Government of Tamil Nadu
Tamil Nadu Urban Development Fund

City Corporate cum Business Plan

Alandur Municipality

FINAL REPORT

September 2007

Wilbur Smith Associates Private Limited

Currency Equivalent

Currency Unity	:	Indian Rupee/s (Re/Rs)
Re. 1.00	:	US$ 0.022
US$ 1.00	:	Rs. 45

Abbreviations and Acronyms

BOT	:	Build, Operate and Transfer
BPL	:	Below Poverty Line
BT	:	Black Top
CAA	:	Constitution Amendment Act
CAGR	:	Compounded Annual Growth Rate
CC	:	Cement Concrete
CCP	:	City Corporate Plan
CMA	:	Chennai Metropolitan Area
CMDA	:	Chennai Metropolitan Development Authority
CMWSSB	:	Chennai Metropolitan Water Supply and Sewerage Board
CPHEEO	:	Central Public Health Environmental Engineering Organization
CSC	:	Community Structure Component
CUA	:	Chennai Urban Agglomeration
DIC	:	District Industries Centre
DPR	:	Detailed Project Report
DWCUA	:	Development of Women and Children in Urban Areas
EAR	:	Environmental Assessment Reports
ELSR	:	Elevated Storage Reservoir
ESF	:	Environmental and Social Framework
ESR	:	Environmental and Social Report
FOP	:	Financial and Operating Plan
FY	:	Financial Year
G.S.T. Road	:	Grand South Trunk Road
gm	:	Grams
GoI	:	Government of India
GoTN	:	Government of Tamil Nadu
gpcd	:	Grams per Capita per Day
GLSR	:	Ground Level Storage Reservoir
ISP	:	Integrated Sanitation Program
Ha	:	Hectares
HH	:	Households
HSC	:	House Service Connection
ISP	:	Integrated Sanitation Program
IPT	:	Intermediate Public Transport
kg	:	Kilograms

LCS	:	Low Cost Sanitation
Lit	:	Liters
LL	:	Lakh Liters
LPA	:	Local Planning Area
lpcd	:	Liters Per Capita Per Day
m	:	Metres
ML	:	Million Liters
MLD	:	Million Liters per Day
MSW	:	Municipal Solid Waste
MT	:	Metric Ton
MTC	:	Metropolitan Transport Corporation
NGO	:	Non-Governmental Organizations
NH	:	National Highway
Nos	:	Numbers
NSDP	:	National Slum Development Program
O&M	:	Operation and Maintenance
OHT	:	Overhead Tanks
PAP	:	Project Affected People
PSP	:	Public Stand Post
PWD	:	Public Works Department
SDBC	:	Semi-Dense Bituminous Concrete
SEC	:	Sensitive Environmental Components
SFC	:	Second Finance Commission
SH	:	State Highway
SI	:	Sanitary Inspector
SJSRY	:	Swarna Jayanti Shahari Rozgaar Yojna
SMP	:	Social Management Plan
SO	:	Sanitary Officer
Sq. km	:	Square Kilometers
STP	:	Sewage Treatment Plant
SWM	:	Solid Waste Management
TCS	:	Thrift & Credit Societies
TNEB	:	Tamil Nadu Electricity Board
TNRDC	:	Tamil Nadu Road Development Corporation
TNSCB	:	Tamil Nadu Slum Clearance Board
TNUDP	:	Tamil Nadu Urban Development Project
TNUIFSL	:	Tamil Nadu Urban Infrastructure Financial Services Limited
tpd	:	Tons per Day
TWAD	:	Tamil Nadu Water Supply and Drainage Board
UGD	:	Underground Drainage
ULB	:	Urban Local Body
USEP	:	Urban Self Employment Program
UST	:	Urban Skill Training
UWEP	:	Urban Wage Employment Program
VAMBAY	:	Valmiki Ambedkar Awas Yojana
W	:	Watts
WBM	:	Water Bound Macadam

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I. BACKGROUND

A. Introduction

1. The 74th Constitution Amendment Act, 1992 has imparted constitutional status on the Urban Local Bodies and assigned appropriate functions to them. A constitutional backing is given to the relationship of the Urban Local Bodies (ULBs) with the State Government with respect to their functions and powers, ensuring of timely and regular elections, arrangements for revenue sharing etc. Urban Local Bodies are given additional powers including preparation of local development plans, programs for ensuring social justice, environmental management making them responsive to the local needs. This is facilitated by Section 243 (W) of the Constitutional Amendment (74th) Act, 1992. The list of programs included under this section is

(i) Urban planning including town planning
(ii) Regulation of land-use and construction of buildings
(iii) Planning for economic and social development
(iv) Roads and bridges
(v) Water supply for domestic, industrial and commercial purposes
(vi) Public health, sanitation conservancy and solid waste management
(vii) Fire services
(viii) Urban forestry, protection of the environment and promotion of ecological aspects
(ix) Safeguarding the interests of weaker sections of society, including the handicapped and mentally retarded
(x) Slum improvement and up gradation
(xi) Urban poverty alleviation
(xii) Provision for urban amenities and facilities such as parks, gardens and playgrounds
(xiii) Promotion of cultural, educational and aesthetic aspects
(xiv) Burials and burial grounds; cremations, cremation grounds and electric crematoriums
(xv) Cattle pounds; prevention of cruelty to animals
(xvi) Vital statistics including registration of births and deaths
(xvii) Public amenities including street lighting, parking lots, bus stops and public conveniences
(xviii) Regulation of slaughterhouses and tanneries

Functions and Powers

2. In conformity with the 74th CAA, the Tamil Nadu District Municipalities Act, 1920 was amended and the ULBs are entrusted with the functions listed in the Twelfth Schedule of the constitution or Section 243 (W) of the Constitutional Amendment (74th) Act, 1992.

Finances and Taxes

3. The 74th CAA also provides for the constitution of a State Finance Commission to review the financial position of the municipalities and make recommendation. The Second State Finance Commission of Tamil Nadu has already submitted its recommendations to improve the financial position of the municipalities.

4. Tamil Nadu District Municipalities Act authorizes a municipality to levy, collect and appropriate such taxes, duties, tolls and fees in accordance with the procedures subject to limits as specified by the legislature. Besides these, the ULBs are also empowered with certain other financial powers.

5. The urban reforms resulting from the 74th Constitution Amendment Act lays larger responsibility on the Municipal Bodies, in terms of development planning, service provision and fiscal affairs. The policy framework of the state and central government has provided the necessary impetus to the urban sector to play a pro-active role in the development process. In the changed scenario, it is imperative for the ULBs to set their priorities and strategies right, designed to achieve a clear vision.

B. City Corporate and Business Plans

6. The State of Tamil Nadu is in the forefront of devolving functions to ULBs as envisaged by 74th CAA and is further strengthening the Urban Governance through a series of initiatives under the Tamil Nadu Urban Development Project-II. A key initiative of TNUDP-II (1999-2004) was to prepare "City Corporate Plans", an implementable plan providing a strategic vision for the development of the town, in consultation with key stakeholders, including the public, through a robust public information and consultation exercise. Expanding the concept of CCP, TNUDF has initiated a process to formulate Business Plans along with CCP's outlining the innovative resource mobilization measures, investment options based on sustaining capacity, clear implementation plan and technical assistance measures to improve service delivery and efficiency.

7. While ensuring the above, the CCP would focus on issues of priority regional and local concerns for livability, and the implied requirements in terms of

   (i) Enhancing City Productivity
   (ii) Reducing Poverty
   (iii) Improving Management
   (iv) Enhancing Financial Sustainability

8. It would involve assisting the Urban Local Bodies in setting up of development goals and objectives, establishing a structured revenue management and investment strategy, designed to achieve the towns' Vision.

9. Wilbur Smith Associates Private Limited is assisting the Alandur, Pallavaram and Tambaram municipalities to prepare City Corporate Plan cum Business Plans through a customized public consultation and information exercise.

10. The objective of this assignment is to assist the municipalities in preparation of their City Corporate Plan and Business Plan, guided by a shared vision for the region and the city's development. It include assisting the ULBs in strategizing developmental goals and objectives, establishing and phasing of a structured Capital Investment Program and a Financial and Operating Plan outlining the revenue management and investment strategy to realize the set goals. The business plan outlines the measured for expenditure management and enhancing the revenue flows through non-traditional means to enhance the credit-worthiness of the municipality. The approach to CCP and BP is presented in **Figure 1.1**.

C. Vision

11. Alandur, Pallavaram and Tambaram present a case that warrants a regional perspective and vision, reinforced by a local one. The towns' proximity to Chennai, location within the Chennai Metropolitan Area along a major corridor (Grand South Trunk Road), and the existing and proposed investments in industries (IT/ITES/BPO industries, TIDEL Park, Biotech Park, MEPZ, Cyber City, Mahindra Industrial Park, BMW plant etc.), indicate the tremendous development potential of the region. This, coupled with the congestion in Chennai and the increasing need for residential land at locations proximal to new developments/employment opportunities, provides a strong rationale for investment in infrastructure in the region / towns. In order to sustain the pace of regional economic growth, availability of critical infrastructure, particularly in the three project towns that are potential engines of regional growth, would be critical.

12. It is thus imperative to consider strategies to tackle ongoing developmental pressures in a regional context, while safeguarding the interests and development vision of individual project towns. GoTN has rightly identified the need to prioritise investments in urban infrastructure, with a view to boost the local economy and enhance the liveability/quality of life offered by these towns.

13. Based on discussions with eminent citizens / retired, senior government officials, the broad consensus vision that appears to be emerging is that the entire CMA may be expected to function as one city in 20 years' time, which has the potential to be an important economic centre not only in Southern India but in the country as a whole. Identification of infrastructure needs to provide an enabling environment for the 'city region' to develop is therefore the need of the day.

14. Case studies worldwide highlight the need to strengthen regional level transport infrastructure as one of the first pre-requisites to regional economic development. Proposed investments in transportation infrastructure (e.g. improvement of NH 45, Outer Ring Road and airport upgradation) in the region are expected to provide a tremendous boost to economic development in the region. Projects/proposals that can lead to mutual benefits and cost sharing related to transportation, water supply, sewerage and solid waste management are discussed in subsequent sections of this study.

15. A participatory approach was adopted for the visioning exercise for CCP and Business Plan preparation. The idea was to arrive at a shared vision, owned by local stakeholders at

both regional and town levels. The process of consultation undertaken for the visioning exercise as an integral part of CCP and Business Plan preparation is outlined below:

(i) Identification of stakeholders at regional and town level – these included agencies like TNUIFSL, CMWSSB, TWAD, TNPCB, regulatory authorities for water bodies, etc. at regional level and Commissioners and Chairpersons of municipalities, elected representatives, municipal officials, NGOs, members of Resident Welfare Associations, academicians and citizens at town level;

(ii) Consultation with identified stakeholders, wherein the project was announced and the purpose, process and expected outcomes of the CCP shared. The existing situation in the town vis-à-vis infrastructure status was presented. Stakeholders were invited to speak / define their vision for the town / region and identify infrastructure needs and priorities. Inputs received from various stakeholders were distilled to formulate the regional and town level vision. (refer List of Participants in town level consultations in Annexure 8.1) Apart from interaction through formal consultations, a series of meetings were held with stakeholders and officials in each town, which helped firm up the vision and arrive at quantifiable indicators on service provision.

(iii) Technical inputs from a team of experts for project preparation / identification and appropriate strategic framework for implementation, incorporating stakeholder concerns and priorities wherever feasible. Sharing of infrastructure needs and priorities and vision at common fora at different stages of CCP preparation (Inception Report, Assessment Report and Rapid Urban Assessment Report) with key stakeholders. (Refer minutes of meeting in Annexure 8.5, 8.6, 8.7 and 8.8).

(iv) Broad consensus with stakeholders is sought on the regional and town level vision and infrastructure priorities, proposals, projects and strategies, on submission of Draft Final Report. The Draft Final version of the City Corporate Plan (CCP) and Business Plan and the vision for the region and individual towns presented in this report is the result of a collective effort of all planning partners and key stakeholders. The CCP is a 20 year program defining development objectives at the regional and town level, program of institutional and policy priorities, environmental, social and economic infrastructure goals, identified high priority investments, capital investment plan and revenue enhancement and expenditure management plans, designed to achieve the towns' vision. Apart from the consultative exercise of visioning and prioritization of infrastructure needs, best practice case studies were referred prior to project identification/preparation. Further comments and concerns of stakeholders, if any shall be incorporated in the Final Report.

Regional Level Vision

16. To sum up, stakeholder consultations yielded the following consensus on a vision for the region:

Chennai Metropolitan Area is likely to function as a single entity in 20 years' time, and has the potential to be an important economic centre in Southern India and the country as a whole. The need for:

(i) Infrastructure service delivery to keep pace with and sustain economic growth in the region, and
(ii) High service levels in the three towns, enabling them to attract population and business to the region, was therefore identified.

Town Level Vision

17. Consultations with citizens of all the project towns upheld the vision, "To make the towns dynamic, vibrant, self-reliant and sustainable with all basic amenities, offering a better quality of life to residents."

18. The vision will be achieved by each ULB through continued consultation with the community in an integrated and cohesive manner and by defining its presence through dedication to achieve excellence in provision of civic amenities and a Responsive, Modern, Simple, Accountable and Transparent Administration. The vision is stated to be achieved through various the proposals and strategies set under each sector of the Corporate Plan. Indicators to monitor CCP implementation and achievements are given in the section on stakeholder consultation (Chapter VIII).

D. Scope of Work

19. The CCP originated with and is wholly owned by the local stakeholders. It primarily:

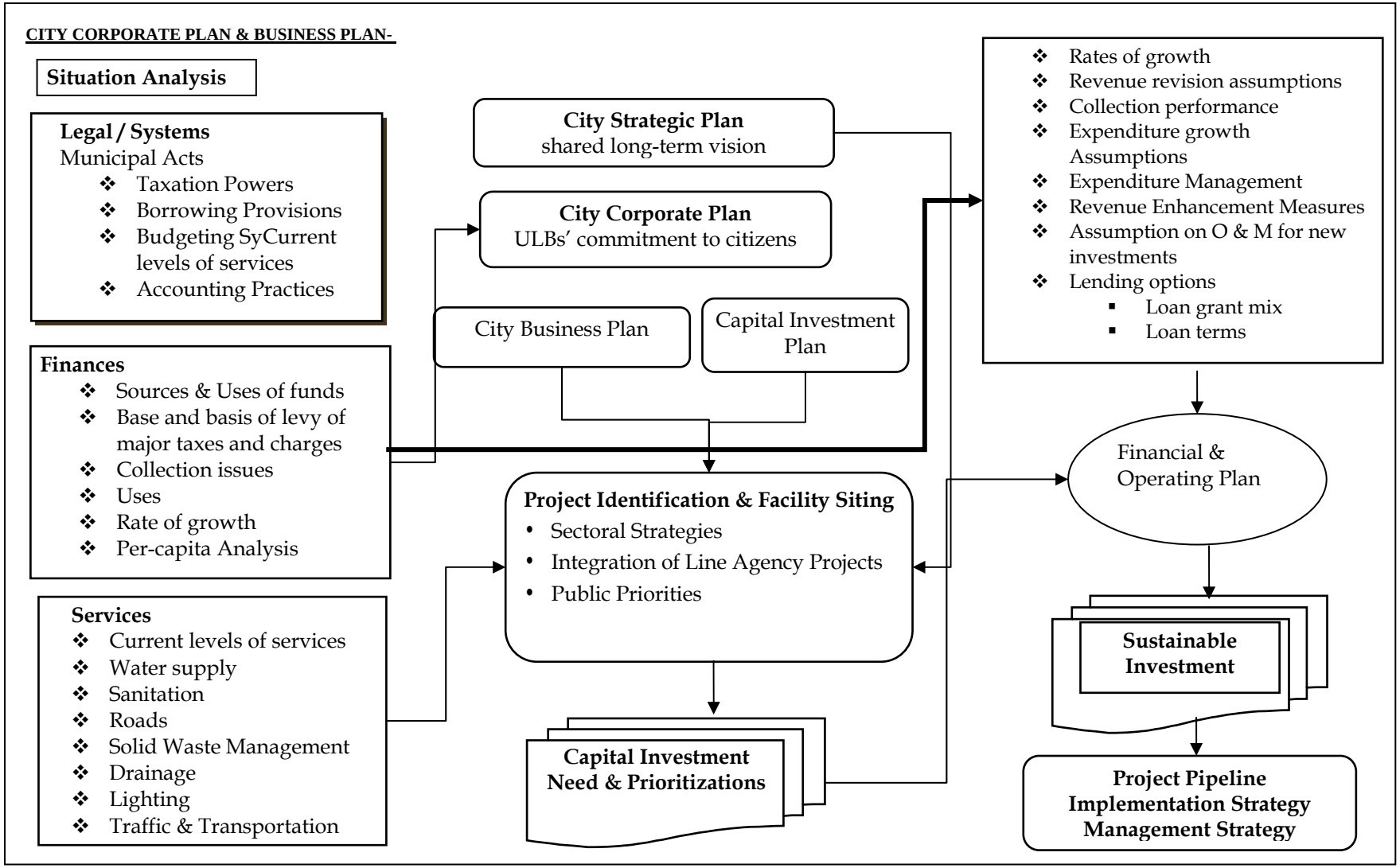
(i) Looks at the demand for the projects specified by the ULBs, and reveals the gap in services;
(ii) Defines the growth directions and service upgradation in relation to the activity mix / growth;
(iii) Broadly outlines the infrastructure needs;
(iv) Defines specific rehabilitation and capital improvement needs with regard to priority city infrastructure in both slums and other areas;
(v) Defines revenue enhancement and revenue management improvements required to sustain the rehabilitation proposed;
(vi) Reforms required in local administration and service delivery;
(vii) Management changes required at the local level to improve O&M of assets; and
(viiii) Carries out a study on waste characterization.

20. The scope of services for preparing City Corporate Plan cum Business Plan for the three towns for broadly covers the following areas:

(i) Assess Levels of Service;

(ii) Financial Assessment of ULBs. An assessment of municipal finances for the past five years;

Figure 1.1: Approach for City Corporate Plan and Business Plan



(iii) Outline issues in revenue realizations, quality of existing assets in relation to service levels and coverage, and institutional constraints. Develop quick indicators of performance;

(iv) Financial and Operating Plan (FOP)

21. Prepare a draft Memorandum of Understanding between Urban Local Body and TNUIFSL for effective implementation and monitoring of the City Corporate and Business Plans.

22. Initiate consultations with council and local stakeholders on the priorities.

23. Finalize Business Action Plan for the town, with a resolution from the council on the priorities and commitment to implement revenue and management improvement measures.

24. Identify the obligations on the part of the ULB/TNUIFSL/TNUDF/Government for successful implementation of the City Corporate Plan and Business Plan.

E. Report Structure

25. The present report is the draft final report containing the following chapters.

26. Chapter 1 is an introduction to the City Corporate Planning Process and presents in brief the methodology and the background of the project in context of 74th Constitutional Amendment Act and the new powers assigned to Urban Local Bodies.

27. Chapter 2 gives the profile of the town in terms of demographic characteristics, past trends and growth, population projections and future trends. It also describes the regional setting and economic development focusing on the economic base, road and rail linkages and the impact of economic activities in the development of the town. The chapter also includes the population projections for the town, which would be used for analyzing the future demand for infrastructure.

28. Chapter 3 provides a review of the urban governance aspects of the municipality with a focus on the organizational responsibilities and emerging initiatives. The chapter also provides the existing financial situation of the municipality in terms of sources and uses of funds, the outstanding dues, operating ratios etc.

29. Chapter 4 describes the land use and spatial growth of the town, concentration of economic activities, review of the master plan and the future growth of the town, spatially.

30. Chapter 6 focuses on the waste characterization of Alandur municipality. The chapter indentifies the physical and chemical characteristics of solid waste of both residential and commercial, undertaken on the basis of field surveys.

31. Chapter 7 addresses the infrastructure needs of the urban poor through an examination of slum population and growth of slums, socio-economic aspects, access to basic urban services, improvement/development programs, institutional aspects, etc.

32. Chapter 8 discusses the design criteria adopted to study the future demand for infrastructure development and service provision. This chapter also identifies the projects required to be implemented to meet the future demand.

33. Chapter 9 presents the asset management for the remunerative and non-remunerative municipal assets.

34. Chapter 10 focuses on the initiatives to be taken up by the local body to enhance their revenue income through the non-traditional sources with minimal investments. In addition, it also discusses the scope for controlling the expenditures on various sectors.

35. Chapter 11 presents the Financial and Operating Plan for the municipality.

36. Chapter 12 presents the initial screening of social and environmental impacts for the implementable projects with mitigation measures.

37. Chapter 13 summarizes the impacts and benefits accruing from project implementation – social, environment and economic benefits. It also summarizes policy interventions and steps to be undertaken by GoTN for proceeding with the detailed design phase.

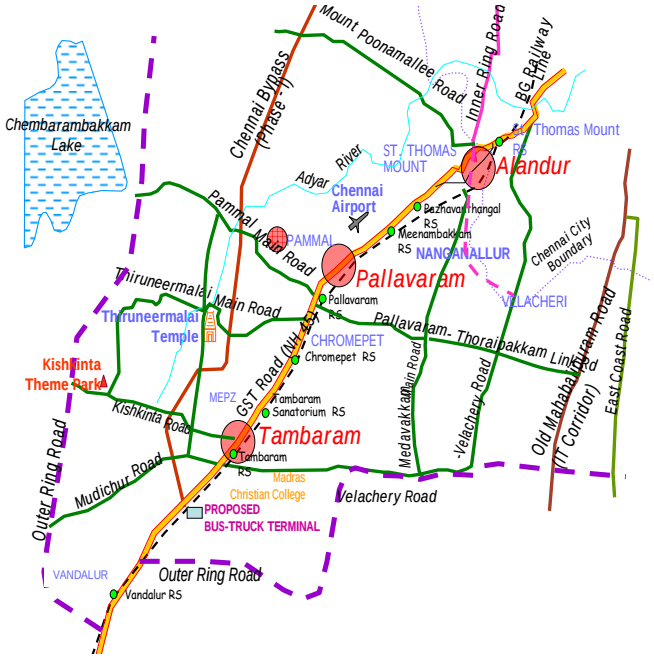
38. Chapter 14 outlines the various best practices and good urban governance. The strategies are also presented in this chapter.

39. Chapter 15 summaries the potential risks and assumptions of various sub projects proposed for the ULB.

II. CITY DEMOGRAPHY

A. Geography and Climate

Figure 2.1: Regional Setting



40. Alandur is the largest urban center in Tambaram Taluka in Kancheepuram District. The town is situated at a distance of about 80 km from the district headquarters and 14 km from the Chennai City. Alandur located on the southern peripheral of Chennai is well connected by good network of roads, located on Grand Southern Trunk Road (G.S.T. Road) (National Highway 45). The Tambaram-Beach suburban railway line divides the town into North and South Alandur. The town encompasses villages of Adambakkam, Palavanthangal, Nanganallur, Thalakancheri and a part of Velachery.

41. The town is an important part of Chennai Metropolitan Area (CMA) which includes Chennai Municipal Corporation, 8 Municipal Towns – Thiruvottiyur, Alandur, Tambaram, Pallavaram, Ambattur, Kathivakkam, Madhavaram, Avadi and township of Thiruverkadu; 27 Town Panchayats and 211 villages comprised in 10 Panchayat Unions. Chennai Metropolitan Development Area (CMDA) has classified Alandur as Adjacent Urban Area (AUA).

42. *Topography*. It is located at $13^0$20' North latitude and $18^0$30' East longitude. The town is situated in relatively flat terrain with a gradual slope towards southeast of the town. The topography varies from 9 m to 14 m towards the northern side of the suburban railway line and 3 m to 15 m towards the southern side of the railway track.

43. *Geology*. The soil of the town falls under three major types – Red, Clay and Clayey Loam with Laterite sub-soil. The predominant soil in the town is red or black soil. This extends to a depth of 0.30 m to 1.0 m. the sub-soil, which is porous in nature, extends from 3 to 4 m. The groundwater table varies from 3.0 m to 9.0 m as maximum during summers while during monsoon season i.e., from November to January, the depth of groundwater table improves and extends to 1.5 m to 2.0 m.

44. *Climate and Rainfall*. The climate of the town is temperate as a whole except during the months of March to June, during which the climate would be hot. The mean annual

average temperature is about 30^0C while the relative humidity reaches upto 90 percent during monsoons. The region receives maximum rainfall from Northeast Monsoon from October to December and the Southwest Monsoon between July to August brings some rains. The annual rainfall is about 1,324 mm.

B. Population Trends and Urbanization

45. The comparison of population of Alandur with Chennai Metropolitan Area (CMA), Chennai Urban Agglomeration (CUA) and Chennai City indicates that the growth rate of Alandur has decreased and dropped well below the growth rates of CMA (27.13 percent) and CUA. However, the sharp decline in the population growth rate of Chennai City with 9.76 percent has effected the CUA's growth rate. This affect can also be witnessed in the growth rate of Alandur, which has declined because of its close proximity to the city. This indicates that the city's saturation level has already reached and the developments now would take place towards the outer peripheries of the City. The comparison with CMA, CUA and Chennai City are presented in **Table 2.1**. As per the discussions with CMDA officials, 2.5 percent growth rate is foreseen for the towns in near to Chennai City.

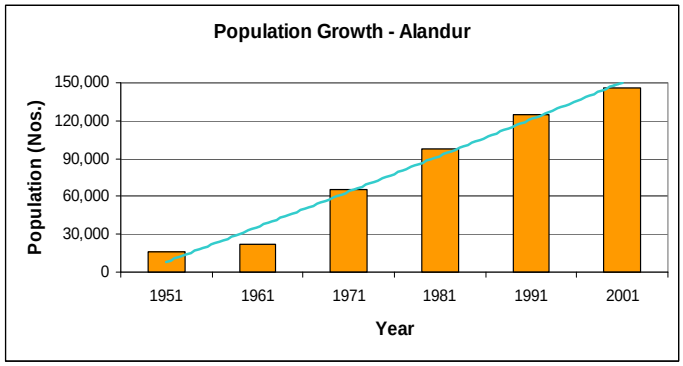
Table 2.1: Comparison of Alandur Population with CMA, CUA and Chennai City

Parameter	Unit	Year	CMA	Decadal Growth (%)	Chennai City	Decadal Growth (%)	CUA	Decadal Growth (%)	Alandur	Decadal Growth (%)
Area	Sq. km		1,177.00		172.00		306.70		19.50	
Population	Lakh									
		1981	46.29		33.17		42.73		0.97	
		1991	59.17	27.82	38.41	15.82	53.41	24.99	1.25	28.52
		2001	75.22	27.13	42.16	9.76	64.25	20.28	1.46	16.80

Source: Census 1981, 1991, and 2001

Map 2.1: Administrative Wards of Alandur

Figure 2.2: Population Growth - Alandur



46. *Population*. Alandur located in proximity to Chennai City along the G.S.T Road is witnessing a significant decrease in the urban population for the last three decades. The population has increased from 1,25,244 in 1991 to 1,46,287 in 2001 with a decline in the growth rate of 16.80 percent which is the lowest decadal growth rate ever recorded for Alandur **(Table 2.2)**. The highest population growth rate was recorded with 194.13 percent during 1961-1971. The details of decadal population growth are given in the **Table 2.2**.

Table 2.2: Population Growth in Alandur

Year	Population			Decadal Growth Rate	Compounded Annual Growth Rate
	Male	Female	Total		
	Nos.	*Nos.*	*Nos.*	*%*	*%*
1951	7,936	7,674	15,610	-	-
1961	11,334	10,778	22,112	41.65	3.54
1971	33,999	31,040	65,039	194.13	11.39
1981	50,308	47,141	97,449	49.83	4.13
1991	64,838	60,406	125,244	28.52	2.54
2001	74,836	71,451	146,287	16.80	1.57

Source: Census Reports

47. Alandur, being in close proximity to Chennai City and primarily a residential area, are some of the factors contributing to the population growth.

48. The Compounded Annual Growth Rate (CAGR) has drastically dropped from 11.39 percent during 1961-71 to 1.57 percent during 1991-01.

49. *Population Density*. The population density for Alandur has not remained constant and has fluctuated over the years. The density has increased from 64 persons per Ha during 1981-91 to 75 persons per Ha (a growth of 17.19 percent) during 1991-01. The chronology of population density in Alandur is presented in **Table 2.3**. During 1951-61, the maximum population density was recorded at 1,067 persons per Ha, which was a result of decrease in the municipal jurisdiction.

Table 2.3: Population Density in Alandur

Year	Population	Area	Population Density
	Nos.	*Ha*	*Persons per Ha*
1951	15,610	147.63	106
1961	22,112	20.72	1,067
1971	65,039	667.00	98
1981	97,449	664.00	147

Year	Population	Area	Population Density
	Nos.	*Ha*	*Persons per Ha*
1991	125,244	1,942.00	64
2001	146,287	1,950.00	75

Source: Census Reports

50. The ward wise analysis of Alandur Municipality indicates that three wards are having very high density; five wards are highly dense while 14 wards are having medium density. The remaining 20 wards fall under the criteria of moderately less dense and low-density wards. The summary of the density pattern is given in **Annexure 2.1**.

Table 2.4: Summary of Density Pattern

Range	Density Pattern	Number of Wards
(Persons per Ha)		*Nos.*
201 & Above	Very High Density	3
151-200	High Density	5
101-150	Medium Density	14
51-100	Moderately Less Dense	12
>=50	Low Density	8

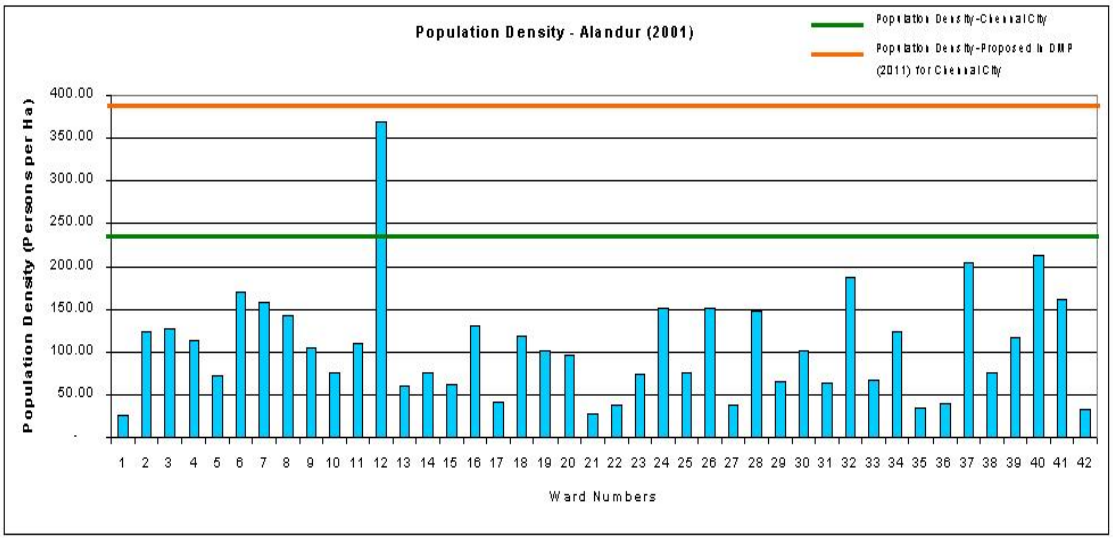
Source: Analysis

51. The wards towards northern part of the town, along G.S.T. Road, are highly dense. Ward No. 28 is predominantly occupied by Economically Weaker Section (EWS). The presence of educational institutions and small industrial units in Ward No. 29, 35 and 36 has resulted in low dense areas.

52. The average population density in Chennai City is 244 persons per Ha. The comparison of city's population density and the ward wise density indicates that only one ward is having population density more than Chennai City while remaining 41 wards are below (refer **Table 2.4**). As Chennai City is already congested, there is a great potential for Alandur for its development. If proper infrastructure facilities are provided, there is no doubt that, in future, Alandur would become one of the major preferred locations for all activities, which include residential developments, commercial establishments, IT offices, etc.

Map 2.2: Population Density Pattern in Alandur

Figure 2.3: Population Density



53. The Draft Master Plan for Madras Metropolitan area proposes the average density for the Chennai City to be 399 persons per Ha. None of the wards has crossed the projected population density for Chennai City, hence not reached the saturation levels. However, Ward No. 12 has attained a density of 369 persons per Ha; thus, in near future this ward would become more thickly populated resulting in the decline of population growth rate.

C. Economic Development

1. Economic Structure

54. Chennai Metropolitan Area (CMA) comprises of Chennai City and areas to an extent of 376.58 sq. km. in Kancheepuram District and 639.39 sq. km. in Thiruvallur District. According to the 2001 Census, 38.6 percent of the population of Kancheepuram District and 57.5 percent of the population in Thiruvallur District live within CMA. The economic base of the Chennai City had shifted from trade and commerce to administration and services by the early part of the 20th Century. In the post-independence period, manufacturing became an important sector and CMA continues to be the most important industrial center in the State. Recent trends show that the economic structure of the city is largely tertiary with growing contribution by Information Technology/Information Technology Enabling Services/Business Process Outsourcing Industries.

(i) Occupational Structure. The comprehensive profile of employment in CMA indicates that the workforce participation rate i.e. proportion of main workers to the population of CMA was 30.74 percent in 1991 and 30.96 percent in 2001. The corresponding figures for Chennai city were 30.50 percent in 1991 and 31.79 percent in 2001. The number of marginal workers both in the Chennai City and in CMA is negligible. **Table 2.5** presents the occupational structure of City and CMA in 2001.

Table 2.5: Occupational Structure in CMA -2001

Sr. No	Component	Chennai City	CMA
1	Total Workers	14,88,364	25,19,278
2	Main Workers	13,80,757	22,84,457
	Main Cultivators	15,149	33,170
	Main Agriculture	5,849	33,390
	Main House Hold	25,836	43,394
	Main Others	13,33,923	21,74,503
3	Marginal Workers	1,07,607	2,34,821
	Marginal Cultivators	2,026	5,728
	Marginal Agricultural	1,233	22,681
	Marginal House Hold	5,156	10,511
	Marginal Others	99,192	1,95,901
4	Non-Workers	28,55,281	4,85,9201

Source: Census of India

The workers in primary activity constitute 6.52 percent in CMA and 1.05 percent in City 1991. In 2001, it was 2.91 percent and 1.52 percent respectively in CMA and Chennai city indicating that the primary activities are on the decline in the peripheral areas due to the emergence of manufacturing and new economy industry. The workers in primary activity are dwindling and it is negligible compared to total, both in Chennai city and in CMA with more than 90 percent of the people engaged in the tertiary sector. The percentage of non- workers was 65.73 percent in city and 69.14 percent in CMA during 2001. As Census 2001 has clubbed town level figures of tertiary sector with primary and secondary, analysis of sectoral shift over time is not possible.

As per Census 2001, the workforce participation rate in Alandur is 34 percent, a jump by 4 percent compared to the previous decade. Overall, the major workforce is concentrated in tertiary sector, i.e., trade and commerce. The trend in occupational pattern is presented in **Table 2.6**. There is an increase in the population of marginal and non-workers, which is an area of concern as this would add to the unemployment population.

Table 2.6: Occupational Structure in Alandur Town

Sr. No	Year	1991	2001
	Population	125,244	146,287
	Sector		
	Primary Sector		
1	Cultivators & Agricultural Laborers	159	648
2	Livestock & Mining	331	-
	Sub-Total- Primary	**490**	**648**
	Secondary Sector		
3	Household & Industry	11,653	606
4	Construction	2,299	-
	Sub-Total- Secondary	**13,952**	**606**
	Tertiary Sector		
5	Trade & Commerce	8,709	-
6	Transport & Communication	4,610	-

Sr. No	Year	1991	2001
7	Other Services/ Other Main Workers	9,877	44,861
	Sub-Total- Tertiary	**23,196**	**44,861***
8	Marginal Workers	157	3,826
	Total Workforce	**37,795**	**49,941**
9	Non- Workers	87,239	96,346
10	Work Force Participation Rate	30%	34%

Source: Census Reports
Note: * Includes the figures of Livestock & Mining, HH & Industry and the tertiary sector.

(ii) Income Estimates for CMA. The following are the Income estimates for the Districts falling under CMA. The income estimates for districts in CMA is presented in **Table 2.7**.

Table 2.7: Income Estimates – NDDP at Current Prices

Sr. No	District	At Current Prices 1999-2000
		Rs. Lakh
1	Chennai	12,48,833
2	Kancheepuram	8,24,702
3	Thiruvallur	4,96,671
4	Tamil Nadu State	1,14,30,943

Source: Department of Economics and Statistics

Chennai City alone accounts for 10.94 percent of the State Income. Estimating the income in the areas of Kancheepuram and Thiruvallur District, which fall within CMA, based on proportion of population, it works out to 2.8 percent and 2.5 percent respectively. These show that CMA accounts for 16.21 percent of the State income from all sectors.

2. Economic Gateways to Chennai

55. *Chennai Port.* Chennai Port is one of the largest ports of India and comprises of well equipped shipping facilities (23 berths including 4 exclusive berths for containers), marine services and other associated facilities like warehouses and storages. The Port has full-fledged container terminals with road and rail connections, which offer all the advantages that containerization could provide such as packaging, landing, pilferage prevention and speedy transportation of cargo. The Port measures a water-spread area of 170 Ha and a land extent of 238 Ha. The principal items of Imports are Petroleum, Oil, Lubricants, Fertilizers, Food Grains and Fibers. The main items of export are Ores (mainly iron ores) granite stones, quartz, Barites, hides and skins, chemical and cotton goods. Chennai Port handles 60

View of Ship at Chennai Port

percent of the total cargo handled by the State. The total number of containers handled during 2003 - 2004 was 5,39,265 showing an increase of 67 percent in the last 5 years. The passenger traffic shows an increase of 22 percent in the last five years.

56. *Ennore Port*. The Port of Ennore is the first corporatised port in the country and handles bulk cargo. The Port measures a water-spread area of 220 Ha. and a land extent of 1336 Ha. Currently, Ennore Port comprises only two berths and is planning to expand its shipping facilities to handle large volumes of bulk cargo. A port specific Special Economic Zone (SEZ) is being planned to enhance the economic opportunities of the port as well as the region.

