage system. The Contour plan showing the natural drainage at the project site is Shown in Figure 2.7, Page 37 of the Conceptual plan.
1.6	What are the quantities of earthwork involved in the construction activity cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc.)	Excavated fertile topsoil during construction phase was stored and used landscape development within the project site. The lower strata earth excavated from the foundation was used for filling the plinths, road substructure

		and leveling.
1.7	Give details regarding water supply, waste handling etc. during the construction period.	The quantity of water required during construction phase was 50 KLD, purchased from private water tankers. The concrete debris is used for site grading and road filling.
1.8	Will the low lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity)	No, there is no low lying area or wetlands within the Project Site.
1.9	Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labour and the means of disposal)	No, the waste does not contribute any health hazards. The construction debris, construction waste, food waste are segregated and disposed properly.

2. Water Environment

S. No.	Information	Details with source of Information data
2.1	Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement met? State the sources & quantities and furnish a water balance statement.	The quantity of water required is **704 KLD** supplied by Gudupakkam Local Panchayat. The water balance diagram is shown in Figure no 3.1, Page 42 of the Conceptual Plan.
2.2	What is the capacity (dependable flow or yield) of the proposed source of water?	During Construction phase, approximately **50 KLD** of water was purchased through private water tankers. Total quantity of water required for the project during Operation Phase is supplied by Gudupakkam Local Panchayat. The quantity of water required during operation phase is **704 KLD**.

2.3	What is the quality of water required, in case, the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality)	Total quantity of water required for the project during Operation Phase is supplied by Gudupakkam Local Panchayat. The quality of water is maintained as per IS 10500-1991 (Drinking water standard)
2.4	How much of the water requirement can be met from the recycling of treated wastewater? (Give the details of quantities, sources and usage)	Quantity of wastewater generated from the project is **634KLD**, which are treated in Sewage Treatment Plant of **750 KLD** capacities. The treated wastewater is used only for Gardening purposes.
2.5	Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption)	There will be no diversion of water from other users.
2.6	What is the incremental pollution load from wastewater generated from the proposed activity? (Give details of the quantities and composition of wastewater generated from the proposed activity)	No incremental pollution load from wastewater generated within the compound. It is treated using the Sewage Treatment Plant and treated wastewater is used for watering the parks within the compound and excess treated water will be given to Local Panchayat. The water balance diagram is shown in **Figure 3.11**, Page 41 of the Conceptual Plan.
2.7	Give details of the water requirements met from water harvesting? Furnish details of the facilities created.	Rainwater Harvesting system is provided and the details are given in Page 45 of the Conceptual Plan. The layout showing Rain water Harvesting is incorporated in Page 46 of the Conceptual Plan.
2.8	What would be the impact of the land use changes occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems	Barren land is utilized for the construction of buildings. The storm water drains and the rain water harvesting structures provided to collect and utilize the rain water properly.

	of flooding or water logging in any way?	
2.9	What are the impacts of the proposal on the ground water? (Will there be tapping of ground water; give the details of ground water table, recharging capacity, and approvals obtained from competent authority, if any)	During Construction phase, the water was purchased through private water tankers. During Operation Phase, the water requirement will be supplied by Gudapakkam Local Panchayat. Rain water harvesting system will be set up for recharging ground water and improving the quality and quantity of groundwater resources.
2.10	What precautions/measures are taken to prevent the run-off from construction activities polluting land & aquifers? (Give details of quantities and the measures taken to avoid the adverse impacts)	The runoff from the construction activities were collected separately and directed into the earthern drain of the scheme.
2.11	How is the storm water from within the site managed? (State the provisions made to avoid flooding of the area, details of the drainage facilities provided along with a site layout indication contour levels)	Storm water will be collected from paved surfaces & unpaved surfaces through rain water harvesting lines constructed along the boundary of the compound.
2.12	Will the deployment of construction laborers particularly in the peak period lead to unsanitary conditions around the project site. Justify.	Most of the laborers were deployed locally and the adequate sanitary facilities are provided for workers residing there temporarily.
2.13	What on-site facilities are provided for the collection, treatment & safe disposal of sewage? (Give details of the quantities of wastewater generation, treatment capacities with technology & facilities for recycling and disposal)	Septic tanks & soak pit was set up within the site to maintain hygienic conditions. Wastewater generation during the Operation Phase is **634 KLD**, which is treated using the Sewage Treatment Plant having **750 KLD** capacity. The treated wastewater is used only for Gardening purposes.
2.14	Give details of dual plumbing system if treated waste is used for flushing of toilets or any other use	Not applicable

3. Vegetation

S. No.	Information	Details with source of Information data
3.1	Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with its unique features, if any)	The project site is a vacant grazing land and it has been observed that there are no ecologically important species of flora & fauna in the local ecosystem of the project site.
3.2	Will the Construction involve extensive clearing or modification of vegetation? (provide a detailed account of the trees & vegetation affected by the project)	The site area is classified as Grazing area and construction was done in the vacant land. There was no any significant loss in trees or vegetation. Only minor clearing activities were taken place to clear the thorny shrubs and trees around the periphery of the Project Site. Parks are developed within the compound for recreational activities and aesthetic value.
3.3	What are the measures proposed to be taken to minimize the likely impacts on important site features (Give details of proposal for tree plantation, landscaping, creation of water bodies etc along with a layout plan to an appropriate scale?)	Green belt/Landscaping are developed inside and around the periphery of the project site List of species for green Belt development are given in the 4.7, Page no 57of the Conceptual plan.

4. Fauna

S. No.	Information	Details with source of Information data
4.1	Is there likely to be any displacement of fauna- both terrestrial and aquatic or creation of barriers for their movement? Provide the details.	No
4.2	Any direct or indirect impacts on the avifauna of the area? Provide details.	No. There will be no direct or indirect impact on the avifauna of the area.
4.3	Prescribe measures such as corridors, fish ladders etc to mitigate adverse impacts on fauna	Not applicable.

5. Air Environment

S. No.	Information	Details with source of Information data
5.1	Will the project increase atmospheric concentration of gases & result in heat islands? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increased traffic generation as a result of the proposed constructions)	There is no significant increase in atmospheric gases due to the project.
5.2	What are the impacts on generation of dust, smoke, odorous fumes or other hazardous gases? Give details in relation to all the meteorological parameters.	The project is construction of residential buildings hence odorous fumes and hazardous gases are not generated. Dust generated from construction& road activities were suppressed by sprinkling of water in the activity zone and insignificant level of smoke was aroused from the construction equipment & vehicles. During operational phase only fugitive emissions are expected from the compound. Parks is developed within the compound and they will help in the sorption of gaseous pollutants.
5.3	Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure and measures proposed for improvement including the traffic management at the entry & exit to the project site	Open parking spaces are provided within the compound.
5.4	Provide details of the movement patterns with internal roads, bicycle tracks, pedestrian pathways, footpaths etc., with areas under each category	Each block within the compound are connected with well maintained internal roads and pedestrian pathways constructed. The internal road layout is shown in the **Site Layout**.

5.5	Will there be significant increase in traffic noise & vibrations? Give details of the sources and the measures proposed for mitigation of the above	During construction phase, the noise level inside the site was increased slightly due to the movement of vehicles and machines used during construction activities. Noise levels were reduced by the slow movement of vehicles. Installation of speed humps to reduce the speed of the vehicles. Properly well maintained vehicles were used to reduce the noise.
5.6	What will be the impact of DG sets & other equipment on noise levels & vibration in & ambient air quality around the project site? Provide details	The green belt development helps in reducing the noise levels at the site.

6. Aesthetics

S. No.	Information	Details with source of Information data
6.1	Will the proposed constructions in any way result in the obstruction of a view, scenic amenity or landscapes? Are these considerations taken into account by the proponents?	This project not affects the view, scenic amenity or the landscape. Parks within the compound, of the project results in improving the existing landscape.
6.2	Will there be any adverse impacts from new constructions on the existing structures? What are the considerations taken into account?	There is no any adverse impact due to the construction of structures.
6.3	Whether there are any local considerations of urban form & urban design influencing the design criteria? They may be explicitly spelt out.	There are no local considerations of urban form & urban design influencing the design criteria.
6.4	Are there any anthropological or archaeological sites or artifacts nearby? State if any other significant features in the vicinity of the proposed site have been considered.	There are no anthropological, archaeological sites and artifacts nearby the site area.

7. Socio-Economic Aspects

S. No.	Information	Details with source of Information data
7.1	Will the proposal result in any changes to the demographic structure of local population? Provide the details.	Since the project involves the construction of 1024 tenements, so there is an increase in the local population.
7.2	Give details of the existing social infrastructure around the proposed project.	The people living in the vicinity of the project area were employed. Primary, secondary schools and college are located within 5 Km radius. Road connectivity is available for the neighboring villages of the site
7.3	Will the project cause adverse effects on local communities, disturbance to sacred sites or other cultural values? What are the safe guards proposed?	No, project will not cause any disturbance to the local communities. There are no sacred sites nearby.

8. Building Materials

S. No.	Information	Details with source of Information data
8.1	May involve the use of building materials with high-embodied energy. Are the construction materials produced with energy efficient processes?(Give details of energy conservation measures in the selection of building materials and their energy efficiency)	Standard list of building materials were used. Some of them have high embodied energy like cement, steel, etc., Energy efficient material were used in the project wherever feasible.
8.2	Transport and handling of materials during construction may result in pollution, noise & public nuisance. What measures are taken to minimize the impacts?	• Use of well maintained vehicles for construction activities • Vehicles carrying construction materials were properly covered. • Equipment like earmuffs, earplugs etc., were used for hearing protection for workers. • Covered piles of building materials like cement, sand and other materials. • Limitation of vehicle speeds were done • Controlled dust through fine water sprays

8.3	Are recycled materials used in roads and structures? State the extent of savings achieved?	• Excavated top soil was used for setting up parks within the site. • Lower soil was used for landscaping.
8.4	Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.	The method of collection, segregation & disposal of the garbage generated during the operation phases is detailed in Page 43 of the Conceptual Plan.

9. Energy Conservation

S. No.	Information	Details with source of Information data
9.1	Give details of the power requirements, source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?	Electricity is sourced from TNEB. Total Electric load the project is **1200 KVA**. 1 number 40 KVA DG Set is used as backup power. Diesel fuel of approximately 5.5lts will be used. Energy efficient fluorescent lamps were provided for street lights.
9.2	What type of, and capacity of, power back-up you plan to provide?	One **40 KVA** DG Set will be used as back-up power supply.
9.3	What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short wave and long wave radiation	Not Applicable
9.4	What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project.	Each dwelling unit is constructed in such that sufficient sunlight can be availed by the occupants during summer and winter seasons.
9.5	Does the layout of streets & buildings maximize the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building complex? Substantiate with details.	The site layout developed taking into consideration the need for utilizing renewable resources i.e. sunlight. The residential blocks were spaced such that sufficient sunlight reaches each dwelling unit. Each dwelling unit is constructed such that sufficient sunlight can be availed by the occupants during summer and winter seasons.