Approach to Ennore Port

57. *International Airport*. The Chennai Airport is one of the largest airports of the country. It handled about 20.54 lakhs international passengers and 25.01 lakh domestic passengers during 2003-04. In addition, the airport handled cargo of about 1.50 lakh tons including 1.35 lakh tons of international cargo and has a significant share in total passengers as well as cargo handled in the four major Airports. The international passengers handled by Chennai Air Port have increased 4 fold from 1991 to 2004 where as the domestic passengers have increased 2 fold in the same year.

View of Chennai Airport

58. In addition, the existing airport is planned for a major expansion to make it a world-class airport and accordingly, GoTN has provided for 1,500 acres of land for its expansion purposes. The expansion and modernization of Airport would impact the economic competitiveness and will have a major impact on the economy of the CMA/the State.

View of Manali Petrochemical

3. Economic Drivers

59. *Manufacturing Sector*. The manufacturing sector of Chennai comprises large industries such as petrochemicals and chemical industry, electrical and automobile and related ancillary industries. Chennai is the

automobile capital of India with the presence of international car manufactures. Some of the largest industrial estates such as Ambattur and Manali are located in CMA and house multi-product industries. Small industrial estates at Guindy, Thirumazhisai and Thirumudivakkam house medium and small-scale industries. Chennai has a large base of leather industry and accounts for 50 percent of the total exports of the country. Tamil Nadu accounts for 70 percent of leather tanning companies in India and 38 percent of leather footwear and components; most of the footwear industries are located within CMA. A cluster of chemical industries is located at Manali in CMA. An export processing zone (MEPZ) spreading over an area of 261 acres is located at Tambaram for apparel and other exports.

60. The metropolitan comprises large automobile engineering, glass and ceramic industries, which are located at Marai Malai Nagar, Irungattukottai, Sriperumbudhur, Thiruvallore and Gummudipoondi. Tamil Nadu accounts for about 21 percent of passenger cars, 33 percent of commercial vehicles and 35 percent of automobile components produced in India. Chennai, the 'Detroit of India' is emerging as a major export hub for cars in South East Asia.

61. International car manufactures such as Ford, Hyundai, and General Motors etc. have established their manufacturing bases to cater to domestic and international markets. Some of the major industrial developments having an impact on the economic development of CMA include:

(i) Saint Gobain Glass factory at Sriperumbudur.
(ii) Mahindra Industrial Park developed over an area of 1,300 acres.
(iii) New testing and homologation centre for automobile sector with an investment of Rs. 1,000 Crores.

62. *New Economy Industries*. Chennai is a preferred destination for IT/ITES and houses all the top 10 IT Indian multi national Companies. The Tidal Park, with a combined area of 2.5 million sq. ft. is an established self-contained IT park housing all the major players in the IT sector. In addition, an exclusive IT Park is being developed at Siruseri to promote IT investments in the region and a Knowledge Industrial Township is being planned in Sholinganallur along the IT Corridor to meet the growing demands of the sector. Tamil Nadu is the second largest software exporter in the country next to Karnataka with more than 90 percent of the exports from Chennai alone. In addition, the initiatives that are planned/on-going that are likely to make Chennai the most preferred destination for new technology industries including:

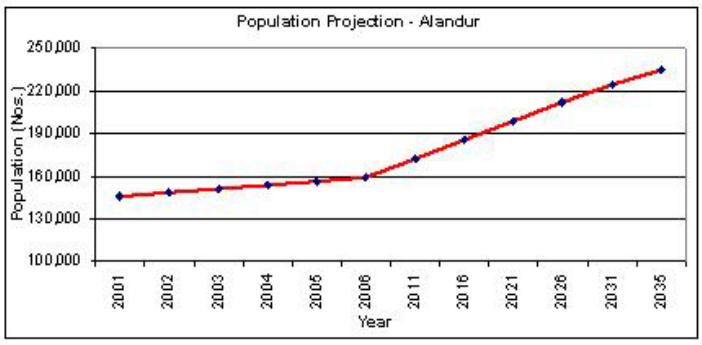
View of Tidal Park

(i) Development of Bio-technology Park or TICEL
(ii) Development of IT Corridor

63. No major industrial units exist in Alandur. Small industrial patches can be witnessed towards the north of the town.

4. Population Growth Trends and Projection

Figure 2.4: Population Projection



64. In order to carry the demand analysis of infrastructure facilities in the town, the town's population has been projected. Different methods of population projection were analyzed and the one, which gave the best fit to the trend with minimal variance, is adopted. In this case, it is Arithmetic method. Increments for the decades 1951-61 to 1991-2001 are taken as the base and the projected population is estimated to be 1.72 lakh in 2011 and 2.35 lakh in 2035.

65. According to the above projection method, the decadal growth rate between 2001 and 2011 is 17.87 percent and the CAGR is 1.66 percent. In comparison, the decadal growth between 1991 and 2001 is 16.80 percent and the CAGR is 1.57 percent.

Table 2.8: Population Projection by Arithmetic Method

Year	Projected Population	CAGR
	Nos.	*%*
2001	146,287	1.57
2005	156,741	1.74
2011	172,422	1.63
2021	198,558	1.42
2031	224,693	1.24
2035	235,147	1.14

Source: Analysis

66. For preparing the detailed project report for Underground Sewerage Scheme for Alandur Municipality, the consultants have projected town's population to be 3 lakh by 2027 using Semi Log - Line of Best-Fit Method.

D. Socio-Economic Profile

1. Land and Housing

67. As per Census 2001, there are 37,313 census houses, out of which 35,701 are occupied and the remaining 1,612 are vacant. The residences form the major occupied houses in the town with 88.50 percent of total occupied census houses. This indicates the town is mainly

a residential zone. The commercial and public institutions like shops and offices account for about 7 percent of the total occupied census houses.

Table 2.9: Occupied Census Houses

Occupied Census Houses	**Numbers**	**Distribution**
	Nos.	*%*
Residence	31,595	88.50
Residence cum Other Use	352	0.99
Shop, Office	2,380	6.67
School, College, etc.	76	0.21
Hotel, Lodge, Guesthouse, etc.	68	0.19
Hospital, Dispensary, etc.	118	0.33
Factory, Workshop, Work shed, etc.	273	0.76
Place of Worship	124	0.35
Other Non-Residential Use	715	2.00
Total Number of Occupied Census Houses	**35,701**	**100.00**

Source: Census Reports

68. Census of Tamil Nadu has classified houses based on the type of roof material, which is detailed out in **Table 2.10**. Like any other towns or cities in India, concrete roof is the most preferred in Alandur also. The structures with concrete roof shares about 73 percent of the total census houses followed by tiled roof with 10 percent. Roofs made of grass, thatch, bamboo, wood, mud; etc accounts for about 9 percent of the total census houses.

Table 2.10: Distribution of Census Houses by Type of Roof

Type of Roof	**Numbers**	**Distribution**
	Nos.	*%*
Grass, Thatch, Bamboo, Wood, Mud, etc	3,397	9.10
Plastic, Polythene	121	0.32
Tiles	3,901	10.45
Slate	29	0.08
G.I., Metal, Asbestos Sheets	1,766	4.73
Brick	518	1.39
Stone	155	0.42
Concrete	27,392	73.41
Any Other Material	34	0.09
Total Census Houses	**37,313**	**100.00**

Source: Census Reports

69. Based on the type of floor in occupied census houses, the census classification is given in the **Table 2.11**. The use of concrete floor is most preferred with 65 percent of the total occupied census houses followed by the usage of mosaic and other tiles.

Table 2.11: Distribution of Census Houses by Type of Floor

Type of Floor	**Number**	**Distribution**
	Nos.	*%*
Mud	2,743	7.76
Wood, Bamboo	26	0.07
Brick	140	0.40

Type of Floor	Number	Distribution
	Nos.	*%*
Stone	98	0.28
Cement	22,990	65.02
Mosaic, Floor Tiles	9,328	26.38
Any Other Material	34	0.10
Total	**35,359**	**100.00**

Source: Census Reports

70. Thus, Alandur can be considered to house working sector that has reasonably good income.

2. Social Capital

71. *Parks and Playgrounds*. Alandur municipality is maintaining 10 parks within its jurisdiction, while one park is maintained by residences. However, the parks are in bad condition and need immediate measures to be taken for maintaining a proper green belt and recreational facilities in the town.

3. Health

72. The ULB is maintaining four IPP V hospitals, three maternity centers, one Siddha hospital and one allopathic hospital. The buildings are poorly maintained and need up gradations. The number of births and deaths show an increasing trend every year. However, the death rate is more than the death rate in the town and this could be attributed for the decline in the population growth of Alandur.

Table 2.12: Number of Births and Deaths

Year	Births	Deaths
	Nos.	*Nos.*
2001	2,282	-
2002	-	-
2003	2,449	807
2004	2,506	909

Source: Alandur Municipality

4. Education

73. Alandur houses few government education institutions along with aided and private institutions.

74. The literacy rate in the town is 82.17 percent. The literacy rate in Alandur is higher than the Chennai City and the state urban average figures of 76.82 percent and 73.47 percent respectively. The main reason for high literacy can be attributed to its proximity to Chennai City, which houses wide range of educational facilities.

75. The local body is maintaining seven municipal schools, six middle and elementary schools and one municipal high school in the town.

III. URBAN MANAGEMENT

A. Institutions and Capacity

1. Institutional Arrangements and Policy Context

76. *Institutional Arrangements*. The State Government's line departments continue to play a crucial role in urban basic service delivery. Sectors and agency involvement include:

(i) Water Supply & Sewerage. The Tamil Nadu Water Supply and Drainage Board (TWAD) and Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB), are the responsible agencies for creation of water and sewerage infrastructure. CMWSSB was formed in 1978 and as per the Act; it is responsible for the entire metropolitan area but has confined its operations to the Chennai Corporation limits. TWAD Board was established as a statutory body for planning and executing the water supply and sewerage schemes all over the state. The ULBs maintain the system – the ULBs, however, continue to face a shortage in quality staff to maintain the system.

(ii) Master Plan/Comprehensive Development Plan. Chennai Metropolitan Development Authority (CMDA) constituted under the Tamil Nadu Town and Country Planning Act, 1971, was set up as a planning and development agency for the controlled growth of Chennai Metropolitan Area (CMA). Presently, its activities are limited to the preparation and implementation of spatial and physical plans viz., Master Plan or Comprehensive Development Plans for spatial development of CMA through public consultations.

(iii) Roads and Highways. The Public Works Department (PWD) maintains National and State Highways that pass through the town/city. The ULB creates and maintains the municipal roads.

(iv) Environmental Protection. The Tamil Nadu Pollution Control Board (TNPCB) established in 1982 is responsible for environmental protection and enforcement of rulings related to the same, passed by competent authorities. The important ruling by the Supreme Court, regarding municipal solid waste, is yet to achieve its objective.

(v) Slum Upgradation. The Tamil Nadu Slum Clearance Board (TNSCB) was set up under the Tamil Nadu Slum Clearance Act 1971. The board develops slum improvement and rehabilitation schemes for notified/regularized slum settlements in the city/town. Infrastructure provision is financed partly through loans from the Housing and Urban Development Corporation (HUDCo) and partly through grants from GoTN and GoI.

77. In addition to involvement of various institutions in the development of regional and local-level infrastructure, the Urban Development Department controls local-level governance

through the Commissioner of Municipal Administration (CMA).

78. *Regulatory Framework*. The Tamil Nadu District Municipalities Act (1920) governs the management of Urban Local Bodies of Tamil Nadu and the same is applicable to Alandur.

2. Service Delivery and Performance of ULB

79. Alandur Municipality is governed by the Tamil Nadu District Municipalities Act (1920). The municipality is responsible for the provision of services and basic amenity to the citizens, which include:

(i) Distribution of potable water;
(ii) Operation and maintenance of drainage and sewerage systems;
(iii) Public lighting;
(iv) Sanitation and public hygiene;
(v) Construction and maintenance of bus terminals, roads, culverts, and bridges;
(vi) Maintenance of public parks and gardens;
(vii) Ensuring systematic urban growth;
(viii) Regulation of building construction; and
(ix) Licensing of commercial activities, etc.

B. Organization Structure of Urban Local Body

80. Prior to 1964, Alandur was a small Panchayat. In 1964, it was constituted as Municipal Grade III comprising of surrounding villages. The municipality was upgraded to Grade II in 1974, while in 1979, the local body's status was recognized as Grade I. Due to rapid growth and development of the town residentially as well as commercially, the municipality was upgraded to Selection Grade Municipality in 1983. The municipality is governed by the Tamil Nadu District Municipalities Act, 1920. The organizational setup of the municipality comprises of a Political Wing and an Executive Wing. The Political Wing is an elected body of Councilors from different wards in the town, headed by the Chairperson. The Executive Wing, headed by the Commissioner looks after the day-to-day functioning of the municipality and supports the Political Wing in the decision-making process.

Political Wing

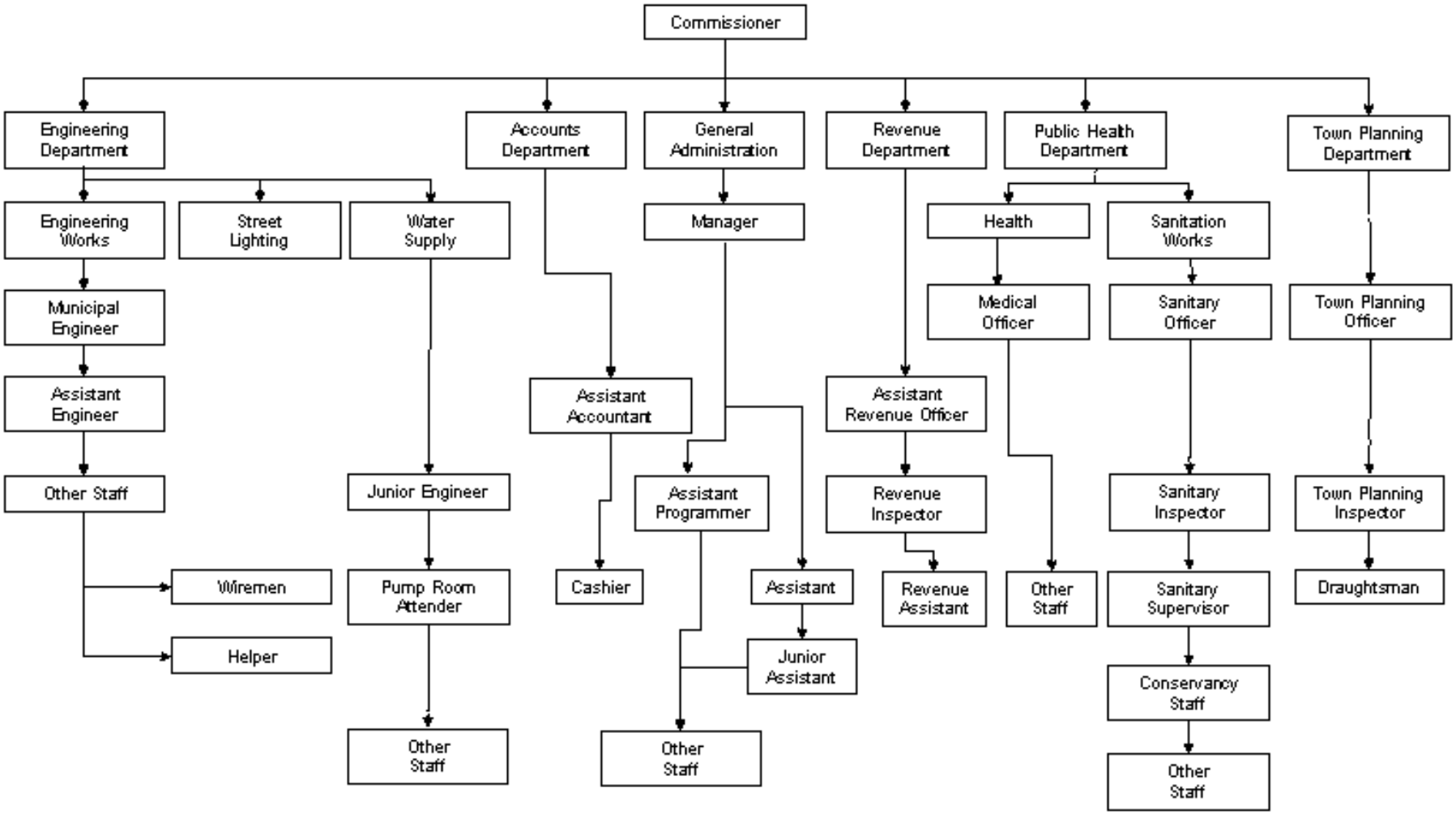
81. The Municipal Council, the political arm of the municipality consists of 42 elected councilors, each representing a ward. Out of 42 wards, five wards (Ward Nos. 32, 35, 36, 37 and 38) are reserved for SC/ST representatives, wards 13, 15, 17, 18, 19, 20, 21, 29, 31 and 39 wards reserved for women, while wards 32 and 37 are reserved for SC/ST women. The Chairperson (elected from among the councilors) heads the Municipal Council, which performs its duties as per the provisions of the District Municipalities Act. The political wing provides an overall direction to the Municipality and performs its functions through a set of committees constituted for different purposes.

Executive Wing

82. The Executive Wing is responsible for day-to-day operations of the Municipality, and is headed by the Municipal Commissioner. The Commissioner is the administrative head of the Municipality and is supported by different departments in the operations. The organizational structure of the Municipality comprises of five functional Departments.

83. The organization chart of Alandur municipality has been shown in the following **Figure 3.1**.

Figure 3.1: Organization Chart of Alandur Municipality



84. Alandur Municipality consists of five functional Departments (refer **Table 3.1**). Each departmental head reports to the Commissioner and functions as per the responsibilities prescribed in the Act and as delegated by the Municipal Commissioner.

Table 3.1: Municipal Departments and Functions

Department	**Functions**
General Administration	Establishment, Records, Accounts, Correspondence, Treasury
Engineering	Works, Water Supply and Operation and Maintenance
Public Health	Preventive Health Care, Conservancy, Vital Statistics
Revenue	Billing and Collection of Taxes, Charges and Fees
Town Planning	Administration of Master Plan

85. The following are the set of rules for different departments of the local body:

(i) The Tamil Nadu Municipal General Service Rules, 1970
(ii) The Tamil Nadu Municipal Engineering and Water Works Service Rules, 1970
(iii) The Tamil Nadu Municipal Engineering Service Rules, 1997
(iv) The Tamil Nadu Municipal Town Planning Service Rules, 1970.
(v) The Tamil Nadu Municipal Medical Service Rules, 1970.

General Administration Department

86. The General Administration Department, headed by the Manager oversees the administrative functions of the Municipality including the accounts and budgeting. The other functions of the Department include:

(i) Public Relations and Redressal of Public Grievances,
(ii) Appointments and Transfers,
(iii) Council Subjects,
(iv) Correspondence,
(v) Record Maintenance,
(vi) Maintenance of Accounts, etc.

87. The General Administration Department is further divided into three sections viz.

(i) Establishment Section
(ii) Dispatch/ Typing and Record Maintenance Section, and
(iii) Accounts Section

Establishment Section

88. An Assistant who reports to the Manager heads the Establishment Section. The responsibilities of this section include

(i) Appointments
(ii) Leave Sanctions and Records
(iii) Correspondence related to Establishment affairs

Dispatch, Typing and Records Maintenance Section

89. A Junior Assistant is responsible for the Numbering and Delivery of all inward correspondence. He handles and maintains all records of all Departments. He is assisted by an attender to dispatch correspondence to all Departments.

Accounts Section

90. The Accounts section headed by the Accountant who carries out functions relating to finances, and accounts of all the Departments except Water Supply and Drainage. In Alandur municipality, the post is vacant and Assistant Accountant (A.A) is in charge for the operations. The Accounts Section also monitors the grants and State Government transfers and devolution, and manages Debt Servicing, Provident Fund Accounts, Pensions, Salaries, Advances, etc.

91. The A.A (in case of Alandur) is responsible for the accounting function of the municipality- his function includes the recording of transactions, maintaining the accounts and compilation of accounts. Junior Assistants assist AA in carrying out the task. A major function of the Assistant Accountant is the preparation of the Annual Budget. The Manager oversees all the activities of this Section.

92. The specific functions of the Accounts Section include:

(i) Receipt of Cash and Cheques,
(ii) Scrutiny of Bills,
(iii) Maintenance of Records/ Registers and Account Books, Payments, etc.

C. Engineering Department

93. The Engineering Department is responsible for all Public Works, and maintenance of civic facilities. This Department is responsible for the following works:

(i) Public Works (Construction and maintenance of roads and storm water drains,
(ii) Maintenance of school buildings,
(iii) Construction and Maintenance of Public Conveniences,
(iv) Maintenance of other facilities viz., Bus stand, Markets, etc.
(v) Street Lighting (Maintenance of Street Lights)
(vi) Water Supply and Sewerage (Provision and operation and maintenance of water supply and sewerage system)
(vii) Parks and Gardens (Maintenance of parks and gardens)

94. The Engineering Department co-ordinates with Tamil Nadu Water Supply & Drainage Board (TWAD) and other state government agencies to implement water supply and other

developmental works. The Department is responsible for ensuring the quality of works and their timely completion.

95. The Municipal Engineer (of Executive Engineer Level) heads the engineering department, and is assisted by Assistant Engineer, Junior Engineer and other staff. As regards fieldwork, Scheme works are delegated to one Junior Engineer who also looks after regular works, related to Public Works, Drains, Street Lighting. The Junior Engineer looks after the water supply and is assisted by electrician, operators and other staff.

Functions

96. A major function of the Municipality is formulation and execution of Works- like construction and maintenance of roads, buildings and other infrastructure systems.

97. *Capital Works.* Capital Works under specific schemes or Master Plan Proposals, includes new construction whether entirely of new works or of major additions/ modifications to existing assets like buildings, roads, infrastructure network, etc.

Maintenance Works

98. Maintenance and repair of existing buildings and infrastructure systems, and construction of minor works.

99. These works involve the co-ordination of various functional departments within a local body, including the Engineering, Administration and Accounts Departments, Council, etc.

100. Based on the functions, the department has four Sections viz.

(i) Public Works
(ii) Street Lighting
(iii) Water Supply
(iv) Parks and Gardens

D. Public Health Department

101. The department is headed by a Sanitary Officer who is assisted by four Sanitary Inspectors, eleven Sanitary Supervisors and several other staff in carrying out the departmental functions.

Functions

102. The Public Health Department is vested with the responsibility of ensuring safe sanitation and cleanliness of a town. The Department is also responsible for the maintenance of Municipal Dispensaries, Burial Grounds and Slaughter Houses.

Maintenance of Sanitation

103. One of the most crucial services of a municipality is maintenance of sanitation and cleanliness in the town. This involves mainly conservancy works involving sweeping of roads, garbage collection and disposal, cleaning of drains, and disinfecting of drains.

104. Four Sanitary Inspectors co-ordinate the entire conservancy works. Eleven Sanitary Supervisors and 238 sanitary workers assist them. The sanitary workers sweep the roads and clean choked drains on a daily basis depending upon the prevailing activities. Private contract was awarded for SWM in certain areas of the town. Market areas and main roads are cleaned every day.

105. For the transportation of the garbage collected to the disposal point, the municipality employs own as well as hired vehicles. The maintenance and upkeep of the vehicles is also the responsibility of the Public Health Department. The garbage is transported to a dumping yard situated about 12 km from the town.

106. The municipality has privatized 15 wards for the solid waste management while the remaining wards are handled by the local body itself. The municipality has proposed to convert the existing compost yard into a transfer station and the identified 16.67 acres of land at Venkata Mangalam for proper land filling and composting of waste.

E. Revenue Department

107. The main function of the Revenue Department is the collection of taxes and charges as levied by the Municipality. The department serves Demand Notices to the taxpayers and charge sheet in the case of default.

108. The Revenue Department is headed by an Assistant Revenue Officer (in Alandur municipality, the post is vacant) and consists of two Revenue Inspectors and nine assistants in carrying out its functions.

Functions

109. This department is solely responsible for the revenue management functions of the Municipality. The function of the department is two-fold:

(i) Levy, Assessment and Collection of Taxes, Fees and Charges; and
(ii) Accounting of Collections

110. The various revenue sources of the Municipality include Taxes, Fees, Charges, and Rents.

F. Town Planning Department

111. The Town-Planning Department's main function is to implement the Master Plan proposals, ensure orderly growth in the town and avoid unauthorized constructions and to formulate projects. The Department is vested with the powers to issue Building Licenses, grant Planning Permissions, collect Development Charges and Encroachment Charges etc. The Department is headed by a Town Planning Officer (this post is vacant in Tambaram municipality) and consists of three Town Planning Inspectors, and one draughtsman.

Functions

112. With regard to day-to-day operations, the Town Planning Department is responsible for issue of building permissions and licenses.

3. Institutional Strengthening and Capacity Building

113. The vacancy rate of municipal staff in Alandur is about 16 percent, which is high. The vacancy rates within department's shows that Engineering Department has a high vacancy rate with 25 percent followed by General Administration and Public Health Departments with 18 percent each. This is an area of concern as the above-mentioned departments play a major role in providing and maintaining services in the town.

Table 3.2: Staff Details of Alandur Municipality

Item	Staff
Sanctioned Positions	504
Vacant Positions	83
Filled Positions	421
Vacancy Rate %	16.47

Source: Alandur Municipality

G. Municipal Financial Management

4. Municipal Fund

114. *Overview*. Alandur Municipality maintains a municipal fund for managing the finances of the Municipality. The accounts of the municipal fund were maintained on a cash based single entry system till the FY 1999-2000. The financial status of the municipality has been reviewed for the past four years, commencing from the financial year 2000-01. This section contains a description of the municipal finances, the sources and uses of funds, and an assessment of municipal finances based on important financial indicators. Currently, the urban local bodies of Tamil Nadu maintain three separate funds, namely General Fund (Revenue Fund), Water & Drainage Fund and Education Fund. For the purpose of this analysis, Education fund has clubbed in to General fund. For further analysis, the items of each fund are categorized under the following major heads.

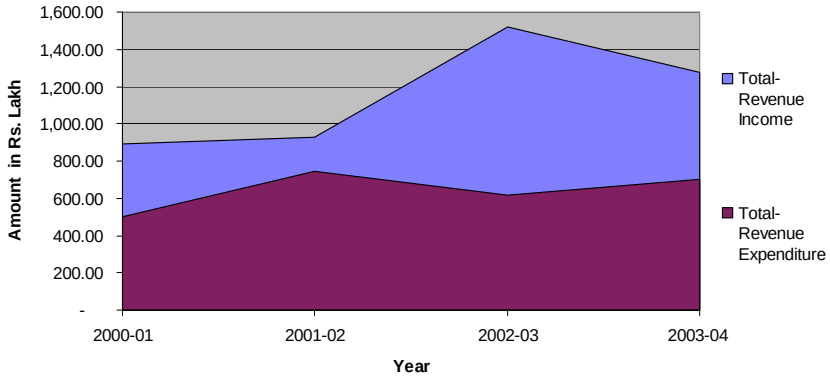
115. *Revenue Account.* All recurring items of income and expenditure are included under this head. These include taxes, charges, salaries, maintenance expenditure, debt servicing etc.

116. *Capital Account.* Income and expenditure items under this account are primarily non-recurring in nature. Income items include loans, contributions by GoTN, other agencies and capital grants under various State and Central Government programs, revenue account transfer for capital works and income from sale of assets. Expenditure items include expenses booked under developmental works and purchase of capital assets.

117. *Deposits and Advances.* Under the municipal accounting system, certain items are compiled under advances and deposits. These items are temporary in nature and are essentially adjustments for the purpose of recoveries and payments. Items under this head include library cess, income tax deductions, pension payments, provident fund, payment and recoveries of advances to employees and contractors, etc.

5. Financial Status

Figure 3.2: Total Revenue Income and Expenditure Trend



118. Revenue income of municipality has grown to Rs. 1,274.07 lakh in the FY 2003-04 from Rs. 890.07 lakh in FY 2000-01, at a high annual growth of 12.70 percent. Revenue expenditure increased at an average annual rate of 11.80 percent from Rs. 503.48 lakh to Rs. 703.53 lakh during the assessment period. The revenue account maintains surplus during the entire assessment period. The trends for the revenue fund are presented in **Table 3.3**. High revenue income during the FY 02-03 has attributed to transfer of previous years ULB's share of State Finance Commission Grant (SFC) allocation and Surcharge on stamp duty.

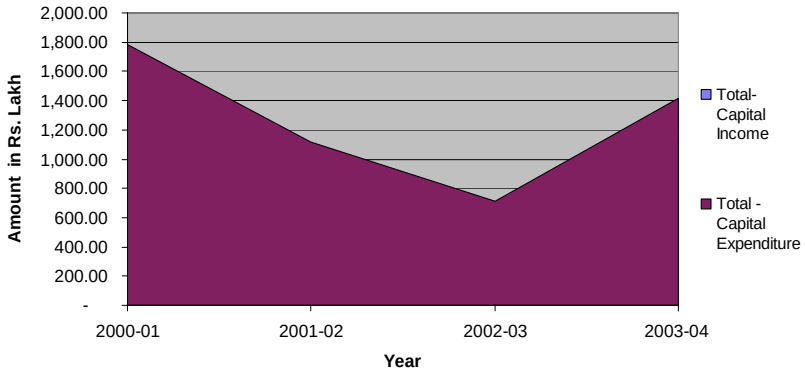
Table 3.3: Summary of Municipal Fund

Item	**2000-01**	**2001-02**	**2002-03**	**2003-04**
	Amount in Rs. Lakh			
Revenue Account				
Revenue Income	890.07	931.05	1,518.28	1,274.07
Revenue Expenditure	503.48	742.21	614.50	703.53
Surplus/Deficit	*386.59*	*188.84*	*903.78*	*570.54*
Capital Account				
Capital Income	1,317.40	856.41	617.41	1,118.21
Capital Expenditure	1,782.20	1,114.17	714.83	1,417.57
Surplus/Deficit	(464.80)	(257.76)	(97.42)	(299.36)
Fiscal Status	***(179.40)***	***(210.00)***	***666.73***	***83.78***
Advances & Deposits				
Extraordinary Income	193.20	304.73	481.25	526.80
Extraordinary Expenditure	7.45	492.47	469.96	468.77

Item	2000-01	2001-02	2002-03	2003-04
	Amount in Rs. Lakh			
Surplus/Deficit	185.75	(187.75)	11.29	58.04
Overall Fiscal Status	***6.36***	***(397.74)***	***678.02***	***141.82***

Source: Alandur Municipality & Analysis.
Note: Figures in parentheses indicates a deficit. Capital Income includes Revenue account transfer for capital works.

Figure 3.3: Total Capital Income and Expenditure Trend



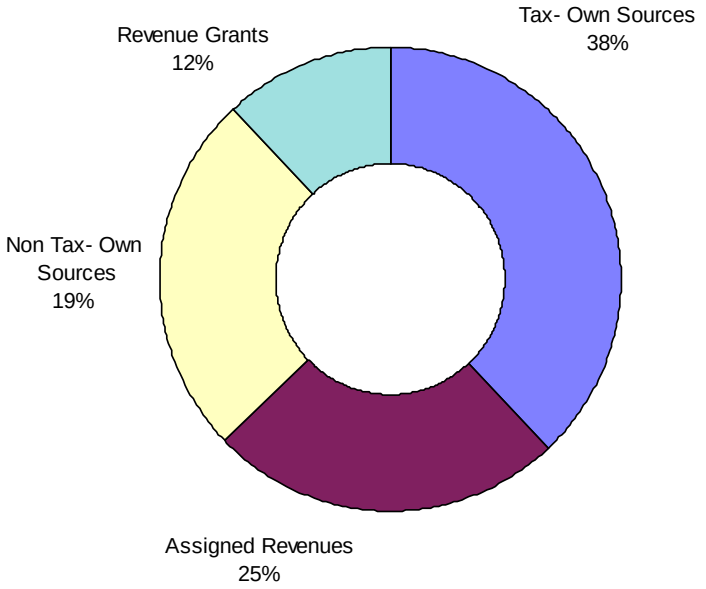
119. Capital income comprises of loans, grants and contribution in the form of initial deposit for water supply connections, revenue account transfer for capital works and sale proceeds of assets. Majority of the capital income is in the form of loans. The capital account has witnessed deficit during the entire assessment period, implying revenue account surplus is being used for asset creation. Fiscal status of revenue account and capital account status witnessed surplus during FY 02-03 & 03-04. During the FY 03-04, major share of capital expenditure were incurred from public works and road asset creation.

120. The following sections present detailed review of revenue and capital accounts, primarily aimed at assessing the municipal fiscal status and providing a base for determining the ability of Municipality to sustain the planned investments.

6. Revenue Account

121. The revenue account comprises of two components, revenue income and revenue expenditure. Revenue income comprises of internal resources in the form of tax and non-tax items and external resources in the form of shared taxes/ transfers and revenue grants from the State Government. Revenue expenditure comprises of expenditure incurred on establishments, operation & maintenance and debt servicing.

Figure 3.4: Source of Income (2000 to 2004)



122. *Revenue Income*. The revenue sources of Municipality can be broadly categorized as own sources, assigned revenues and grants. The source-wise income generated during the review period is presented in **Table 3.4**. The base and basis of each income source has been further elaborated in the following section. The revenue income of Alandur Municipality has increased from Rs. 568.72 Lakh in 2000-01 to Rs. 978.15 Lakh in 2003-04 – a high Compound Annual Growth Rate (CAGR) of about 19.81 percent. During the financial year 2002-03 the Alandur Municipality has received maximum surcharge on stamp duty and State Finance Commission Grant (inconsistent transfer of ULB share), which attributed to high revenue income during the same period.

Table 3.4: Sources of Revenue Income

Item	**2000-01**	**2001-02**	**2002-03**	**2003-04**
	Amount in Rs. Lakh			
Own Sources				
Tax	296.53	267.44	286.03	296.65
Non Tax	131.09	193.45	288.46	202.59
Assigned Revenue	93.71	90.63	397.85	317.30
Grants	47.38	54.77	161.86	161.62
Total (Excl. W&D a/c)	**568.72**	**606.29**	**1,134.20**	**978.15**

Source: Alandur Municipality & Analysis.

123. Own-source income includes income from resource mobilization activities of Municipality in the form of taxes, income from municipal properties and markets, building permit fee, trade licenses, income from fees and fines, etc. Own revenue sources are further classified as tax revenue and non-tax sources that are generated by various sections of the Municipality. The salient features of the revenue head is detailed below:

(i) Own Sources/Tax. This item head comprises of income sourced primarily from property tax (General purpose tax, Lighting tax, Scavenging tax and Education tax excluding Water and Drainage tax), professional tax and other taxes. The property tax is the largest revenue-generating item. Own sources of tax income is presented in **Table 3.5**. Average income from own sources constituted 63.22 percent of the total revenue income during the review period and has increased at an average compounded annual growth rate of 5.30 percent. Tax sources contributed 38 percent of the revenue income and non-tax sources contribute 25.38 percent of the revenue

income. Income from municipal properties, markets and other remunerative assets witnessed inconsistent collection performance during the assessment period, which attributed to low revenue non-tax income during FY 00-01.

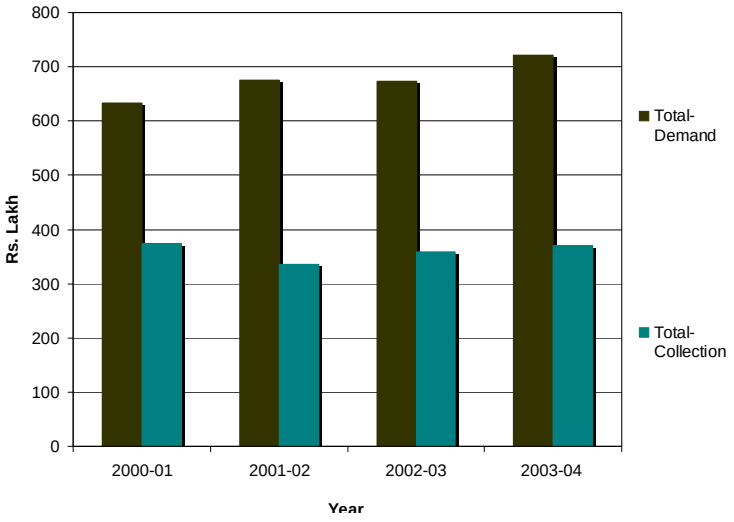
Table 3.5: Own Sources of Revenue Income

Item	2000-01	2001-02	2002-03	2003-04
	Amount in Rs. Lakh			
Taxes				
Property Tax (excl. W&D tax)	277.58	249.10	266.03	274.49
Profession Tax	18.96	18.34	20.00	22.16
Other Taxes	-	-	-	-
Non - Taxes				
Income from ULB's. properties	6.92	63.78	46.26	44.00
License Income (Trade, etc.)	14.71	11.69	11.89	12.26
Income from Fees and Fines	2.39	4.67	2.96	5.60
Miscellaneous Income	107.06	113.32	227.36	140.72
Total	**427.63**	**460.89**	**574.50**	**499.24**

Source: Alandur Municipality & Analysis.

- *Property Tax*. This is the most important category of own source income to the Municipality. Alandur Municipality levies a consolidated property tax of 27 percent of the Annual Rateable Value (ARV). During the assessment period, the numbers of property tax assessments increased at an average growth rate of 3.56 percent per annum. Though the property tax assessment registered positive growth rate, property tax income (collected amount) have decreased at a CAGR of about 0.37 percent during the assessment period.

Figure 3.5: Property Tax Collection Performance



The average collection performance of Property Tax for the review period is 53 percent and the same is presented in **Table 3.6**. The property tax levied is 27 percent of the Annual Rental Value (ARV) and includes the general tax (15 percent), water and drainage tax (7 percent) and education tax (5 percent). It is observed that the Municipality maintained a Low arrear collection of average about 12 percent.