9.6	Is shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of Wallson the East and the West and the Roof? How much energy saving has been effected?	Parks with native trees are developed on the eastern and western sections of the project. These will provide shade and aid in cooling the surrounding areas.
9.7	Do the structures use energy-efficient space conditioning, lighting and mechanical systems? Provide technical details. Provide details of the transformers and motor efficiencies, lighting intensity and air-conditioning load assumptions? Are you using CFC and HCFC free chillers? Provide specifications.	Buildings were designed and constructed taking into consideration natural ventilation and reducing the dependency on electrical energy. Energy efficient fluorescent and compact fluorescent lamps are used.
9.8	What are the likely effects of the building activity in altering the micro-climates? Provide a self-assessment on the likely impacts of the proposed construction on creation of heat island & inversion effects?	• The project is construction of residential buildings hence air pollutants released into the atmosphere is insignificant. • The only source of pollutants is from the vehicles moving in and out of the compound and from equipments (D.G Set). • Heat island effects are mitigated by parks within the site. These will help in reducing the ambient air temperature through evapo-transpiration. • No inversion effects are expected to occur.
9.9	What are the thermal characteristics of the building envelope? (a) roof; (b) external walls; and (c) fenestration? Give details of the material used and the U-values or the R-values of the individual components.	The U value and the R value for roof, external walls and fenestration are designed as per the standards of Energy Conservation Building Code.
9.10	What precautions & safety measures are proposed against fire hazards? Furnish details of emergency plans	All buildings were designed and constructed to manage the emergency situation. Contact details of the nearest Fire Safety

		Department will be displayed prominently within the site.
9.11	If you are using glass as wall material provide details and specifications including emissivity and thermal characteristics	Glass is not used as a wall material.
9.12	What is the rate of air infiltration into the building? Provide details of how you are mitigating the effects of infiltration.	This is a residential building with no significant pressure difference inside and outside of the building. Infiltration is reduced by sealing cracks and gaps and by the planted plants near the buildings. To conserve energy.
9.13	To what extent the non-conventional energy technologies are utilized in the overall energy consumption? Provide details of the renewable energy technologies used.	The site layout was developed taking into consideration the need for utilizing renewable resources i.e. sunlight and local air movement. The blocks were spaced such that sufficient sunlight and natural ventilation reaches each dwelling unit reducing the dependency on electrical energy.

10. Environmental Management Plan

S. No.	Information	Details with source of Information data
10.1	Environmental Management Plan would consist of all mitigation measures pertaining to the anticipated impacts raised due to the various activities related to the project during Construction and Operation phase. Along with that Environmental Monitoring Plan will be proposed in such a way to monitor the impacts during operation phase for the entire period	The impacts on air quality during construction were due to vehicular movement, which is controlled by spraying water on roads and use of dust covers, etc. The Impacts on noise quality during construction & operation phase is due to the vehicular movement and this is controlled by adopting better traffic management. The impacts on water quality during the operational phase are due to sewage generation which is treated in the STP and treated sewage is used for gardening & landscaping. The impact on soil due to generation of construction and demolition waste was

		controlled by implementing appropriate waste management system. The brief description of EMP is given in the Chapter 4; Page 48-57 of the Conceptual Plan.

1.0 INTRODUCTION

1.1 Background of the project

Tamil Nadu Slum Clearance Board (TNSCB) was formed by Tamil Nadu Slum Areas (Improvement & Clearance) Act 1957 with the motto "we shall see God in the smile of the poor" for the construction of storied tenements with adequate basic amenities so that the slums might not be a source of danger to the health, safety or well being of the public. Initially, its activities were confined to the Chennai city. Subsequently, TNSCB was extended to other Municipalities and Town Panchayats in Tamil Nadu and are currently implementing various housing and Slum Improvement programmes.

1.2 Objectives of Tamil Nadu Slum Clearance Board

The main objectives of Tamil Nadu Slum Clearance Board are

- To clear all the slums in Chennai & other towns in Tamil Nadu to provide self contained hygienic tenements.
- To prevent the growth of slums & encroachments.
- To prevent the eviction of slum dwellers by private owners and to provide the slum families with security of tenure.
- To provide basic amenities like water supply, street lights, storm water drains, sewer line, etc to the slum areas.

JNNURM Scheme

The Government of India has constituted the “Jawaharlal Nehru National Urban Renewal Mission” (JNNURM) to assist local bodies for urban development. JNNURM is a Government of India initiative aiming at encouraging reforms and fast track planned development of identified cities. The Mission addresses the following main concerns,

- Integrated development of infrastructure services
- Ensure adequate funds to fulfill deficiencies
- Planned development of cities
- Provision of services for the urban poor
- Secure effective linkages between asset creation and asset management

The Funding pattern for the projects under JNNURM (BSUP) is as follows:

GOI grant: 50% of project cost	Excludes certain components like Convenient shop, store shed, Ration shop, Burial ground, Price escalation, tender excess, contingencies and supervision charges etc.,
GTN share & Beneficiaries share: 50% of project cost	Beneficiaries share at 10% for SC/ST &12% for other weaker section to be collected as housing should not be provided free to the beneficiaries as per Mission's policy and the balance 40% is to be borne by the GoTN as its share.

Based on the above guidelines, the Government of Tamil Nadu, Tamil Nadu Slum Clearance Board (TNSCB) has constructed residential apparments for the Economically Weaker Section at Gudapakkam Village, Poonamallee Taluk, Thiruvallur District.

Since the activity constitutes construction of buildings in an area greater than 20,000 sq.m., it requires Environmental Clearance from State Environment Impact Assessment Authority (SEIAA) under sector 8(a) of EIA Notification 2006. As TNSCB have started the construction without obtaining prior EC, the file has been delisted by SEIAA and project is pending for want of Environmental Clearance. In order to obtain EC from MoEFCC we are applying to EAC, MoEFCC to get EC as per the procedure prescribed in Notification dated 14.03.2017.

The total plot area acquired for the project is about **33820 Sq.m**. and a total built up area of **37754.88 Sq.m.** As per screening of EIA in accordance with Ministry of Environment & Forest (MoEF) guidelines, Conceptual Plan is prepared in order to describe the Project Activity and Environmental Management Plan.

In this regard, **Tamil Nadu Slum Clearance Board (TNSCB)** has appointed **M/s. ABC Techno Labs India Private Limited, Chennai,** accredited by National Accreditation Board for Education and Training (NABET) – Quality Council of India (QCI), New Delhi to formulate Environmental Management Plan during Construction & Operational Phases to mitigate any adverse impacts to the Environment.

The Conceptual Plan describes all the details of the project and its specific activities that considered for investigation of the significant adverse impacts. The report also provides specific measures that will be put to practice to minimize the impacts on the Environment.

2.0 DESCRIPTION OF THE PROJECT SITE

2.1 Location

The project site is for construction of 1024 Slum Tenements for the Economically Weaker Section, at Survey Nos. 340/2B 1B of Gudapakkam Village, Poondhamalli Taluk, Thiruvallur District. The site co-ordinates are 13°5'22.42''N 79°59'43.06''E. The Satellite image of the project site and the location of the project site are given in **Figure 2.1** & **Figure 2.2**.

Figure 2.1 - Google Image of the Project Site

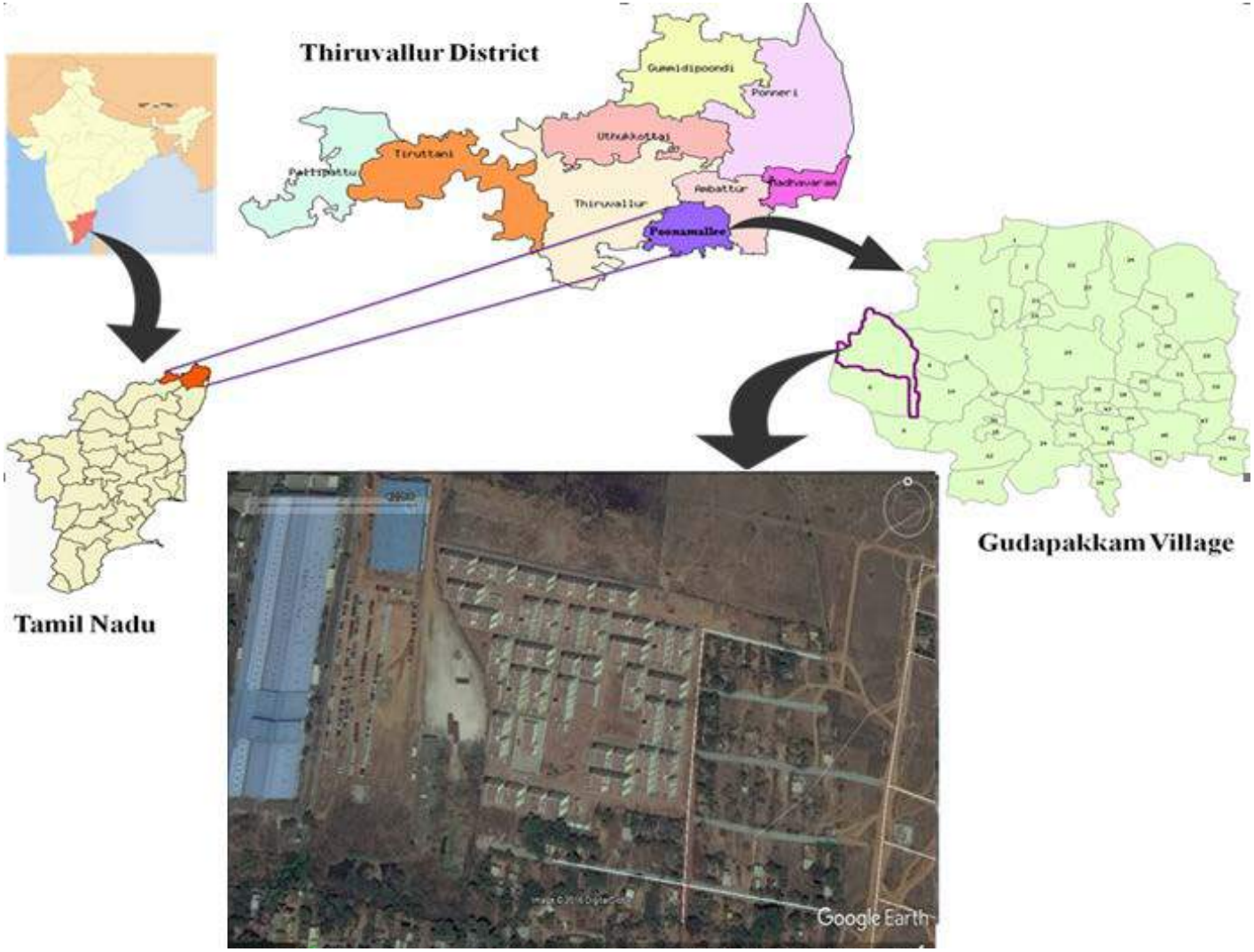


Figure 2.2 - Map Showing the Location of the Project Site

2.2 Environmental Sensitivity of the project site

The site selected to develop 1024 Slum Tenements is barren land, categorized as Grazing Land by Directorate of Town and Country Planning. The existing land use does not alter since the project is for the development of Residential Buildings. Land-use map of 10 km radius is shown in **Figure 2.3**. Topo map covering 10 km radius from periphery of the project site is given in **Figure 2.4.** The drainage map of the project site Covering 10 Km is shown in **Figure 2.5.**

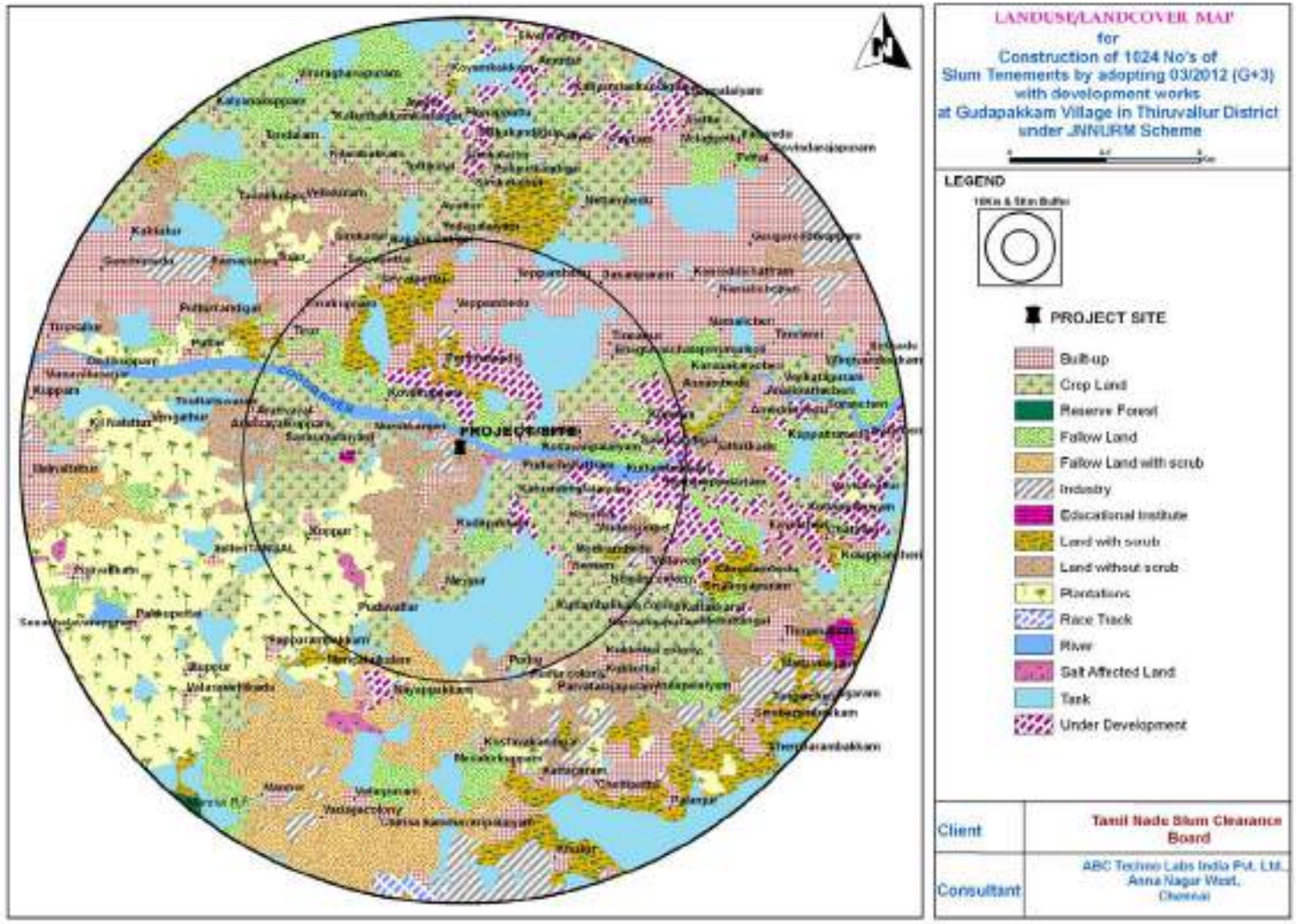


Figure 2.3 - Land use map of 10 Km radius

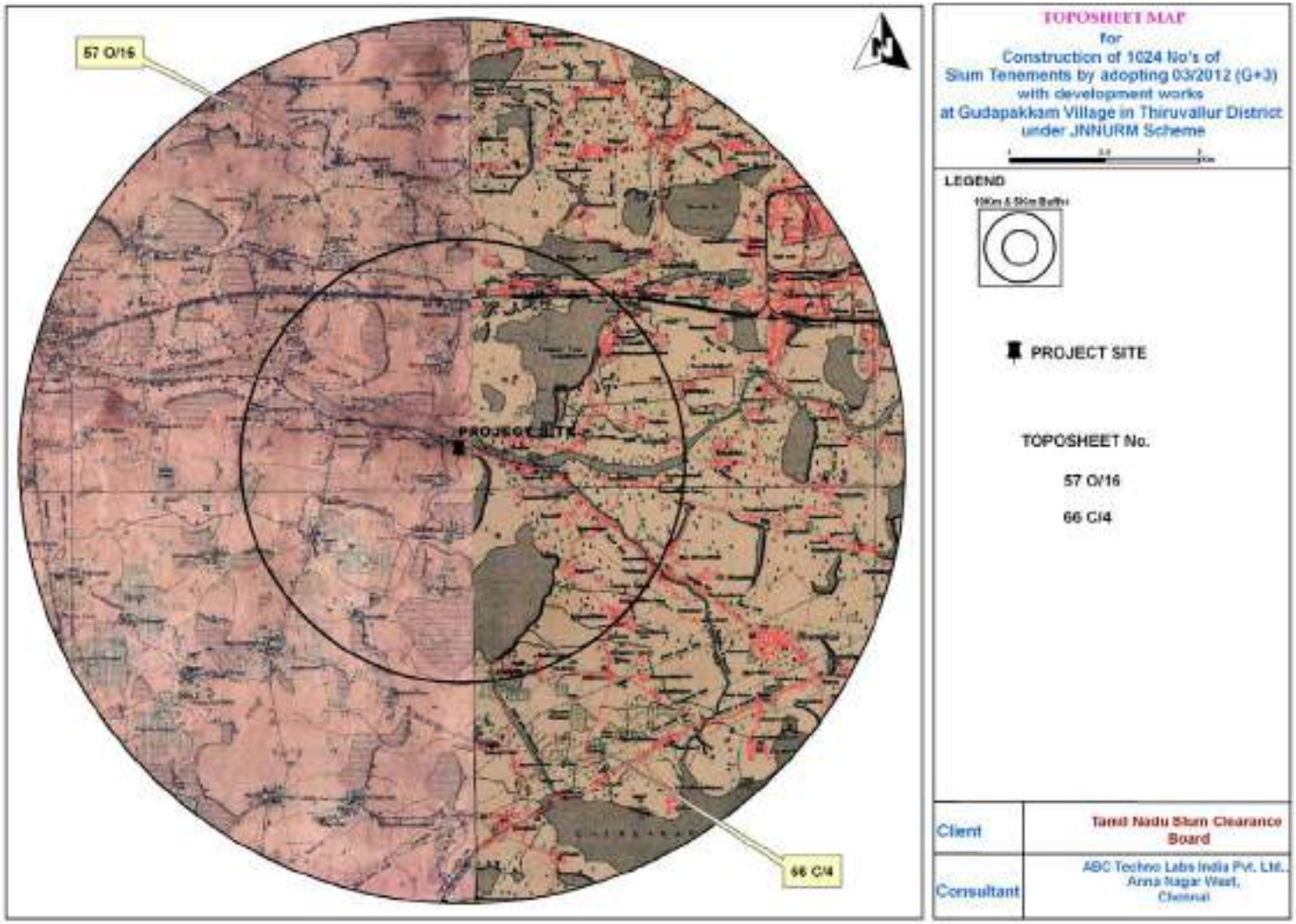


Figure 2.4 - Topo Map of the site covering 10 Km radius

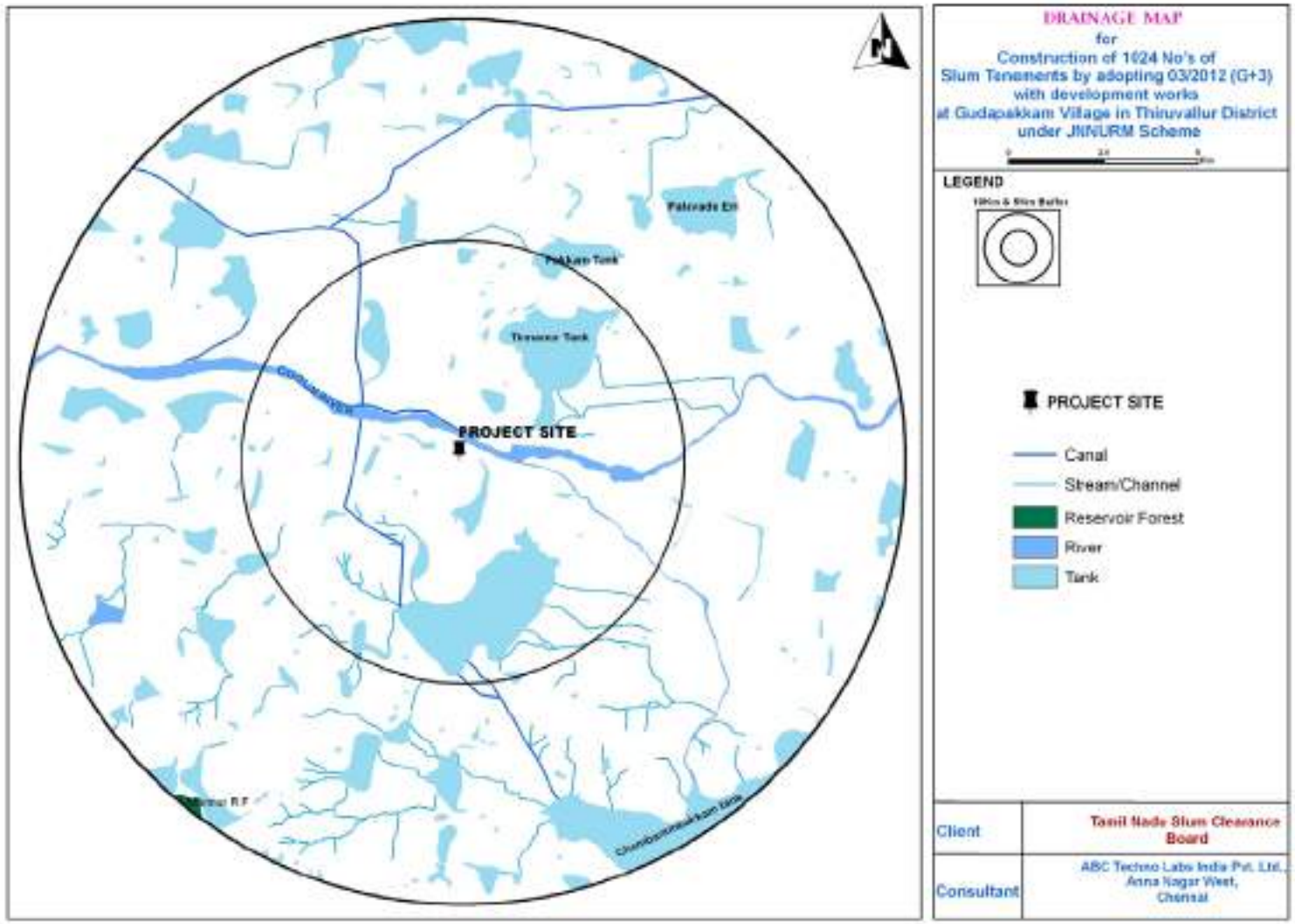


Figure 2.5 - Drainage map of the Project site covering 10 Km radius

The Environmental setting of the project site is given in **Table 2.1.**

Table 2.1 - Environmental Setting of the Project Site

S. No.	Particulars	Details
1	Site Latitude	13°5'22.42''N
2	Site Longitude	79°59'43.06''E
3	Present Land use	Grazing Land
4	Nearest Bus Stand	Gudapakkam Bus Stop – 670 m (NE)
6	Nearest railway station	Vepampattu Railway Station – 3.8 km (N) Sevvapet Railway Station – 5.1 km (NW)
7	Nearest airport	Anna International Airport, Chennai – 22 km (SE)
8	Nearest town/ city	Thiruvallur – 11.10 km (NW) Poonamallee – 15.63 km (E) Chennai – 28 km (W)
9	Hills/ valleys	Nil in 15 km radius
10	Topography	Plain
12	National parks/ Wildlife Sanctuaries	Nil in 15 km radius
13	Reservoir/Lake	Gudapakkam Lake – 2 km Thirunindravur Lake - 3 km (NE) Vepampattu Lake - 3.8 km (N) Nayapakkam Eri - 6 km (S) Valarpuram Eri - 6.5 km (S) Thandalam Eri - 7.4 km (S) Chembarambakkam Lake - 9.8 km (SE) Vilinjiyambakkam Lake - 10 km (NE)