Table 3.6: Property Tax – Demand Collection and Balance Statement

Item	2000-01	2001-02	2002-03	2003-04
Demand (Rs. Lakh)				
Arrear	231.39	258.33	230.81	246.00
Demand	401.71	416.87	442.56	475.15
Total	*633.10*	*675.20*	*673.37*	*721.15*
Collection (Rs. Lakh)				
Arrear	89.73	12.20	7.43	6.42
Demand	285.00	324.09	351.71	364.15
Total	*374.73*	*336.29*	*359.15*	*370.56*
Collection Performance (%)				
Arrear	39%	5%	3%	3%
Demand	71%	78%	79%	77%
Total	***59%***	***50%***	***53%***	***51%***

Source: Alandur Municipality & Analysis.

The average property tax collection performance of the municipality has decreased marginally during the assessment period. The maximum arrear collection was achieved during the FY 00-01 and the same was as low as 3 percent during FY 02-03 & 03-04. There are a total of 32,200 assessed properties in the Municipality and this has increased at an average growth rate of 3.56 during the review period. The ARV per property during the FY 04 is Rs. 5,067 and the tax per property is Rs. 1,368.

- *Professional Tax*. Professional tax is also collected by the municipality from all registered organizations, companies or firms, public or private, individuals and State & Central Government departments. Currently 4,096 assesses are registered with the Municipality. Based on the demand, the average tax per professional is about Rs. 642 per annum. Low average arrear collection of 5 percent observed during the review period and the average current collection is around 66 percent during the same period. The details of Demand Collection and Balance statement are provided in **Table 3.7**.

Table 3.7: Profession Tax – Demand Collection and Balance Statement

Item	2000-01	2001-02	2002-03	2003-04
Demand (Rs. Lakh)				
Arrear	39.61	46.11	54.06	60.34
Demand	25.46	26.28	26.28	26.28
Total	*65.07*	*72.39*	*80.33*	*86.62*
Collection (Rs. Lakh)				
Arrear	1.58	2.08	4.24	2.97
Demand	17.38	16.25	15.76	19.19
Total	*18.96*	*18.34*	*20.00*	*22.16*
Collection Performance (%)				
Arrear	4%	5%	8%	5%
Demand	68%	62%	60%	73%
Total	***29%***	***25%***	***25%***	***26%***

Source: Alandur Municipality & Analysis.

(ii) Own Sources/Non-Tax. This item head comprises of income from municipal properties, fees on municipal services (building permission, etc.), income from interest on investment and miscellaneous services. On an average, through the assessment period, own source/non-tax income constitutes 25.28 percent of the total revenue income. Income from remunerative enterprises, income from fees and fines constitute the major revenue sources under this item head. Income through non-tax own sources of the municipality has grown over the assessment period at a CAGR of about 15.61 percent.

- *Remunerative Enterprises*. Income from remunerative enterprises is the non-tax income in the form of rentals from assets like shopping complexes, market fee, parking fee and income from other real assets owned by the municipality. Income from the remunerative assets of the municipality contributed 5.08 percent of the revenue income during the assessment period and registered a high CAGR of about 85.23 percent. The average revenue mobilized during the review period under this item head is Rs. 40.24 Lakh.

(iii) Assigned Revenues. This item head comprises of income from Government of Tamil Nadu (GoTN)/State transfers of municipal income collected by the state line department. Transfers are in the form of municipality's share of taxes levied and collected by GoTN from establishments/operations within the municipal limits. Surcharge on transfer of immovable properties and entertainment tax, are the major items on which these revenues are realized by municipality.

Table 3.8: Income from Assigned Revenue

Item	**2000-01**	**2001-02**	**2002-03**	**2003-04**
	Amount in Rs. Lakh			
Entertainment Tax	7.79	3.71	3.72	2.37
Surcharge on Stamp Duty	85.92	86.76	394.13	301.28
Other Transfers	-	0.15	-	13.65
Total	**93.71**	**90.63**	**397.85**	**317.30**
Share in total Revenue Income (%)	16.43	14.90	35.08	32.33
Growth (%)		*(3.30)*	*339.00*	*(20.25)*

Source: Alandur Municipality & Analysis.

Income through assigned revenues contributes around 24.68 percent of revenue income and it is growing at an average compounded annual growth rate of 50.16 percent during the review period. It is observed (Table 8.6) that the inflow from this account head has been inconsistent due to delays in transfers and deductions at source towards Municipality debt repayment commitments and/ or other dues payable to GoTN.

- *Entertainment Tax*. The Commercial Tax (CT) Department collects entertainment tax from five cinema halls (with a total capacity of 3,864 seats) functioning within municipal limit. The CT Department transfers 90 percent of the total tax collection to municipality, and retains 10 percent towards management charges. Entertainment tax accounts for just below one percent of total revenue income.

- *Stamp Duty.* Surcharge on stamp duty is another assigned revenue source, accounting for 23.69 percent of revenue income during the assessment period. It is levied in the form of a surcharge on stamp duty applicable on all properties registered or transferred within municipality limits. The Registration Department collects and 90 percent of the collections are transferred to municipality.

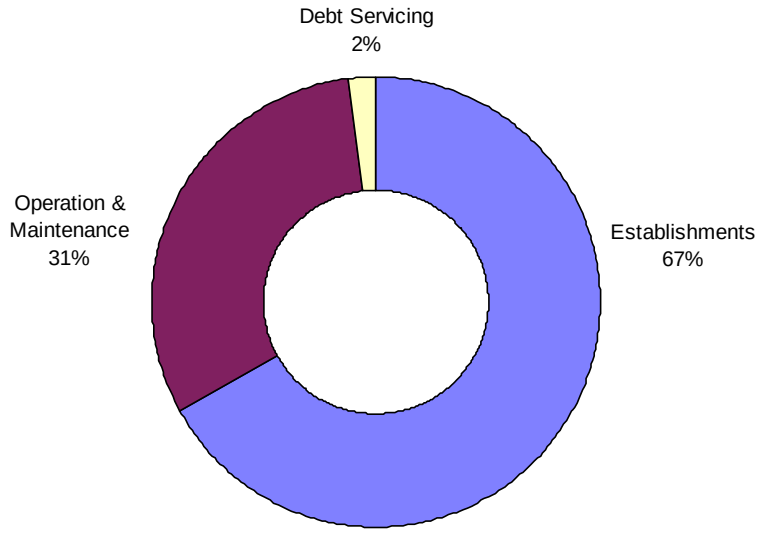
(iv) *Revenue Grants and Contribution.* This item mainly comprises revenue grants and compensations from the State Government under various heads. The regular grants include the SFC grants and the others include aid grants, grants for services like roads, buildings, maternity and child welfare, public health, contributions for elementary and secondary schools and etc. Grants, which are for specific purposes, are ad-hoc in nature. In case of Alandur Municipality, revenue grants and contributions constitute about 12 percent of the total revenue income and have registered an average annual growth rate of 50.53 percent. SFC Devolution is major item of grants, which is transferred as part SFC recommendation. As per SFC recommendation, 12 percent of state revenue under pool B is transferred to each local body based on a formula recommended by SFC. The fluctuation in SFC grant is due to delay and deduction at source.

Table 3.9: Income from Revenue Grants

Item	**2000-01**	**2001-02**	**2002-03**	**2003-04**
	Amount in Rs. Lakh			
State Finance Commission Grant	8.89	50.05	161.81	161.62
Other Grants	38.49	4.72	0.05	-
Total	*47.38*	*54.77*	*161.86*	*161.62*
Share in total Revenue Income (%)	8.31	9.00	14.27	16.47
Growth (%)	-	*15.60*	*195.50*	*(0.15)*

Source: Alandur Municipality & Analysis.

Figure 3.6: Items of Revenue Expenditure (2000 to 2004)



124. *Revenue Expenditure.* Revenue expenditure of Municipality has been analyzed based on expenditure heads broadly classified under the following departments- General Administration and Tax collection, Public Works and Roads, Street Lighting, Public Health & Conservancy, Town Planning and Miscellaneous Items. Water supply and drainage revenue expenditure is analysed separately and the same is presented in the following section. Revenue expenditure is further classified under Establishment, Operation & Maintenance and Debt Servicing.

Table 3.10: Sector wise Revenue Expenditure

Item	**2000-01**	**2001-02**	**2002-03**	**2003-04**
	Amount in Rs. Lakh			
Establishment	299.63	302.68	305.63	318.07
Operation & Maintenance	48.12	309.70	122.17	161.00
Debt Servicing	7.29	6.24	8.34	15.43
Total (excl. W&D A/C)	**355.04**	**618.63**	**436.14**	**494.50**
Growth (%)		*74.24*	*(29.50)*	*13.38*

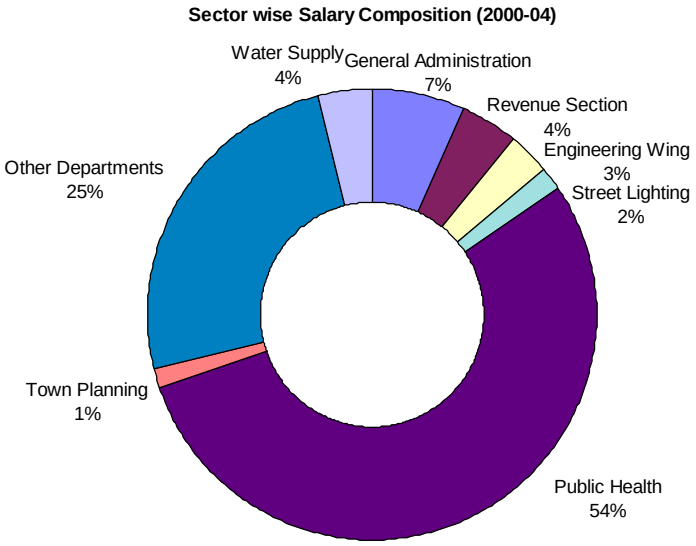
Source: Alandur Municipality & Analysis.

(i) Establishment Expenditure. Establishment expenditure alone accounts for about 67 percent of revenue expenditure, excluding water supply and drainage account. About 37 percent of the total revenue income is utilized for payment of salaries excluding water supply and drainage staff salary and other related expenses. Only 2 percent of revenue expenditure is utilized for debt servicing.

For the assessment period, revenue expenditure grew at an average rate of 11.68 percent; while growth in revenue income was 19.84 percent during the same period. This indicates that revenue and education fund of Municipality is in surplus position.

Further, while expenditure on establishment grown at annual average rate of 2 percent, expenditure on O&M grew at an average rate of 49.56 percent per annum indicating that the Operations and maintenance expenditure need to be controlled. Street lighting O&M has increased by 1.50 times during the financial year 2002-03 to 2003-04.

Figure 3.7: Sector Wise Salary Composition (2000 to 2004)



The following table presents sector /department wise salary expenditure during the assessment period. Since, the department wise establishment expenditure is not furnished in the account statement (consolidated figures only available in the 2000 series); consultant used the third SFC questionnaires for working out the department wise salary. Over 54 percent spent for Public Health Conservancy staffs salary and around 25 percent for other department salary (excluding engineering, street lighting, water supply, general admin & public health departments). Water supply staff salary contributes about 4 percent of the total expenditure incurred towards establishments.

Table 3.11: Sector wise Salary

Item	2000-01	2001-02	2002-03	2003-04
	Amount in Rs. Lakh			
General Administration	20.57	20.06	19.36	19.86
Revenue Section	12.09	12.69	12.82	11.20
Engineering Department	8.88	8.87	8.97	9.97
Conservancy	139.14	160.44	166.10	162.88
Street Lighting	4.31	4.72	5.01	5.26
Water Supply	11.66	11.66	11.66	11.66
Town Planning	5.39	4.00	4.05	3.31
Other Departments	73.30	73.28	70.85	75.64
Total	**275.34**	**295.72**	**298.82**	**299.78**
Growth (%)	-	7.40%	1.05%	0.32%

Source: SFC Questionnaire Document

Establishment expenditure of all sections (excluding water & drainage account) accounts for an average of 67 percent of revenue expenditure.

(ii) Operations & Maintenance. Operation and maintenance expenditure of all sections together accounts for 31 percent of revenue expenditure and had increased at an average rate of 49.56 percent per annum. Conservancy, Street lighting, Public works and roads are the major expenditure items. O&M expenses are dominated by power charges for street lighting, while that for the upkeep of roads has been very minimal. Street lighting maintenance has been privatized by the Municipality and started implementing energy conservation measures to curtail the costs on repairs, replacements and power charges.

(iii) Debt Servicing. A review of the outstanding loan statement of municipality, as on March 31, 2005, i.e., at the start of the FY 2004-05 reveals that the net outstanding debt liabilities of municipality are at Rs. 476.59 lakh. **Table 3.12** details out the agency wise outstanding loans.

Table 3.12: Outstanding Loan Statement

Item	Loan Amount	Outstanding
	Amount in Rs. Lakh	
Government of Tamil Nadu	1,013.14	1,243.67
TUFIDCO - Road Works	13.96	6.38
TUFIDCO - Building Works	39.00	14.38
TUFIDCO - UGS Works	1,288.25	1,108.25
TUFIDCO - Spl. Road Works	116.02	116.02
TUFIDCO - Imp. Road Works	240.00	222.42
TUFIDCO - Imp. Road Works	118.00	101.72
TUFIDCO - SWD Road Works	60.37	55.49
Metro (MAWS) Works - WSPF	403.00	349.27
Total	**3,291.74**	**3,217.60**

Source: Alandur Municipality & Analysis.

The total amount of loans drawn by the municipality till date is Rs. 3,291.74 lakh, majority of it from Government of Tamil Nadu and TUFIDCO for Under Ground

Drainage works. It needs mention that the ratio of outstanding loans to current demand of property tax is about 677 percent. The ratio in terms of ARV (estimated at Rs. 5,067) is 1.97; thereby indicating that the municipality is capable of leveraging additional debt to finance its projects as this is below the threshold of 2 to 3 (generally considered by Financial institutions).

Debt servicing accounted for around 9.74 percent of revenue expenditure (including all funds) during the review period and the DSR (as percent of revenue income) is around 4.53 percent, which is well below the threshold level of 25 percent, as considered by financial institutions. The municipality has to start to focus upon sustainable debt servicing after having cut down establishment costs to improve its credit rating and capability towards leveraging additional debts.

7. Water Supply and Drainage Account

125. As mentioned earlier, local bodies in Tamil Nadu maintain a separate water supply and drainage fund. Hence, to maintain the consistency and to assess the cost recovery aspect, the consultants have analyzed the water fund separately. The details are provided in the following table and the water supply and drainage revenue fund expenditure trend is plotted on a graph.

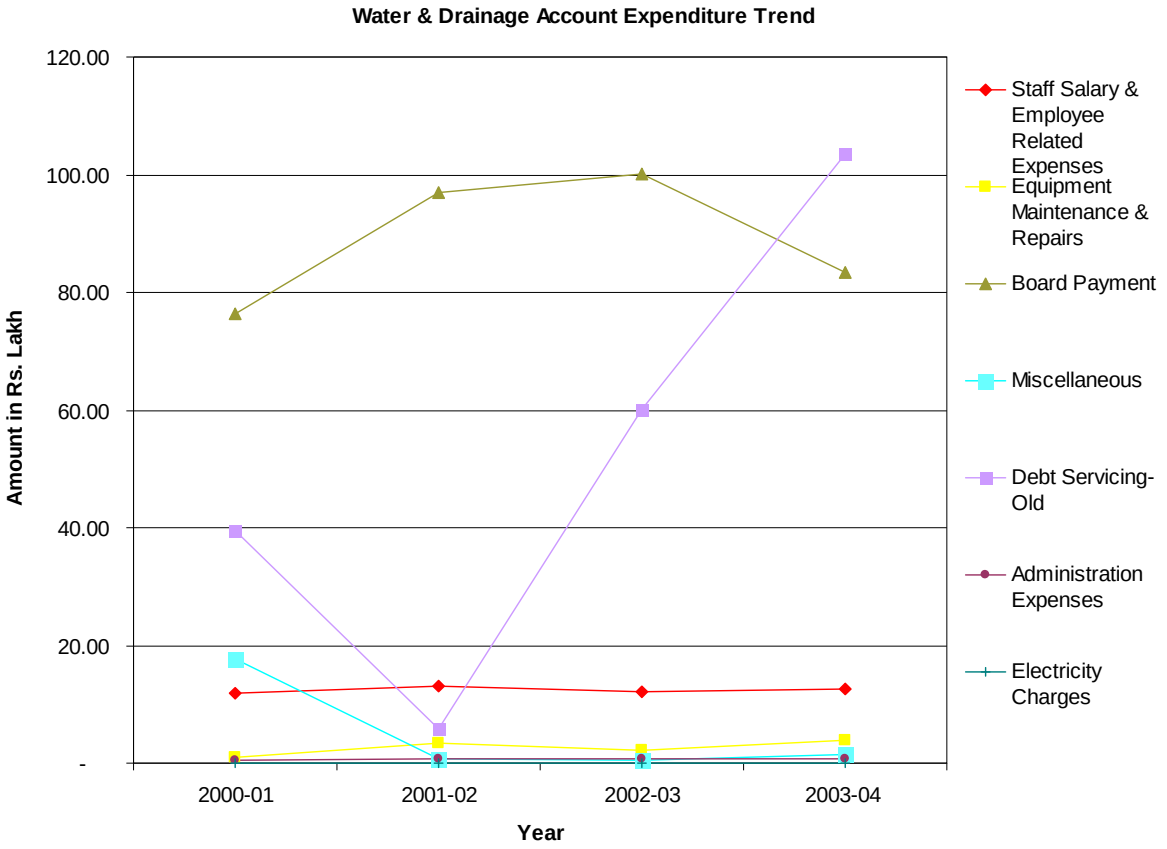
Table 3.13: Revenue Account Status of Water Supply and Drainage Fund

Item	**2000-01**	**2001-02**	**2002-03**	**2003-04**
	Amount in Rs. Lakh			
Revenue Income				
Water & Drainage Tax	97.15	87.19	93.11	96.07
Water Charges	30.72	49.91	90.01	73.44
Drainage Charges	37.16	6.45	-	-
Income from Deposits	93.74	97.39	46.10	21.87
Water Supply & Sanitation Grant	62.58	83.82	154.86	104.53
Other Income	-	-	-	-
Total	*321.35*	*324.75*	*384.08*	*295.91*
Revenue Expenditure				
Establishments	11.79	12.98	12.06	12.62
Board Payment	76.33	96.87	100.16	83.34
Vehicle Maintenance & Repairs	1.72	3.03	2.67	3.66
Miscellaneous	19.12	4.86	3.24	5.99
Debt Servicing- Old	39.48	5.84	60.23	103.43
Total	*148.44*	*123.58*	*178.36*	*209.04*
Surplus/Deficit	**172.91**	**201.17**	**205.72**	**86.88**
Recovery (%) only from Charges	*46%*	*46%*	*50%*	*35%*

Source: Alandur Municipality & Analysis.

126. Salaries of staff directly working in the water supply department are booked under this head, while salaries of other engineering staff performing administrative functions related to water supply are booked under the engineering section of general fund. Expenditures incurred under this account comprised of 56.46 percent board payment and other operation & maintenance expenses accounts 7.09 percent and 7.81 percent on establishment costs. About 29 percent utilized towards debt servicing of existing loans.

Figure 3.8: Water & Drainage Account Expenditure Trend



127. The cost recovery incase of only water and drainage charges is 44 percent of the revenue expenditure incurred in the water supply and drainage fund account. Major share of water supply income is derived by way of water and drainage taxes and water supply and drainage grant.

128. There are 14,205 water supply house service connections as of 2004-05 provided by the Municipality in the town. The average collection performance of water charges for the review period indicated in **Table 3.14**.

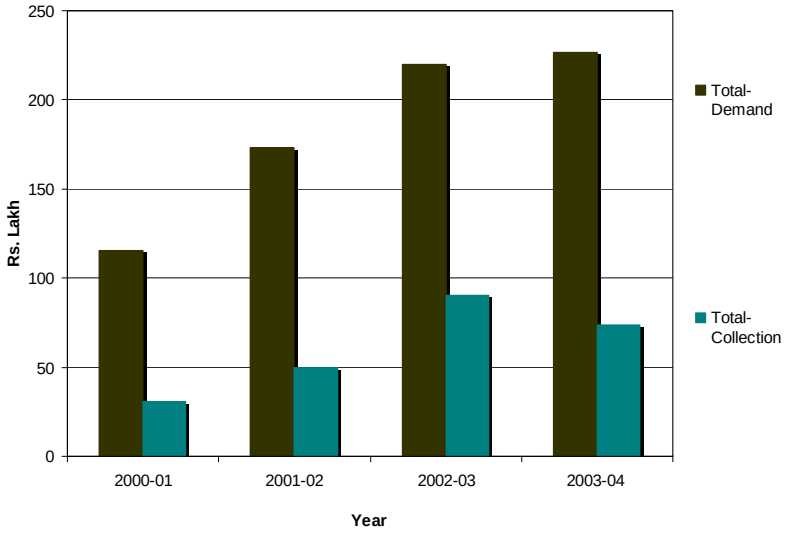
Table 3.14: Water Charges – Demand Collection and Balance Statement

Item	2000-01	2001-02	2002-03	2003-04
Demand (Rs. Lakh)				
Arrear	73.68	84.93	123.67	130.54
Demand	41.76	88.44	96.44	95.92
Total	*115.44*	*173.37*	*220.11*	*226.47*
Collection (Rs. Lakh)				
Arrear	9.59	10.29	36.34	21.08
Demand	21.13	39.62	53.66	52.36
Total	*30.72*	*49.91*	*90.01*	*73.44*
Collection Performance (%)				
Arrear	13%	12%	29%	16%
Demand	51%	45%	56%	55%
Total	*27%*	*29%*	*41%*	*32%*

Source: Alandur Municipality & Analysis.

Figure 3.9: Water Charge Collection Performance

129. The numbers of House Service Connections stand at just 44 percent of the PT assessments indicating the large numbers of unauthorised connections in the Municipality. The unauthorised connections and unassessed properties need to be brought under the user charges and municipal tax.



8. Capital Account

130. *Capital Income*. Capital income comprises of loans, grants and contributions. The detailed components of capital income are detailed in **Table 3.15**. An analysis of this account indicates that grants & contributions have contributed the maximum share of income under this account. While on an average, 33 percent of the capital income is in the form of capital grants and contribution and 38 percent in the form of revenue account surplus transfers. Capital loans contribute to 29 percent of the total capital income. There is also no income realized by the municipality in the form of sale proceeds.

Table 3.15: Status of Capital Account - General

Item	**2000-01**	**2001-02**	**2002-03**	**2003-04**
	Amount in Rs. Lakh			
Capital Income				
Capital Loans	30.00	105.00	118.00	200.38
Capital Grants and Contribution	*230.90*	*66.02*	*105.45*	*80.51*
Own Sources (incl. Rev.a/c transfer)	101.19	141.07	139.63	187.39
Total (excl. W & D a/c)	*362.08*	*312.09*	*363.08*	*468.28*
Capital Expenditure				
General	789.71	689.84	47.59	138.43
Public Works and Roads	631.44	61.65	369.62	606.01
Street Lighting	22.52	4.56	-	0.44
Public Health & Conservancy	14.89	1.91	2.82	2.77
Education	83.64	122.97	1.99	185.68
Others	20.09	1.05	-	-
Total	*1,562.28*	*881.99*	*422.02*	*933.34*
Surplus/Deficits (excl. W &D a/c)	*(1,200.20)*	*(569.90)*	*(58.95)*	*(465.06)*

Source: Alandur Municipality & Analysis.

131. *Capital Expenditure*. The majority of capital expenditure has been directed towards general purpose includes all item of works excluding water supply and drainage and roads over the past four years, this is due to fact TNUDF/TUFIDCO had funded most of the municipalities for roads during the assessment period. Hence, there is a sudden major jump in spending on roads.

132. Analysis of capital income and capital expenditure notes that the account was in deficit during the entire review period.

133. Water supply and drainage capital account status is detailed in **Table 3.16**. Capital income is mainly from loans and own sources, other than that water supply and sewerage connection charges contributed significantly during the review period. Capital account is surplus during the entire assessment period excluding FY 02-03.

Table 3.16: Status of Water Supply and Drainage Capital Account

Item	**2000-01**	**2001-02**	**2002-03**	**2003-04**
	Amount in Rs. Lakh			
Capital Income				
Capital Loans	400.00	400.00	200.00	188.25
Capital Grants and Contribution	391.00	58.91	16.83	25.50
Own Sources – WS Conn. Charges	31.75	31.32	34.36	36.99
Own Sources – Sewer Conn. Charges	132.57	54.09	3.14	399.19
Total	*955.31*	*544.32*	*254.34*	*649.93*
Capital Expenditure				
Water supply	-	173.08	188.82	267.02
Drainage &Sanitation	219.91	59.11	103.99	217.20
Total	**219.91**	**232.18**	**292.81**	**484.23**
Surplus/Deficits	*735.40*	*312.14*	*(38.47)*	*165.70*

Source: Alandur Municipality & Analysis.

9. Assets and Liabilities

134. Current assets and liabilities of Alandur Municipality include monies due to Municipality from debtors and monies due from Municipality to creditors, respectively. **Table 3.17** presents a summary of the current assets and liabilities of Alandur Municipality.

135. The current assets include outstanding arrears in property tax, water charges and profession tax and lease rental (non-tax items) dues. The total current assets due to municipality are Rs. 1,063.145 lakh.

136. Current liabilities include the payment of power charges due to TNEB, Salaries Payable, tax /cess payable to government, other payables and deposits. The net liability of Alandur Municipality is Rs. 909.39 lakh. The current ratio is the ratio of total current assets to total current liabilities, which is used to measure short-term liquidity of a ULB. The idea behind measuring this ratio is to assess whether the ULB has enough liquid assts to pay off its current obligations when they fall due. Intuitively one would expect that this ratio should

be over 1. In case of Alandur Municipality the current ratio is 1.17 and this is more than one is comfortable current ratio.

Table 3.17: Summary of Current Assets and Liabilities Status

Description	Amount (Rs. Lakh)
A. Current Assets	
Property Tax Recoverable	357.68
Profession Tax Recoverable	66.52
Water Charges Recoverable	133.20
License/Lease/Rental/other Recoverable	-
Other Recoverable	234.17
Cash on Hand /Bank	271.56
Total – Current Assets	*1,063.14*
B. Current Liabilities	
Salaries Payable	-
PF and Other Contribution	0.32
TNEB	-
Library Cess Payable	17.71
Other Payables	642.86
Recoveries from staff	0.36
Deposits	247.14
Total – Current Liabilities	*909.39*
Net Status	**154.75**

Source: Alandur Municipality & Analysis.

10. Key Financial Indicators and Issues

137. A set of key financial indicators has been derived using the financial data procured from the Municipality for the assessment period. **Table 3.18** presents these indicators. These indicators are used to assess the municipal performance with regards resource mobilization, fund utilization, financial performance and collection efficiencies.

Table 3.18: Key Financial Indicators

	Indicators		Value	Unit
A	**Resource Mobilization**			
1	Per Capita Income		811	Rs. p.a
2	Sources of Funds			
	a	Share of Own Sources in Total Revenue Income (RI)	64.91	%
	b	Share of Property Tax in Total Revenue Income	32.74	%
	c	Share of Revenue Grants & Subsidies in Total RI	17.25	%
3	Growth in Revenue Income		12.70	% p.a
4	Growth in Own Sources of Revenue Income		0.67	%
5	Per Capita Own Income		344	Rs. P.a
B	**Fund Application**			
1	Per Capita Expenditure		449	Rs. p.a
2	Uses of Funds			
	a	Share of Establishment Expenditure in Total RE	50.87	%
	b	Share of O&M Expenditure in Total Revenue Expenditure	39.38	%
	c	Share of Establishment Expenditure to Total RI	27.70	%

	Indicators	Value	Unit
3	Growth in Establishment Expenditure	1.54	%
4	Growth in O&M Expenditure	38.00	%
5	Growth in Total Revenue Expenditure	14.90	% p.a
C	**Liability Management**		
1	Per Capita Liability (2004-05 estimated)		
a	Outstanding Debt per Capita	2,242	Rs.
b	Outstanding Non-Debt Liability per Capita	74	Rs.
c	Total Outstanding Liability per Capita	2,316	Rs.
2	As a Proportion of Property Tax Current Demand (2003-04 estimated)		
a	Outstanding Debt as % of P.T Demand	677.18	%
b	Outstanding Non-Debt Liability as % of P.T Demand	22.36	%
c	Total Outstanding Liability as % of P.T Demand	699.54	%
3	As a Proportion of Property Tax Own Revenue Income (2003-04 estimated)		
a	Outstanding Debt as % of Own Revenue Sources	465.90	%
b	O/s Non-Debt Liability as % of Own Revenue Sources	15.38	%
c	Total O/s Liability as % of Own Revenue Sources	481.28	%
4	Non-Debt Liability as % of Total Liability	30.41	%
5	Debt Servicing Ratio (D.S/ Revenue Income)	5.10	%
D	**Performance Indicators**		
1	Operating Ratio	0.58	Ratio
2	Growth in Per Capita Own Income	6.88	% p.a
3	Growth in Per Capita Grant	52.80	% p.a
4	Growth in Per Capita Total Revenue Income	14.40	% p.a
5	Growth in Per Capita Establishment Expenditure	3.58	% p.a
6	Growth in Per Capita O&M Expenditure	22.30	% p.a
7	Growth in Per Capita Revenue Expenditure	13.48	% p.a
8	Capital Utilization Ratio	5.40	Ratio
E	**Efficiency Indicators**		
1	Tax Collection Performance		
a	Property Tax	53%	%
b	Water Charges	32%	%
c	Sewer Charges	NA	%
d	Profession Tax	26 %	%
2	No. of P.T Assessments per Tax Collection Staff	3,578	Nos.
3	Property Tax Demand per Assessment	1,368	Rs. p.a
4	No. of Municipal Staff per 1000 Population	2.93	Nos.
5	Annual Revenue (Own Source) per Municipal Staff	11.86	Rs. lakh p.a
6	Population per Residential P.T Assessment	4.92	Persons

Source: Analysis.

138. *Resource Mobilization Indicators*. These indicators summarize the performance of the municipality with regards sources of funds. Alandur Municipality derives about 64.91 percent of its revenue income from own sources, while grants account for just about 17.25 percent of the revenue income.

139. *Fund Application Indicators.* These indicators are a measure to ascertain the utilization from the municipal fund. Around 50.87 percent of the revenue expenditure is spent on establishment heads, only about 39.38 percent for O&M of municipal assets and services. Leaving only 9.74 percent utilized for debt servicing. Establishment expenditure accounts

for about 27.70 percent of the total revenue generated by the Municipality.

140. *Liability Management Indicators*. These indicators are a measure to ascertain the utilization from the municipal fund regards to debt servicing. The ratio of debt servicing to revenue income is only 5.10 percent during the assessment period. The per capita average outstanding debt works out to 2,242 rupees and per capita non-debt liability is 74 rupees. Outstanding debt to property demand is around 677 percent and non-debt liability is 22 percent times the property tax demand for the current year. Outstanding debt to property tax current demand ratio is very high.

141. *Overall Financial Performance Indicators*. These indicators are a measure to assess the overall financial performance of the Municipality with regards operational performance and effective growth in revenue income and expenditure. The average operating ratio during the assessment period was a healthy 0.58 and the capital utilization ratio was high at 5.40 indicating frequent utilization of revenue surpluses in asset creation. The indicators of growth in per capita income and expenditure item heads indicate the effective growth, giving a performance measure relative to the growing population. Alandur Municipality has demonstrated 14.40 percent annual growth in per capita revenue income during the assessment period, while the per capita revenue expenditure has grown at 13.48 percent during the same period. This indicates that as the population increases, the revenue fund will be in surplus; however, there is a need for controlling operation and maintenance expenditure.

142. *Efficiency Indicators*. These indicators are essentially a measure to assess Municipal efficiency with regards revenue base coverage and realization. Alandur Municipality has maintained an average collection performance both with regards property tax and water charges (53 percent and 32 percent respectively). The average population per residential assessment at 4.92 indicates that the property tax base has a wide coverage.

143. Key issues and conclusions are based on the review and assessment municipal finances and discussions with relevant municipal officials.

(i) Maintenance and Reporting of Accounts. ULB’s do not maintain department/sector wise salary expenditure as mentioned in the ULB’s Accounting Manual.

(ii) Revenue Realization. Taxes and charges are major own sources of revenue income. Being more dynamic in nature and within the control of the ULB, these revenue incomes have potential to contribute more to the municipal fund. Besides low tax rates and charges levied, the actual demand itself is not established. Key issues regarding the above comprise:

- Low water supply coverage witnessed there are chances of illegal or unauthorized connections in the town; and

(iii) Fund Application. Key issues regarding application from the municipal fund comprise:

- About 51 percent of the total expenditure is on establishment-related heads, leaving relatively lower amounts for expenditure on operation and maintenance

of services.

(iv) Efficiency. Key issues regarding collection efficiency comprise:

- Average property tax and water charges arrear collection is very low (12 percent & 18 Percent).

IV. PLANNING AND LAND USE MANAGEMENT

A. Planning Efforts in the Past

1. Master Plan Outline

144. Chennai Metropolitan Development Authority (CMDA) prepared the first Master Plan for Chennai Metropolitan Area (CMA) in 1975. In order to ensure orderly development of CMA, CMDA formulated the Master Plan, in sequel to the first Master Plan, with a horizon year of 2011 for a projected population of 95.05 lakh. The distribution of the land use pattern for the CMA for 2011 is given in the following **Table 4.1**.

Table 4.1: Distribution of Land Use for CMA for 2011

Land use	**Chennai Metropolitan Area**			**Distribution**
	Inside City	**Outside City**	**Total**	
	Ha	*Ha*	*Ha*	*%*
Residential	7,464.36	11,813.29	19,277.65	19.41
Commercial	2,201.17	7,505.11	9,706.28	9.77
Industrial	906.17	6,575.33	7,481.50	7.53
Transportation	4,456.82	2,086.85	6,543.67	6.59
Open /Recreational Spaces	1,015.71	11,012.68	12,028.39	12.11
Urbanizable Land	89.58	28,009.57	28,099.15	28.29
Non-Urbanizable Land	98.10	16,102.75	16,200.85	16.31
Total	**16,231.91**	**83,105.58**	**99,337.49**	**100.00**

145. The highlights of broad recommendations proposed in Master Plan are:

(i) Developing specialized industrial estates for the manufacture of export oriented industries around Pammal, Pallavaram MEPZ, and the Electronic City at Sholinganallur;
(ii) Setting up of a financial trade centre to house the new city level junction at Taramani;
(iii) Setting up of decentralized business districts for CMA;
(iv) Strengthening of informal sector;
(v) Introduction of alternative transport systems like Aerometros-improved versions of trams, electrically operated buses etc;
(vi) Setting up procedures for drawl of water from the three main sources, viz., Poondi, Red Hills and Tamaraipakkam Panjetty
(vii) Activating the additional sources viz., tapping of Palar aquifer, storing of additional run off, recycling of waste water for industrial purposes, etc.,

146. Some of the facts about the Master Plan are:

(i) To reduce the pressure of population on Chennai City, there is a need to develop areas outside the city with proper infrastructure facilities;

(ii) The present planning system is based solely on physical planning and lacks an integrated approach between the economic activities and the infrastructural facilities;
(iii) Scarce urban land is being used up inefficiently and most of the housing plots are blocked for deferred use, leaving little room for immediately needed developments;
(iv) At present, public sectors contribution to housing is still small compared to the total need, private sector is not contributing to the needs of the lower income groups;
(v) Under the pressure of developments, ecologically sensitive areas, which require conservation, are getting urbanized. Pollution of water bodies is a threat to human health;
(vi) Intense pressure is building up on the road system particularly with respect to commute traffic;
(vii) Present levels of resource mobilization are far below the level required for meeting the investment and maintenance needs of infrastructure.

B. Land Use Management

147. The Alandur LPA extends upto 1,964.69 Ha (19.65 sq. km).

148. *Existing Landuse.* As per the Draft Master Plan, the existing land use for 1991 has total developed area of 1,617.87 Ha while the total non-urbanized area constitutes for 346.82 Ha, which is 17.65 percent of total planning area. The distribution of land use for 1991 is given in **Table 4.2**.

Figure 4.1: Distribution of Existing Land use

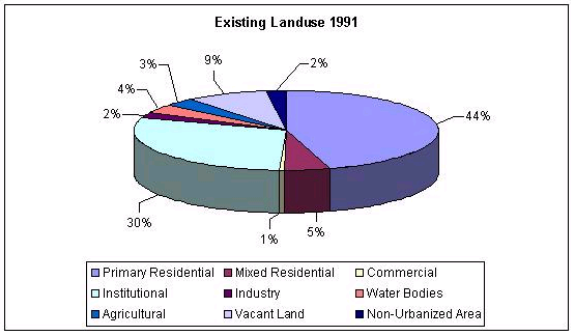


Table 4.2: Existing Land use (1991)

Land use	**Area**	**Distribution**
	Ha	*%*
Primary Residential	888.35	45.22
Mixed Residential	98.11	4.99
Commercial	10.49	0.53
Institutional	579.84	29.51
Industry	41.08	2.09
Water Bodies	74.63	3.80
Agricultural	57.86	2.94
Vacant Land	170.36	8.67
Non-Urbanized Area	43.97	2.24
Total	**1,964.69**	**100.00**

Source: Draft Master Plan for Madras Metropolitan Area - 2011

149. *Proposed Land Use*. The CMDA has proposed the land use for 2011.

150. Due to unavailability of land use break-up, the areas are worked out with the proposed land use map using AutoCAD. Care has been taken to minimize the errors. The

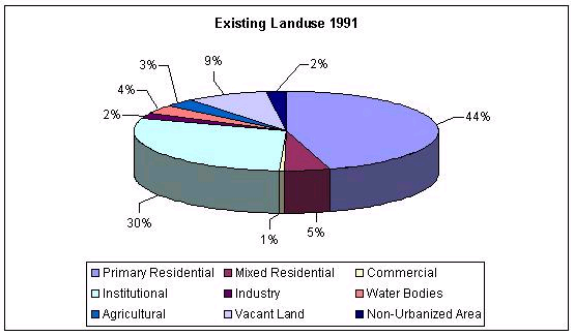
distribution of proposed land use is given in the following **Table 4.3**.