14	Reserved/ Protected Forests	Nil in 15 km radius
15	Seismicity	Seismic Zone III
16	Defense Installations	Tambaram Air Force Station 24 Km (SE)
17	Nearest Port	Chennai Port – 32 km (E)

2.3 SITE CONNECTIVITY

The Project Site is well connected by road and railways. The site lies 200m south NH-205 (Chennai-Madanapalle). An access road connects the site with NH-205. Vepampattu Railway Station lies on the north side at a distance of 3.8 Km from the site. The Road connectivity map and local connectivity map of the project site are given as **Figure 2.6** and **Figure 2.7**.

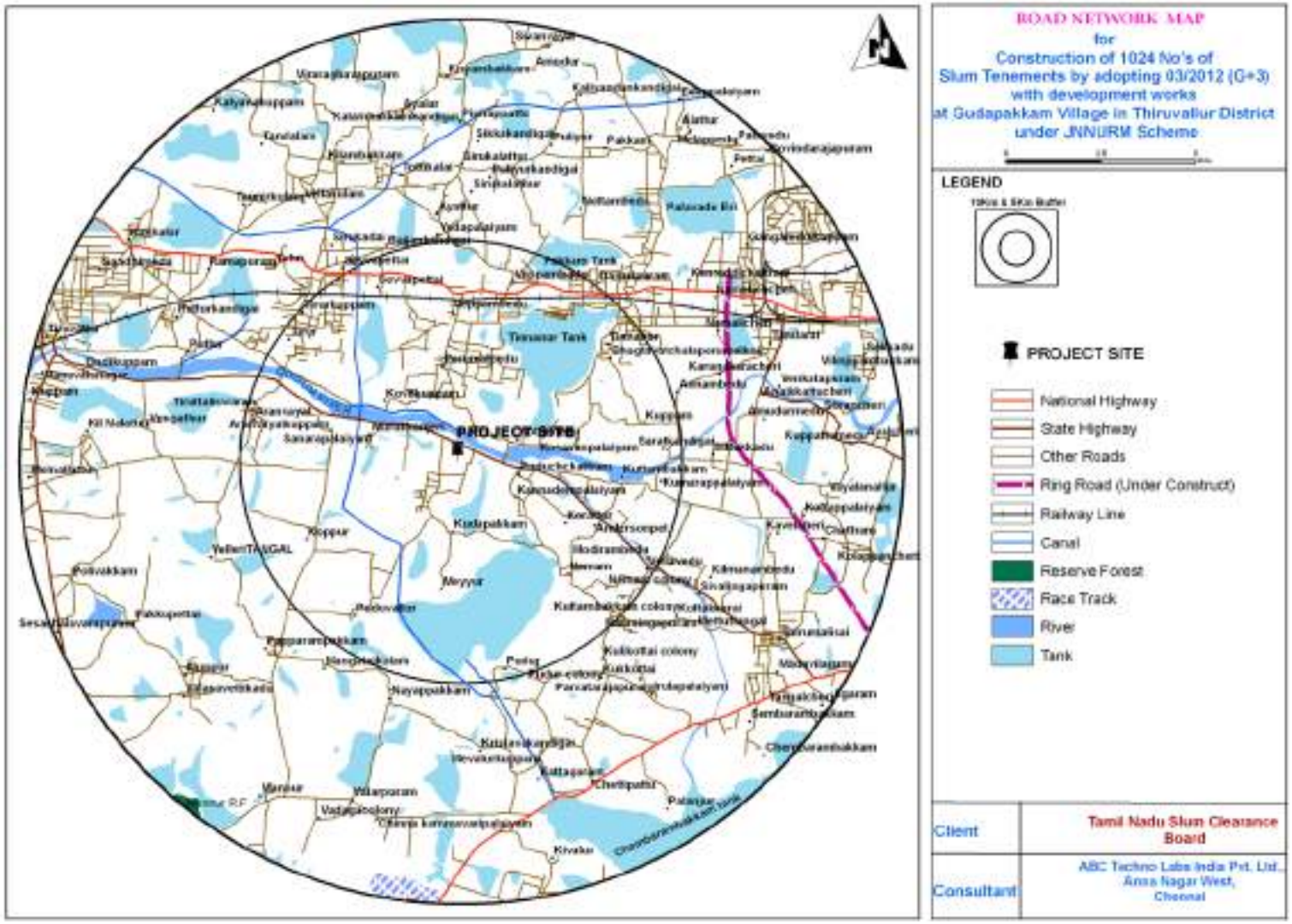


Figure 2.6 - Road connectivity of the Project site

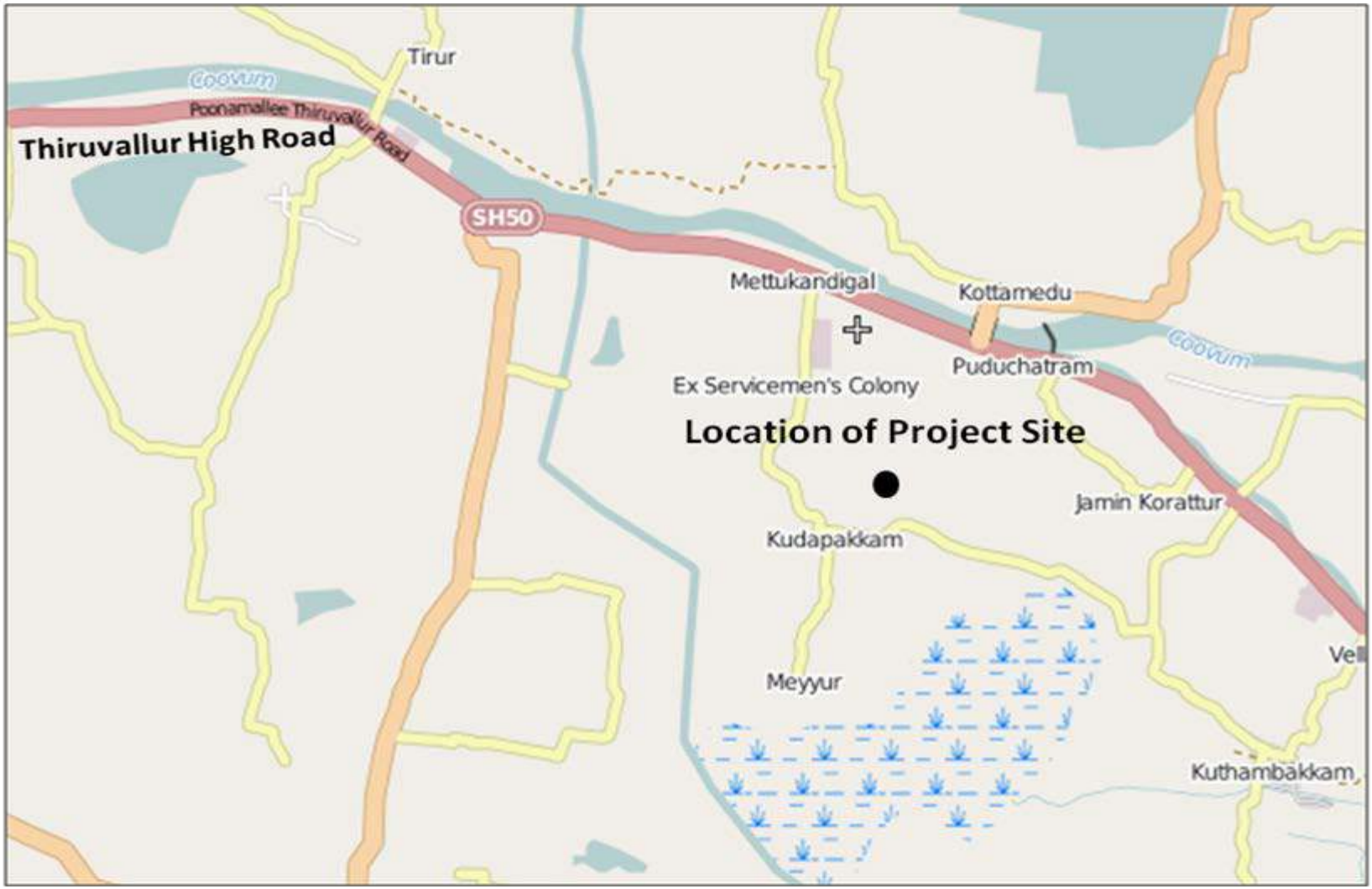


Figure 2.7 - Local connectivity of the Project site

2.4 TOPOGRAPHY

Topographically, the project area is unleveled terrain that gradually slopes down at its northern end. The project site had minor vegetation in the form of bushes; they were cleared and leveled during construction. The contour map of the project site is given in **Figure 2.8.**

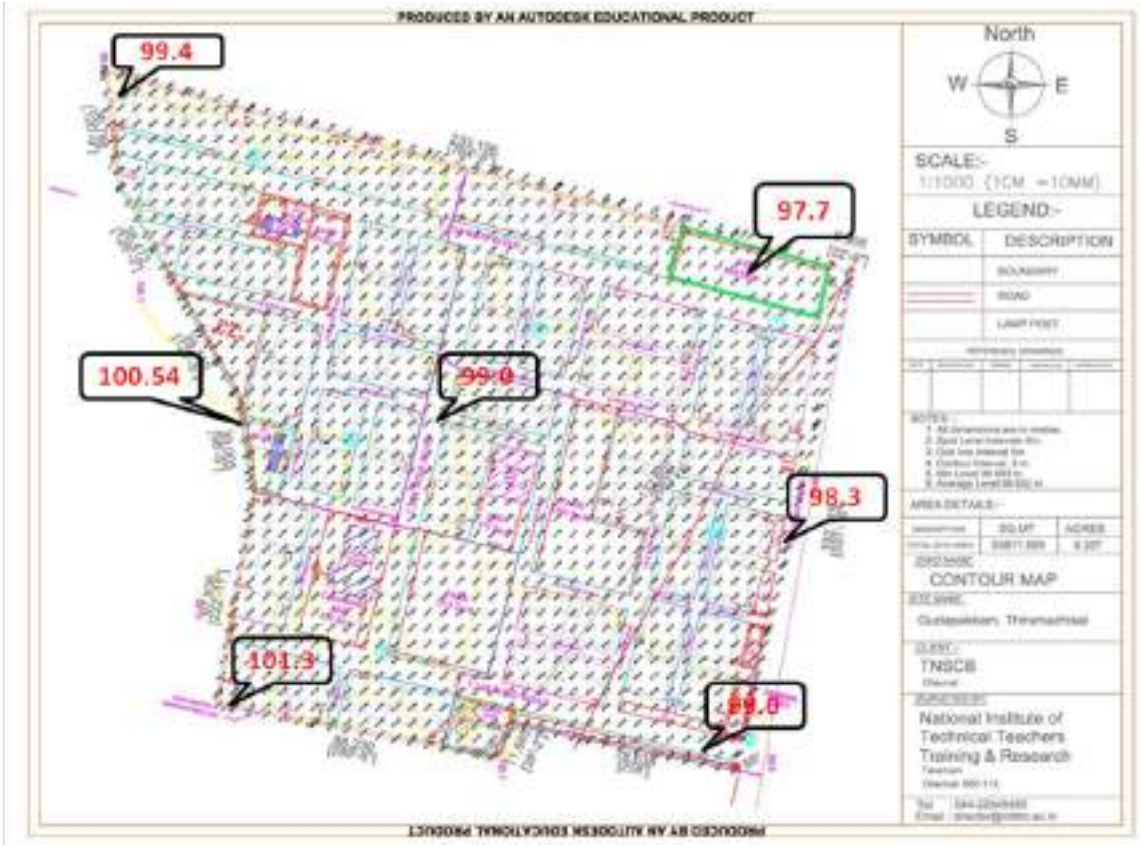


Figure 2.8 - Contour Map of the project site

3.0 PROJECT DESCRIPTION

3.1 Overview of the project

TNSCB constructed residential building for Slum Tenements with total built up area of **37754.88 Sq.m** at Survey Nos. 340/2B 1B, Gudapakkam Village, Poonamallee Taluk, Thiruvallur District. The project consists of 32 blocks comprising 1024 dwelling units. The Dwelling Units are of uniform design having 1 BHK+Bathroom. Split-up area details of the project site and built-up area statement is given in **Table 3.1 & 3.2**. The salient features of the project site are given in **Table 3.3**.

Table 3.1 - Split-up area

Description	Area (ha)	% Occupancy
Residential	1.7124	50.63
Parks	0.3490	10.33
Public Purpose	0.3779	11.17
Commercial & convenient store space	0.0308	0.91
Roads	0.9119	26.96
Total	**3.3820**	**100.00**

Table 3.2 - Summary of Built up area Statement

Plinth area/unit (including common area)	36.87 sq.m	0.003 ha
Common area	6.28 sq.m	0.0006 ha
Plinth area/unit (excluding common area)	30.59 sq.m	0.003 ha
Carpet area	25.44 sq.m	0.002 ha
Floor wise Area Calculation for 32 Dwelling Units/Blocks (For 32 Blocks)		
Ground floor	9438.72 sq.m	0.9438 ha
First floor	9438.72 sq.m	0.9438 ha
Second floor	9438.72 sq.m	0.9438 ha
Third floor	9438.72 sq.m	0.9438 ha
Total	**37754.88 sq.m**	**3.775 ha**

Table 3.3 - Salient Features of Project

DESCRIPTION	DETAILS
Total Area of Extent	33820 sq. m
Total Built up area	37754.88 sq. m
Plot Coverage	28 %
Green Belt Area	3434 sq. m
Open Parking Area provided	678 sq. m
Source of Water Supply	Gudapakkam Local Panchayat
Water requirement	Total Fresh Water Requirement – 704 KLD
Quantity of wastewater generation	634 KLD
Power requirement & Source	1200 KVA & Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO)

Solid waste generation, treatment and management	2820.6 kg/day Bio-degradable Waste – 1091.84 kg/day Inert Waste – 491.328 kg/day Non Biodegradable Waste – 1146.432 kg/day

3.2 Population Details

During Construction Phase

The total manpower for construction phase of the Project is given in **Table 3.4.**

Table 3.4 - Manpower Requirement during Construction Phase

S.No	Description	
1	300 persons	Inclusive of workmen, Laborers, Supervisors, Engineers, Architects and Managers

During Operation Phase

The population during Operation Phase of the Project is given in **Table 3.5.**

Table 3.5 - Estimated Population during Operational Phase

Description	Unit	No. of Persons/Unit	Total No. of Persons
Residential	1024	5	5120
Community Hall	1	300	300
Convenient shop	2	2	4
Ration shop	1	2	4
Primary Health Center	1	8	8
ICDS	2	10	20
Visitors 10 %	-	-	512
Total			**5968**

3.3 Project Cost

The project cost for the G+3 Residential Complex is Rs. 71.44 Crores.

3.4 Construction Materials

Construction materials quantity required for construction is given in **Table 3.6.**

Table 3.6 - Quantity of Construction Materials Required

Material Description	Units of Measurement	Approximate Quantity
Cement	MT	9534
Steel	MT	1965
River Sand	M3	32000
Aggregates	M3	11600

3.5 WATER REQUIREMENT

During Construction Phase

The construction phase water requirement of 50 KLD was met through private water Tankers.

During Operation Phase

Operation Phase water requirement is of 704 KLD. Water is sourced through Gudapakkam Local Panchayat. The acceptance letter for water supply from Gudapakkam Local Panchayat is enclosed as **Annexure III**. The details of water calculation are given in **Table 3.7** and the water balance chart is shown in **Figure 3.1**.

Table 3.7 - Details of Water Requirement Calculation

S.No	Description	Total no. of Persons	Water demand per person/day	Break up of demand per person per day in Litres		Domestic water Demand in Litres	Flushing Demand in Litres
				Domestic use	Flushing use		
1	Dwelling Units	5120	135	90	45	460800	230400
2	Floating population (10% visitors)	512	15	10	5	5120	2560
3	Community Hall	300	15	10	5	3000	1500
4	Convenient shop (Unit workers)	4	15	10	5	40	20
5	Ration shop (Unit workers)	4	15	10	5	40	20
6	Primary Health Center (Unit workers)	8	15	10	5	80	40
7	ICDS (Unit workers)	20	15	10	5	200	100
Total						**469280**	**234640**