Table 4.3: Proposed Land use (2011)

Land use	**Area**	**Distribution**
	Ha	*%*
Primary Residential	1,365.35	80.08
Mixed Residential	18.10	1.06
Institutional	88.22	5.17
Commercial	70.58	4.14
Recreational	16.65	0.98
General Industry	109.30	6.41
Light Industrial	36.84	2.16
Total	**1,705.04**	**100.00**

Source: Master Plan

Figure 4.2: Distribution of Proposed Land use



151. The Tambaram-Beach Sub-Urban Line divides the town into two parts – North Alandur and South Alandur.

152. *Residential Use.* Alandur, being the main residential zone occupied about 45 percent of the Local Planning Area in 1991. To decongest Chennai, as per the AutoCAD drawing, about 80 percent of the land is proposed for the residential use for 2011. The maximum residential use can be witnessed south of Alandur and few settlements in the north as well. One of the main reasons that can attribute to this is the presence of important roads like G.S.T. Road, which connects Alandur with Tambaram, and other important towns. New extension areas are also coming up towards the south along Brindavan Nagar Main Road and Medavakkam Main Road.

153. *Mixed Residential Use*. The mixed land use pattern can be observed towards the north of the railway line along Muthukumara Swami Road.

154. *Commercial Use*. The major concentration of commercial establishments is along Adambakkam Eri, spread across in wards 12 and 14. In 1991, minimal commercial establishments were existing in the town. However, in proposed land use of 2011, it has been proposed to increase the usage by 70.58 Ha.

155. *Institutional Use*. Most of the educational and public institutions are situated in the North. The town has educational institutions like Agurchand Manmull Jain College along G.S.T. Road, Jai Gopal Garodia Girls Higher Secondary School, D.A.V. High School, etc. Municipal Office, Tamil Nadu Water Supply and Drainage Board (Division Office), Magistrate Court, Madras Race Club Stables are also located in north. This indicates that, in Alandur, the maximum trips are attracted towards north while the south being dominated by residential zones may be considered as maximum trip generating zones.

156. *Industries*. The town does not have major industries. However, it houses light industries

towards the south of the railway track. In 1991, industries occupied only 41.08 Ha, which is about 2 percent of the total planning area. As per the AutoCAD drawing of proposed land use, the area under industries has been increased to 146.14 Ha, an increase of more than three times than in 1991.

157. *Water Bodies*. Adambakkam Eri, a major lake is located in the heart of the town. The entire eri is almost fully encroached. In the north, there are a few small water bodies along Kathipara Main Road.

Map 4.1: Proposed Land use Map (2011)

158. *Zoning Regulations.* Zoning regulations are prepared to promote public health, safety, general moral and social welfare of the community. These regulations ensure that the most appropriate, economical and healthy development of the town takes place in accordance with the proposed land use plan.

159. *Municipality and CMDA.* Chennai Metropolitan Development Authority (CMDA) is the agency responsible for the preparation and implementation of the master plan. CMDA, through its regional network and Local Planning Authorities prepares the plan, receives objections and notifies the plan elements and after approval, implements the plan with the assistance of the municipality. The municipality is the regulating body of the developments taking place in the town limits in consultation with various departments. The Development Plans and development control regulations form the basis of regulation. Accordingly, the role of the municipality in plan implementation includes:

(i) Sanctioning building plans and construction supervision;
(ii) Issuing completion certificates;
(iii) Sanctioning colony layout plans; and
(iv) Regularizing unauthorized developments.

2. Development Patterns – Growth Areas and Direction

160. *Regional Setting*. The three Municipalities, namely Alandur, Pallavaram and Tambaram located within CMA along NH 45, known as G.S.T. Road. Other major roads comprising the regional road network include NH bypass, Velachery road, Medavakkam Main Rd, Pallavaram-Thoraipakkam link Rd, IT Corridor and the proposed Outer Ring Road and the extension of Inner Ring road from St. Thomas Mount to Velachery. The suburban railway line between Beach and Chengalpet runs almost parallel to G.S.T. Road. It is also proposed to extend the MRTS line from Velachery to St. Thomas Mount.

161. *Activity Zones*. The major activity zones present in the region include the international airport at Meenambakkam, the industrial estates at Guindy, Pallavaram and Pammal and the Entertainment Park at Kishkinta. The proposed developments in the region include the development of IT Corridor, proposed Peerkankaranai bus and truck terminal and the proposed Thairuneermalai Satellite town.

162. *Growth Direction*. It is evident that the major road corridors comprising National Highways, State Highways and other Major District Roads in the region offer great potential for the growth and development of the region and the project town.

163. The Tambaram-Beach suburban railway line divides the town into North and South Alandur.

164. *North Alandur*. Mohite Park (Battle Field 1759) along G.S.T. Road and Guindy Industrial Estate are located in the north of Alandur. The location of railway station and easy accessibility from other parts has resulted maximum growth of the town towards north.

165. *South Alandur*. The town's growth is also taking place towards south and southeast. The southern part is primarily dominated by residential use. The maximum developments are

taking place along Medavakkam Main Road and Karuneekar Street, which ultimately meets Velacheri Road. The Tamil Nadu Road Development Corporation (TNRDC) is developing the Old Mahabalipuram Road (OMR) from Madhya Kailash to Siruseri as IT Corridor, including improvement of the 2.1 km long East Coast Road (ECR) link, which connects OMR. The Taramani Road, which passes through Velachery, which has great potential for growth and development. Growth is also witnessed along Nanganallur road.

166. The growth is also witnessed along Nehru Main Road, which proceeds as M.G.R. Road from the teacher's colony. New extension areas are also coming up along the railway line at a slow pace.

167. As described earlier section that the wards with low density have greater scope for the future expansion and development while the overcrowded wards are needed to be decongest.

Map 4.2: Growth Direction of Alandur Town

C. Key Developmental Issues

(i) Need for a Revised Master Plan for Alandur LPA, addressing the growth pull-and-push factors, economic spurt and growth potential;

(ii) Need for a specific regional approach for development of towns along the G.S.T. belt, which is the main receiving hub of Chennai City;

(iii) To exploit potential benefits of proximity to IT Corridor - need for rezoning, new development guidelines and demarcation of Special Development Areas;

(iv) Multiplicity and conflict of institutions dealing with land use management.

168. *Transportation Related Problems*. The major problems in the comprehensive transportation network of the region constituting the National Highways, State Highways and other roads could be summarized as

(i) Lack of Connectivity with NHs and SHs. Since the NHs and SHs are the major traffic corridors in the region, better links to these regional corridors need to be developed for better accessibility,

(ii) Lack of Inter Municipal Road Network. Better connectivity between the municipalities is vital for the growth of region as a whole,

(iii) Missing Links. Links to major road corridors from important activity centers in the region is essential. Hence, it is required to identify missing links in the region and to be develop the same,

(iv) Absence of Connectivity to Major Activity Zones. All major activity zones should be well connected to major transport corridors in the region,

(v) Narrow Bus Routes. The roads through which buses are plying should have sufficient width to cater bus traffic as well as other traffic. All the bus routes in the region should have minimum width of two-lane carriageway (7.0 m),

(vi) Absence of proper traffic infrastructure facilities such as

- Parking
- Junctions
- Level crossings
- Pedestrian facilities

V. INFRASTRUCTURE SERVICES

A. Physical Infrastructure

1. Water Supply

169. Alandur municipality meets its water supply requirements through surface and sub-surface sources. Tamil Nadu Water Supply and Drainage Board (TWAD) with Palar River as a source commissioned the first organized combined water supply scheme to Alandur and Pallavaram in 1972. The scheme has been designed to supply 22.70 MLD of water. The water is supplied to enroute villages also. Alandur municipality receives about 2.40 MLD from this scheme. In 2002, Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) has commissioned a new water supply scheme, designed to supply 28.00 MLD (Ultimate Stage) to Alandur. The scheme is supplying about 3.00 MLD during summer and 6.00 MLD during normal seasons. The TWAD Board stopped supplying water to this town; however, during acute shortage in summers, the water from Palar River is supplied.

170. In addition, the town has 241 bore wells and 26 open wells are in use, which yields about 0.82 MLD. The water supply requirement during summers is also met with the tankers.

B. Source of Water Supply

171. The town is served by both ground and surface sources of water. Due to the insufficient availability of water from the main source, the Krishna River, tapping of ground water through bore wells; hand pumps and open wells are practiced to augment the current supplies. The water to the unserved areas is supplied with two tanker lorries of 9,500 liters capacity each, both owned by the ULB.

Combined Water Supply Scheme for Alandur and Pallavaram

172. The combined water supply scheme for Alandur and Pallavaram was commissioned in 1983 at an estimated cost of Rs. 950.00 lakh, with a design capacity of 22.60 MLD serving about 2,00,000 persons. The scheme has been proposed to supply 18.00 MLD in normal season while during summers; the scheme would supply 16.00 MLD. This system is also proposed for supplying water to the enroute towns and villages. The quantity of water supplied to these villages is presented in **Table 5.1**.

173. CMWSSB has commissioned a new water supply scheme to Alandur with River Krishna as source, thus stopping the supply from the River Palar. However, during acute shortage, the water is supplied from / supplemented by River Palar.

Table 5.1: Water Supply from TWAD Scheme

Sr. No	Name	Designed Supply	Normal Supply	Present Supply	Remarks
		MLD	*MLD*	*MLD*	
1	Tambaram Municipality	-	2.00	0.50	
2	Pallavaram Municipality	5.40	4.60	2.00	
3	Alandur Municipality	9.00	-	1.20	Delinked from this scheme September 2002
4	Pammal Town Panchayat	0.90	1.80	0.80	
5	Anakaputhur Town Panchayat	1.00	0.90	0.20	
6	Chitlapkkam Town Panchayat	0.90	1.00	0.50	
7	Cantonment Board	1.80	1.00	0.40	Presently (summer), Supply being given to Pallavaram only
8	Indian Air Force, Tambaram	1.80	1.80	1.00	
9	Vandaloor Zoo	1.80	0.60	0.20	
10	Taj Flight Kitchen	-	0.30	0.20	
	Total	**22.60**	**14.00**	**7.00**	

Source: TWAD Division Office, Alandur

Palayaseevaram Headworks at Palar River and Cheyyar

174. *Old Headworks*. The old headwork at Palayaseevaram includes infiltration gallery, manhole wells and pump sets. There are five manholes of 3.50 m diameter each. The water is collected from these wells in a common sump from where it is pumped with the help of 3 Turbine pump sets of capacity of 60 HP each (one standby) (Discharge - 4,920 lpm and Head - 35 m) to the booster station at Devariambakkam through 300 mm AC pipe of Class 10.

175. *New Headworks*. The new headwork at Palayaseevaram includes eight infiltration wells of 3.50 m diameter each. The water from the infiltration wells is collected at a common sump of capacity 0.10 ML. The water from the sump is pumped with the help of 9 submersible pump sets with the capacities varying from 3 HP to 12.5 HP, (Discharge - 500 lpm to 1,000 lpm and Head - 22 m to 40 m) and two centrifugal pump sets (one is standby) of 50 HP each (Discharge - 4,000 lpm and Head - 22 m) to booster station at Devariambakkam through 600 mm C.I. pipe of length 7.20 km.

Vengudi Headworks at Palar River

176. The Vengudi headwork at River Palar includes nine infiltration wells of 4.50 m diameter each. The water from these wells is collected in a common GLSR of capacity 0.10 ML. The water is pumped to booster station at Devariambakkam with the help of 13 submersible pump sets of power varying from 3 HP to 12.5 HP (Discharge - 500 lpm to 2,000 lpm) with a constant head of 18 m. in addition, three centrifugal pump sets of 70 HP capacity each (Discharge – 9,090 lpm and Head – 22 m) (one is standby) also pumps water

to the booster station. The water is conveyed to booster station through 500 mm diameter C.I. pipe of Class L.A of length 8.23 km.

177. *Booster Stations*. There are four booster stations at Devariambakkam, Krishna Nagar, Kadaperi and Mannivakkam, with ground level sumps and pump sets. The booster station at Kadaperi has three centrifugal pumps of capacity 75 HP each, which pumps water to Alandur and other enroute towns.

Chennai Metropolitan Water Supply and Sewerage Board – Krishna Stage II

178. River Krishna is the source for this scheme. This scheme has been designed to supply 28.00 MLD (Ultimate Stage) and 12.80 MLD (Present Stage) to Alandur. Presently, only 3.00 MLD of water is supplied to the town, a per capita supply of 20.51 lit per day.

Other Source of Supply

179. There are 236 bore wells with hand pumps and five power pumps installed across the town. In addition, the ULB has provided 236 public stand posts and 26 open wells. The ground water table varies from 3.0 m to 9.0 m as maximum during summers while during monsoon season i.e., from November to January, the depth of groundwater table improves and extends to 1.5 m to 2.0 m. The supply from other sources is about 0.82 MLD.

Table 5.2: Supply from Other Sources

Source	**Numbers**	**Supply**
		MLD
Bore Wells	241	0.48
Public Stand Posts	236	0.24
Open Wells	26	0.10
Total		**0.82**

Source: Alandur Municipality

C. Distribution System

180. The distribution system comprises of storage reservoirs and distribution network. The municipality is responsible for the operation and maintenance of the distribution system within its area of jurisdiction.

181. *Storage Reservoirs.* Alandur has five storage reservoirs, which forms five water supply zones with total capacity of 6.20 ML capacity. The details of storage reservoirs are given in **Table 5.3**. Sufficient storage capacity is available to cater the future needs of the town.

Table 5.3: Storage Reservoirs in Alandur

Sr. No	Location	Year of Construction	Numbers			Capacity		
			GLSR	OHT	Total	GLSR	OHT	Total
			Nos	*Nos*	*Nos*	*ML*	*ML*	*ML*
1	Alandur (New Street)	1969	-	1	1	-	1.80	1.80
2	Adambakkam	1970	-	1	1	-	1.20	1.20
3	New Colony	1969	-	1	1	-	0.90	0.90
4	Nanganallur	1969	-	1	1	-	0.90	0.90
5	Bakthavatchalam Nagar (B.V. Nagar)	1970	-	1	1	-	1.40	1.40
6	CMWSSB		1	-	1	7.00	-	7.00
	Total		**1**	**5**	**6**	**7.00**	**6.20**	**13.20**

Source: Alandur Municipality

182. The following **Table 5.4** gives the coverage of each service reservoir in the town.

Table 5.4: Coverage of Service Reservoirs

Sr. No	Location	Capacity	Wards Covered
		ML	
1	Alandur (New Street)	1.80	1-4, 35-42
2	Adambakkam	1.20	5-10
3	New Colony	0.90	11-16
4	Nanganallur	0.90	17-21, 31-34
5	Bakthavatchalam Nagar (B.V. Nagar)	1.40	22-30
	Total	**6.20**	

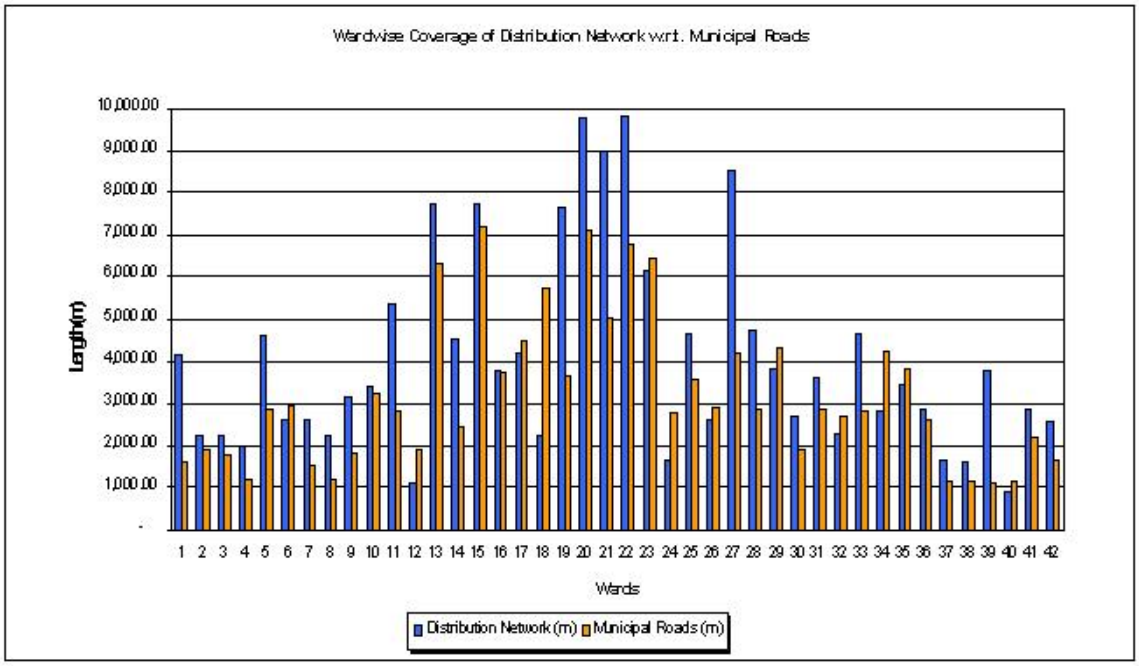
Source: Alandur Municipality

183. *Distribution Network*. The distribution network was laid in 1972. The total length of distribution network provided in the town is 169.87 km. The ward wise coverage by the network is given in **Annexure 5.1**. The total road length within the municipal limits is 153.95 km, which indicates that the distribution network has been laid on almost all roads.

184. **Figure 5.1** explains about the ward wise coverage of distribution network with respect to municipal roads. It can be observed that in most of the wards, the length of distribution network is more than the municipal road. This is mainly because the length of distribution network covered includes the length of transmission mains also. To meet the required pressure in the pipeline for the water supply, sometimes, additional pipeline is also provided.

Map 5.1: Location of Storage Reservoirs in Alandur

Figure 5.1: Ward wise Coverage of Distribution Network w.r.t. Municipal Roads



185. *Supply Arrangements*. TWAD and CMWSSB have laid different pipelines for water supply. CMWSSB has provided a valve near Meenambakam – Cargo section from where the water is supplied to Alandur municipality. A main valve is located at Alandur municipality, which controls the supply to the OHT located opposite to the municipal office. Once this OHT is filled, the water is supplied to the near by areas and the same is followed for other OHTs. This cycle of supply is followed continuously.

186. *Coverage and Per Capita Supply*. TWAD Board is not supplying water to Alandur. CMWSSB is supplying 3.00 MLD during summer season and 6.00 MLD during normal seasons.

187. The water is pumped for 24 hours to the reservoirs and supply to the consumers is for once in two days for one to two hours.

188. Alandur, thus, receives gross supplies of about 26.11 lpcd (Summer season) and 46.62 lpcd (Normal season) from both surface as well as sub-surface source. The supply rate, thus, is very less compared to the prescribed standards of 90 lpcd by TWAD Board and CPHEEO guidelines prescribe 135 lpcd for a town with piped water supply but sewerage schemes exist / contemplated. Looking at the pace of growth in Alandur's population, there is an immediate need to augment more supply to the town.

189. *Supply to Consumers*. No metered connections exist in the town. The municipality has given 14,205 water supply connections. Out of which, 14,154 connections are given to domestic while the remaining 51 connections to non-domestic. Domestic connections account for 99.64 percent while non-domestic connections accounts for 0.36 percent. No industrial connection has been given in the town. As per Census 2001, Alandur has 34,927 households. Thus, only 40.52 percent of households are provided with House Service Connections (HSC), which is very low.

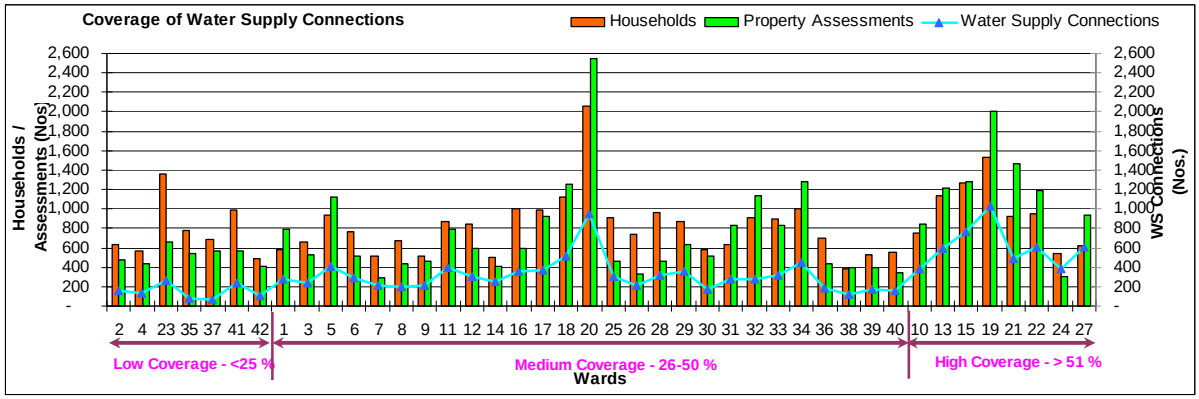
190. The following **Table 5.5** shows the range considered for the ward wise coverage of waster supply connections with respect to households.

Table 5.5: Criteria for Coverage of HSCs

Coverage	Criteria
Low Coverage	> 25%
Medium Coverage	25%-50%
High Coverage	<50%

Source: Analysis

Figure 5.2: Coverage of Water Supply Connections



191. The ward wise analysis of coverage of HSCs with respect to households indicates that 27 wards have medium coverage, 7 wards are poorly covered and only 8 wards (10, 13, 15, 19, 21, 22, 24 and 27) have coverage more than 50 percent of households. Most of the low coverage wards are situated towards the north of the railway line while the wards with medium coverage are scattered across the town.

192. In comparison with residential assessments of 29,143 done by the municipality, the coverage of HSCs is about 49 percent. As a whole, the coverage of piped water supply in Alandur is very low which indicates that either the municipality has not been able to cover the other areas due to practical difficulties or there exists good number of unauthorized connections. As no study has been carried out for unaccounted for water, thus, quantification of unauthorized connections is not possible.

193. *Connection Charges*. The municipality collects the connection charges from the residents. Water supply charges (deposit and monthly tariff) are given in **Table 5.6**. These charges are in force from April 1, 2001.

Table 5.6: Water Supply Connection Charges

Type of Connection	Monthly Tariff	Connection Deposit
	Rs.	*Rs.*
Residential	50.50	3,000
Commercial	120.50	5,000
Industrial	120.50	10,000

Source: Alandur Municipality

194. *Public Stand Posts/Public Fountains*. There are about 236 public stand posts in Alandur. Thus, on an average 5 to 6 public stand posts are provided per ward. The number of public stand posts covered by each service reservoir is given in the following **Table 5.7**.

Table 5.7: Public Stand posts Served by Each Service Reservoir

Service Reservoir	**Numbers**
Alandur	112
Adambakkam	36
New Colony	13
Nanganallur	30
Bakthavatchalam Nagar (B.V. Nagar)	45
Total	**236**

Source: Alandur Municipality

195. Thus, the number of public stand posts is maximum with 112 in Zone I, which is served by Alandur overhead tank of capacity 1.80 ML capacity.

196. *Water Supply with Tankers*. Supply through tanker facilities is a common phenomenon during summers. However, two tankers are used to supply areas that are not covered by piped water supply system, mainly in slums. Parts of Ward No. 35-37, 15, 23-25 are supplied through tankers. The capacity of each tanker is 9,500 liters; both are owned by the ULB.

D. Ongoing/Proposed Projects

197. Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) formed in 1978 as a statutory body, is vested with the responsibility of planning, construction, operation and maintenance of water supply and sewerage system in Chennai Metropolitan Area (CMA) and the same is planned to be done progressively as and when adequate source of water supply is available. The implementation of the Master Plan for Water Supply and Sewerage drawn in the year 1978, revised in 1991 and updated in 1997, is being taken up by CMWSSB in stages, with funding from the World Bank, HUDCO, TUFIDCO and other financial institutions. Primarily the proposals envisaged construction additional water treatment plants, transmission mains and distribution system.

198. CMWSSB has worked out the requirements of water supply for CMAfor the year 2026, which is around 2,248 MLD. This includes 1,606 MLD for domestic purposes and the remaining for commercial and industrial purposes. The assumptions related to per capita water supply and demand for water supply for CMA are presented in **Tables 5.8** and **Table 5.9**.

Map 5.2: Water Source Surface and Sub Surface for Chennai Metropolitan Region

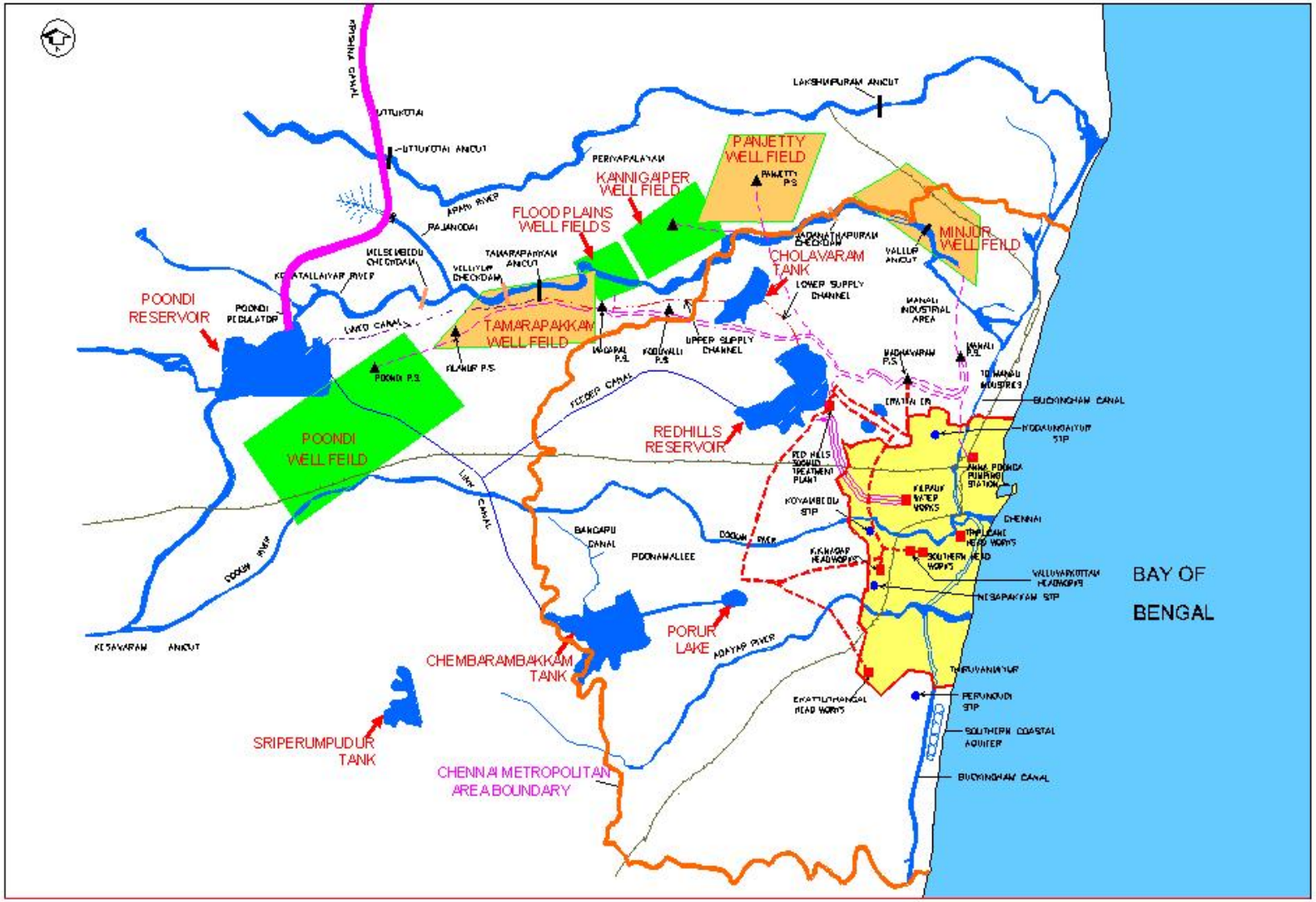


Table 5.8: Assumptions- Water Requirement

Component	**Details**
Residential Use	
Chennai City	150 lpcd
Municipalities	125 lpcd
Special Village Panchayats	100 lpcd
Village Panchayats	80 lpcd
Commercial uses	30% of resident population requirements
Industrial use	10% of resident population requirements

Source: CMWSSB

Table 5.9: Total Water Requirement for CMA

Sr. No	**Name of Category**	**Year**			
		2011	**2016**	**2021**	**2026**
		MLD			
1	Water requirement for the resident population	1,165	1,284	1,431	1,606
2	Water requirement for office, commercial, industrial premises and other places of employment, education etc.	349	385	429	482
3	For industrial use	116	128	143	160
	Total Water requirement	**1,630**	**1,797**	**2,003**	**2,248**

Source: CMWSSB

(i) Source Development. The CMWSSB has completed the scheme to augment the source of water supply by implementing Chennai Water Supply Augmentation Project-I to supply 180 MLD in CMA area. A project to construct a 100 MLD Reverse Osmosis based seawater desalination plant under DBOOT basis has also been taken up for implementation. Further, the CWSAP II project at an estimated cost of Rs.124 crore is also under implementation to firm up source sustainability, in addition to augmenting the source. In addition, improvement works to enhance the storage capacity of Kandaleru, Somasila reservoirs and the lining of Telugu Ganga Project canal to improve the flow efficiency are in progress to enable supply of 12 TMC (930 MLD) of water to Chennai city. The sources and availability of water from each source is presented in **Table 5.10**.

Table 5.10: Sources and Availability of Water to Meet Demand

Sr. No.	**Name of Source**	**Safe Yield**
		MLD
1	Poondi-Cholavaram – Red Hills Lake system (including diversion of flood flow from Araniar to Korataiyar	200
2	Ground Water from Northern Well Field	100
3	Southern Coastal Aquifer	5
	Sub Total (A)	**305**
4	Krishna Water I Stage	400
5	Krishna Water II Stage	530
6	New Veeranam (CWSAP-I)	180

Sr. No.	Name of Source	Safe Yield
		MLD
7	CWSAP-II (Proposed)	20
8	Sea Water Desalination (Proposed)	100
	Sub Total (B)	**1,230**
	Grand Total (A) + (B)	**1,535**

Source: CMWSSB

The projections indicate that the overall water demand for the year 2026 is of the order of 2,248 MLD as against the full potential of the existing and presently ongoing source works totaling to 1,535 MLD, thus leaving a deficit of 713 MLD. Due to frequent and recurrent deficit monsoon in Chennai and in AP, there is uncertainty on the availability of water during such periods. Hence, it is pertinent to create additional reliable sources of water supply and accordingly the use of recycled wastewater and desalination of seawater are being considered.

The reuse of wastewater, though desirable from the environmental point of view, is fraught with limitations, untill acceptability for use is established. Until then, the utilization of recycled wastewater can be limited to industrial purposes only.

Considering the above, desalination is one of the options being considered for reliable source of water supply. Accordingly 700 MLD is proposed in two phases, phase I comprising of 300 MLD and phase II of 400 MLD. The land required for establishing the additional desalination plants have already been identified, one at Kattupally near Minjur and the other near Thiruporur and Kelambakkam.

(ii) Transmission Main and Distribution Network. Based on the Master Plan already prepared by the CMWSSB action has been taken to integrate the requirements of the adjacent and distant Local Bodies and the network of transmission mains has been created with this objective in mind. Therefore, it would be possible for CMWSSB to cover the Adjacent Municipalities and Special Village Panchayats by drawing from the transmission main network system and creating appropriate separate distribution for these areas. Under the Phase I program, extension of trunk mains from the CMWSSB system already available can be implemented with additional trunk mains to be established from the proposed desalination plants.

(iii) Improvements to Water Distribution System. All the source development interventions would result in increased water availability and hence warrants systemic improvement projects in water distribution system in the City. Consequent to the systemic improvements undertaken, strengthening of the water distribution system was also undertaken in 11 zones. It is proposed to take up the strengthening of the water distribution system in the remaining 5 zones viz. Anna Poonga, Kilpauk, Triplicane, Southern Head works and K.K. Nagar also and providing valves in all the 16 zones towards isolation of zones, so that the entire service area would be benefited in supply eliminating defective streets of piped water supply. The pipelines will be laid to a total length of about 307 km. The existing distribution stations also needs strengthening to handle the water requirement of 2026 population. The total estimated cost of these works is Rs.338.36 crore.

(iv) Unaccounted for Water in Left Out Areas. Initial study by the NEERI in the 1970s

revealed that leakage losses in the existing system were in the order of 35 percent to 40 percent. Hence, to increase the terminal pressure and to avoid leakage losses, it was decided to take up the leak detection programme in phases with the objective of saving water. Out of the 3.40 lakh HSCs in Chennai City, so far, renewal and leak detection tests in 2.24 lakh HSCs has been completed. It is proposed to take up further 30,000 HSCs under this project including renewal of corresponding water mains of about 100 kms, which are aged and choked. Further works are to be taken up in the coming years to minimize unaccounted for water.

(v) Rehabilitation of Existing Raw Water Conduits. Three existing masonry conduits, used to draw raw water from Redhills constructed in the years 1914, 1955 and 1986 are brick masonry arched conduits, which need complete rehabilitation. The study carried out by international consultants M/s. Compagnie Generale des Eaux has examined the condition of these conduits in an extensive way and have recommended reconstruction of conduits I and III and repairs and rehabilitation of Conduit-II to transfer 359 MLD of water to Kilpauk Water Treatment Plant. The proposals envisage construction of 1,300 mm x 1,300 mm RCC conduit within the existing Conduit-I and Construction of 1,700 mm x 1,400 mm RCC conduit within the existing conduit in Conduit-III at an estimated cost of Rs. 44.00 crores.

E. Key Issues

199. Based on the available data, discussions with the officials, and field survey, the following the key issues and performance indicators are arrived.

Table 5.11: Performance Indicators

Service Indicators	Units	Value
Daily Per Capita Supply		
Summer Season	Liters	26.11
Normal Seasons	Liters	46.62
Roads Covered with Distribution Network	%	110.34
Total Storage Capacity with respect to Supply		
Summer Season	%	162.30
Normal Seasons	%	90.91
Assessment Covered by House Service Connections	%	48.57

Source: Analysis

(i) Scarcity during Summer. As the yield from Surface source gradually decreases and worsens during summer season, the water supply requirement is met with tankers and ground water.

(ii) Low Gross Per Capita Supply. The gross per capita supply to Alandur is only 26.11 lpd during summers and 46.62 lpd during normal seasons, which are very low compared to the standards of 90 lpcd (As per TWAD Board). To meet the standards, additional supply of 6.35 MLD of water is required.

(iii) Duration of Supply. The municipality is supplying the water once in two days.

(iv) Unauthorized Connections. The distribution system covers most of the roads, yet HSCs with respect to residential assessments is as low as 49 percent. Apparently, there may be unauthorized/illegal connections in the town.

(v) Frequent Power Failures. Frequent power failures increase system losses.

2. Sewerage and Sanitation

F. Overview

200. Alandur Municipality has recently commissioned Under Ground Drainage (UGD) System in Alandur. Individual septic tanks and low cost sanitation units also provide the safe disposal of sullage and night soil in the town.

G. Underground Drainage System

201. *Overview*. Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) with aid from World Bank awarded the detailed project preparation of UGD System in Alandur to a consultant. The final project report for UGD System, estimated at Rs. 330 lakh, was sent for approval in 1998. The project is phased out in two phases to cover the entire town. The estimated quantity of sewage generation for intermediate stage (2012) and ultimate stage (2027) is 16 MLD and 24 MLD respectively.

202. *Coverage*. The UGD scheme has been designed for the ultimate population of 3.0 lakh for 2027. A sewer network of 120 km (refer **Table 5.12**) has been laid in the town, of which main sewers are 20.0 km and the remaining 100.0 km are branch sewers.

Table 5.12: Length of Sewer Network

Diameter of Sewers	Type of Material	Length
mm		*m*
200	Stone Ware Pipe	101,939
250	Stone Ware Pipe	45
300	Stone Ware Pipe	6,054
375	Stone Ware Pipe	4,770
450	Stone Ware Pipe	1,875
500	Stone Ware Pipe	339
600	Reinforced Cement Concrete*	261
700	Reinforced Cement Concrete*	825
750	Reinforced Cement Concrete*	576
800	Reinforced Cement Concrete*	114
900	Reinforced Cement Concrete*	651
1,000	Reinforced Cement Concrete*	644
1,100	Reinforced Cement Concrete*	1,520
1,200	Reinforced Cement Concrete*	387
Total		**120,000**

Source: Final Report of Under Ground Drainage Scheme for Alandur Municipality, Vol.-I
Note: * Reinforced Cement Concrete pipe with sulfate resisting cement

203. The minimum and maximum sizes of sewers used in the sewer network are 200 mm diameter and 1,200 mm diameter respectively. The network is provided with about 102 km of length with 200 mm diameter while for the remaining length, the diameter of the pipes ranging from 250 mm to 1,200 mm, are provided. Stoneware pipes are used upto 500 mm

diameter while the balance is of RCC NP3 Class with sulfate resisting cement, inside lined with high alumina cement.

204. The total length of roads within the municipal limits is 153.95 km, which indicates that the sewer network covers about 78 percent of town roads.

205. *Pumping Station*. One pumping station has been constructed towards the southeast of the municipality, which acts as a terminal pumping station. The site for the pumping station is spread over 1,200 sq. m (30 m x 40 m). **Table 5.13** provides the flow of sewage in intermediate and ultimate stages of UGD system.

Table 5.13: Flow of Sewage in Intermediate and Ultimate Stages

Year		**2012**	**2027**
Flow Condition	**Unit**		
Peak Flow	LPS	556.41	834.19
Average Flow	LPS	186.04	278.63
Lean Flow	LPS	100.00	150.00

Source: Final Report of Under Ground Drainage Scheme for Alandur Municipality, Vol.-I

206. To meet the pumping requirements at various inflows conditions of 2012, pumps of following capacities are provided: 1 No. – 300 LPS, 2 Nos. – 200 LPS and 2 Nos. – 100 LPS. During peak flow, 1 No. of 300 LPS pump, 1 No. of 200 LPS and 1 No. of 100 LPS pumps are in operation, during average sewage flow, 1 No. of 200 LPS pump or 2 Nos. of 100 LPS pumps are used and during lean flow, 1 No. of 100 LPS pump is operational.