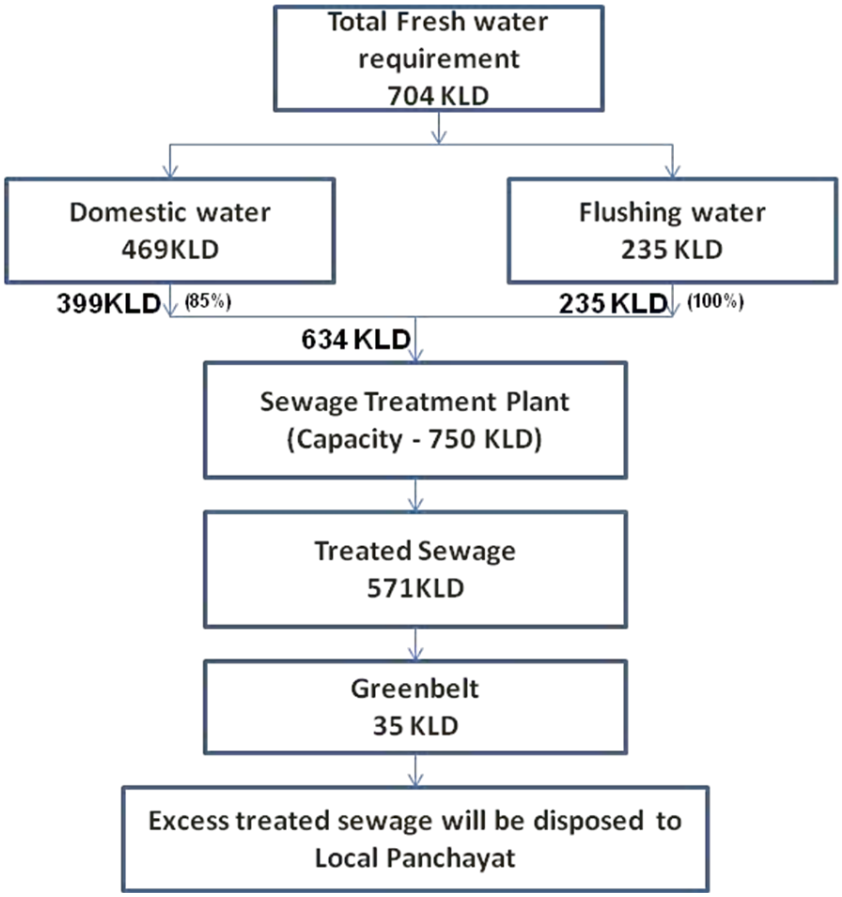


Figure 3.1 - Water Balance Chart

3.5 Wastewater Generation, Treatment and Disposal

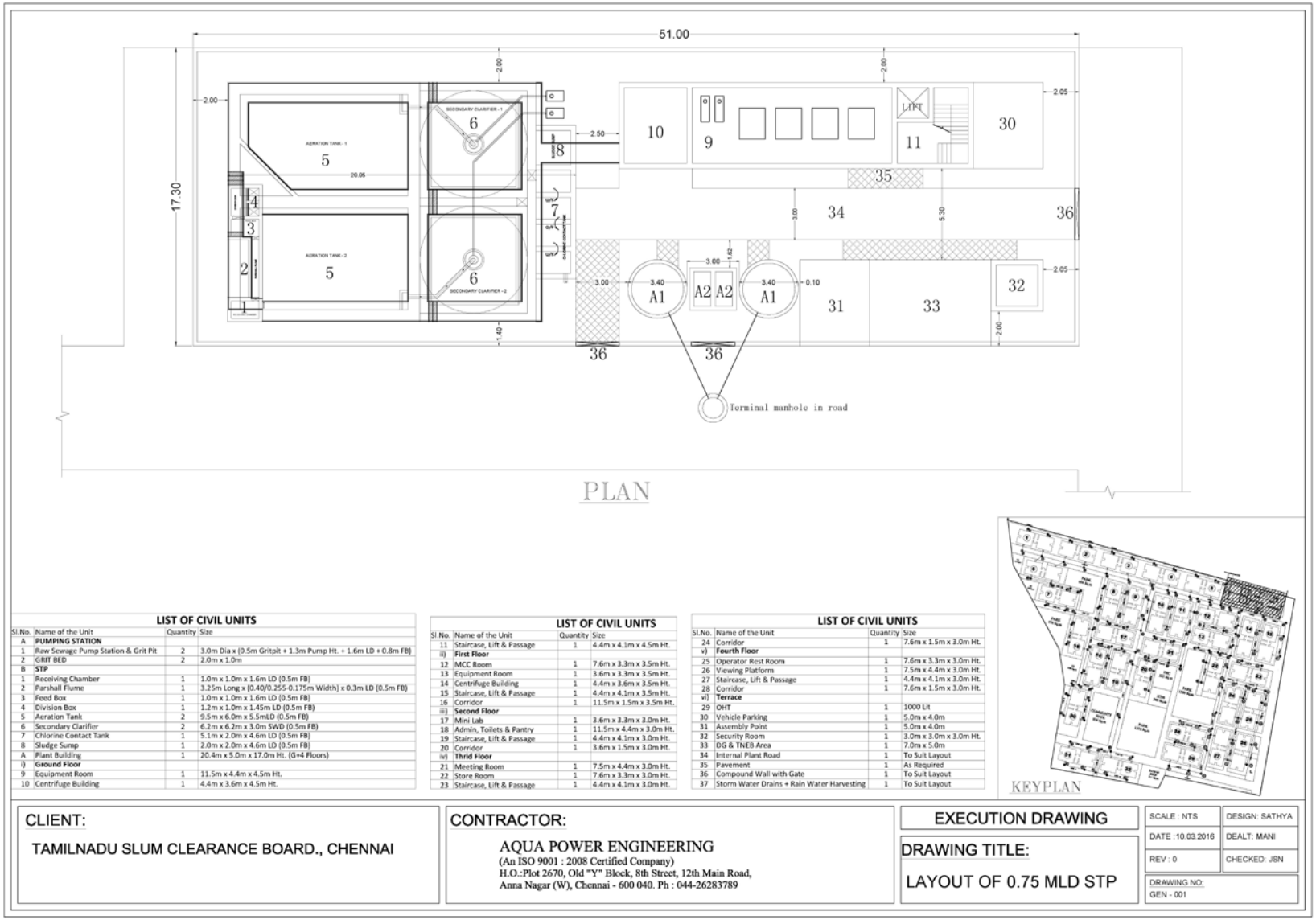
During Construction Phase

Domestic wastewater generated was treated using septic tank and soak pit within the premises.

During Operation Phase

A Sewage Treatment Plant with treatment capacity of 750 KLD has constructed to treat the wastewater generated within the residential compound. The treatment scheme is designed to deliver the treated water quality norms as stipulated by Tamil Nadu Pollution Control Board (TNPCB)/CPCB.

The STP is designed to ensure that treated sewage parameters are within the permissible limits, even under varying quantity and quality conditions. The designed system is also be capable of withstanding shock loads.



LIST OF CIVIL UNITS

Sl.No.	Name of the Unit	Quantity	Size
A	**PUMPING STATION**		
1	Raw Sewage Pump Station & Grit Pit	2	3.0m Dia x (0.5m Gritpit + 1.3m Pump Ht. + 1.6m LD + 0.8m FB)
2	GRIT BED	2	2.0m x 1.0m
B	**STP**		
1	Receiving Chamber	1	1.0m x 1.0m x 1.6m LD (0.5m FB)
2	Parshall Flume	1	3.25m Long x (0.40/0.255-0.175m Width) x 0.3m LD (0.5m FB)
3	Feed Box	1	1.0m x 1.0m x 1.6m LD (0.5m FB)
4	Division Box	1	1.2m x 1.0m x 1.45m LD (0.5m FB)
5	Aeration Tank	2	9.5m x 6.0m x 5.5mLD (0.5m FB)
6	Secondary Clarifier	2	6.2m x 6.2m x 3.0m SWD (0.5m FB)
7	Chlorine Contact Tank	1	5.1m x 2.0m x 4.6m LD (0.5m FB)
8	Sludge Sump	1	2.0m x 2.0m x 4.6m LD (0.5m FB)
A	Plant Building	1	20.4m x 5.0m x 17.0m Ht. (G+4 Floors)
i)	**Ground Floor**		
9	Equipment Room	1	11.5m x 4.4m x 4.5m Ht.
10	Centrifuge Building	1	4.4m x 3.6m x 4.5m Ht.

LIST OF CIVIL UNITS

Sl.No.	Name of the Unit	Quantity	Size
11	Staircase, Lift & Passage	1	4.4m x 4.1m x 4.5m Ht.
ii)	**First Floor**		
12	MCC Room	1	7.6m x 3.3m x 3.5m Ht.
13	Equipment Room	1	3.6m x 3.3m x 3.5m Ht.
14	Centrifuge Building	1	4.4m x 3.6m x 3.5m Ht.
15	Staircase, Lift & Passage	1	4.4m x 4.1m x 3.5m Ht.
16	Corridor	1	11.5m x 1.5m x 3.5m Ht.
iii)	**Second Floor**		
17	Mini Lab	1	3.6m x 3.3m x 3.0m Ht.
18	Admin, Toilets & Pantry	1	11.5m x 4.4m x 3.0m Ht.
19	Staircase, Lift & Passage	1	4.4m x 4.1m x 3.0m Ht.
20	Corridor	1	3.6m x 1.5m x 3.0m Ht.
iv)	**Thrid Floor**		
21	Meeting Room	1	7.5m x 4.4m x 3.0m Ht.
22	Store Room	1	7.6m x 3.3m x 3.0m Ht.
23	Staircase, Lift & Passage	1	4.4m x 4.1m x 3.0m Ht.

LIST OF CIVIL UNITS

Sl.No.	Name of the Unit	Quantity	Size
24	Corridor	1	7.6m x 1.5m x 3.0m Ht.
v)	**Fourth Floor**		
25	Operator Rest Room	1	7.6m x 3.3m x 3.0m Ht.
26	Viewing Platform	1	7.5m x 4.4m x 3.0m Ht.
27	Staircase, Lift & Passage	1	4.4m x 4.1m x 3.0m Ht.
28	Corridor	1	7.6m x 1.5m x 3.0m Ht.
vi)	**Terrace**		
29	OHT	1	1000 Lit
30	Vehicle Parking	1	5.0m x 4.0m
31	Assembly Point	1	5.0m x 4.0m
32	Security Room	1	3.0m x 3.0m x 3.0m Ht.
33	DG & TNEB Area	1	7.0m x 5.0m
34	Internal Plant Road	1	To Suit Layout
35	Pavement	1	As Required
36	Compound Wall with Gate	1	To Suit Layout
37	Storm Water Drains + Rain Water Harvesting	1	To Suit Layout

CLIENT:

TAMILNADU SLUM CLEARANCE BOARD., CHENNAI

CONTRACTOR:

AQUA POWER ENGINEERING
(An ISO 9001 : 2008 Certified Company)
H.O.:Plot 2670, Old "Y" Block, 8th Street, 12th Main Road,
Anna Nagar (W), Chennai - 600 040. Ph : 044-26283789

EXECUTION DRAWING

DRAWING TITLE:

LAYOUT OF 0.75 MLD STP

SCALE : NTS	DESIGN: SATHYA
DATE :10.03.2016	DEALT: MANI
REV : 0	CHECKED: JSN
DRAWING NO: GEN - 001	

Figure 3.2 – Layout of 750 KLD STP

3.6 Solid Waste Generation, Collection, Transport and Disposal

During Construction Phase

- The 300 m^3 quantity of construction debris, was used for leveling roads and land in the surrounding low lying areas.
- The quantity of excavation materials generated during construction phase was about 50757 m^3. All the topsoil excavated during construction phase was stored and filled in parks area within the project site.

During Operation Phase

The quantity of municipal solid waste generated during Operation Phase is **2729.6 Kg/day.** The quantity of waste generation is given in **Table 3.8 & 3.9.**

Table 3.8 - Solid Waste Generation

S.No	Description	No. of Persons	Quantity (kg/day)
1	Residential Units	5120	2560
2	Community Hall	300	60
3	Convenient Shops	4	0.8
4	Ration shop	4	0.8
5	Primary Health Centre	8	1.6
6	ICDS	20	4
7	Visitors	512	102.4
Total			**2729.6**

**** The estimation of solid waste generation for Residential Buildings is taken as 0.5 kg/person/day & 0.2 Kg/person/day for floating population.***

Table 3.9 - Solid Waste Generation & Management

S.No	Description	Quantity (kg/day)	Method of Disposal
1	Bio degradable Waste	1091.84	Gudapakkam Local Panchayat for disposal
2	Non Bio degradable Waste	1146.432	
3	Inert Waste	491.328	
4	Sludge from STP	91	Used as manure within the compound
Total		**2820.6 Kg/day**	

- Solid waste generated within the compound are collected in dust bins and handed over to Gudapakkam Local Panchayat for disposal.
- The agreement executed between TNSCB and Gudapakkam Local Panchayat regarding solid waste management has been shown in **Annexure IV**.
- Sludge generated from treating the wastewater generated within the compound are used as manure.

3.7 Rainwater Harvesting & Storm Water Drain

A rainwater harvesting system comprises components of various stages – transporting rainwater through pipes or drains, filtration, and recharging the ground water through tanks. Percolation pits are constructed for ground water recharge. Runoff from the first spell of rain carries a relatively large amount of pollutants from the air and catchments surface so the system are provided with a filtration pit consisting of layers of sand, gravel and pebbles of relevant sizes to remove impurities from the collected rainwater.

Need for Rainwater Harvesting

- Surface water is inadequate to meet the daily demand and we have to depend on ground water.
- Due to rapid urbanization, infiltration of rain water into the sub-soil has decreased drastically and recharging of ground water has diminished.
- Rainwater harvesting prevents the flooding of low-lying areas in the site.
- Salinity of ground water is reduced.