207. *Pumping Main.* A pumping main of 800 mm diameter C.I. LA Class is provided for a length of 6.0 km from the pumping station to the proposed treatment plant at Perungudi.

208. *Sewage Treatment Plant*. The ultimate sewage generation in Alandur is projected at 24 MLD in 2027. Activated Sludge Process (ASP) is proposed for the waste treatment for which the requirement of land is about 30.0 Ha. Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) is operating a sewage treatment plant, which serves the Sewerage Zone V of Chennai. The total land within the premises of the plant is 380 Ha, out of which 30 Ha is occupied by the existing STP. Due to availability of land at the existing STP premises, the STP for Alandur is proposed in the same premises. It is also proposed to construct the STP on BOT basis (Lease period 14 years) in modules of 12 MLD.

209. *Effluent Disposal*. Effluent mains of 2.27 km discharge the treated effluent from the treatment plant to Buckingham Canal. The sludge that settles at the bottom of the tank is used as manure in agricultural fields.

210. *House Service Connections.* As per the latest resolution passed dated August 30, 2005, the following is the graded tariff structure adopted by the ULB.

Table 5.14: Graded Tariff Structure for UGD Connections

Area	Monthly Tariff	Deposit	Monthly Tariff	Deposit
Sq. ft	*Rs.*	*Rs.*	*Rs.*	*Rs.*
	Domestic Connection		**Commercial & Industrial Connections**	
< 500	60	6,000	200	13,000
500-1500	80	7,500	400	16,000
1500-3000	100	10,000	600	20,000
>3000	120	20,000	-	-
3000-5000	-	-	800	30,000
>5000	-	-	1,000	100,000

Source: Alandur Municipality

211. As of now, 23,401 applicants have deposited the money for the UGD connection, however, the ULB could provide only 12,873 connections (Residential – 11,828, Commercial – 1,045).

212. *Low Cost Sanitation Units*. Low cost sanitation facilities are proposed for Economically Weaker Section (EWS) where the water supply is inadequate. Under this UGD scheme, 2,000 low cost sanitation units and 20 community toilets with 10 seater capacities are proposed. The locations for the community latrines are given in **Table 5.15**.

Table 5.15: Location of Proposed Community Toilets

Sr. No	Location	Effluent Disposal
1	VOC Nagar	Connected to Sewer
2	Raja Street	Connected to Sewer
3	Kannan Colony	Connected to Sewer
4	B.V. Nagar	Connected to Sewer
5	Gandhi Nagar	Connected to Septic Tank
6	Sundaramurthy Street	Connected to Sewer
7	Burma Tamilar Colony	Connected to Septic Tank
8	Indira Nagar	Connected to Sewer
9	M.K.N. Road	Connected to Septic Tank
10	B.V. Nagar Nehru Nedunchalai	Connected to Sewer
11	Margo Street	Connected to Septic Tank
12	Halfman Street	Connected to Sewer
13	Near Subway	Connected to Septic Tank
14	D.G.D Complex	Connected to Sewer
15	Mannadiamman Koil Street	Connected to Sewer
16	Kuntrakudi Nagar	Connected to Sewer
17	Balakrishnapuram (Near Burial Ground)	Connected to Sewer
18	Jai Naikkum School	Connected to Septic Tank
19	Nanganallur (Near Temple Tank)	Connected to Sewer
20	Near D.G.D. Complex	Connected to Sewer

Source: Final Report of Under Ground Drainage Scheme for Alandur Municipality, Vol.-I

213. *Project Cost*. The total estimated cost of the project is Rs. 340.00 lakh.

H. Sanitation Facilities

214. In the absence of UGD system or parts not covered by the system, septic tanks and public conveniences serve as the major source for the safe disposal of human waste.

215. The sewage generated flows into septic tanks and its supernatant overflows causes odor nuisance. The sullage and sewerage water from the households in the town is presently led into drains, which ultimately accumulate as stagnant ponds in low-lying areas, leading to breeding of mosquitoes and unsanitary conditions.

216. The town has 18,450 individual septic tanks, which serves as the major means of safe disposal of human waste. The septic tanks serve about 53 percent of town's population. In addition, the municipality has provided about 2,200 low cost sanitation units, which serves about 6 percent of the total population. The Self Welfare Groups (SWGs) in Alandur have constructed five toilets under Integrated Sanitation Program (ISP). The users (HHs) of ISP toilets are charged with Rs. 30 monthly by the SWGs while for other users Re. 1 is charged. They are located at VOC Nagar, Raja Street, Kannan Colony, Nehru Neduchllai (in Naganallur) and Burma Tamilar (in Naganallur). In addition to this, the town has nine community toilets constructed in VAMBAY Scheme and three community latrines constructed at M.K.N. Street, Hoppman Street and Thiruvalluar Street. **Table 5.16** provides the details on sanitary facilities in the town.

Table 5.16: Sanitation Facilities

Description	**Value**	**Population Covered**
	Nos.	*Nos.*
No. of Septic Tanks	18,450	77,306
No. of Low Cost Sanitation Units	2,200	9,218
No of Toilets Constructed in Integrated Sanitation Program (ISP)	5	-
No. of Toilets		
Community Toilets Constructed under VAMBAY Scheme	9	-
Community Latrines	3	-

Source: Alandur Municipality

Map 5.3: Location of Sanitation Facilities

I. Performance Indicators

217. As per the analysis of available data, the performance indicators for Alandur have been arrived (**Table 5.17**).

Table 5.17: Performance Indicators

Indicator	Current Situation
	%
% P.T. Assessment Covered with UGD	39.98
% P.T. Assessment Covered with Septic Tanks	63.31
% P.T. Assessment Covered with LCS	7.55

Source: Analysis

J. Key Issues

218. The key issues identified are:

(i) House Service Connections. The local body is providing the UGD connections at a very slow pace although the system is fully functional.

(ii) Areas not Covered by UGD System. Pockets not covered by UGD system result in disposal of sullage and night soil into roadside/storm water drains. Due to poor linkages in the storm water drains, the problem becomes more prominent during rainy season.

(iii) Inadequate and Ill-Maintained Public Sanitation. There is a high dependency by slum population on public conveniences, the seat per person is limited and most slum dwellers resort to open defecation; public awareness regarding safe sanitation is very poor.

3. Storm Water Drainage and Rehabilitation of Water Bodies

K. Overview

219. Alandur has an effective network of storm water drains to the length of 118.10 km, which is 76.71 percent of the total road network. Veraangal Odai (length – 600 m), which is a natural nallah, passing through the outskirts of the town. It carries the storm water from the entire town to the outskirts and finally discharges into Perungudi River. The following **Table 5.18** provides further details regarding the type of storm water drains in the town.

Table 5.18: Storm Water Drains

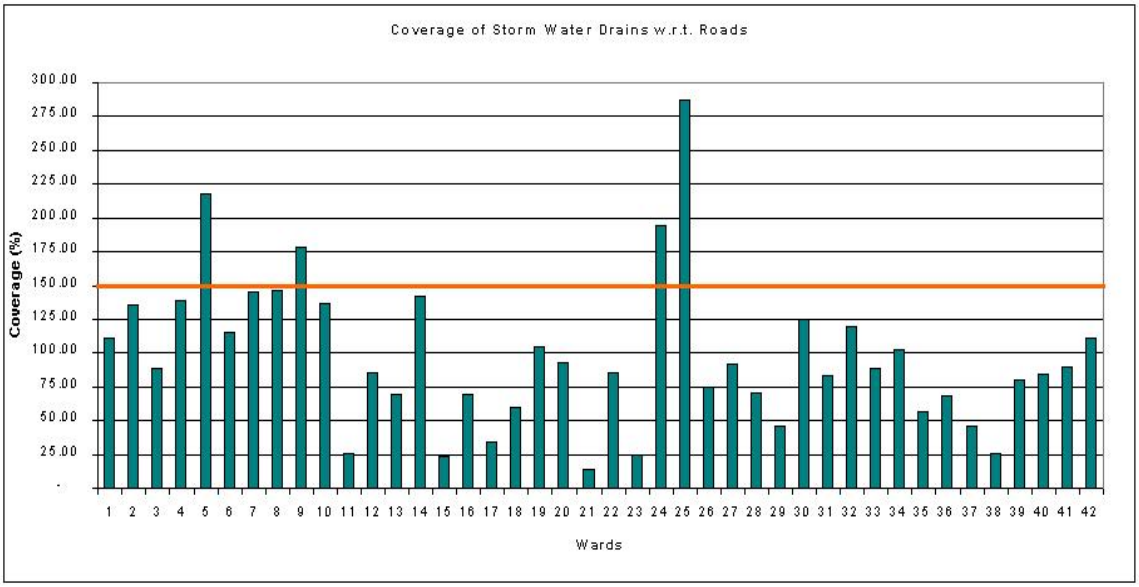
Drain Type	**Length**	**Distribution**
	Km	*%*
Open Drains – Pucca	117.90	99.83
Closed Drains – Pucca	0.20	0.17
Total	**118.10**	**100.00**
Primary Nallah	0.60	

Source: Alandur Municipality

220. The ward wise coverage of storm water drains with respect to municipal roads indicates that Ward Nos. 5, 9, 24 and 25 have drains covered about 150 percent of roads indicating very good coverage. However, Ward Nos. 3, 11-13, 15-18, 20-23, 26-29, 31, 33, 35-39 has coverage less than 100 percent, which infers poor disposal of storm water and may result into unhygienic conditions.

221. Ward 21 has least coverage of drains with respect to roads with only 14 percent while the Ward 25 has maximum coverage.

Figure 5.3: Coverage of Storm Water Drains with respect to Roads



Drainage System

222. *Topography*. Alandur is located at $13^0$20’ North latitude and $18^0$30’ East longitude. The town is situated in relatively flat terrain with a gradual slope towards southeast of the town. The topography varies from 9 m to 14 m towards the northern side of the suburban railway line and 3 m to 15 m towards the southern side of the railway track. The storm water from all the wards (except Ward No. 1 and Ward No. 15) is drained towards Adambakkam Eri, the only major Eri in the town. The storm water from Ward No. 1 (part) is drained into Adyar River.

223. *Rainfall*. The region receives maximum rainfall from Northeast Monsoon from October to December and the Southwest Monsoon between July to August brings some rains. The

annual rainfall is about 1,324 mm.

224. *Primary Drain*. Veraangal Odai is the only natural nallah, which is situated in south and flows towards east of the town. The nallah stretching to about 600 m within the municipal limits, carry town's storm water outside the limits and ultimately meets Perungudi River.

225. *Road Side Drains*. The municipality has provided 118.10 km of roadside built-up drains in the town. As per the municipal records, the town is not covered by kutcha drain. The municipality has provided one side as well as both side drains along the roads in the town.

226. *Disposal*. In Alandur, Veraangal Odai carries the entire storm water outside the municipal limits and ultimately discharges the same into Perungudi River.

227. *Water Bodies*. Alandur has four tanks within the municipal limits. Adambakkam Eri is maintained by the PWD Department while the other three Eris are with Revenue Department. The details of the tanks with the present status are presented in **Table 5.19**. Most of the tanks are encroached. Adambakkam Eri, spread on about 13 Ha of land is encroached by about 554 houses out of which 528 are pucca houses. Easwaran Sannathi Kulam is not encroached while only one pucca house is constructed at Nanganallur Temple Tank. Thus, there is a need to initiate measures to improve the condition of the tanks and make them encroachment-free. Another water body named Subramani Koil Tank is used as a playground and is surrounded by residential built-up structures.

Table 5.19: Water Bodies in Alandur

Name of Tank	Area of Tank	Storage Capacity	No. of Encroachments			Action Taken for Removal of Encroachments		Development Works			
			Kutcha	Pucca	Total	Eviction Undertaken	No. of Notices Issued	Undertaken		Proposed	
								Nature	Amount	Nature	Amount
	Sq. m	*cum*							*Rs. Lakh*		*Rs. Lakh*
Nanganallur Temple Tank	12,150	90,000	Nil	1	1		Revenue land	Construction of compound wall completed by temple	8.00	Nil	Nil
Easwaran Sannathi Kulam	2,625	3,600	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Mankulam	8,250	7,200	2	73	75	Nil	Seven notices issued by Tambaram Tehasildar as per high court W.P. No. 24655/2003 as per CLA proceeding T2/463/99 dated: 31.07.2002 appeal is pending RDO Chengalpattu	Nil	Nil	Nil	Nil
Adambakkam	138,160	-	26	528	554	Nil	No. 6 notice issued by Tehasildar, Tambaram as per High Court judgement W.P. No. 42091 and W.P. 45824 to 45828/02 judgement dated: 30.12.02	Nil	Nil	Improve-ments to Eri to be taken by PWD as per Kanchee-puram Collector's direction	35.00

228. A site visit was conducted to understand the actual condition of water bodies. The observations are tabulated below in **Table 5.20**.

Figure 5.4: Photographs of Water Bodies

Table 5.20: Existing Status of Water Bodies

Name of Water Body	Source	Mixing of Sewage/SWD	Inlet/Outlet		Supply to Agricultural Land	Surrounding Land use	Over Flow During Rainy Season	Availability of Water*	Remarks
		Yes/No	Inlet	Outlet	Yes/No				
Naganallur Temple Tank	Rain Water	No	Storm Water Drain		No	Residential	No	6 Months	Water is not used for any purpose
Easwaran Sannathi Kulam	Rain Water	No			No	Residential	No	6 Months	Water is not used for any purpose
Mankulam	Rain Water	Yes			No	Mixed Residential	No	12 Months	Water is not used for any purpose. It is surrounded by metal scrapping units and lot of metal waste is observed in water body
Adambakkam Eri	Rain Water	Yes	Storm Water Drain	Veerangal odai	No	Residential	No	12 Months	Occupied by water plants. Only 20 percent of land is without encroachment

Note:* Discussions with local residents
Source: Field visit

229. *Water Holding Capacity*. The water bodies offer a potential for ground water recharge and as localized sources for water supply. However, prior to use as water supply sources, detailed studies would be required on the water quality, extent of rehabilitation and regular maintenance required to ensure adequate storage and water quality, and the related treatment and pumping facilities and cost-effectiveness of supply from water bodies. The estimated water holding capacity for the existing tanks is given in **Table 5.21**. As most of the water bodies are in dilapidated condition, they need to be rehabilitated and strengthened.

Table 5.21: Water Holding Capacities of Eris

Tank	**Storage Capacity**	**Actual Water Storage Capacity**	**Actual Water Storage Capacity**
	Mcum	*Mcum*	*ML*
Nanganallur Temple Tank	0.02	0.01	8.51
Easwaran Sannathi Kulam	0.01	0.002	1.84
Mankulam	0.02	0.01	5.78
Adambakkam	0.28	0.10	96.71
Total	**0.32**	**0.11**	**112.84**

Source: Analysis

230. Once the UGD system becomes fully functional (including provision of desired level of HSCs) and a proper networking of storm water drains is undertaken, the disposal of waste into the existing water bodies can be minimized / prevented. The water bodies can be improved to make them suitable for storing rainwater. Provision of proper treatment facilities and formulation and strict adherence to guidelines to keep them pollution free would be required prior to supply to consumers. Thus, the water bodies offer a potential local source that can supplement the regular water supply during summer. Improvement of water bodies would also lead to better environmental conditions and groundwater recharge.

L. Key Issues

231. Based on the available data, discussions with officials, and field survey, the following the key issues and the performance indicators are arrived at:

Table 5.22: Performance Indicators

Service Indicators	**Units**	**Value**	**Benchmark**
Roads Covered with Storm Water Drains	%	76.71	> 150
% Kutcha Drains	%	-	0.00
% Pucca Drains	%	100.00	100.00

Source: Analysis

(i) Disposal of Domestic Sewage. Areas with inadequate sewerage and sanitation facilities discharge the domestic sewage into storm water drains resulting in overflow of the drains and creating unhygienic conditions.

(ii) Silting and Solid Waste Accumulation. Silting and uncontrolled solid waste dumping cause blockage and stagnation of storm water/wastewater runoff. Consequently, storm water drains choke and overflow into neighboring areas.

(iii) Storm Water Drain Inadequacy. About 68 percent of the total road length in the town is covered by storm water drains. It is recommended that drains cover at least 150 percent of the town roads.

(iv) Unlined Natural Nallah. As the natural nallah is earthen in nature, the flow sometimes becomes very less due to choking by trees, bushes, solid waste, etc., leading to blockage and over-flooding the surrounding areas.

(v) Low Lying Areas/Flooding Areas. The recent rains have submerged the low-lying wards including 5, 8, 9, 10, 11, 12, 15, 17, 18, 20, 21, 22, 25, 27, 34, 36 and 37. Due to low-lying, these wards face the problem of water logging during rainy season.

Map 5.4: Drainage Pattern in Alandur

4. Solid Waste Management

M. Overview

232. The collection, transportation and disposal of municipal solid waste, is an obligatory function of the Alandur municipality. The municipal solid waste mainly comprises waste from households, markets, commercial establishments, hotels, hospitals and industries in the town. The health department of the municipality, headed by Sanitary Officer (SO), is responsible for the solid waste management of the town. For the efficient administration and for day-to-day operational purposes, the town is divided into eight sanitary zones covering all the 42 municipal wards.

Solid Waste Generation

233. *Quantity of Generation*. As per the Solid Waste Action Plan prepared for Alandur municipality, the total quantity of waste generated in Alandur is to the tune of 72 tons per day. This works out to 492 gm per capita per day (2001), which is higher than the specified standards of 350 grams per capita for the town of similar size.

234. *Sources*. The various sources of waste generation in Alandur are detailed out in the **Table 5.23**.

Table 5.23: Sources of Solid Waste Generation

Source	**Quantity**	**Distribution**
	Tons/day	*Percent*
Domestic	47.00	65.28
Commercial	11.00	15.28
Industrial	-	-
Hospitals and Clinics	2.00	2.78
Others	12.00	16.67
Total	**72.00**	**100.00**

Source: Alandur Municipality

235. Out of 72.0 tons of waste generation, 27.50 tons are segregated while the remaining 44.50 tons remains unsegregated.

236. *Domestic Waste.* In Alandur, the major source of waste generation has been the households. The quantum of waste generated from households is around 47 tons per day, which is 65.28 percent of the total waste generation of the town. The household waste mainly consists of organic waste such as vegetable waste, food, etc., which can be easily disposed.

237. *Commercial Waste*. Commercial establishments like hotels, restaurants, shops, trading units, small time street traders, kalyan mandapams, etc., generate solid waste, which mainly comprises of paper, plastics and other in-organic waste. Alandur has two daily vegetable markets maintained by the private, M.G.R. Market in Ward No. 4 and a roadside

market in Ward No. 39. The total quantum of waste generated from these sources is 11.0 tons per day, which constitutes about 15 percent of the total waste generated in the town.

238. *Industrial Waste*. As there are no major industries in the town, the waste from the existing units is not mixed with the municipal waste.

239. *Hospital and Clinical Waste*. The urban local body is maintaining has four IPP V, three maternity centres, one each of sidha and allopathic hospitals. In addition, the town also has 25 hospitals/health clinics. The medical association in Alandur has employed a private contractor to collect and dispose the bio-medical waste at the existing disposal site. Thus, the hospital waste is not mixed with the municipal waste.

240. *Waste from Other Sources*. The municipality also collects waste generated from street sweeping, drain desilting and construction. The quantity of solid waste generated from the above sources is of the order of 12.0 tons per day, which is about 16 percent of the total waste generation.

241. *Composition of Waste*. To analyze the physico-chemical characteristics of solid waste, waste characterization study was conducted and the results are presented in **Table 5.24** and **Table 5.25**. The details of test results are presented in **Annexure 5.1**.

Table 5.24: Waste Characterization - Physical

Parameter	**Unit**	**Average**	
		Residential	**Commercial**
Organic			
Organic Matter	%w/w	23.70	25.77
Paper	% w/w	3.29	3.30
Garden Waste	%w/w	20.40	22.40
Inorganic			
Ash	%w/w	47.33	48.28
Bulk Density	Kg/cu.m	249.40	241.00
Ash & Fine Earth	%w/w	32.32	34.90
Glass & Ceramics	%w/w	0.10	0.10
Inorganic Matter	%w/w	6.35	2.70
Metal	%w/w	-	1.05
Other Inert Materials	Nil	-	-
Plastic	%w/w	7.85	4.13
Rubber & Leather	%w/w	5.98	5.67

Source: Waste Characterization Study, 2006

Table 5.25: Waste Characterization - Chemical

Parameter	**Unit**	**Average**	
		Residential	**Commercial**
Carbon	%w/w	14.47	15.42
Fixed Carbon	%w/w	2.46	11.47
Gross Calorific Value	Kcal/Kg	2,291.00	2,366.00
Nitrogen as N	%w/w	1.15	1.38
Phosphorous as P	%w/w	0.14	0.13
Volatile Matter	%w/w	46.06	36.24
Cadmium as Cd	mg/Kg	0.39	0.23

Parameter	Unit	Average	
		Residential	Commercial
Lead as Pb	mg/Kg	22.50	18.45
Arsenic as As	BDL (DL: 0.10 mg/Kg)	0.12	0.51
Nickel as Ni	mg/Kg	8.71	4.25
Zinc as Zn	mg/kg	6.56	16.90
Copper as Cu	mg/Kg	76.10	18.30
Mercury as Hg	BDL (DL: 0.10 mg/Kg)	BDL	BDL
pH (@ 25 ^{0}C)	(10% Suspension)	7.11	7.18
Moisture	%w/w	73.50	75.15

Source: Waste Characterization Study, 2006

242. The summary of physico-chemical characteristics indicate that, on an average, the organic waste (including garden waste and paper waste) content in residential and commercial wastes is 47.39 percent and 51.47 percent respectively. The average ash content in residential and commercial wastes is about 47 percent and 48 percent of respectively. The gross calorific value of the samples in residential and commercial wastes were found to be around 2,291 kcal/kg and 2,366 kcal/kg respectively, much higher than the advised calorific value of 1,500 kcal/kg for self-sustaining reaction for combustion.

Solid Waste Collection

243. *Primary Collection*. The three local bodies have initiated the practice of door-to-door waste collection in the towns.

244. In June 2001, Alandur municipality has initiated the concept of “Private Sector Participation” by handing over 15 wards (Ward Nos. 5 - 18 and Ward No. 34) to a private contractor for the solid waste management while the local body maintains the remaining wards. The ULB has given the contract for 5 years and with a payment of Rs. 659 per ton of waste collection.

245. Alandur is divided into eight sanitary divisions. These divisions are supervised by four Sanitary Inspectors (SI) and assisted by eleven Sanitary Supervisors (SS). The details of sanitation divisions are given in **Table 5.26**.

Table 5.26: Solid Waste Management in Alandur

Sanitary Divisions	Wards Maintained by		Households Covered
	Local Body	Private Contractor	*Nos.*
I	1,2,41,42		2,691
II	3,40		1,213
III	4,37 (part),39		1,263
IV	35,36,37 (part),38		2,379
V	19,30,31,32,33		4,546
VI	27,28,29		2,450
VII	20,21,22	5-18,34	16,838
VIII	23,24,25,26		3,547

Source: Alandur Municipality

246. The local body has provided 16 pushcarts and 130 tri-cycles (35 tri-cycles – Old and 95 – New) for door-to-door collection. However, out of 35 old tri-cycles, 10 tricycles are required to be repaired. The waste segregation is done at household level itself. Thus, the workers carry the segregated waste to the secondary collection points. For door-to-door system, no monthly charges are collected from the households. The waste collected is transported to the secondary collection points. The municipality has identified ward wise secondary collection points from where the waste is carried to the compost yard. The collection is done based on the priority and importance. The prioritized locations / streets are markets and slums.

247. The ULB is collecting door-to-door waste in the mornings only from 6.00 a.m. to 10.00 a.m. while the private contractor collects from 6.00 a.m. to 1.00 p.m.

248. As per Solid Waste Management Rules of 2000, the door-to-door collection is necessary and as a result of which the municipality has not provided any dustbins for the primary collection.

Map 5.5: Sanitary Divisions for Solid Waste Management

Map 5.6: Wards Maintained by Municipality and Private Contractor

249. However, there are about 80 dustbins provided by various NGOs and Social Welfare Groups in most of the wards. These agencies and groups take care of the solid waste management in their respective wards. The system includes sweeping, cleaning and disposing the waste into the nearby disposal points.

250. In spite of door-to-door collection, it is observed that many of the households throw the waste onto the streets, drains and open spaces within the locality creating unhealthy conditions. Further, the waste thrown into the open drains leads to its choking causing the overflow of the wastewater on the streets.

251. *Street Sweeping.* One of the major activities in solid waste management is street sweeping activity, which is time consuming and labor intensive. In addition to street sweeping, due to the open drain system of sewage collection, drain desilting is also essential. The local body and the private contractor carry out street sweeping and drain desilting in their respective wards. Hand brooms made of coconut are used for street sweeping while metal shovel and tricycles are used for drain desilting activities. Due to shortage of workers, these activities are carried out for once in two days in each sanitary division.

252. In Alandur, there are “Zero Garbage Area”. The ULB has identified few locations in the town, which are tried to maintain as garbage-free areas. These areas are Thiruvalluvar Nagar Main Road (Ward No. 36), Laxmi Nagar (Ward No. 20), TNGO Colony (Ward No. 10) and Adambakkam area. In these areas, the streets are swept, cleaned and waste is disposed daily. The other activities include the plantation of trees along the roads.

253. Market places and important roads like Medawalia Main Road, M.K.N. Road, M.G.R. Road and Fourth Main Road are swept during night hours too. Sweeping is undertaken from 8.00 p.m. to 4.00 a.m.

254. The local body has engaged 238 sanitary workers against the sanctioned posts of 293 to manage the solid waste in the town. Due to high vacancy rate of 19 percent, many of the streets are not swept regularly. The private contractor employs about 65 to 70 workers to manage 15 wards. Thus, about 500 m of road length per conservancy worker is being maintained, which is well within the prescribed limit of 1,000 m. The shortfall of workforce is felt by the local body; this is mainly due to practicing an unplanned/unorganized way of managing the solid waste.

255. *Secondary Waste Collection*. The secondary collection refers to collection of waste from community dustbins and intermediate collection points or transit points to the disposal site. In Alandur, there is only one secondary collection point at Thillai Ganga Nagar (Ward No. 18), used since 4 to 5 years. This collection point serves Ward No. 5 to Ward No. 18 and Ward No. 34, covering about 54 km road stretch. Thus, the wastes from these wards are dumped into this collection point from where it is carried to the compost yard. The waste from the uncovered wards and streets are transferred directly to the nearby disposal vehicle.

256. *Frequency of Collection*. The frequency of waste collection from the households and secondary collection points are daily.

Transportation of Waste

257. The local body and the private contractor have engaged 11 and 5 vehicles respectively for the transportation of waste from secondary collection site to the disposal site. The municipality hired six tractors for Rs. 950 per day per vehicle from the Agricultural Department. With the purchase of six new Eicher vehicles, the ULB did not renew the contract and stopped hiring the tractors. With the consideration of bulk density of 250 kg/cum, the total rated capacity of the available fleet in Alandur is 63.66 tons, indicating a collection performance of 88.42 percent of the total waste generation. The details of vehicles with their carrying capacities are given in **Table 5.27**. Adopting the bulk density of 350 kg/cum[1], the actual vehicle carrying capacity (i.e., after compaction) increases to 124 percent of the total waste generation indicating sufficient availability of fleet in the town for solid waste collection and disposal.

Table 5.27: Details of Transportation Vehicles

Description	**Mfg. Year**	**Owner Ship**	**Nos.**	**Capacity**	**Trips / Day**	**Bulk Density**	**Rated Capacity**
				Tons	*Nos.*	*Tons/m^3*	*Tons/day*
Municipality							
Trucks	1998	Munic-ipality	2	3.00	3	0.25	15.22
Hunter	2000	Munic-ipality	2	1.00	3	0.25	7.53
Dumper Placer	2005	Munic-ipality	1	2.00	9	0.25	22.83
Mini-Lorry	2006	Munic-ipality	6	2.50	3	0.25	18.08
Sub-Total			**11**				**63.66**
*Private Contractor**							
Trucks	NA	Pvt.	2	3.00	2		
Mini-Lorry	NA	Pvt.	3	2.50	2		
Sub-Total			**5**				
Total							**63.66**

**Note: ***As the ULB did not renew the contract of using the private vehicle, the use of private contractor's vehicles will be stopped and hence, their vehicles are not considered for calculating the solid waste collection performance.
Source: Alandur Municipality

[1] The Solid Waste Management studies conducted in several towns of Tamil Nadu (Palani, Mamallapuram, Kodaikanal, Rameswaram, Erode etc have put the density factor compacted is observed to be in the range of 0.35 -0.4.

Disposal of Solid Waste

258. Scientific method of disposal of waste is not followed in the town. The waste collected from the town is disposed off into a compost yard at Palikarnai, which is around 12 km from the heart of the town. The compost yard is spread on 15 acres of land and is in use for the last 15 years. A site visit was conducted to the existing disposal site at Palikarnai and the salient features observed are tabulated in **Table 5.28**.

Table 5.28: Salient Features of Existing Disposal Site – Palikarnai

Description	**Palikarnai**
Approach Road*	The site is located on the Velacheri -Tambaram road (BT Surface), Tambaram is towards North of the site while Saidapet is towards its South.
Year of Usage*	15 Years
Fencing and Equipment at the Site	Compound wall is provided along the access road while the other sides are provided with fencing
Waste Disposal Method	Open dumping
Adjoining Conditions of the Existing Site*	i. The site is located near to the newly developing residential locality. The site is surrounded by residences along three directions (North, South and East). Due to odor and filthy conditions at the site, the local residents are uncomfortable and raised objections for its use. The site is located in front of Centre for Wind Energy Technology (CWET). Palikarnai Eri is located at 0.2 km from the site towards East, which drains into Buckingham Canal in Perungudi located at 2 km from the Eri. ii. The compost yard extends to a height of about 2 to 3 feet from the ground level and, thus, there is a potential scope for further expansion of this site in future.
Remarks*	Municipality has employed two workers to look after the site. 10 - 15 rack pickers segregate the waste at the disposal site

Note: * Discussions with ULB officials and local residents
Source: Field Visit

Figure 5.5: Status of Existing Disposal Site at Pallikarnai

259. In order to make the solid waste disposal system safe and scientific, an integrated modern compost yard for the three municipalities viz., Alandur, Pallavaram and Tambaram at an estimated cost of Rs. 2.10 crores has been identified at Venkata Mangalam (near Vendalur), which is 23 km from the town with 16.67 acres of land for Alandur Municipality (Survey No. 16/2). The land is capable of handling 180 tones of waste per day from these municipalities.

260. The ULB has paid its contribution to the State Government amounting to Rs. 37,46,667. However, the work on 50 acres of land was started in June 2005, but soon came to a halt following the protests from residents in the vicinity over the land acquisition and also from the Indian Air Force Base who voiced concerns on safety to their flights on the ground that the compost yard once completed might attract birds. However, a visit was conducted to capture the existing situation of the proposed disposal site at Venkata Mangalam. The salient features of the proposed site are presented in the following **Table 5.29**.

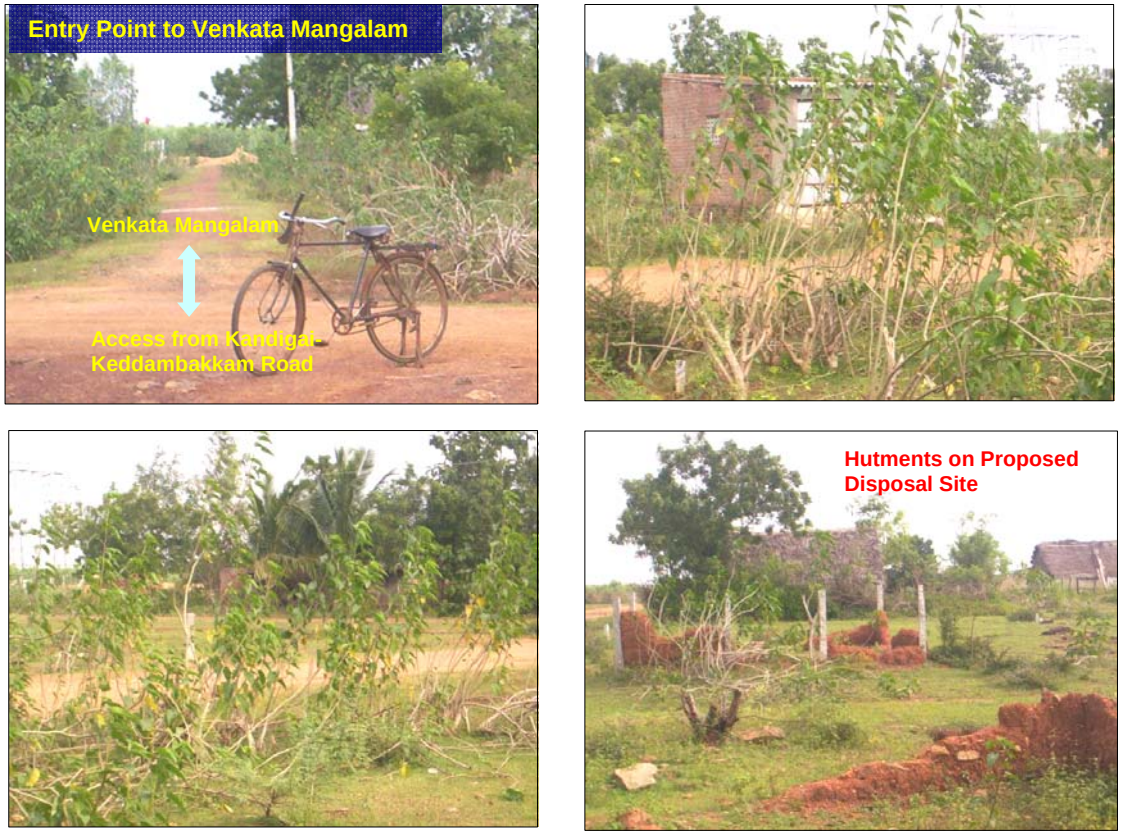
Table 5.29: Salient Features of the Proposed Disposal Site – Venkata Mangalam

Description	**Venkata Mangalam**
Total Area	50 acres
Approach Road*	The site is situated along Kandigai road (from Vandalur to Kallambakkam Salai)
Fencing and Equipments at the Site	No Facilities
Adjoining Conditions of the Proposed Site*	The site is enclosed by three Eris located in three different directions - Rathanamangalam Eri (Area – 50 acres, 0.5 km from the proposed site), Akaram Eri (Area – 150 acres, 0.10 km from the proposed site) and Madurapakkam Eri (Area – 100 acres, 2.00

Description	Venkata Mangalam
	km from the proposed site). The proposed disposal site is also surrounded by the agricultural fields
Remarks	The site is in close proximity to the newly developing residential locality and surrounded by the social forest. Functioning of the disposal site may create problems like bad odor, filthy conditions, etc., thus, this is being objected to by the local residents. Birds are another major problem at the site as the Air Force Station is about 3 km from site, which may create problems to the flights. Presently, there are 60-65 families residing at the proposed site location. With the help of Venkata Mangalam Panchayat and Air Force officials, these people have raised objections to the disposal. All three Eri's (mentioned above) join together and ultimately meet Venkata Mangalam Eri which serves as a drinking water source for 7 villages

Note: * Discussions with ULB officials and residents
Residents residing at the proposed site location, claim that the Venakata Mangalam Panchayat had issued the land holding rights to them during 1970s (as indicated during discussions). However, the ULB is still of the view that the land has been illegally encroached by them.
Source: Site Visit

Figure 5.6: Status of Proposed Disposal Site at Venkata Mangalam



Institutional Set-Up

261. As described earlier, municipal solid waste management is an obligatory function of the urban local body. In Alandur, Sanitary Officer, supported by four Sanitary Inspectors, heads the health department. Eleven sanitary supervisors reporting to Sanitary Inspectors, supervise eight sanitary divisions in Alandur.

Table 5.30: Staff Details of Health Department

Description of Post	Sanctioned Post	Filled Post	Vacant Post	Vacancy Rate
	Nos.	*Nos.*	*Nos.*	*%*
Sanitary Officer	1	1	-	-
Sanitary Inspector	8	4	4	50%
Sanitary Supervisor	11	11	-	-
Driver	14	13	1	7%
Cleaner	3	3	-	-
Field Assistant	2	2	-	-
Malaria Mazdoor	9	9	-	-
Sanitary Workers	293	238	55	19%
Total	**341**	**281**	**60**	**18%**

Source: Alandur Municipality

262. The total sanctioned posts in the health department is 341, out of which only 281 posts are filled indicating a very high vacancy ratio of 18 percent.

N. Key Issues

263. As per the available data and field visits, the following performance indicators are derived.

Table 5.31: Performance Indicators

Indicator	Unit	Current Situation	Benchmark
Per-Capita Generation	Gram	492	< 350
Collection Performance (% Collected to Generated)	%	88.42	100.0
% Actual Carrying Capacity of Vehicles to Total Waste Generation	%	124	>= 100.0
Road Length per Conservancy Staff	m	500	< 1,000

Source: Analysis

(i) Per Capita Waste Generation. High per capita waste generation of 492 gm per day is generated in Alandur against a prescribed level of 350 gm.

(ii) Waste Collection Performance. The collection efficiency of waste is 88 percent, which is lower than the recommended level of 100 percent.

(iii) Transportation of Waste. At present, the waste is being transported in open vehicles to the compost yard. The spillage of waste all along the route and odor from the waste is a common problem associated with open transportation of waste.

(iv) Occupation Health Hazards. The waste collection, loading and unloading operations are manually dealt. The sanitary workers have not been provided with any protective equipment, which poses health hazards.

(v) Lack of Scientific Waste Disposal. As the scientific disposal of waste is not followed, the waste is being disposed through open dumping. Consequently, the waste finds its way onto the surrounding areas due to wind, making the surroundings unhygienic, and posing problem to environment.

(vi) Improper Practice of Solid Waste Management. Although the coverage by each sanitary worker is less than the prescribed standards of 1,000 m, still 55 posts of sanitary workers are vacant. In spite of less coverage by each sanitary worker, the local body feels the shortage of workers. This is attributed to the improper and unorganized practice of solid waste management system in the town.

264. In spite of following the door-to-door collection in all the wards, still all the houses are not covered. To improve the coverage, the ULB has recently updated the requirements for the solid waste management and aimed to provide, by December 2005, a proper solid waste management in the town. The details of revised project components under solid waste management are presented in the following **Table 5.32**.

Table 5.32: Revised Project Components under Solid Waste Management

Sr. No	Item	Requirement	Remarks
		Nos	
A	**Vehicles**		
1	Tricycles	95	Supply order issued on 4/10/2005 for 95 tricycles
2	Push Carts	16	Supply order issued on 29/06/2005 for 16 push carts
3	Mini Lorry	6	Supply order issued on 29/06/2005 for all vehicles
4	Tipper Lorry	5	Supply order issued on 29/06/2005 for all vehicles
5	Dumper Placer	1	Supply order issued on 29/06/2005 for the vehicle
6	Compactor	1	Supply order issued on 29/06/2005 for the vehicle
7	Front End Loader	1	Supply order issued on 4/10/2005 for the vehicle
B	**Compost Yard** (Pallikaranai Village, 15 acres)		Compressing of garbage with chain dosar and covering with soil work is under progress from 23/9/2005
1	Compound Wall		Work order issued on 29/6/2005 for leveling and all round fencing
2	Water Supply Facilities	1	Bore well is provided
3	Tree Plantation	300	300 saplings to be planted
C	**Manure Production**		Production – 20 tons per day Sale – Rs. 21 per tons per day

Source: Alandur Municipality

265. The ULB has proposed to sell the compost waste to the farmers, identified departments and institutions. The estimated production of compost waste is about 20 tons per day, which is proposed to be sold at the rate of Rs. 21 per ton per day.

Table 5.33: Revised Project Components

Departments	**Numbers**
	Nos.
Private Farmers	22
Institution Sale	23
Agricultural Dept	24
Forest (Govt. Sale etc.)	25
Any Other	26
Total	**120**

Source: Alandur Municipality

5. Roads and Traffic Management

Roads

266. Alandur municipalitys' role regarding roads comprises construction of major roads and maintenance of all roads in its jurisdiction, except roads belonging to PWD and Highway Department. In the new extension areas within municipal limits too, the local body develop and maintain the internal roads. It is also responsible for implementing proposals from master plan with regards new major roads and road widening activities.

267. Grid pattern of roads is witnessed with G.S.T. Road originating from north and traverses toward west through the outskirts of the town limits. The Tambaram-Beach suburban railway line divides the town into North and South Alandur. The distribution of roads in the town is given in the following **Table 5.34**.

Table 5.34: Distribution of Roads in Alandur

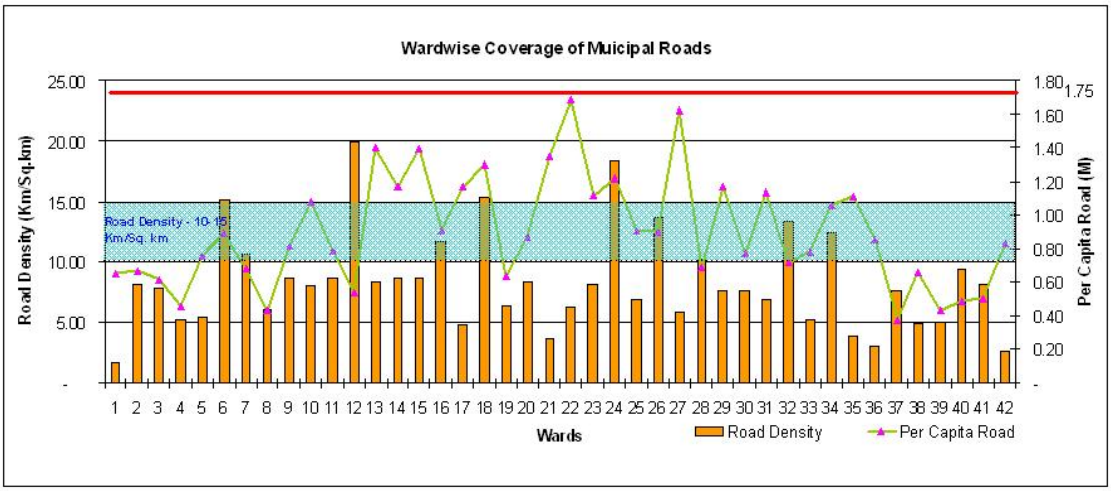
Roads	**Length**	**Distribution**
	Km	*%*
Municipal Roads		
Surfaced Roads		
Black Topped	108.60	81.08
Cement Concrete	10.79	8.06
Unsurfaced Roads		
WBM	10.69	7.98
Earthen/Kutcha	3.87	2.89
Sub-Total	**133.95**	**100.00**
Other Departmental Roads		
Highways and Major District Roads	20.00	
Sub-Total	**20.00**	
Total	**153.95**	

Source: Alandur Municipality

268. Roads in the interiors of the town are narrow and have a width ranging from 4 m to 6 m. Of the 153.95 km of roads in Alandur, 133.95 km is maintained by the local body while the remaining 20.00 km is maintained by the other departments. Concerning the surface condition of municipal roads, about 81 percent of the total municipal road length have bitumen surface.

269. The ward wise coverage of municipal roads is given in **Annexure 5.3**. The ward wise per capita coverage of municipal roads is very poor. Ward 15 has the maximum percentage of municipal roads, while the maximum per capita coverage is in Ward No. 22 with 1.69 m, which is below the requirement of 1.75 m.

Figure 5.7: Ward wise Coverage of Municipal Roads



270. The density of roads in the town is 7.90 km/sq. km. The per-capita road length maintained by the local body is 0.92 m, which is less than the standard of 1.75 m.

271. Road density in 10 wards (Wards 6, 7, 12, 16, 18, 24, 26, 28, 32 and 34) is above the prescribed standards of 10-15 km/sq. km. The maximum being in Ward 12 with 19.90 km/sq. km and minimum in Ward 1 with only 1.63 km/sq. km

272. The condition of major roads is average. However, minor roads and roads within individual residential colonies are in bad condition. Footpaths and parking facilities are lacking on the streets.

O. Key Issues

273. The key issues and conclusions are based on field visits and data analysis and performance indicators presented in the **Table 5.35**.

Table 5.35: Essential Road Network Indicators

Indicator	Units	Current Situation	Benchmark
Road Density	km/sq. km	7.90	10.00 – 15.00
Per Capita Road Length (Municipal Roads)	M	0.92	1.75
Percent of Black Topped Roads to Total Road Length	%	90.54	70.00
Percent of Municipal Surfaced Roads	%	89.12	100.00

Source: Analysis

(i) High Density and Congested Lanes. Central areas of the town are narrow and surrounded by heavily built-up areas. These roads also carry large volumes of traffic that cater to commercial trading in the area. These factors make the lanes highly susceptible to air pollution and delayed travel times.

(ii) Encroachment. The margins of roads are encroached upon in several sections of major roads of the town by small-time street vendors, illegal parking and other informal activities. With no margins left on the roads, the effective carriageway of the road is reduced drastically leading to congestion.

(iii) Absence of Street Furniture/Signages. The roads lack signals, signages, and footpaths. Improper road sweeping results in most roads being covered with silty soil, which reduces the driving safety.

Traffic and Transportation

274. Alandur situated towards the south of Chennai City is one of the major urban areas in the metropolitan area. The excellent road connectivity and rail linkages have helped in its rapid development. The commercial activity is mainly concentrated near the railway station and the bus terminal on the G.S.T. Road (NH 45). Consequently, heavy movement of vehicular as well as pedestrian traffic has resulted in traffic congestion.

275. *Travel Pattern.* The travel pattern in the town is guided by the road network and land use pattern in the town. The road pattern also makes a lot of thorough traffic to pass through the town. All the regional traffic too has to pass through the centre of the town owing to the presence of the G.S.T. Road, which is the gateway to Chennai City.

276. *Parking*. Land-use and economic activity of the town drives the parking demand in the region. In Alandur, there is no proper parking regulation, control put to practice, as a result, abrupt, and indiscriminate roadside parking is done. This has led to reduction in the effective carriageway of the roads leading to congested travel and accidents. The municipality has also not provided the authorized parking lot on important roads like G.S.T. Road.

277. *Public Transportation System*. Metropolitan Transport Corporation (MTC) provides the public transportation system for Alandur. In addition, the autos, which form the Intermediate Public Transport (IPT) mode, are widely used. The important bus routes are M.K.N. Road, Nanganallur 4th Main Road, Nanganallur 5th Main Road, M.G.R. Road, Nehru Main Road, Muvarasanpattu Main Road, etc.

Map 5.7: Map Showing the Status of Proposals for Traffic and Transportation in Chennai Metrpolitan Region

278. *Projects under Implementation*. The various projects identified by different agencies that are being implemented or in the planning stage are given in **Table 5.36**.

Table 5.36: Projects under Implementation

Sr. No	Proposals	Status
	Up Gradation of Road Rail Crossing	
1	MKN Road	Construction in Progress

P. Key Issues

(i) Discontinuous Road Sections. Discontinuous sections of roads are creating several traffic congestion problems and add more load to the other roads.

(ii) Lack of Connectivity with G.S.T. Road. M.K.N. Road acts as a bypass road to Kathipara junction, which starts from Anna Salai and terminates on G.S.T. Road on the other side of Kathipara junction. The road is fully encroached and width of carriage way is reduced to only 5.5 -7.0 m. This could be improved to a four-lane road as it a bypass stretch for Kathipara junction.

(iii) Narrow Bus Routes. It is observed that certain bus routes have carriageway width less than a two-lane width and hence, recommend to provide minimum of 7.0 m carriageway for such roads. In addition, the major bus route such as Medavakkam Main Road is currently 7 m wide, which is not sufficient to cater the future traffic.

(iv) Level Crossing. The level crossing at LC No. 15 near Neetish School is located on the Chennai – Kanyakumari main railway line and sub-urban line between Tambaram – Chennai Beach. Educational institutions and residential areas are located around this link. Hence, nearly about 1,000 - 1,500 people cross the track every day. Hence, there is a need of a subway to cater to the need and safety of commuters.

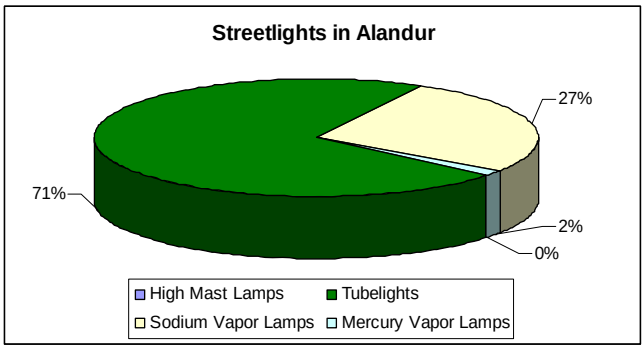
(v) Bus routes lack proper bus bays and shelters.

(vi) Absence of Traffic Infrastructure Facilities for better traffic management such as

- Organized on-street parking facilities
- Junction improvement
- Pedestrian facilities such as foot path, safe pedestrian crossings

6. Street Lighting

Figure 5.8: Distribution of Streetlights in Alandur



Q. Overview

279. The provision and maintenance of streetlights is an obligatory function of Alandur municipality. The Tamil Nadu Electricity Board (TNEB), a statutory body formed in 1957 under the Electricity Supply Act, 1948, supplies electricity to Alandur. TNEB is responsible for installing new streetlight poles and drawing electric cables to light them. The municipality bears the expenses incurred. The local body in case of fairs and festivals organized in the town also extends temporary lighting arrangements.

280. There are about 3,644 streetlights in the town limits. The average spacing of streetlight pole is 42.25 m, which is more than the preferred spacing of 30 m indicating the need for additional streetlights in the town. **Table 5.37** summarizes the streetlight composition.

Table 5.37: Composition of Streetlights in Alandur

Type of Fixture	**Numbers**	**Distribution**
	Nos.	*%*
High Mast Lamps	1	0.03
Tube lights	2,609	71.60
Sodium Vapor Lamps	971	26.65
Mercury Vapor Lamps	63	1.73
Total	**3,644**	**100.00**

Source: Alandur Municipality

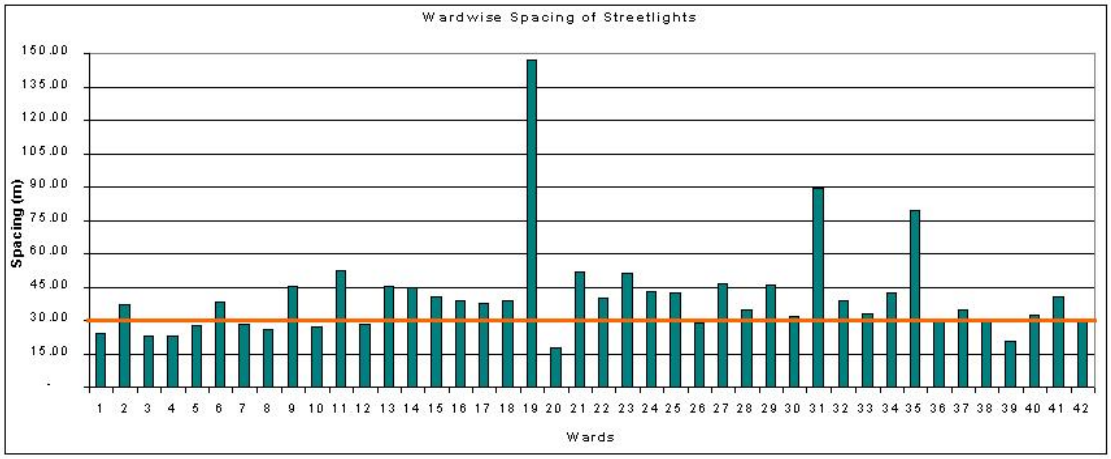
281. Tube light constitutes more than 70 percent of the total light poles in the town followed by sodium vapor lamps with about 26 percent. Only one high mast lamp is installed at Nanganallur Independence Day Park.

282. The details of ward wise luminaries are given in the following **Annexure 5.4**.

283. The large average spacing of 42 m between the street poles results in poor illumination. The problem can be witnessed in the extension areas and crowded places. Most of the wards in Alandur have spacing more than the specified standards of 30 m. The maximum spacing of 147 m is in Ward No. 19. Only 12 wards (Ward Nos. 1, 3-5, 7-8, 10, 12, 20, 26, 38-39) have spacing less than 30 m. Thus, there is a need to take proper measures or installations of new streetlight in poorly lit wards or locations. **Figure 5.9** provides the ward wise spacing of streetlights.

Map 5.8: Poorly lit Wards in Alandur Town

Figure 5.9: Ward wise Spacing of Streetlights



284. *Operation and Maintenance*. In 1989, TNEB handed over the operation and maintenance of streetlights to the municipality. As the municipality was incurring high expenses on the O&M, the O&M in all the administrative wards were privatized on April 1, 2005. The contract has been awarded to the private contractor for 1 year.

285. The scope of work for the private contractor includes switching on and off the streetlights, maintenance of fixtures based on unit rate and attending to streetlight complaints. The municipality pays an amount of Rs. 1,18,031 per month. The per unit rates charged by the contractor annually are Rs. 210 for tube light, Rs. 630 for sodium vapor lamp (70 W), mercury lamps for Rs. 1,200, Rs. 935 for both sodium vapor lamp (250 W) and mercury vapor lamp and Rs. 22,440 for high mast lamp.

286. As per the contract document, the contractor is required to use only ISI Certified products. If the contractor fails to attend the complaints within the stipulated time of 24 hours, he is liable to a fine of 5 percent per post, which would be deducted once in a year.

287. However, the discussion with engineering department officials revealed that after privatizing the O&M of streetlights, the number of complaints from the public have reduced drastically. The contractor appears to be delivering a satisfactory performance.

R. Key Issues

288. Poor illumination at new extension areas and congested places and damaged poles are the key issues with respect to street lighting in Alandur. The performance indicators are given below.

Table 5.38: Performance Indicator

Indicator	Unit	Current Situation	Benchmark
Average Spacing between Lamp Posts (Town as a Whole)	M	42	< 30.0
% Tube Lights	%	72	70.0 – 80.0
% High Power Lamps	%	28	20.0 – 30.0

Source: Analysis

Note: The average for the town given in the table above cloaks the discrepancies between wards. While the average for the town is within / above prescribed limits, certain wards fall below the standard, with wider spacing.

7. Social Infrastructure

289. *Primary Health*. The ULB maintains four IPP V hospitals, three maternity centers, one Siddha hospital and one allopathic hospital. The buildings are poorly maintained and need up gradations. The number of births and deaths show an increasing trend every year. However, the death rate is more than the birth rate in the town and this could attribute to the decline in the population growth of Alandur.

Table 5.39: Number of Births and Deaths

Year	Births	Deaths
	Nos.	*Nos.*
2001	2,282	-
2002	-	-
2003	2,449	807
2004	2,506	909

Source: Alandur Municipality

290. *Education*. Alandur houses few government education institutions along with aided and private institutions.

291. The literacy rate in the town is 82.17 percent. The literacy rate in Alandur is higher than the Chennai City and the state urban average figures of 76.82 percent and 73.47 percent respectively. The main reason for high literacy can be attributed to its proximity to Chennai City, which houses wide range of educational facilities.

292. The local body is maintaining seven municipal schools, six middle and elementary schools and one municipal high school in the town.

293. *Burial Ground*. There is only one burial ground located at Thillai Ganga Nagar 1st Main Road in the town, which needs improvement.

VI. WASTE CHARACTERIZATION

A. Introduction

294. Estimating the characteristics of solid waste generated in Alandur is one of the primary tasks of the present study. These characteristics are strongly influenced by, climatic and seasonal variation, the economy of the region, the physical characteristics of the city and social and religious customs of the society.

295. Considering the aspects, surveys were carried out in Alandur for assessing the exact characteristics of the solid waste generated in the town.

(i) Solid waste sampling for the analysis of physico-chemical characteristics

296. Details of these surveys and the results of the same are discussed in the subsequent sections of this chapter.

B. Physico-Chemical Characteristics of Solid Waste

297. The physico-chemical characteristics of solid waste are analyzed in this section. For this purpose, sampling surveys were carried at the Pallikarnai disposal site of the town. As per the project scope of work, at least one sample was required to be analyzed at the transfer stations. However, there are no formal transfers stations functioning in Alandur town and the characteristics of waste at the collection points (if considered as the temporary transfer stations) was found to be not the true representative of the solid waste produced by town.

298. Considering these aspects, all the samples were collected from the disposal site for two consecutive days (13 Feb 2006 and 15 Feb 2006).The sampling program comprised collecting one residential and one commercial waste sample on two different days of the week (Monday and Wednesday) and performing on site characterization and lab analysis of the same. The Monday samples will represent the holiday waste and the Wednesday sample will represent the weekend waste.

299. In order to represent the waste characteristics from different parts of the town, the two samples were collected from different parts of the disposal site. The sample analysis comprised

(i) Onsite characterization by way of segregation and weighing the percentage of each constituent in terms of paper, plastic, rags, organic and inorganic components on the site and

(ii) Chemical analysis of representative sample in the lab for various chemical parameters as listed in the CPHEEO manual

C. Selection of Samples

300. Selection of samples for characteristics survey is done based on the various sources of waste generation presented in the earlier section.

(i) Domestic Sources. For Domestic Sources a group of solid waste trucks originating from a particular neighbourhood (Residential Area) is unloaded and mixed thoroughly by the coning and quartering method and a sample of 5 kg is collected from one quarter, that represent the sample waste and then analysed for its characterization.

(ii) Commercial Sources. For Commercial Sources, a group of solid waste trucks originating from a particular neighbourhood (Commercial Area) is unloaded and mixed thoroughly by the coning and quartering method and a sample of 5 kg is collected from one quarter that represent the sample waste and then analysed for its characterization.

D. Methodology of Sampling

301. For the purpose of survey, a day before the sampling survey, each Municipality Sanitary worker was briefed about the purpose of the study, and modalities of waste collection. On the day of sampling, Municipality Sanitary workers were given a duly labelled sampling bag and were requested to place all the accumulated waste in the bag for collection. In addition, the survey team collected the waste in a vehicle from each of the identified samples around 12:30 PM in the afternoon. The same procedure was followed for all the two days of sampling.

302. The collected samples were then collated at a common place (Lab) and weighed for the total waste generated. During weighing the basic characters of the sample such as condition and broad constituents in the sample, etc. were recorded.

303. At the waste sampling locations on-site, segregation was undertaken to establish the broad categorization of various constituents of waste such as:

(i) Organic matter (food and vegetable matter)

(ii) Garden waste
(iii) Paper
(iv) Plastic
(v) Rubber and leather
(vi) Metal
(vii) Glass and ceramics
(viii) Inorganic and
(ix) Other inert materials, etc.

and percentage composition in the sample estimated.

304. The physico-chemical characteristics was then analysed in the laboratory as per BIS guidelines and the characters in terms of

(i) pH
(ii) Moisture content
(iii) Carbon
(iv) Nitrogen
(v) Phosphorous
(vi) Volatile matter
(vii) Ash
(viii) Calorific value
(ix) Heavy metals such as Arsenic, Zinc, Lead, Cadmium, Copper, Mercury and Nickel.

E. On Site Physical Analysis of Solid Waste

1. Domestic Sources

305. Domestic waste comprises the solid wastes that originate from single and multi-family household units. These wastes are generated as a consequence of household activities such as cooking, cleaning, repairs, packing, clothing, old books, and old furnishings.

306. As per the sample survey and analysis, Ash and Fine Earth are the major constituents of the solid wastes of Alandur. The composition of Ash and Fine Earth as presented in **Table 6.1** is around 32.32 percent, the contribution of Organic matter and Garden waste constitutes to a significant is 23.70 percent and 20.40 percent respectively.

307. The other significant constituents of solid waste in Alandur are plastic and inorganic matter. The contribution of these elements is around 7.85 percent and 6.35 percent. It is noted that in physical characteristics of solid waste the inorganic waste constituents are more (52.60 percent) when compared to organic waste (47.39 percent). The inorganic content is high in the town because of market waste like plastic, ash and fine earth, etc. Similarly, the contribution of plastic and paper is higher than the normal composition estimated by CPHEEO in its manual on solid waste management for towns of this size class. This can be attributed to the growing urbanisation in the region and around the project town of Alandur and associated activities.

Table 6.1: Physical Characteristics of Solid Waste - Domestic Waste

Parameter	Units	Sample-I	Sample-2	Average
Bulk Density	**Kg/Cu.m**	**104.00**	**394.80**	**249.40**
Physical Characteristics (% of total weight) - wet weight basis				
Organic Matter	**% w/w**	**4.45**	**42.94**	**23.695**
Garden waste	**% w/w**	**4.45**	**36.35**	**20.4**
Plastic	**% w/w**	**1.58**	**14.12**	**7.85**
Paper	**% w/w**	**0**	**6.58**	**3.29**
Inorganic Matter	**% w/w**	**12.7**	**0**	**6.35**
Rubber & Leather	**% w/w**	**11.95**	**0**	**5.975**
Metal	**% w/w**	**0**	**0**	**0**
Glass & Ceramics	**% w/w**	**0.20**	**0.00**	**0.10**
Other Inert Materials	**NIL**	**0**	**0**	**0**
Ash & Fine Earth	**% w/w**	**64.64**	**0**	**32.32**

Source: Sample Analysis

Figure 6.1: Composition of Solid Waste – Domestic Waste

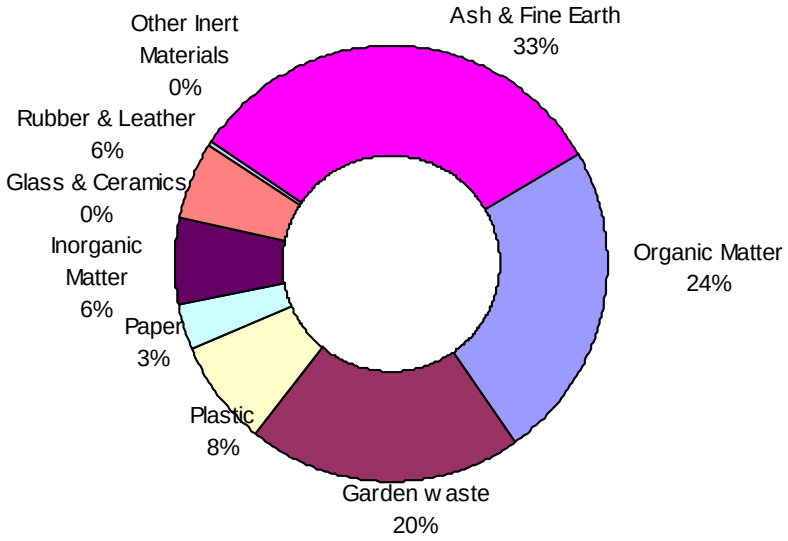


Table 6.2: Physical Characteristics of Solid Waste as Per CPHEEO - Domestic Waste

Parameter	Units	Composition	
		As per CPHEEO[1]	***As per MNES[2]***
Paper	**% w/w**	**2.91**	**3.09**
Plastic	**% w/w**	**-**	**0.57**
Rubber & Leather	**% w/w**	**0.78**	**-**
Glass & Ceramics	**% w/w**	**0.56**	**0.29**
Metal	**% w/w**	**0.33**	**0.51**
Inorganic Matter	**% w/w**	**43.59**	**33.41**
Other Inert Materials	**% w/w**	**44.57**	**46.06**

Note:

1. For towns of population 0.1 to 0.5 million
2. For towns of population less than 0.2 million

Source: CPHEEO Manual on Solid Waste Management

308. *Chemical Characteristics*. As regards, the chemical composition, moisture content of solid

waste was found to be around 73.50 percent. Similarly, the calorific value of the waste is around 2291.00 Kcal / kg in Alandur. These values are higher than the advised Moisture content and Heating Calorific Value estimated by CPHEEO. The other significant constituents of solid waste in Alandur are ash content and volatile matter. The contribution of these elements is around 47.33 percent and 46.06 percent.

Table 6.3: Chemical Characteristics of Solid Waste - Domestic Waste

Parameter	Units	Sample-I	Sample-2	Average
pH		**8.27**	**5.94**	**7.105**
Moisture Content	**% w/w**	**72**	**75**	**73.5**
Calorific Value	**Kcal/Kg**	**688**	**3894**	**2291**
Volatile Matter	**% w/w**	**14.53**	**77.59**	**46.06**
Ash Content	**% w/w**	**80.84**	**13.82**	**47.33**
Carbon	**% w/w**	**4.14**	**24.8**	**14.47**
Fixed Carbon	**% w/w**	**2.33**	**2.59**	**2.46**
Nitrogen (N)	**% w/w**	**0.54**	**1.76**	**1.15**
Phosphorous (P)	**% w/w**	**0.013**	**0.26**	**0.1365**
Metals				
Arsenic	**mg/Kg**	**0.12**	**BDL (DL:0.10mg/kg)**	**0.12**
Copper (Cu)	**mg/Kg**	**127.5**	**24.7**	**76.1**
Zinc (Zn)	**mg/Kg**	**0.12**	**13**	**6.56**
Lead (Pb)	**mg/Kg**	**37.5**	**7.5**	**22.5**
Cadmium (Cd)	**mg/Kg**	**0.6**	**0.17**	**0.385**
Mercury	**mg/Kg**	**BDL (DL:0.10mg/kg)**	**BDL (DL:0.10mg/kg)**	
Nickel	**mg/Kg**	**10.72**	**6.7**	**8.71**

Source: Sample Analysis

309. Since there are 25 private hospitals and 7 municipal hospitals in Alandur, some toxic (metal) content was also found. Copper and Lead are the major constituents of the solid wastes of Alandur. The composition of Copper and Lead as presented in **Table 6.3** is around 76.10 mg/kg and 22.50 mg/kg respectively. The other significant constituents of solid waste in Alandur are nickel and zinc. The contribution of these elements is around 8.71 mg/Kg and 6.56 mg/Kg.

Table 6.4: Chemical Characteristics of Solid Waste as Per CPHEEO - Domestic Waste

Parameter	Units	Composition	
		As per CPHEEO[1]	***As per MNES[2]***
Moisture Content	**% w/w**	**25.81**	**22.21**
Carbon	**% w/w**	**-**	**12.56**
Nitrogen	**% w/w**	**0.71**	**0.60**
Phosphorus	**% w/w**	**0.63**	**0.70**
Potassium	**% w/w**	**0.83**	**0.70**
Heating Calorific Value, kcal/kg	**Kcal/Kg**	**1009.89**	**800.00**

Note:

1. For towns of population 0.1 to 0.5 million
2. For towns of population less than 0.2 million

Source: CPHEEO Manual on Solid Waste Management

2. Commercial Sources

310. Commercial waste comprises the solid waste that originates in offices, wholesale and retail stores, restaurants, hotels, markets, warehouses and other commercial establishments.

311. Ash and Fine Earth are the major constituents of the solid waste of Alandur. The composition of Ash and Fine Earth as presented in **Table 6.5** is around 34.90 percent , the contribution of organic matter and garden waste constitutes a significant proportion and is 25.77 percent and 22.40 percent respectively.

Table 6.5: Physical Characteristics of Solid Waste - Commercial Waste

Parameter	Units	Sample-I	Sample-2	Average
Bulk Density	**Kg/Cu.m**	**114.00**	**368.00**	**241.00**
Physical Characteristics (% of total weight) – wet weight basis				
Organic Matter	**% w/w**	**5.86**	**45.67**	**25.765**
Garden waste	**% w/w**	**5.56**	**39.24**	**22.4**
Plastic	**% w/w**	**0.25**	**8**	**4.125**
Paper	**% w/w**	**0.3**	**6.3**	**3.3**
Inorganic Matter	**% w/w**	**5.4**	**0**	**2.7**
Rubber & Leather	**% w/w**	**11.34**	**0**	**5.67**
Metal	**% w/w**	**1.3**	**0.8**	**1.05**
Glass & Ceramics	**% w/w**	**0.2**	**0**	**0.1**
Other Inert Materials	**NIL**	**0**	**0**	**0**
Ash & Fine Earth	**% w/w**	**69.8**	**0**	**34.9**

Source: Sample Analysis

312. The other significant constituents of solid waste in Alandur are plastic and paper. The contribution of these elements is around 4.13 percent and 3.30 percent, which is higher than the normal composition anticipated by CPHEEO in its manual on solid waste management. This may be attributed to growing urbanisation in Alandur and associated activities. It is noted that in physical characteristics of solid waste, the inorganic waste constitutes are less (48.55 percent) when compare to organic waste (51.47 percent). The organic waste is high because of the number of hotels (8) and *kalyanamandabams* (24) in the town.

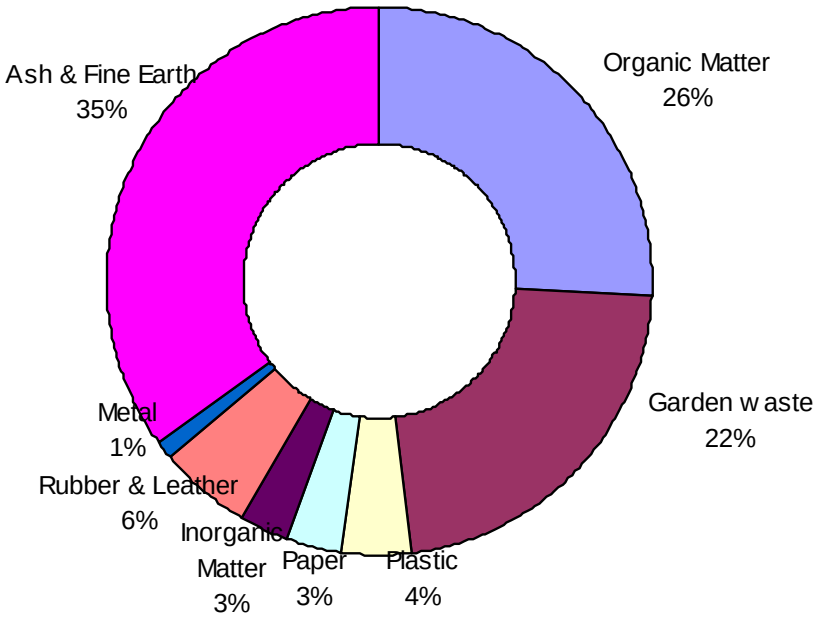
Table 6.6: Physical Characteristics of Solid Waste as Per CPHEEO - Commercial Waste

Parameter	Units	Composition	
		As per CPHEEO[1]	***As per MNES[2]***
Paper	**% w/w**	**2.91**	**3.09**
Plastic	**% w/w**	**-**	**0.57**
Rubber & Leather	**% w/w**	**0.78**	**-**
Glass & Ceramics	**% w/w**	**0.56**	**0.29**
Metal	**% w/w**	**0.33**	**0.51**
Inorganic Matter	**% w/w**	**43.59**	**33.41**
Other Inert Materials	**% w/w**	**44.57**	**46.06**

Note:
1. For towns of population 0.1 to 0.5 million
2. For towns of population less than 0.2 million

Source: CPHEEO Manual on Solid Waste Management

Figure 6.2: Composition of Solid Waste – Commercial Waste



313. Chemical Characteristics. As regards the chemical composition, moisture content of solid waste was found to be around 75.15 percent. Similarly, the calorific value of waste is around 2366.00 Kcal / kg in Alandur. These values are higher than the Moisture content and Heating Calorific Value estimated by CPHEEO for town of similar size class. The other significant constituents of solid waste in Alandur are ash content and volatile matter. The contribution of these elements is around 48.28 percent and 36.24 percent.

Table 6.7: Chemical Characteristics of Solid Waste - Commercial Waste

Parameter	Units	Sample-I	Sample-2	Average
pH		**6.61**	**7.74**	**7.175**
Moisture Content	**% w/w**	**77**	**73.3**	**75.15**
Calorific Value	**Kcal/Kg**	**685**	**4047**	**2366**
Volatile Matter	**% w/w**	**12.52**	**59.96**	**36.24**
Ash Content	**% w/w**	**82.76**	**13.80**	**48.28**
Carbon	**% w/w**	**5.63**	**25.2**	**15.415**
Fixed Carbon	**% w/w**	**2.28**	**20.66**	**11.47**
Nitrogen as N	**% w/w**	**1**	**1.75**	**1.375**
Phosphorous as P	**% w/w**	**0.05**	**0.21**	**0.13**
Metals				
Arsenic	**Mg/Kg**	**0.51**	**BDL (DL:0.10mg/Kg)**	**0.51**
Copper as Cu	**Mg/Kg**	**18.6**	**18**	**18.3**

Parameter	Units	Sample-I	Sample-2	Average
Zinc as Zn	**Mg/Kg**	**11.1**	**22.7**	**16.9**
Lead as Pb	**Mg/Kg**	**30.5**	**6.4**	**18.45**
Cadmium as Cd	**Mg/Kg**	**0.28**	**0.17**	**0.225**
Mercury	**Mg/Kg**	**BDL (DL:0.10mg/Kg)**	**BDL (DL:0.10mg/Kg)**	
Nickel	**Mg/Kg**	**6.75**	**1.74**	**4.245**

Source: Sample Analysis

Table 6.8: Chemical Characteristics of Solid Waste as per CPHEEO - Commercial Waste

Parameter	Units	Composition	
		As per CPHEEO[1]	***As per MNES[2]***
Moisture Content	**% w/w**	**25.81**	**22.21**
Carbon	**% w/w**	**-**	**12.56**
Nitrogen	**% w/w**	**0.71**	**0.60**
Phosphorus	**% w/w**	**0.63**	**0.70**
Potassium	**% w/w**	**0.83**	**0.70**
Heating Calorific Value, kcal/kg	**Kcal/Kg**	**1009.89**	**800.00**

Note:

1. For towns of population 0.1 to 0.5 million
2. For towns of population less than 0.2 million

Source: CPHEEO Manual on Solid Waste Management

314. Since there are 25 private hospitals and 7 municipal hospitals in Alandur, some toxic (metal) content was also found. Copper Lead and are the major constituents of the solid wastes of Alandur. The composition of Copper & Lead are presented in **Table 6.7** is around 18.45 mg/Kg and 18.30 mg/Kg respectively. The other significant constituents of solid waste in Alandur are zinc and nickel. The contribution of these elements is around 16.90 mg/Kg and 4.25 mg/Kg.

F. Key Issues

(i) In the physical composition of solid waste, the organic waste of commercial establishment (51.47 percent) is more when compared to domestic waste (47.39 percent). The organic waste from commercial establishments is high because of the waste from hotels and kalyanamandapams.

(ii) In the physical composition of solid waste, the inorganic waste of commercial establishments (48.55 percent) is less when compared to domestic waste (52.60 percent). This is due to the fact that plastic, inorganic matter and rubber & leather are generated more from domestic sources.

(iii) In the chemical composition of solid waste, the calorific value of commercial establishment and domestic waste is above 2,000 Kcal/Kg due to the constituents of paper and plastic.

(iv) In the chemical composition of solid waste, the carbon content of both commercial establishments and domestic waste is around 15 percent due to more constituents of garden waste.

(v) In the chemical composition of solid waste, the toxic content of commercial establishments (58.63 mg/Kg) is less compared to domestic waste (114.38 mg/Kg).

(vi) The significant constituents of solid waste in Alandur are plastic and paper, which is higher than the normal composition estimated by CPHEEO in its manual on solid waste management. This can be attributed to the growing urbanisation in the region and associated activities.

(vii) The Moisture content and Calorific value of solid waste of Alandur was found to be higher than the Moisture content and Heating Calorific Value as per CPHEEO standards.

VII. URBAN BASIC SERVICES FOR POOR

A. Overview

315. Slums and squatter settlements are essentially products of urban poverty. Almost by definition, the population living in slums lack access to basic infrastructure services such as safe water, sanitation, solid waste collection and disposal, drainage, access roads, streetlights, neighborhood amenities (e.g., safe play areas for children and community facilities), and electricity.

316. The Tamil Nadu Slum Clearance Board (TNSCB) is the responsible authority for notifying and upgrading the slums, and providing clearances and basic services to the urban poor residing in slums and within municipal limits.