Rainwater Harvesting Network

Rain water harvesting trenches are constructed all around the residential blocks to collect rain water. Excess storm water will be allowed to drain into the earthen pits. The depth of the trench is 1.5m and the width is of 1m. The trench is filled with rounded pebble 50 to 75mm size. The sectional detail of the rain water recharge pit is shown in **Figure 3.3**.

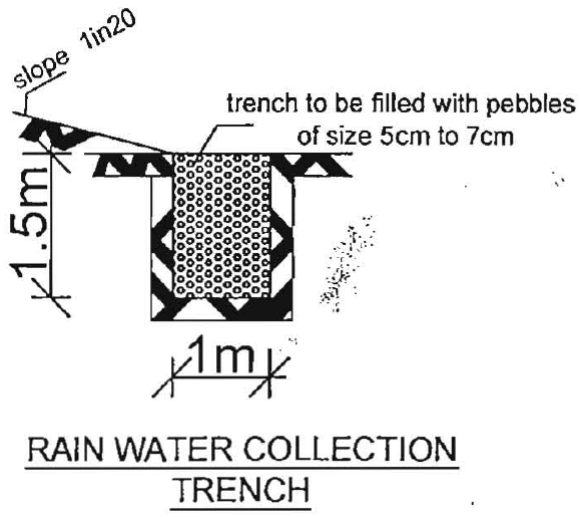


FIGURE 3.3 - SECTION OF RWH TRENCH

A total of 64 Rain water harvesting pits are constructed in the project site (two around each block) to collect and Harvest the rain water from roof tops. The path ways around the boundaries of the project site are routed to earthen drain. Surplus water from the recharge wells/pits will diverted to the earthen drain. The quantity of run-off water potential for the site is given below.

Surface runoff Harvesting

Table 3.10 - Rain water available from paved areas (A)

S.NO.	ITEM	AREA
1	Paved area	9119 m^2
2	Rainfall minimum	1.2 m/Annum
3	Runoff co-efficient for paved surface area	0.7
4	Net quantity of water available for harvesting	7659.96 m^3/Annum

Table 3.11 - Rainwater from unpaved area (B)

S.NO.	ITEM	AREA
1	Unpaved area	18300 m^2
2	Runoff co-efficient	0.20
3	Rainfall minimum	1.2 m/Annum
4	Net quantity of water available for harvesting	1763.04 m^3/Annum

Total Quantity of water available for Harvesting

(A + B) = 9423 m^3/Annum

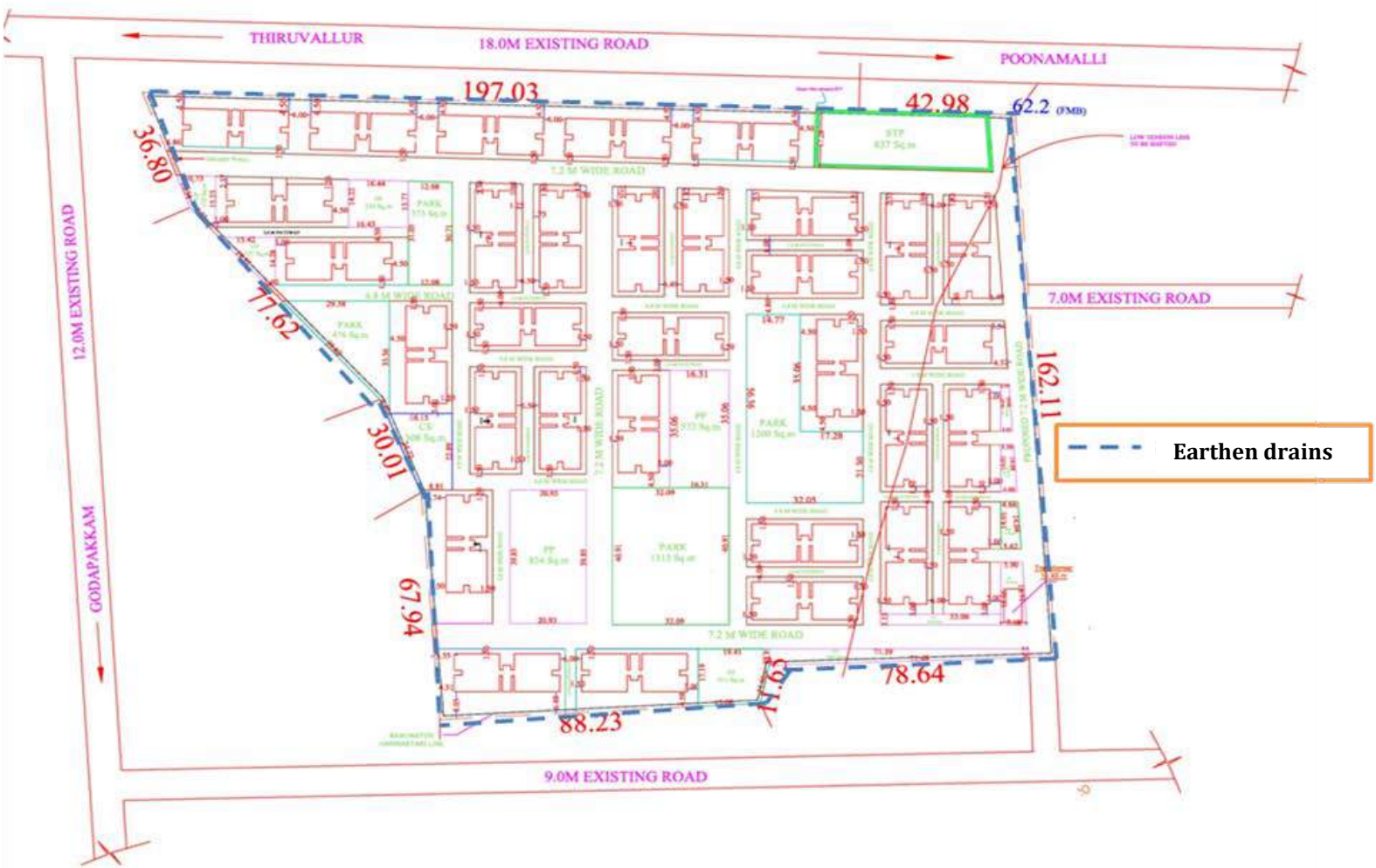


Figure 3.4 - Rain Water Harvesting Layout

3.8 Power Details

Power is sourced from Tamil Nadu Generation & Distribution Corporation Limited (**Annexure V**). Total Electric load for this project is **1200 KVA**. A DG set of **40 KVA** is provided to run the STP during power failure period.

3.9 Fire Fighting System

The building plan consists of 32 blocks having uniform G+3 floor design. Since the present project is not a Multi Storied Building, Fire Fighting System is not mandatory. However sand buckets are provided in each block.

3.10 Parking Area Details

The construction is carried out to accommodate approximately 5120 persons belonging to the Economically Weaker Section. On-site parking facilities are provided to the extent of **678 sq. m.** and were designed in such a way that there will be no restrictions on accessibility to parking.

4.0 ENVIRONMENTAL MANAGEMENT PLAN

A detailed Environmental Management Plan to be followed during the Construction and Operation Phase is presented in **Table 4.1 and 4.2.**

Table 4.1 - Environmental Management Plan – Construction Phase

S. No	Environmental Impacts	Mitigation Measures
(i)	Air pollution due to emissions from construction machinery and movement of vehicles.	a) Construction materials prone to fugitive dust emissions were covered properly while transporting. b) Trucks carrying sand were provided with tarpaulin sheets to cover the bed and sides of the trucks. c) All construction vehicles were checked for compliance with air emission standards and be maintained properly.
(ii)	Air pollution, noise and safety hazard due to movement of construction vehicles through internal roads of residential areas.	a) To withstand the movement of heavy construction vehicles the road surface were improved to the standards. b) Appropriate signage and deploying flagmen during peak traffic period to regulate the movement of traffic were done.
(iii)	Noise pollution due to operation of construction machinery at the site.	a) Construction contracts specified the construction equipment emission levels to meet the noise and air emission levels as per EPA Rules, 1986. b) Generator sets were provided with noise shields around them. c) Well maintained Vehicles used for transportation of construction material. d) The workers operating high noise machinery or operating near it were provided with ear plugs e) The high noise generating stationary machinery was located at central portion of the site
(iv)	Impact on community water resources (quality).	a) All waste water discharges from construction site were received in septic tanks with adequate capacity. b) Oil handling and storage area were surfaced and provided with catch pit to intercept any accidental spillages.

(v)	Sanitation and healthcare at workers camp	a) The contractor installed adequate lavatories and baths at the construction camp to cater to the requirements of the workers. b) The contractor built septic tanks with adequate capacity at construction yard. c) All organic wastes generated at construction yard were properly disposed to Urban Treatment Facility. d) Quarterly health check-ups of construction workers were organized at construction camp. e) First aid room was provided inside the site during construction to handle the emergency situation.
(vi)	Improvement of Access Roads to the site	a) Improvement and widening of the existing access roads was done. b) The existing road along the boundary of the project site connecting the Main road is used for transportation of construction materials to the site.
(vii)	Impact on Micro Climate	a) Existing trees at the site boundary are maintained and new trees were planted to provide shade. b) Planting of numbers of trees, of native species like *Poongamia Glabra*, *Acacia arabica, Azadirachta indica*, *Thespesia populnea*, *Enterolobium Saman* etc., along the avenues and on the designated open spaces to ensure the improvement of micro-climatic condition of the project site.

Table 4.2 - Environmental Management Plan - Operation Phase

S.No	Environmental Impact	Mitigation Measures
i	Increase in ambient air level and noise level due to operation of D.G. sets	a) Low sulphur diesel is used for the generators. b) Acoustic enclosures are provided for D.G. sets. c) Adequate stack height is provided for the generator for dispersion of pollutants. d) Ear muffs / plugs will be provided to the personnel in the close vicinity of noise sources. e) Green belt will be developed which acts as both noise and pollutants absorber.
ii	Increase in ambient air level and noise level due to vehicular movement inside the residential development.	a) Restricting the speed of the vehicles inside the campus. b) Internal roads are maintaining properly for free movement of vehicles. c) Roadside tree plantation to be restored and maintained. d) Besides additional planting of trees will be done wherever feasible. e) Proper maintenance of vehicles will reduce the impacts.
iii	Affect land and ground water if sewage generated is not properly disposed.	Sewage from the various buildings is conveyed to the sewage treatment plant. The sewage treatment plant comprises of the aerobic treatment system and filters for effective treatment. The treated water from sewage treatment plant is reused for green belt development. The surplus treated water will be properly disposed as per the norms.
iv	Affect land and ground water if solid waste is not properly disposed.	a) Proper segregation and collection of wastes are being practiced. b) Collection of wastes from apartment and dry leaves which are biodegradable in nature are segregated and treated. c) The non biodegradable solid wastes are sold to vendors and while transporting the waste the vehicles are covered properly to avoid

		spillages.
v	To avoid depletion of water resources	a) Rain water harvesting structures are constructed to recharge the ground water. b) Percolation pits are made at suitable points to collect the runoff generated from the paved areas and unpaved areas. **Water Conservation Measures** a) Selection & use of native species of vegetation to reduce landscape water requirement. b) Maximizing drainage from paved surfaces into recharge trenches to increase aquifer recharge. c) Sewage treatment plant is constructed within the compound to promote reuse of treated wastewater in watering green-belt and parks.