317. In Alandur, there are 22 declared slums, which houses about 51,500 persons. Thus, about 35.26 percent of the town's population resides in approved slums.

Figure 7.1: Distribution of Slum Population in Alandur

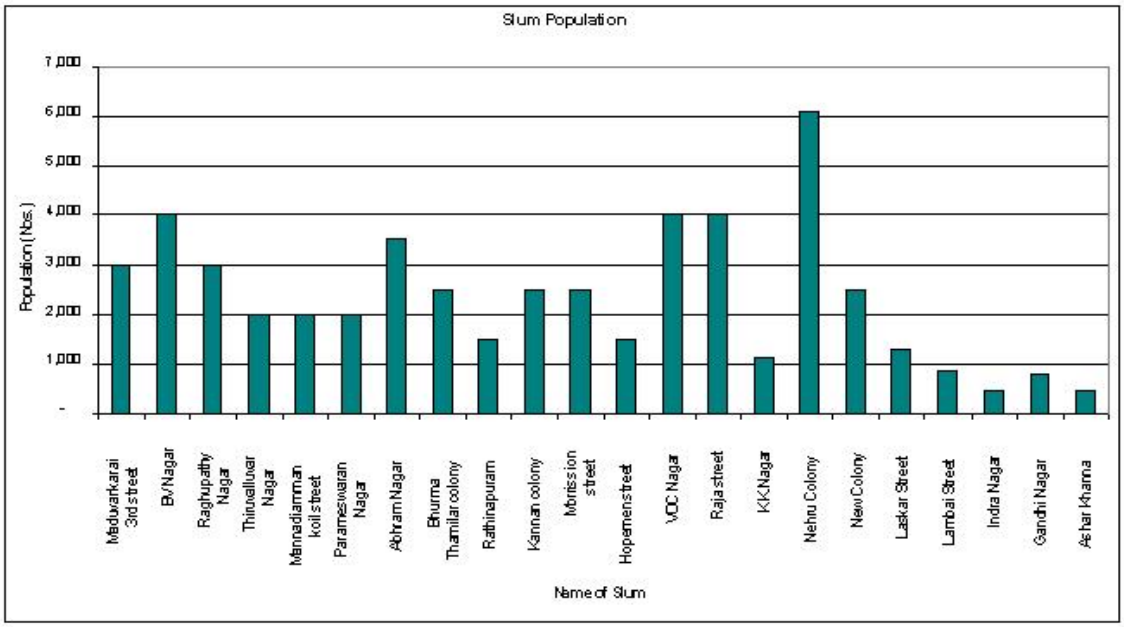


Table 7.1: Approved Slums in Alandur

Sr. No	Name of Slum	No of Households	Population
1	Maduvankarai 3rd street	610	3,000
2	BV Nagar	820	4,004
3	Raghupathy Nagar	610	3,002
4	Thiruvalluvar Nagar	400	2,000
5	Mannadiamman Koil Street	510	2,002
6	Parameswaran Nagar	500	2,000
7	Abhram Nagar	710	3,502

Sr. No	Name of Slum	No of Households	Population
8	Bhurma Thamilar Colony	500	2,500
9	Rathinapuram	300	1,500
10	Kannan Colony	510	2,500
11	Morrission Street	500	2,500
12	Hopemen Street	300	1,500
13	VOC Nagar	800	4,000
14	Raja street	800	4,000
15	K.K. Nagar	227	1,135
16	Nehru Colony	1,217	6,085
17	New Colony	500	2,500
18	Laskar Street	262	1,310
19	Lambai Street	170	850
20	Indira Nagar	91	455
21	Gandhi Nagar	156	780
22	Ashar Khanna	92	460
	Total	**10,585**	**51,585**

Source: Alandur Municipality

318. Slum located at Nehru Colony houses maximum number of population with 6,085, which is spreaded across Ward Nos. 5, 6 and 7. Slum at B.V. Nagar has about 4,004 population forming second largest population residing in the slums. Slum at Indira Nagar has the minimum number of slum settlements with 455 persons residing.

B. Infrastructure Provision in Slums

319. Slums in Alandur lack proper infrastructure facilities, like slums anywhere in the country. An overview of the existing infrastructure in slums is presented in the **Table 7.2** – this is based on secondary data provided by the respective municipality and discussions with officials. To improve the condition of slums and to make slum dwellers self-dependent, government is initiating various programs, which has been described in the following section.

Table 7.2: Overview of Existing Infrastructure in Slums

Name of Slum	Water Taps/Hand pumps	No. of Seats in Public Toilet	No. of Dustbins	Total Roads	Surfaced Roads	Storm Water Drains	Streetlights
	Nos.	*Nos.*	*Nos.*	*km*	*km*	*km*	*Nos.*
Maduvankarai 3rd Street	1	8	-	0.26	0.26	0.59	6
BV Nagar	2	8	-	5.65	2.45	5.47	126
Raghupathy Nagar	2	8	-	1.74	0.64	1.57	49
Thiruvalluvar Nagar	1	-	-	0.26	0.26	0.43	24
Mannadiamman Koil Street	1	8	-	0.54	0.54	0.51	29
Parameswaran Nagar	1	8	-	0.76	0.76	0.51	22
Abhram Nagar	2	-	-	0.19	0.19	0.18	6
Bhurma Thamilar Colony	1	8	-	0.33	0.33	3.00	8

Name of Slum	Water Taps/Hand pumps	No. of Seats in Public Toilet	No. of Dustbins	Total Roads	Surfaced Roads	Storm Water Drains	Streetlights
	Nos.	*Nos.*	*Nos.*	*km*	*km*	*km*	*Nos.*
Rathinapuram	1	8	-	0.41	0.41	0.34	1
Kannan Colony	1	8	-	1.24	0.54	0.98	22
Morrission Street	1	8	-	1.41	1.41	0.30	56
Hopemen Street	1	8	-	0.60	0.60	0.41	21
VOC Nagar	4	8	-	0.62	0.62	0.13	8
Raja Street	2	8	-	1.08	0.68	0.30	27
K.K. Nagar	1	-	-	0.93	0.63	0.81	13
Nehru Colony	3	8	-	2.83	2.03	2.18	105
New Colony	-	-	-	0.37	0.37	0.16	22
Laskar Street	1	-	-	0.11	0.11	0.02	18
Jinna Street	-	-	-	0.31	0.31	0.30	9
Indra Nagar	6	-	-	0.76	0.76	0.23	19
Gandhi Nagar	1	-	-	0.15	0.15	0.70	13
Ashar Khanna	1	-	-	0.43	0.43	0.28	14
Total	**34**	**104**	**-**	**20.96**	**14.47**	**19.37**	**618**

Source: Alandur Municipality

(i) Water Supply. The main sources of water supply in slums are hand pumps and public stand posts (PSPs). The local body has provided only 34 units of hand pump and PSP covering all the slums. The slum at Indra Nagar has maximum number of water outlets with 6 numbers while other slums have in the range of 1 to 3. Dependency on hand pump or PSP is very high with about 1,500 persons per unit against the standard norm of 75 persons per hand pumps or PSPs. Water tankers also supplement the water supply requirement in the slums.

(ii) Sewerage and Sanitation. Safe sanitation facilities comprise of public conveniences and toilets provided under ISP. Public toilets are provided in 13 slums viz., Maduvankarai 3rd Street, BV Nagar, Raghupathy Nagar, Mannadiamman Koil Street, Parameswaran Nagar, Bhurma Thamilar Colony, Rathinapuram, Kannan Colony, Morrission Street, Hopemen Street, Hopemen Street, VOC Nagar, Raja Street and Nehru Colony. People living in slums without access to sanitation facilities either depend on nearby public toilets or resort to open defecation. Considering 13 slums, on an average, each seat serves about 370 persons, which is very high compared to the prescribed limits of 30 to 50 persons per seat.

(iii) Solid Waste Management. As per the discussions with slum dwellers, it was stated that few slums have dustbins, which are also in bad condition and need replacement. As a result, in most of the slums, waste is disposed in nearby vacant areas creating unhygienic conditions.

(iv) Roads. The ULB has provided about 20.96 km of roads out of which 14.47 are surfaced roads while the remaining 6.49 km stretch is unsurfaced. The per capita road maintained by the ULB in slums works out to 0.41 m that is less than the total roads maintained by the ULB on town level and prescribed standards of 0.92 m and 1.75 m. This indicates the coverage of roads in slums is less.

(v) Storm Water Drains. The total drains provided in slums extend to a length of 19.37 km indicating coverage of about 133 percent of the surfaced roads, which is within the prescribed limits of 50 percent of surfaced roads. However, the demand for the proper connectivity of slum drains with the main drains is high.

(vi) Street Lights. The ULB has provided 618 numbers of streetlights in slums with an average spacing of 33.92 m between the poles, which is above the standards spacing of 30 m. Overall, the streetlight spacing in Alandur is about 42 m. Thus, the slums are averagely lit. The slum at B.V. Nagar is provided with maximum number of streetlights with 126 followed by 105 at Nehru Colony.

Map 7.1: Location of Slums in Alandur

C. Poverty Alleviation and Community Development

1. Policies, Targets and Programs

320. This section reviews programs that address service delivery to the poor in Alandur. A review of Slum Improvement Programs indicates that by improving basic infrastructure and access to municipal services, there is a significant impact on the quality of life of slum residents. To alleviate the problems of slum dwellers and to reduce urban poverty, a number of programs initiated and has been implemented by the local body with assistance from state and central government.

321. Two major slum improvement programs are being implemented in Alandur viz., Swarna Jayanti Shehari Rojgar Yojna (SJSRY) and National Slum Development Program (NSDP).

Swarna Jayanti Shehari Rojgar Yojna (SJSRY)

322. Swarna Jayanti Shehari Rojgar Yojana (SJSRY) is central and state government sponsored scheme started in 1997 in Alandur. The main programs in this scheme are:

(i) Development of Women and Children in Urban Areas (DWCUA). This scheme is distinguished by the special incentive extended to urban poor women who decide to set up self-employment ventures as a group as opposed to individual effort. Groups of poor women shall take up an economic activity suited to their skill, training, aptitude and local conditions. Besides generations of income, their group shall strive to empower the urban poor women by making them independent as also providing a facilitation atmosphere for self-employment.

Under this program, groups of women devise a project plan. A successful plan will receive a subsidy from the government and a loan from an area bank branch. To be eligible for subsidy under this scheme, the DWCUA group should consist of at least 10 urban poor women. The loan is 45 percent of the project cost (maximum), the subsidy is 50 percent (maximum), and the remaining 5 percent are borne by the group. The maximum project size supported is Rs. 2, 50,000. The details of fund disbursement and the beneficiaries are brief in the following **Table 7.3**.

Table 7.3: Details of Funds Disbursed and Beneficiaries - DWCUA

Year	Amount Disbursed			No. of Beneficiaries
	Loan	Subsidy	Total	
	Rs. Lakh	*Rs. Lakh*	*Rs. Lakh*	*Nos.*
2000 - 01	-	-	-	-
2001 - 02	-	-	-	-
2002 - 03	80,000	40,000	120,000	10
2003 - 04	43,000	21,750	64,750	10
2004 - 05	-	-	-	-

Source: Alandur Municipality

(ii) Thrift & Credit Societies. This program brings together 10-20 women from Below Poverty Line families to carry out saving and lending activities. The government gives a lump sum grant to the group after it has been functioning for one full year. The grant is determined at the rate of Rs. 1,000 per member and is to be used as a revolving fund.

(iii) Urban Skill Training. This component sponsors skill development in a variety of service and manufacturing trades as well as in local skills and local crafts. After being trained, beneficiaries should be able to set up self-employment ventures or secure salaried employment with enhanced remuneration. Training institutions such as ITIs/ Polytechnics/ Shramik Vidyapeeths/ Engineering Colleges and other suitable training institution run by Government, private, or voluntary organizations may be utilized and provided support for this purpose (but they must be registered with the concerned government department). Training includes computer skills, beautician skills, car driving, screen-printing, doll making, tailoring, TV & radio repair, electrical equipment repair, candle making, detergent and soap making and bookbinding. Training is limited to an expense of Rs. 2,000 per student, including a Rs. 300 stipend. For trainees successfully completing their courses, the scheme can provide up to Rs. 600 for a toolkit. Some institutes place candidates in jobs.

(iv) Urban Wage Employment Program (UWEP). This program seeks to provide wage employment to beneficiaries living below the poverty line within the jurisdiction of urban local bodies by utilizing their labor for construction of socially and economically useful public assets. Under this program, there is no restriction on educational qualification. The material labor ratio for works under this program is to be maintained at 60:40. The prevailing minimum wage rate, as notified from time to time for each area, has to be paid to beneficiaries under this program.

(v) Urban Self-Employment Program (USEP). Under this program, individuals (men or women) devise an income generation project plan and apply for a loan. A successful plan will receive a subsidy from the government and a loan from an area bank branch. The loan is 80 percent of the project cost (maximum), the subsidy is 15 percent (maximum), and the remaining 5 percent are borne by the individual. The maximum project size supported is Rs. 50,000 per individual.

The details of funds and the beneficiaries are given in the **Table 7.4**.

Table 7.4: Details of Funds Disbursed - USEP

Year	Loans	Subsidy	Total	No. of Beneficiaries
	Rs. Lakh	*Rs. Lakh*	*Rs. Lakh*	*Nos.*
2000 - 01	250.00	37.50	287.50	1
2001 - 02	619.20	92.88	712.08	5
2002 - 03	3,840.00	576.00	4,416.00	45
2003 - 04	490.00	73.50	563.50	8
2004 - 05	-	-	-	-

Source: Alandur Municipality

(vi) Community Structure Component (CSC). This component provides a budget for working with other government agencies and departments to address needs of the eligible population beyond jobs and income.

National Slum Development Program (NSDP)

323. Under this program, the central and state government provide 50 percent of the project cost while the local body has to bear the remaining 50 percent. The works are finalised by the decision of the council. They are inspected by the RDMA through the Regional Engineer. Special Priority is given to the following:

(i) Improvement of Drinking Water Supply System
(ii) Laying/Relaying of Roads
(iii) Provision of Street Lights
(iv) Drainage Facilities
(v) Improvement and New Public Conveniences with Water Supply
(vi) Welfare (education, etc.); and
(vii) Shelter Up gradation (Individual Water Connections)

Valmiki Ambedkar Awas Yojana Scheme (VAMBAY)

324. Valmiki Ambedkar Awas Yojana Scheme is centrally sponsored scheme with 50 percent central and 50 percent state share to construct houses for slum dwellers. As per the guidelines issued by Ministry of Urban Development and Poverty Alleviation, the target group has been identified based on the yearly income of the slum dwellers. The objective of this scheme is to provide housing in urban slums in a march towards the goal of slum less cities with a healthy and enabling urban environment. The selection of slums has based on the declared status of slums.

D. Key Issues

325. Poor infrastructure facilities in slums, is the main issue in Alandur slums.

VIII. INFRASTRUCTURE DEVELOPMENT AND SERVICE PROVISION

A. Rationale, Need and Demand

326. Infrastructure assessment of the town indicates inadequate service levels for the present scenario, which will further escalate given the future growth; (i) Per capita supply a low at 26 lpcd for summer season and 47 lpcd for normal seasons. Water is supplied in the municipality only once in two days; Coverage of water supply connections with respect to property tax assessments is as low as 49 percent; (ii) the recently commissioned underground drainage system is designed for 3 lakh population for 2027; Coverage of sewer connections with respect to property tax assessment is only 40 percent, indicating a possibility of existence of illegal connections; (iii) ULB lacks scientific municipal solid waste treatment and disposal system catering to the waste collected; waste collection efficiency of the local body based on rated capacity of the vehicle is a low 88 percent; (iv) Surfaced roads within the ULB is approximately 76 percent; missing links, network deficiency and lack of traffic management systems causes congestion within the ULB area and reduces the carrying capacity of the roads; (v) Drainage network of the town covers only 77 percent of the total road length; which has been indicated as one of the major causes of flooding and water logging. The abysmal levels of service therefore provide a strong basis and need for the project.

(i) Approach and Design Criteria. The ULB should increase the level of coverage of all facilities, to meet the service norms based on State Norms, CPHEEO Norms, UDPFI Norms or other applicable criteria. Based on this, considering the current deficits and the future requirements for the ULB, strategies and action plan are suggested.

(ii) Component Selection Criteria. The total investment in the ULB depends on several parameters like the level of current basic needs, the town's affordability, and the assessed implementation capacity of the town or its agencies. Overall, project component selection is majorly influenced by affordability and implementation capacity. In the interest of integrated town development, another criterion considered in project component selection has been to ensure inter-sector linkages and optimization. For instance, water supply, sanitation and sewerage have been seen as a composite sector and not in isolation from each other.

(iii) Least Cost Solutions and Component Selection. In formulating project components, the preferred option was developed based on least cost options, taking into account service delivery targets and whole-life costs, including considerations on achievable operation and maintenance arrangements, given available resources in terms of skills and facilities. Based on the considerations and screening referred to in the preceding section, priority components were selected and scrutinized and their financial, social and environmental impacts assessed to verify acceptability.

1. Water Supply

327. Considering the current deficits and the future requirements for water supply, strategies and action plan are suggested. For the provision of water supply, the ULB should facilitate creation of capital assets to meet the future requirements.

328. *Design Supply*. The rate of water supply of 90 lpcd at consumer end is assumed for working out the water demand of Alandur town.

329. *System Losses*. The following system losses are considered to determine the capacity of the system.

Table 8.1: Losses in Water Supply System

Losses	**Value**
Loss of water in the distribution system	15 %
Loss of water in the clear water transmission	2 %
Loss of water in the water treatment process	4 %
Loss of water in the raw water transmission	2 %

330. *Service Storage.* Service reservoir provides a buffer between inflow from the source at fixed *pumping* rate and outflow to the distribution network of varying rate, depending on the drawal by the consumers during the supply hours. Assuming that the supply to the consumers will be in two shifts (four hours in the morning and four hours in the evening) per day, the service storage required will be equal to one third of the daily demand.

331. *Water Demand*. Water demand is calculated for the present population and population projected for 2026 as shown in **Table 8.2**. The demand of service storage and distribution system is also projected.

Table 8.2: Projected Water Demand and Distribution System Requirement

Description	**Year 2005**		**Year 2011**		**Year 2026**	
	Population	**Demand**	**Population**	**Demand**	**Population**	**Demand**
		MLD		*MLD*		*MLD*
Water Demand						
Consumer end (90 lpcd)	156,741	14.11	172,422	15.52	211,626	19.05
At service reservoirs (15% loss)		16.22		17.85		21.90
At WTP outlet (2% loss)		16.55		18.20		22.34
At WTP inlet (4% loss)		17.21		18.93		23.23
At source works (2% loss)		17.55		19.31		23.70
Capacity Requirement						
Service storage (1/3rd of daily demand) - ML		4.70		5.17		6.35

Description	Year 2005		Year 2011		Year 2026	
	Population	Demand	Population	Demand	Population	Demand
		MLD		*MLD*		*MLD*
Distribution network to cover population		156,741		172,422		211,626

332. *Comparison.* The projected demand for 2026 is compared with the optimum supply available from the existing system, to verify the adequacy of the existing system and need to augment the capacity of certain components.

Table 8.3: Demand, Supply and Required Augmentation of Water Supply System for 2026

Component	Unit	Supply	Demand					
			Year 2005		Year 2011		Year 2026	
			Demand	Surplus (Deficit)	Demand	Surplus (Deficit)	Demand	Surplus (Deficit)
Raw Water Pumping	MLD	6.00	17.55	(11.55)	19.31	(13.31)	23.70	(17.70)
Raw Water Transmission	MLD		17.21	(17.21)	18.93	(18.93)	23.23	(23.23)
Water Treatment Plant	MLD	12.80	16.55	(3.75)	18.20	(5.40)	22.34	(9.54)
Clear Water Pumping	MLD		16.22	(16.22)	17.85	(17.85)	21.90	(21.90)
Clear Water Transmission	MLD	6.00	14.11	(8.11)	15.52	(9.52)	19.05	(13.05)
Service Storage	ML	6.20	4.70	1.50	5.17	1.03	6.35	(0.15)
Distribution System	Km	169.87	156.74	13.13	172.42	(2.55)	211.63	(41.76)

Source: Analysis

333. *Sector Approach*. Considering the above requirements, capital investments in water supply have to be planned to address issues focusing upon; (i) Augmentation of source to meet the per capita demand of water; (ii) Increase in the storage and distribution of existing facilities to meet the growing demand; (ii) Rehabilitation of existing facilities to avoid the higher costs of deferred maintenance.

334. There are two options for source augmentation to meet the desired supply rates in these thee towns. Option I considers the proposals prepared by CMWSSB (as mentioned in Section D of Chapter V) and Option II is to construct a combined desalination plant for Alandur, Pallavaram and Tambaram municipalities. To meet the supply rate of 90 lpcd for the requirements of 2026, the cost requirements for common desalination plant is given in **Table 8.4**. The cost for treating 1 MLD of water is estimated at Rs. 409.07 lakh with annual operation and maintenance cost of Rs. 45.80 lakh (per MLD).

Table 8.4: Cost Estimation for Common Desalination Plant for 3 Towns

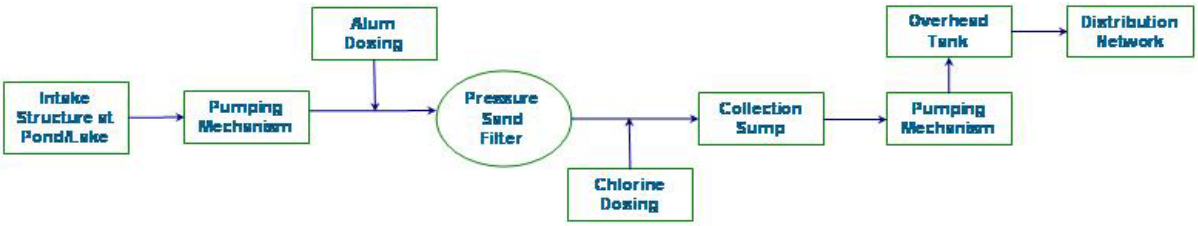
Parameters	Units	Alandur	Pallavaram	Tambaram	Total
Water Supply	MLD	13.05	15.89	14.17	**43.11**
Cost	Rs. Lakh	5,336.85	6,498.80	5,797.63	**17,633.27**
Annual O&M Cost	Rs. Lakh	597.58	727.68	649.17	**1,974.42**
Cost of Water Production	Rs./KL	12.55	12.55	12.55	**37.65**

Source: Analysis

335. The option of having a common desalination plant would ensure regular supply with 90 lpcd supply rate. However, it is a high energy consuming process and would incur high capital and O&M costs. It requires trained operator. The membrane used in the reverse osmosis process has to be changed once in 3 years. Consequently, Option I supersedes Option II.

336. *Local Source Development*. The existing water bodies could serve as recharge zones for ground water. Improvement/rejuvenation of water bodies and keeping them encroachment-free would also serve to enhance their storage capacity. These may be considered as a supplementary source for the water supply, especially during the summer season (i.e., 90 days), provided studies on water quality, extent of rehabilitation and regular maintenance required to ensure adequate storage and water quality, and the related treatment and pumping facilities and cost-effectiveness of supply from water bodies are undertaken and reveal the feasibility of the exercise. Provision of proper treatment facilities and formulation and strict adherence to guidelines to keep them pollution free would be a pre-requisite, prior to supply to consumers. While water supply from each water body may not be feasible or cost-effective (the same may be ascertained only after a detailed feasibility study is conducted), the study examines the potential of water bodies as potential groundwater recharge zones/supplementary local sources. Partnerships with the private sector for maintenance of water bodies and development of parks / other potential revenue generating options around the same may be considered. The spin-offs are likely to be in terms of environmental improvement and enhanced land values around the area. The water stored in the water body may be pumped to the localized treatment plant (Pressure Sand Filter). Alum shall be mixed with the water before it reaches the treatment plant. The treated water shall be given chlorination treatment and collected in a collection sump. The chlorinated water shall be pumped to the nearest service reservoir. The schematic diagram of water supply from water body (Pond/Lake) to the overhead tank is given in **Figure 8.1**.

Figure 8.1: Schematic Diagram of Water Supply from a Water Body to Service Reservoir



337. As most of the water bodies are encroached, two options are worked out for calculating the

actual storage capacity of the water bodies:

(i) Option - I. Calculation of actual storage capacity assuming all the encroachments are removed.

(ii) Option - II. Calculation of actual storage capacity assuming the encroachments are not removed. Thus, the net area available after deducting the area under encroachments from the gross area is used for calculating the actual storage capacity of the water body.

338. *Option - I*. The capacity for water storage in the water bodies and potential for supply is worked out (assuming that encroachments are removed) and presented in **Table 8.5**.

Table 8.5: Water Supply from Water Bodies – Option - I

Name	**Actual Storage Capacity***	**Supply to OHT**	**Design Population**	**Estimated Storage Capacity per Day**	**Potential Per Capita Supply Rate**
	ML		*Nos*	*MLD*	*lpcd*
Nanganallur Temple Tank	8.51	Nanganallur	39,042	0.09	2.42
Easwaran Sannathi Kulam	1.84	Adambakkam	18,922	0.02	1.08
Mankulam	5.78	Alandur	35,502	0.06	1.81
Adambakkam	96.71	Nanganallur	39,042	0.21	5.50
		Adambakkam	18,922	0.21	11.36
		Alandur	35,502	0.21	6.05
		New Colony	20,819	0.21	10.32
		B.V. Nagar	32,002	0.21	6.72

Note: * Actual Storage Capacity available for 90 days
Source: Analysis

339. *Option - II*. The capacity for water storage in the water bodies is worked out (assuming that encroachments are not removed) and presented in **Table 8.6**.

Table 8.6: Water Supply from Water Bodies – Option - II

Name	**Actual Storage Capacity***	**Supply to OHT**	**Design Population**	**Estimated Storage Capacity per Day**	**Potential Per Capita Supply Rate**
	ML		*Nos*	*MLD*	*lpcd*
Nanganallur Temple Tank	8.51	Nanganallur	39,042	0.09	2.42
Easwaran Sannathi Kulam	1.84	Adambakkam	18,922	0.02	1.08
Mankulam	0.30	Alandur	35,502	0.003	0.09
Adambakkam	19.17	Nanganallur	39,042	0.04	1.09
		Adambakkam	18,922	0.04	2.25
		Alandur	35,502	0.04	1.20

Name	Actual Storage Capacity*	Supply to OHT	Design Population	Estimated Storage Capacity per Day	Potential Per Capita Supply Rate
	ML		*Nos*	*MLD*	*lpcd*
		New Colony	20,819	0.04	2.05
		B.V. Nagar	32,002	0.04	1.33

Note: * Actual Storage Capacity available for 90 days
Source: Analysis

340. The water demand from a water body is calculated, considering the respective zonal population. The OHTs availability in each water supply zone is less when compared to the larger numbers of available water bodies. Hence, it is assumed that each water body may serve many water supply zones. Due to this, it may be noted that the design population to be served (**Table 8.6**) by the water bodies is more than the actual population of the town.

341. Thus, the average gross per capita supply from the existing water bodies during 90 days of summer season would be around 9 lpcd for Option - I and 2 lpcd for Option - II. If system losses are considered, the per capita supply rate would decrease. It must be noted that the figures mentioned in the above tables are indicative and are arrived at on the basis of certain assumptions. As mentioned earlier, the feasibility of supplying water from the water bodies to the OHTs must be studied in detail, which would give a fair idea of the adequacy as supplementary source, quality, cost-effectiveness and possible supply rate during peak seasons.

342. *Operation & Maintenance Plan.* Adoption of an O&M Plan and Schedule, including options of using the private sector for O&M (e.g. management contract).

343. *Water Management Plan*. Adoption of a comprehensive strategy for Water Management, through leak detection, checking of unaccounted-for-water and strategy for use of recycled water for non-potable use, based on a study for the ULB.

344. *Tariff Revision.* Future capital investments on system up-gradation being imminent, the tariff structure shall be revised from time to time to enable cost recovery and to service the additional debt from the capital investments.

345. *Performance Monitoring*. It is important to monitor certain key indicators to assess the performance of the system and to ensure sustainability of operations.

346. *Institutional Strengthening and Capacity Building.* Recruitment of trained engineering personnel for management of waterworks is an important issue confronting the ULB. Of greater importance is the issue of keeping them technically updated. It is necessary that periodic training be imparted to the operations staff of the ULB. Such training facilities are available along with training manuals at TWAD Board and CMWSSB office.

2. Sewerage and Sanitation

347. *Design Criteria*. Water demand of the town has been projected at the rate of 90 lpcd

(considering all losses). Hence, the sewer network is also designed for a sewage flow of 90 lpcd. The treatment plant however, can be developed in phases. Initially, the STP for the town may be provided at 80 percent of 90 lpcd i.e. 72 lpcd and may be augmented subsequently to treat 90 lpcd. Hence, the demand for sewerage system is worked out at following rates of sewage flow:

(a) 90 lpcd for sewer network, and
(b) 72 lpcd for sewage pumping and treatment plant, upto year 2011 and 90 lpcd beyond year 2011.

348. *Demand of Sewerage System*. The capacity of sewerage system required for the town is worked out in the **Table 8.7**.

Table 8.7: Demand of Sewerage System

Component	**Year 2005**		**Year 2011**		**Year 2026**	
	Population	**Demand**	**Population**	**Demand**	**Population**	**Demand**
		MLD		*MLD*		*MLD*
Sewer Network	156,741	14.11	172,422	15.52	211,626	19.05
Pumping Station		11.29		12.41		19.05
Sewage Treatment Plant		11.29		12.41		19.05

349. There are various technologies available to treat wastewater. A comparison of their efficiencies with respect to cost is explained in the **Table 8.8**.

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Table 8.8: Comparison of Various Sewage Treatment Technologies

Parameter	**Units**	**TF**	**ASP**	**AL+MP**	**OD**	**Single Cell WSP**	**Multiple Cell WSP**	**UASP+MP**
Detention Time		1 Day	4 to 6 hr	3 to 5 hr	1 Day	20 to 30 Days	6 to 10 Days	2 to 4 Days
Land Required	Ha/MLD	0.3	0.25	0.5	0.3	2 to 3	1 to 2	0.6 to 1
Method of Oxygen Supply		Atmospheric	Mechanical	Mechanical	Mechanical	Biological (Algae)	Biological (Algae)	Not Required
Power Required	Kw/MLD	180	250	300	400	Nil	Nil	120
Ease of Operation		Simple	Difficult	Simple	Simple	Very Simple	Very Simple	Simple
Skill for O&M		High	High	Moderate	Moderate	Low	Low	Moderate
Capital Cost	Rs. Lakh/MLD	30.0	35.0	20.0	20.0	6.0	8.0	20.0
Annual O&M Cost		Medium	High	High	Medium	Very Low	Very Low	Low
Reliability		Good	Least	Good	Good	Very Good	Very Good	Good
FC Removal	%	90-96%	90-96%	95-98%	95-98%	98-99%	98-99%	95-99%

Note: TF – Trickling Filter, ASP – Activated Sludge Process, AL – Aerated Lagoon, OD – Oxidation Ditch, WSP – Waste Stabilization Pond, UASP – Up flow Anaerobic Sludge Blanket, MP – Maturation Pond, FC – Feacal Coliform

350. The UGD system for Alandur town is recently commissioned with a designed capacity of 24 MLD (Ultimate Demand) for 2027.

351. *Comparison*. The following table compares the capacity of various components of the existing/proposed system with the projected demand.

Table 8.9: Comparison of Demand and Anticipated Supply of Sewerage Facilities for 2026

Component	Unit	Status	Year 2005		Year 2011		Year 2026	
			Demand	Surplus /Deficit	Demand	Surplus/ Deficit	Demand	Surplus /Deficit
Sewer Network	Km	120.00	98.75	21.25	108.63	11.37	133.32	(13.32)
Pumping Station	MLD	24.00	11.29	12.71	12.41	11.59	19.05	4.95
Sewage Treatment Plant	MLD	24.00	11.29	12.71	12.41	11.59	19.05	4.95

Source: Analysis

352. *Adequacy*. The existing sewer network can serve the town upto 2027 without any augmentation of the system components. However, there is a small deficit of sewer network of 13.32 km for 2026. Hence, the investment is proposed for the additional sewer network required for the year 2026.

353. *Sector Approach*. Considering the above requirements, capital investments in Underground Drainage System have to be planned to address issues focusing upon; (i) Augmentation of additional sewer network for 2026 (ii) Enhancement of Revenue through maximization of Service Connections.

354. *Operation & Maintenance Plan*. Adoption of an O&M Plan and Schedule, including options of using the private sector for O&M (e.g. management contract).

355. *Asset Management Plan*. To address the condition assessment and the performance of sewerage assets, it is recommended that an asset management plan, which would require a fairly detailed study, be prepared for the management of UGD assets in Alandur town in future.

356. *Tariff Revision*. The tariff structure shall be revised from time to time to enable cost recovery and to service the additional debt from the capital investments.

357. *Institutional Strengthening and Capacity Building*. Recruitment of trained engineering personnel for management of Sewer works is an important issue confronting the ULB. The present system is being implemented by CMWSSB and shall be transferred to the ULB for maintenance of assets. It will therefore be important to keep them technically updated. It is necessary that periodic training be imparted to the operations staff of the ULB. Such training facilities are available along with training manuals at the TWAD Board and CMWSSB office.

3. Storm Water Drainage and Rehabilitation of Water Bodies

358. *Design Criteria*. The ULB should increase service levels in terms of coverage, to achieve coverage of 150 percent of road length, through built drains. It is recommended that the ULB adopt a strategy for rejuvenation of lakes and ponds, to be used as sources for groundwater re-charge and as summer storage. Networking of water bodies may also be considered.

359. The drain network demand for 2011, based on 150 percent road length is approximately 349 km (also includes the drains along the new formation of roads anticipated in future), as against a service level of 77 percent for 2005. As most of the water bodies are presently in a dilapidated condition, improvements would be necessary prior to proper usage.

360. *Sector Approach*. Considering the requirements, capital investments in drainage have to be planned to address issues focusing upon; (i) Improvement works and construction of storm water drains.(ii) Drainage improvement works for low lying areas, through improvement of networking of secondary and tertiary drains to primary drains; (iii) Improvement and rehabilitation of primary drain (Veraangal Odai), through widening, deepening, construction of side-walls and cross-drainage works; (iv) Rehabilitation works for water bodies, through de-silting, bunding works and Intersection and Diversion of Sewage wherever required. Once the UGD system becomes fully functional (including provision of desired level of HSCs) and a proper networking of storm water drain is done, the disposal of waste into the existing water bodies can be minimized and prevented. The water bodies can be improved to make them suitable for storing rainwater with provision of proper treatment facilities to make it potable for the consumers. Thus, the local source i.e., water bodies may supplement regular water supply during summer.

361. Areas along G.S.T. Road in Alandur, Pallavaram and Tambaram municipal areas (especially from Alandur municipal office to Tambaram hospital at Chrompet) usually get inundated during the rainy season.

362. Water bodies such as lakes, tanks, catchment areas and leading channels have been encroached and urbanized. During the normal rainy spell, rainwater is discharged directly into the now-encroached streams and water bodies, thus submerging portions of buildings (even upto the ceiling of the first floor) and other structures, especially in and around Alandur and Pallavaram areas. Hence, a proper disposal mechanism of floodwater is required.

363. Two options are considered to discharge rainwater:

(i) Adambakkam Eri. The storage capacity of Adambakkam Eri has reduced from 96.71 ML to 19.17 ML due to encroachments. Construction of lead drains to discharge rainwater from Airport area to Adambakkam Eri requires sufficient land. This can be achieved either by removal of encroachments or acquisition of additional land. Additional care has to be taken to avoid flooding of wayside areas. This option may be considered as a long-term option and requires government action to remove encroachments or acquire additional land.

(ii) Adyar River. The best option to avoid flooding of areas of Alandur and Pallavaram is to divert floodwater to Adyar River. This can be achieved by providing deep drains, which would involve deep cuttings, as there are reverse slopes. The link to be provided is around 1 km from NH-45 to Adyar River. In addition to these drains, horizontal and vertical drains with geo-fabric material should also be used at regular intervals to disperse the water to underground. This would help in recharging the ground water table. As there is a proposal by Public Works Department for constructing check dams along Adyar River, this diversion of floodwater would also contribute to recharge the ground water. The construction of vertical drains depends on the availability of sand at minimum 5 m depth. Hence, a geo-technical survey would be needed to ascertain the profile of soil stratum and accordingly, vertical drains can be laid.

The total investment (for option II) envisaged is estimated at Rs. 500 lakh.

The following funding/cost-sharing arrangement may be considered:

- Contribution from Highway Department = 40 %
- Contribution from Airport Authority = 20 %
- Contribution from Alandur ULB = 16.67 %
- Contribution from Pallavaram ULB = 16.67 %
- Contribution from Cantonment Board = 6.67 %

In case the rocky stratum along the NH-45 is at shallow depth, vertical drains can be constructed as per the availability of sandy layer at minimum depth of 5 m. The other option is to provide a leading drain from NH-45 to Adyar River, which would cost around Rs. 400 lakh.

364. *Operation & Maintenance Schedule.* Adoption of an O&M schedule for works varying from drain cleaning to desilting, including options of using the private sector for O&M (e.g. management contract).

4. Solid Waste Management

365. *Design Criteria.* The ULB should increase the service levels to meet the norms recommended by Solid Waste Handling Rules, 2000 and The State Finance Commission Norms. The ULB should achieve 100 percent coverage, through door-to-door collection and segregation of waste at source.

366. The future trend of waste generation has been estimated based on the projected population and per capita waste generation. The per capita growth rate for the solid waste has been assumed to be 0.2 percent every year.

367. **Table 8.10** shows the projected quantity of waste generated. As per the estimate, the total population in the year 2026 would be 211,626 and the quantity of waste generation would be around 101 tons per day.

Table 8.10: Projected Waste Generation

Year	Population	Waste Generation	
		Per Capita	Total Waste
	Nos.	*Gms/Day*	*Tons/Day*
2005	156,741	459.00	71.94
2011	172,422	463.61	79.94
2015	182,877	467.33	85.46
2021	198,558	472.96	93.91
2026	211,626	477.71	101.10

Source: Analysis

368. As the town lacks a proper mechanism for the solid waste management, there is a need for the ULB to take initiatives to improve the solid waste management of the town.