4.1 Disaster Management Plan

Disaster is an unexpected event due to sudden failure of the system, external threats, internal Disturbances, earthquakes, fire and accidents. Following subsection describes the measures to be undertaken by the project proponent to prevent / minimize risk of unexpected event.

Preventive Action

Once the likelihood of a disaster is suspected, action has to be initiated to prevent a failure. Engineers responsible for preventive action should identify sources of repair equipments, materials, labour and expertise for use during emergency.

Reporting Procedures

The level at which a situation will be termed a disaster shall be specified. This shall include the stage at which the surveillance requirements should be increased both in frequency and details. The project in-charge should notify the officer for the following information:

- Exit points for the public,
- Safety areas in the nearest medical facilities.

Communication System

An efficient communication system is absolutely essential for the success of any disaster management plan. This has to be worked out in consultation with local authorities. More often, the entire communication system gets disrupted when a disaster occurs. The damage areas need to be clearly identified and provided with temporary and full proof communication system.

Emergency Action Committee

To ensure coordinates action, an Emergency Action Committee should be constituted. Emergency Action Committee will prepare the evacuation plan and procedures for implementation based on local needs and facilities available. The plan should include:

- Demarcation of the areas to be evacuated with priorities,
- Safe area and shelters,
- Security of property left behind in the evacuated areas,

- Functions and responsibilities of various members, and
- Setting up of joint control action.

All personnel involved in the Emergency Action Plan should be thoroughly familiar with all the elements of the project area and their responsibilities. The staff at the site should be trained for problem detection, evaluation and emergency remedial measures. Individual responsibility to handle the segments in emergency plan must be allotted. Success of an emergency plan depends on public participation, their response to warning notifications and timely action. Public has to be educated on the hazards and key role in disaster mitigation by helping in the rescue operations. It is essential to communicate by whom and how a declared emergency will be terminated. There should be proper notification to the public on de-alert signals regarding termination of the emergency. The notification should be clear so that the evacuees know precisely what to do when re-entering or approaching the affected areas.

4.2 Energy Conservation Measures

- Building Envelope Design is designed in an energy efficient way
- Use of virgin wood and other building materials with high embodied energy is minimized
- Building materials with high recycle content are used
- The building materials were made available regionally within 250 miles radius from the project site
- Various measures such as protection of soil for reuse for landscaping, barricading to prevent dust, soil and debris movement beyond site to neighboring areas during site planning shall be done
- Rain water harvesting to minimize storm water runoff from site
- Selection of low flow toilet fixtures to reduce water consumption
- Selection of native and adaptive landscaping species
- Electrical appliances with energy star rating are installed
- Recycled and reused the construction debris for minimizing virgin materials
- Use of low VOC materials such as paints, adhesives etc.
- Usage of solar water heaters

4.3 ENVIRONMENTAL MONITORING PLAN

It is proposed to monitor essential parameters for ambient air quality, ambient noise quality, ground water quality, and waste water quality both during the construction and operation phases of the project. The frequency of monitoring and method of monitoring will be conducted as per norms of CPCB. However the monitoring schedule is given in **Table 4.3.**

Table 4.3 - Environmental Monitoring Schedule

S. No	Particulars	Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
1	**Ambient Air Quality Monitoring**			
	Project site	Once in 3 Months	24 hr continuously except CO	PM_{10}, $PM_{2.5}$, SO_2, NO_x & CO
2	**Stack Monitoring**			
	DG Set – Stack	Once in 3 Months	30 min	SO_2, NO_x, PM, CO, Temperature, Flow rate & Velocity of the gas
3	**Ambient Noise Level**			
	Near DG set	Once in 3 Months	8 hr continuous with 1 hr interval	Noise level in dB(A)
4	**Ground/Drinking Water/Wastewater Quality Monitoring**			
	Ground Water – at project site	Once in 3 Months	Grab Sampling	Parameters specified under IS:10500, 1993
	STP Inlet	Once in a month	Grab Sampling	pH, Oil & grease, BOD, COD, TDS, TSS
	STP Outlet	Once in a month	Grab Sampling	pH, Oil & grease, BOD, COD, TDS, TSS
5	**Soil Quality**			
	At the green belt area	Once in a year	Samples were collected from three different depths viz., 30cm, 60cm, and 100cm below the surface	Parameter for soil quality: pH, texture, electrical conductivity, organic matter, nitrogen, phosphate, sodium, calcium, potassium and Magnesium.

4.4 EMP Budget Provisions

The implementation of the pollution control and environmental monitoring and management programmes is the basis of mitigation of impacts. The environmental expenditures show commitment of the management on environmental front. The details of the expenditure on environmental measures are given in **Table 4.4.**

Table 4.4 - Environmental Management Plan – Budget

S.No	EMP Component	Capital Cost (Lakhs)	Operational Cost (Lakhs) / yr
1	Monitoring of Environmental components	-	5
2	Sewage Treatment Plant	40	7
3	Green Belt Development	10	1.5
	Total	**50**	**13.5**

4.5 Environmental Management Cell

Environment Management Cell (EMC) will look after the environment related matters during the construction and operation phase of the project. EMC will perform the following assignments.

- Periodic monitoring of emissions and report any abnormalities for immediate corrective measures.
- Periodic monitoring of ambient air quality, ground and surface water quality.
- Periodic noise monitoring of the building zone and surrounding area.
- Regular monitoring of storm water drains.
- Green belt plantation, maintenance, development of other forms of greenery.
- Regular monitoring of solid wastes quantity and ascertaining avenues for utilization of solid wastes.
- Development & maintenance of schemes for water conservation.

4.6 DEVELOPMENT OF GREENBELT

To provide a dense tree cover and to provide good sound and dust barriers, the planting of tree species in open areas were done. The recommended plant species are listed in **Table 4.5.** As per guidelines of CPCB, the three main criteria for selection of plants may be as follows,

- ✓ Trees, shrubs that have dense foliage with a large surface area, because leaves absorb pollutants.
- ✓ Evergreen trees are found to be more effective.
- ✓ The species chosen must be resistant to pollutants, particularly in the early stages of their growth.
- ✓ The species chosen may be native species and drought tolerant.

Table 4.5 - Recommended species for green belt development

S.No.	Botanical name	Tamil name
1	*Zizyphus mauritiana*	Elantha
2	*Ficus glomerata*	Athi
3	*Casuarina equisetifolia*	Savukku
4	*Terminalia chebula*	Kadukkai
5	*Sesbani grandiflora*	Agathi
6	*Ficus benghalensis*	Alamaram
7	*Ficus religiosa*	Arasu
8	*Calotropis gigantean*	Erukku
9	*Azadirachta indica*	Veppam
10	*Saraca indica*	Asogam
11	*Phoenix sylvestris*	Icham
12	*Madhuca longifolia*	Illupai

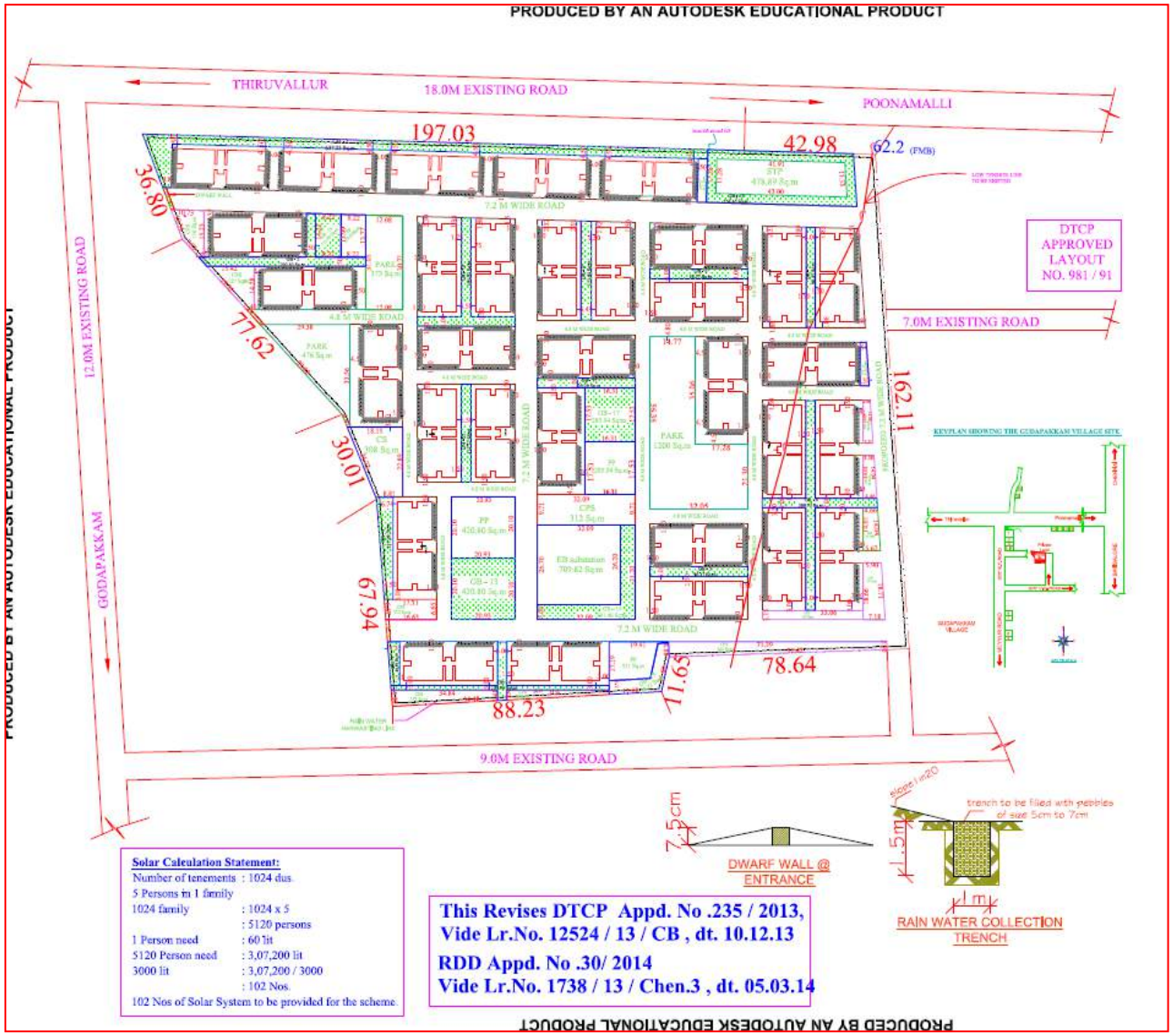


Figure 4.1 - Greenbelt Layout