369. *Implementation Strategy*. The Solid Waste Action Plan, 2004, prepared by the ULB need to be updated and implemented on an immediate basis. Highest priority has to be accorded for segregation and storage at source irrespective of the area of generation to facilitate an organized and environmentally acceptable waste collection, processing and disposal. Source segregation of recyclables and biodegradable organic waste will not only provide an efficient way for resource recovery, but will also substantially reduce the pressure and pollution in landfill sites.

370. *Approach for Waste Collection and Transportation*. The following measures have been recommended for improving the primary collection practices of the ULB; (i) Implementation of 'Door-to-Door collection' through 100 percent privatization or through SHGs; (ii) Street sweeping on daily basis; (iii) Source segregation and collection of commercial waste, through privatization; (iv) Source segregation and collection of hotel and market waste; (v) Introduction of bin system at household and establishment level for storage and segregation of waste at source; (vi) Enforcement of by-laws and waste collection and handling rules.

371. It is envisaged that 100 percent area of the ULB be brought under door-to-door collection and hence, no additional dustbins are proposed, except for slums and other areas. In this scenario, the ULB shall be responsible for the collection. Based on these assumptions, the equipments for primary collection are estimated, to meet the future waste generation.

372. To improve the waste collection performance and transportation efficiency of the ULB, dumper placers with bins would be ideal, as their introduction would reduce the multiple handling of solid waste as recommended by Solid Waste Handling Rules, 2000.

373. *Approach for Disposal of Waste*. The existing practice of dumping the solid waste collected is on open land and does not comply with Solid Waste Management Regulations. Hence, it is recommended to develop a scientific landfill site for safe disposal. Considering that more than 50 percent of the waste generated constitutes organic waste, composting is the one of the feasible option of solid waste processing.

374. *Composting and it's Various Technologies*. Composting can be undertaken either by controlled or uncontrolled aerobic composting. Even in aerobic composting, there are

many types, depending on the method of aeration adopted. However, the following are the broad categories of composting that are most commonly used:

(i) Wind Row Composting,
(ii) Aerated Static Pile Composting,
(iii) In-Vessel Composting, and
(iv) Vermi Composting

Anaerobic technologies that produce methane rich gas are just emerging from development stage and the commercial viability and their long-term operational aspects are not clearly known. Thus, for small towns, Aerobic form of Wind Row Type Composting is the most appropriate option, as this kind of composting would require no major mechanization and the compost plant would be manually operated.

Table 8.11: Comparison of Composting Technologies

Category	**Composting Process**		
	Wind Row	**Aerated Static Pile**	**In-Vessel**
Capital Cost	Generally Low	Low in small system High in large system	Generally High
Operating Cost	Generally Low	High in sludge systems where bulking agents are used	Generally Low
Land Requirement	High	High	Low, Increases, if drying or curing is required
Air Control	Limited	Complete	Complete
Operational Control	Turning Frequency Amendment or Compost Recycle addition	Air Flow Rate	Air Flow Rate, Dynamic Agitation Amendment or Compost Recycle Addition
Sensitivity to Cold or Wet Weather	Highly Sensitive	Demonstrated in Cold and Wet Climate	Demonstrated in Cold and Wet Climate
Control of Odor	Depends on feedstock, Potential large area source	May be large area source, but can be controlled	Potentially Good
Potential Operating Problems	Susceptible to adverse weather	Air supply control is critical, potential for channeling or short circuiting of air supply	Potential for Channeling or short circuiting of air supply (plug flow), system may be mechanically complex

375. The disposal strategies for the ULB will do with, (i) Composting the organic fraction of the waste; (ii) Sanitary land filling of inorganic fraction of waste and the compost rejects; (iii) Educating the community on 4R strategy (Reduce, Reuse, Recycle and Recover).

376. The major municipal expenditure on solid waste management in the town goes into the salaries or wages of the sanitary workers and O&M (which also includes the cost of fuel)

of the vehicles. To understand the expenditure pattern on solid waste, an attempt has been made, by assuming a common disposal site for the three municipalities (Alandur, Pallavaram and Tambaram) and the implementation of solid waste proposals identified under CCP in a phased manner. Three options are worked out based on the following assumptions:

(i) Introducing door-to-door collection charge of Rs. 10 from each household until the year 2015. The collection charge shall be increased by 6 percent until 2020 and thereafter, every five years, an increase by 2 percent is assumed.

(ii) If the compost plant is handled by the private contractor, then he would charge Tipping Fees from the ULB to compost the solid waste. It is assumed that the contractor shall charge Rs. 300 per ton of waste until the year 2015 and thereafter, the fees shall be increased by 7 percent after every five years.

(iii) The compost shall be sold at the rate of Rs. 2.50 per kg.

(iv) The contract document for the private contractor shall be prepared in such a way that there shall be a profit sharing between the ULB and the private contractor over the sale of compost. Here, it is assumed that until the year 2015, the profit share for the ULB shall be 10 percent of the total income from the sale of the compost while the remaining 90 percent shall be for the private contractor. Thereafter, an increase of 2 percent in the ULB share is assumed after every five years.

377. The following three options are worked out:

(i) Option – I. **Table 8.12**, **8.13** and **8.14** tabulates Option – I. It is worked out assuming that the projects identified under CCP are implemented, the private contractor charges a Tipping Fee and the contractor agrees to a contract of profit sharing with the ULB from the sale of compost. The following tables detail out the indicative figures on the reduction in expenditure (Rs. per Ton) for the ULB towards solid waste handling.

Table 8.12: Option – I – Summary of Projected Expenditure towards Solid Waste Handling

Solid Waste Handling	**2005**	**2010**	**2015**	**2020**	**2026**
	Rs. / Ton	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*
Collection	883	721	675	635	593
Transportation	329	413	268	289	146
Disposal	-	736	757	779	436
Total	**1,213**	**1,870**	**1,700**	**1,703**	**1,175**

Source: Analysis

Table 8.13: Option – I – Summary of Projected Income towards Solid Waste Handling

Solid Waste Handling	**2005**	**2010**	**2015**	**2020**	**2026**
	Rs. / Ton	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*
Collection	-	-	-	-	-
Transportation	-	-	-	-	-
Disposal	-	38	45	53	60
Total	**-**	**38**	**45**	**53**	**60**

Source: Analysis

Table 8.14: Summary of Reduction of Projected Expenditure towards Solid Waste Handling

Solid Waste Handling	**2005**	**2010**	**2015**	**2020**	**2026**
	Rs. / Ton	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*
Collection	883	721	675	635	593
Transportation	329	413	268	289	146
Disposal	-	698	712	727	376
Total	**1,213**	**1,833**	**1,655**	**1,650**	**1,115**

Source: Analysis

(ii) Option – II. **Table 8.15**, **8.16** and **8.17** tabulate Option – II. It is worked out assuming that the projects identified under CCP are implemented, introducing the user charges for door-to-door collection from each household and the private contractor charges a Tipping Fee. The following tables detail out the indicative figures on the reduction in expenditure (Rs. per Ton) for the ULB towards solid waste handling.

Table 8.15: Option – II – Summary of Projected Expenditure towards Solid Waste Handling

Solid Waste Handling	**2005**	**2010**	**2015**	**2020**	**2026**
	Rs. / Ton	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*
Collection	883	721	675	635	593
Transportation	329	413	268	289	146
Disposal	-	736	757	779	436
Total	**1,213**	**1,870**	**1,700**	**1,703**	**1,175**

Source: Analysis

Table 8.16: Option – II – Summary of Projected Income towards Solid Waste Handling

Solid Waste Handling	**2005**	**2010**	**2015**	**2020**	**2026**
	Rs. / Ton	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*
Collection	-	75	186	244	340
Transportation	-	-	-	-	-
Disposal	-	-	-	-	-
Total	**-**	**75**	**186**	**244**	**340**

Source: Analysis

Table 8.17: Option – II – Summary of Reduction of Projected Expenditure towards Solid Waste Handling

Solid Waste Handling	**2005**	**2010**	**2015**	**2020**	**2026**
	Rs. / Ton	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*
Collection	883	646	489	391	253
Transportation	329	413	268	289	146
Disposal	-	736	757	779	436
Total	**1,213**	**1,795**	**1,514**	**1,459**	**835**

Source: Analysis

(iii) Option – III. **Table 8.18**, **8.19** and **8.20** shows Option – III. It is worked out assuming that the projects identified under CCP are implemented, introducing the user charges for door-to-door collection from each household, the private contractor charges a Tipping Fee and the contractor agrees to a contract of profit sharing with

the ULB from the sale of compost. The following tables detail out the indicative figures on reduction in expenditure (Rs. per Ton) for the ULB towards solid waste handling.

Table 8.18: Option – III – Summary of Projected Expenditure towards Solid Waste Handling

Solid Waste Handling	**2005**	**2010**	**2015**	**2020**	**2026**
	Rs. / Ton	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*
Collection	883	721	675	635	593
Transportation	329	413	268	289	146
Disposal	-	736	757	779	436
Total	**1,213**	**1,870**	**1,700**	**1,703**	**1,175**

Source: Analysis

Table 8.19: Option – III – Summary of Projected Income towards Solid Waste Handling

Solid Waste Handling	**2005**	**2010**	**2015**	**2020**	**2026**
	Rs. / Ton	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*
Collection	-	75	186	244	340
Transportation	-	-	-	-	-
Disposal	-	38	45	53	60
Total	**-**	**113**	**231**	**296**	**400**

Source: Analysis

Table 8.20: Option – III – Summary of Reduction of Projected Expenditure towards Solid Waste Handling

Solid Waste Handling	**2005**	**2010**	**2015**	**2020**	**2026**
	Rs. / Ton	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*	*Rs. / Ton*
Collection	883	646	489	391	253
Transportation	329	413	268	289	146
Disposal	-	698	712	727	376
Total	**1,213**	**1,758**	**1,469**	**1,406**	**775**

Source: Analysis

378. Although the above options are based on assumptions, the indicative value arrived at indicates that once the identified projects are implemented, the expenditure on solid waste handling by the ULB would come down.

379. *Operation and Management Schedule.* Adoption of an O&M Schedule, including options of using the private sector for O&M (e.g. management contract). In view of the criticality of the information on vehicle movement in assessing the collection and disposal efficiency of the local body, it is recommended that a standard register at the disposal site and transfer station be maintained. The register should contain information on each of the vehicle trips at both the locations and the origin of waste collection. The Schedule can be used for periodic maintenance of vehicles to differ costs. A summary of this information shall be prepared at the end of the day, to be verified by the head of the Health Department.

380. *Approach for Optimal Manpower Utilization.* Since the entire area of ULB is proposed for privatization, it is considered that there would not be any further requirement to induct conservancy workers. The existing street sweeping operations in the ULB are satisfactory

and to ensure operational efficiency of the system, the following measures are suggested, (i) Markets and other areas of the town shall be swept at least twice a day and sweeping should be done on Sundays and holidays in core areas and denser areas. (ii) Sweepings shall be collected separately as degradable and non-biodegradable waste and deposited in containers kept at various locations and de-silting of larger drains may be done by a separate crew equipped with appropriate implements.

381. *Institutional Strengthening and Capacity Building.* Recruitment of trained engineering personnel for solid waste management is an important issue confronting the ULB. It will be equally important to keep them technically updated. It is necessary that periodic training be imparted to the operations staff of the ULB.

5. Roads and Traffic Management

382. *Objectives*. The strategic objectives of road network improvements are (a) To improve the connectivity and accessibility within the town, (b) To improve the efficiency of road space, and (c) To reduce delays at the junctions and remove bottlenecks if any.

383. *Design Criteria*. Strategy shall focus on have 100 percent coverage of surfaced roads including up-gradation of roads. Out of 100 percent of surfaced roads, 85 percent would have bitumen surface, 5 percent of cement concrete and the remaining 10 percent would be WBM. The deficiencies in the ULB area with respect to the road infrastructure pertain mainly to the condition of the surface, width and density of the roads (presently, the roads density is 7.90 km/sq. km only). Formation of new roads based on the future requirement of the town is also envisaged under this project.

384. *Strengthening and Widening of Major Roads*. Emphasise on strengthening and widening of bus route roads (provision of minimum 7.0 m carriageway for bus routes less than 7.0 m carriageway and widening of major bus routes to 4 lane width) and other important arterial roads of the town, formation of link roads to the highways and other important roads, to address the issues of congestion and incomplete network. With due consideration to the growing traffic intensity, it has been proposed to upgrade the major links and bus routes. The components of improvement proposals include;

(i) Strengthening of existing two-lane carriageway and widening to four lanes with 50 mm BM and 25 mm SDBC with 1.5 m gravel shoulder.

(ii) Strengthening of existing two-lane carriageway with 50 mm BM and 25 mm SDBC with 1.5 m gravel shoulder.

385. *Asset Rehabilitation.* Upgrading shall be undertaken to extend, refurbish and enhance the roads. Plans would be phased to optimize cost and surface condition and shall include upgrading earthen roads to bituminous-topped roads. This phased up-gradation would considerably reduce the costs on new formations.

386. *Traffic Management Plan*. These shall focus on junction improvements, traffic management within core areas of the town, regional level proposals, parking and pedestrian facilities. It has been observed that, in most of the major roads in the town, pedestrians are forced to use the carriageway due to the absence or poor maintenance of

footpaths. Footpaths of 1.5 m width are proposed along the major roads where heavy pedestrian movements are observed. For traffic safety and convenience, appropriate signs, markings, lighting, guideposts are required to be provided on curves, intersections, public utility places, etc. Proposals for road furniture are made considering the importance of the road, safety and aesthetic. The design of the road furniture and quality proposed are of international standards. It is proposed to provide the following road furniture for the roadway:

(i) Kilometer stones on the major roads
(ii) 200 m Furlong stones
(iii) Road painting using reflectorised thermoplastic road paint
(iv) High intensity grade informatory, regulatory and cautionary signboards
(v) Street lights on all major roads within the municipal limits, which have been considered for improvement
(vi) High mast lighting at all major junctions
(vii) Stop signs
(viii) Place identification signs

387. Improvements to major and minor junctions are also proposed in terms of geometry, traffic management, lighting and signages.

388. To meet the needs and the safety of the pedestrians crossing the railway track near Neetish School at LC 15 (16/16-17), a box culvert type pedestrian subway is proposed. The ULB has to deposit the money with the railways and the railways shall carry out the construction work. On requisition to the Ministry of Railways, the ULB may be reimbursed 50 percent of the project cost from Railway Safety Fund. The total estimated cost for the subway is Rs. 177.0 lakh.

6. Street Lighting

389. *Sector Approach*. The local body has provided insufficient number of street light fixtures within the municipal limits as the spacing between the poles is 42 m, which is well above the prescribed spacing of 30 m. Thus, town is poorly lit. Given the high density of population within the ULB area, and limited area for development, it is proposed to emphasize on high power fixtures and tube lights. The assumed distribution based on the type of fixture is 80 percent for tube lights and 20 percent for high-powered fixtures. Important junctions will be provided with High Mast Lamp with power saver switches.

390. The strategic intervention in this sector is increasing the number of lampposts in the identified wards to reduce the average spacing between lampposts to 30 m. Further, measures are also to minimize the percentage of high power lamps and finally the power consumption charges. These measures are expected to pay back in the form of reduced and sustained O&M costs.

391. Further, to improve upon the O&M of the street lighting it is recommended to mechanize the system and involve private sector in the same. The mechanization would be towards introducing dimming systems during non-peak hours of operation to reduce the power consumption.

7. Urban Basic Services for Poor

392. *Design Criteria*. The ULB should increase the coverage of services in Low Income Areas and Slum Areas, through implementation of government schemes and other innovative programs with public participation. Given the high share of slum population, within the limited area for development, it is proposed to emphasize on provision of basic services, like water, sanitation and waste management, and improvement of quality of life through relocation and rehabilitation of slum areas.

393. The detail of service levels for future is presented in **Table 8.21**.

Table 8.21: Design Criteria and Target Service Level for Urban Slums

Description	Unit	Based on Design Norms
Water Supply Demand	Lpcd	90
Distribution Network Demand	Percent of Road Length	100
Sewer Network Demand	Percent of Road Length	100
Persons per Public Water Stand Post/Taps	Persons	75
Persons per Public Toilet Seat	Persons	30
Persons per Public Urinal	Persons	50
Daily Per Capita Waste Generation	Gms per Day	350
Size of each Dustbin/Container	cu. M	0.30
Spacing of Temporary Waste Storage Points	M	300
Per Capita Road Demand		
Population above 1,000	m	0.25
Population below 1,000	m	0.51
Percentage of Surfaced Roads in Municipalities	Percent	70
Percentage of Surfaced Roads to be Provided with Storm Water Drains	Percent	50

Source: Norms

394. *Sector Approach*. As a policy, notified/declared slums are considered for slum up gradation. The implementation of National Slum Development Program (NSDP) is in progress. The following types of infrastructure are provided: (a) roads and culverts, including concrete pavements for certain stretches; (b) surface/storm water drains; (c) water supply, with house service connections; (d) sewerage system with household latrines; and (e) external electrification.

395. In recent years, TNUIFSL has carried out a study on slums in Chennai Metropolitan Area and envisaged the capital investments needed for the upgradation of infrastructure facilities in slums. The study has been taken into consideration and updated as per the existing details for approved slums only. The infrastructure components considered under this project are the same as in NSDP.

396. Lack of basic infrastructure facilities in most of the slums is a key issue.

8. Other Municipal Projects

397. As per the Vision Plan, the local body has identified certain projects related to

improvements to parks, tree plantation along roadside and improvements to burial ground for which the investment size has been estimated by the local body and the same has been considered for this project.

B. The Consultative Process

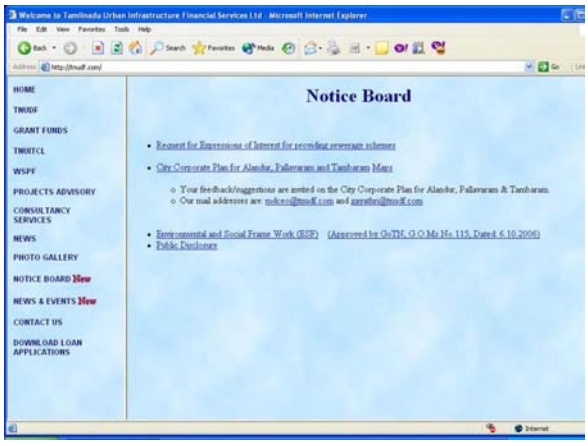
398. The entire exercise revolved around stakeholder participation at various stages to formulate a shared vision for each of the municipalities outlining:

(i) Development objectives and long term environmental, social, economic infrastructure, cultural and health goals, and
(ii) Program of institutional and policy priorities and a definition of sectoral and inter sectoral goals and development strategies.

399. The process followed was: (i) stakeholder identification, (ii) consultation/meetings with identified stakeholders to firm up vision and arrive at goals/quantifiable indicators, (iii) technical inputs from experts and firming up of vision and goals, and (iv) seeking broad consensus on regional and town-level vision and identified infrastructure priorities/projects. A series of meetings were conducted to define the vision and identify and prioritize the projects, which would help in improving the service levels in towns, and in turn, improve the pace of regional growth and development.

400. In Alandur, a series of meetings with stakeholders including the Commissioner, Chairperson, municipal and other officials were held. The focus of the discussions at the workshops and meetings was on the existing infrastructure situation and identified investments to meet the future requirement of the towns. It included the existing situation review, demand-gap analysis and key issues under each sector. The consultation workshops were also meant to create awareness among the stakeholders on the present situation with respect to various service sectors in the town. The consultations yielded specific suggestions from the stakeholders on the vision, approach and short term and long-term requirements of the town. The minutes of consultation meetings/workshops held at various stages of the report submission is given in **Annexures 8.2**, **8.3, 8.4** and **8.5**.

401. In addition to the consultation workshops, the Consultants identified key stakeholders who included government and non-governmental agencies/ institutions involved in service delivery, educational institutions, representatives of trade and industry, and social welfare groups. **Annexure 8.6** presents the list of Stakeholders met. The Consultants familiarized stakeholders with the purpose and process and expected outcomes of the City Corporate Plan (CCP), and built enthusiasm, understanding and commitment to the CCP process among all the stakeholders. Inputs from Stakeholders



Project Summary uploaded in official web page of TNUIFSL

have been an intrinsic part of CCP cum BP preparation. Issues raised /suggestions given by Stakeholders are presented in **Annexure 8.7**. To recive further comments from different section of people, on September 09, 2006, TNUIFSL uploaded the summary of the report in their web site (www.tnudf.com) for futher suggestions and comments.

402. Hence, the feedback from various stakeholders has strengthened the visioning process and helped in prioritizing the projects.

1. Priorities and Suggestions

403. A participatory approach was adopted to arrive at a shared vision and infrastructure needs identification/prioritization exercise for CCP and Business Plan preparation. Stakeholders discussed and gave suggestions on various issues and problems faced by the region and the town. The overall outcomes of the meetings / consultations are given below.

(i) Feasibility for use of quarries for storing water
(ii) Use of existing water bodies as localized source of water supply
(iii) Construction of additional public toilets
(iv) Solution to prevent flooding of areas during rainy seasons
(v) Poor condition of roads – Needs resurfacing of roads
(vi) Improve connectivity from town to state and national highways
(vii) Concern for road safety and need for pedestrian subway near Niteesh School at LC 15
(viii) Inadequacy of streetlights and need to improve the same
(ix) Improvements to parks
(x) Construction of electric burial ground
(xi) Addressing the problem of encroachments along main roads

2. Regional Level Vision

404. To sum up, stakeholder consultations yielded the following consensus on a vision for the region:

Chennai Metropolitan Area is likely to function as a single entity in 20 years' time, and has the potential to be an important economic centre in Southern India and the country as a whole. The need for:

(i) Infrastructure service delivery to keep pace with and sustain economic growth in the region, and

(ii) High service levels in the three towns, enabling them to attract population and business to the region, was therefore identified.

3. Town Level Vision

405. Consultations with citizens of the project town upheld the vision, "To make the town dynamic, vibrant, self-reliant and sustainable with all basic amenities, offering a better quality of life to residents."

406. Based on discussions with stakeholders, an attempt was made to arrive at quantifiable or measurable indicators that would facilitate monitoring of CCP implementation in the project town, as presented in **Table 8.22** below:

Table 8.22: Goals and Service Outcomes

Sr. No	Parameters	Alandur	Goal
		2005	2026
A. Water Supply			
1	Coverage of distribution network	100*%	100%
2	Per Capita Supply (Normal Season)	46.62 lpcd	90 lpcd
3	Quality of Water	Safe & in conformance with standards	Safe & in conformance with standards
B. Sewerage			
1	Coverage of Sewer Network	78%	100%
C. Storm Water Drain and Water Bodies			
1	Storm Water Drain Coverage (% of road length)	76.71%	150%
2	Rehabilitation of Existing Nallahs and Water Bodies		100%
D. Solid Waste Management			
1	Door to Door Collection		100%
2	Collection Performance for Handling of Waste	88%	100%
3	Scientific Disposal		100%
E. Traffic and Transportation			
1	Road Density	7.9 km/sq. km	15 km/sq. km
2	Percent of Municipal Surfaced Roads	89.12 %	100%
F. Street Lighting			
1	Initiatives in energy saving mechanisms	No	Yes
2	Average spacing of street poles	Avg 42 m	30 m or less in all wards
G. Basic Services for Poor			
1	Dependency on public taps/standposts	1,500 persons per unit	75 persons per unit
2	Dependency on public conveniences	496 persons per unit	30 persons per unit
3	Provision of Dust-bins	Not Provided	300 m
4	Average spacing of street poles	34 m	30 m

Note: * Figure given by the ULB

C. Project Identification for Service Delivery

1. Water Supply

(i) Sub-Project Components. To meet the water supply requirements for 2026, augmentation of additional headwork to meet the demand gap of 13.05 MLD at the rate of 90 lpcd, is proposed. Under this component, rehabilitation of existing distribution network of 86.59 km, provision of additional distribution network for a length of 41.76 km with road overlay of 31.76 km, construction of storage reservoir of 1.50 LL capacities and a water treatment plant of 9.54 MLD (2026), is proposed under this project.

(ii) Cost Estimates. **Table 8.23** illustrate the capital investment is estimated at Rs. 1,950.09 lakh.

Table 8.23: Projects Identified for Water Supply (2026)

Sr. No	Item	Quantity	Unit	Cost
				Rs. Lakh
A	***System Rehabilitation***			
1	Distribution Network	86.59	km	432.93
2	Leak Detection and Reduction Measures for Distribution Network	169.87	km	33.97
	Sub-Total (A)			***466.90***
B	***New Infrastructure***			
1	Augmentation of Headwork	13.05	MLD	1,043.70
2	Storage Reservoir	1.50	ML	8.18
3	Distribution Network	41.76	km	208.78
4	Road Overlay	31.76	km	79.41
5	Water Treatment Plant	9.54	MLD	143.12
	Sub-Total (B)			***1,483.19***
	Total (A+B)			**1,950.09**

Source: Analysis.

2. Sewerage and Sanitation

(i) Sub-Project Components. Under this component, it is proposed to provide sewer network for a length of 13.32 km for 2026 with road overlay.

(ii) Cost Estimates. The capital investment is estimated at Rs. 333.10 lakh is tabulated in **Table 8.24**.

Table 8.24: Projects Identified for Sewerage System (2026)

Sr. No	Item	Quantity	Unit	Cost
				Rs. Lakh
A	***New Infrastructure***			
1	Sewer Network	13.32	km	199.86
2	Road Overlay	13.32	km	133.24

Sr. No	Item	Quantity	Unit	Cost
				Rs. Lakh
	Sub-Total (A)			***333.10***
	Total			**333.10**

Source: Analysis.

3. Storm Water Drainage and Rehabilitation of Water Bodies

(i) Sub-Project Components - Drainage. Under this component, it is proposed to provide Pucca drains with proper connectivity. Rehabilitation of existing drains for a length of 94.48 km and desilting, strengthening of primary nallah (0.60 km) and diversion of floodwater from Airport area to Adyar River is also proposed under this project.

(ii) Cost Estimates - Drainage. **Table 8.25** furnishes the capital investment for the improvements and up gradation of storm water drains, which is estimated at Rs. 2,062.34 lakh.

Table 8.25: Projects Identified for Drains (2011)

Sr. No	Description	Value	Unit	Cost
				Rs. Lakh
A	***Rehabilitation***			
1	Rehabilitation of Existing Storm Water Drains	94.48	km	94.48
B	***Up gradation of Kutcha to Pucca***			
1	Pucca Open to Pucca Closed	14.54	km	72.72
C	***Formation of New Drains***			
1	New Pucca Open Drains	40.75	km	489.03
2	New Pucca Closed Drains	77.55	km	1,318.28
D	***Primary Drains***			
1	Desilting & Strengthening of Primary Drains	0.60	km	4.50
E	***Diversion of Floodwater from Airport to Adyar River***			83.33
	Total			**2,062.34**

Source: Analysis.

(iii) Sub-Project Components – Water Bodies. Under this component, it is proposed to improve the four existing water bodies viz., Nanganallur Temple Tank, Easwaran Sannathi Kulam, Mankulam and Adambakkam Eri. The improvements include the desilting, strengthening and beautification of the water bodies.

(iv) Cost Estimates - Water Bodies. The capital investment for the improvements of existing water bodies and supply to the water supply zones is summarize in **Table 8.26** (which includes the conveying main, collection sump, pumping machinery, treatment facilities, etc.) is estimated at Rs. 83.53 lakh.

Table 8.26: Estimated Cost for Improvements to Lakes

Sr. No	Name of Tank	Improvements to Lakes	Infrastructure for Supply to OHTs
		Rs. Lakh	*Rs. Lakh*
1	Nanganallur Temple Tank	2.51	6.47
2	Easwaran Sannathi Kulam	0.54	6.95
3	Mankulam	1.70	9.80
4	Adambakkam Eri	28.50	27.07
	Total	**33.24**	**50.29**

Source: Analysis.

4. Solid Waste Management

(i) Sub-Project Components. Under this component, it is proposed to develop a comprehensive solid waste management system for the town. House-to-house waste collection is proposed. The primary collection comprises of tricycles and pushcarts. The total requirement for primary collection including street sweeping and drain desilting has been estimated as 119 tricycles (with 6 bins each) and 241 pushcarts (after deducting the supply order issued by the ULB for 95 tricycles and 16 pushcarts). The secondary collection and transportation system consists of 14 dumper bins of 7.0 cum capacity each and 7 dumper placers. The primary, secondary collection and transportation equipment is estimated to cater the needs till 2026. To treat and dispose the waste safely, it is proposed to develop an integrated compost and landfill facility for the town. The integrated plant has been designed to treat and dispose ultimate waste generation of about 101.10 tons by the year 2026.

(ii) Cost Estimates. **Table 8.27** points out the capital investment, which is estimated at Rs. 580.58 lakh.

Table 8.27: Projects Identified for Solid Waste Management (2026)

Sr. No	Item	Quantity	Unit	Cost
				Rs. Lakh
A	***New Infrastructure***			
I.	**Waste Collection and Transportation Equipment**			
1	Tri-cycles (with 6 Bins Each)	119	Nos	9.52
2	Push Carts	241	Nos	17.35
3	Dumper Bins (7 cum)	14	Nos	7.70
4	Dumper Placers	7	Nos	70.00
	Subtotal (I)			***104.57***
II.	**Compost Plant Development and Sanitary Landfill Site Development**			
1	Compost Yard	61.00	Tons	152.50
2	Landfill	40.44	Tons	323.51
	Subtotal (II)			***476.01***
	Total (I+II)			**580.58**

Source: Analysis.

5. Roads and Traffic Management

(i) Sub-Project Components. Under this component, **Table 8.28** elaborates the proposal to upgrade the existing roads to cement concrete and a bitumen surface, formation of new roads based on the future growth (2011) of the town, widening, and strengthening of the existing internal roads, bus routes and the major links, is proposed. **Table 8.29** represents the improvements to the traffic and transportation related components considered under this project.

Table 8.28: Proposed Improvements to Bus Routes and Major Links

Sr. No	Road Name	Length	Importance of Road	Existing Width	Proposals
		m		*m*	
1.	M.K.N. Road				
1.1	From Anna Salai to Station	2,000	Bypass road to Kathipara junction starts from Anna Salai ends on G.S.T. Road on other side of Kathipara junction	5.5	Widening and Strengthening of existing two lane carriageway to four lane with 50 mm BM and 25 mm SDBC with 1.5 m gravel shoulder
1.2	From Station to G.S.T. Road	1,000		7.0	
2.	Medavakkam Main Road	900	State highway connecting Alandur and Medavakkam	7.0	Widening and Strengthening of existing two lane carriageway to four lane with 50 mm BM and 25 mm SDBC with 1.5 m gravel shoulder
3.	Nanganallur 4th Main Road	800	Bus route		Strengthening of existing two lane carriageway with 50 mm BM and 25 mm SDBC with 1.5 m gravel shoulder
4	MGR Road	2,000			Strengthening of existing two lane carriageway with 50 mm BM and 25 mm SDBC with 1.5 m gravel shoulder
5	Muvarasanpattu Main Road	1,000			Strengthening of existing two lane carriageway with 50 mm BM and 25 mm SDBC with 1.5 m gravel shoulder
6	Nanganallur 5th Main Road	1,200			
7	Nanganallur 6th Main Road	1,500			

Sr. No	Road Name	Length	Importance of Road	Existing Width	Proposals
		m		*m*	
	Nanganallur 1st Main Road	1,600			
8	Nehru Main Rd	2,000			
9	Nanganallur 2nd Main Road	2,500	Bus route		Strengthening of existing two lane carriageway with 50 mm BM and 25 mm SDBC with 1.5 m gravel shoulder
10	Karunekar Street	1,400			
11	Vembuli Amman Koil Street				
11.1	From Junction to Veeramamunivar Street	500	Bus Route	5.5	Strengthening of existing two lane carriageway with 50 mm BM and 25 mm SDBC with 1.5 m gravel shoulder
11.2	From Veeramamunivar St to Nanganallur 4th Main Road	400		7.0	
12	Station Road				
12.1	From M.K.N. Road Junction to Gilani Street	400	Link for accessing Railway Station from G.S.T. Road	5.5	Strengthening of existing two lane carriageway with 50 mm BM and 25 mm SDBC with 1.5 m gravel shoulder
12.2	From Gilani Street to G.S.T. Road	300		7.0	
13	Meenambakkam Road	1,000	Part of Ring Road connecting Velachery to G.S.T. Road		

Table 8.29: Proposed Improvements to Major Junctions

Sr. No	Junction	Type of Junction	Road Leads to	Existing Condition	Proposals
1	Anna Salai- M.K.N. Road	T Junction	Anna Salai & Alandur	Turning Radius is not Provided Sub-standard Channelisation is provided Junction lighting absent Absence of proper direction boards and signages	Improvement of Geometrics Proper Channelisation High mast Lighting Proper Traffic signs and lane marking, Pedestrian Crossings
2	G.S.T. Road- Station Road Junction	T Junction	G.S.T. Road & Alandur	Turning Radius is not Provided Sub-standard Channelisation is provided Junction lighting absent Absence of proper direction boards and signages	Improvement of Geometrics Proper Channelisation High mast Lighting Proper Traffic signs and lane marking, Pedestrian Crossings
3	Station Road- M.K.N. Road Junction	4- legged junction	Anna Salai, G.S.T. Road and Alandur	Turning Radius is not Provided Sub-standard Channelisation is provided Junction lighting absent Absence of proper direction boards and signages	Improvement of Geometrics Proper Channelisation High mast Lighting Proper Traffic signs and lane marking, Pedestrian Crossings
4	Medavakkam Rd-Karuneekar Street Junction	4- legged junction	Nanganallur, Anna Salai, Madipakkam & Medavakkam	Turning Radius is not Provided Sub-standard Channelisation is provided Junction lighting absent Absence of proper direction boards and signages	Improvement of Geometrics Proper Channelisation High mast Lighting Proper Traffic signs and lane marking, Pedestrian Crossings
5	Medavakkam Road-Moovarasanpettu Road Junction	4- legged junction	Anna Salai, Madipakkam & Medavakkam	Turning Radius is not Provided Sub-standard Channelisation is provided Junction lighting absent Absence of proper direction boards and signages	Improvement of Geometrics Proper Channelisation High mast Lighting Proper Traffic signs and lane marking, Pedestrian Crossings

The minor junctions identified for the improvements are:

(i) Nanganallur Ist Main Road - Nanganallur 4th Main Rd
(ii) Nanganallur Ist Main Road - Nanganallur 5th Main Rd
(iii) Nanganallur 5th Main Road - Nanganallur 6th Main Rd
(iv) Nanganallur 4th Main Road - Nanganallur 6th Main Rd
(v) Nanganallur 5th Main Rd - MGR Road
(vi) MGR Road - Nehru Main Road

The following roads are proposed with pedestrian footpaths and the on-street parking:

(i) Medavakkam Main Road
(ii) M.K.N. Road
(iii) Mandi Street
(iv) Karunekar Street
(v) Station Road

To meet the needs and the safety of the pedestrians crossing the railway track near Neetish School at LC 15 (16/16-17), a box culvert type pedestrian subway is proposed.

Map 8.1: Proposed Improvements of Roads (Bus Routes) and Traffic Management

(ii) Cost Estimates. The capital investment is estimated at Rs. 11,025.43 lakh is tabulated in **Table 8.30**.

Table 8.30: Projects Identified for Roads and Traffic & Transportation

Sr. No	Item	Value	Unit	Cost
				Rs. Lakh
I	**Roads**			
A	*Up gradation (Excludes the Bus Route and Major Links)*			
1	BT to Concrete	1.73	Km.	34.61
2	WBM to Black Top	7.50	Km.	112.44
3	Earthen to Black Top	3.87	Km.	77.49
B	*New Formation (Excludes the Bus Route and Major Links)*			0
1	Concrete	1.41	Km.	66.24
2	Black Top	24.74	Km.	791.60
3	WBM	4.52	Km.	63.29
C	*Widening/ Strengthening (Excludes the Bus Route and Major Links)*	36.29	Km.	254.06
D	*Widening/ Strengthening for the Bus Route and Major Links (Maintained by Municipality)*	16.60	Km.	457.00
	MKN Road	0.2	Km.	1000.00
	At Meenambakkam Railway Station near Jain College	0.6	Km.	1500.00
	Sub – Total (I)			***4356.73***
	Highway Department and Others			
E	*Widening/ Strengthening of Bus Route and Major Links (Maintained by Highway Department)*	3.90	Km.	780.00
F	Subway on GST road MKN road – Intersection			5658.00
G	Widening Alandur Road to 4 lane	1.2		
H	Connectivity to Velachery Road / bypass	2.1		
I	Chakrapani Street – Improvement	3.7		
J	Vandikaran Street – Improvement			
K	Velachery Tank bund Road			
	Sub-Total (II)			***6438.00***
II	**Traffic and Transportation**			
A	*Junction Improvement*	11	Nos.	40.00
B	*Parking Facility*	1.40	Km.	3.50
C	*Footpath (1.5 m Wide)*	5.10	Km.	10.20
D	*Subway at LC 15 near Neetish School*	1	No.	177.00
	Sub-Total (III)			***230.70***
	Total (I+II+III)			**10925.43***

Note: *The cost excludes land acquisition cost

Source: Analysis.

6. Street Lighting

(i) Sub-Project Components. Under this component, it is proposed to provide proper lighting facilities with an average spacing of 30 m between the poles. For existing roads, 766 tube lights, 104 high power lamps and 3 high mast lamps with power saver switches at important junctions are proposed. To meet the future demand of new roads for 2011, 818 tube lights, 206 high power lamps and 4 high mast lamps with power saver switches are proposed. Multi-utility underground duct is also proposed for the major bus route roads.

(ii) Cost Estimates. The capital investments estimated at Rs. 423.56 lakh are presented in **Table 8.31** and **Table 8.32**.

Table 8.31: Projects Identified for Streetlights (2011)

Sr. No	Fixture	Value	Unit	Cost
				Rs. Lakh
A	***Distribution by Type (For Existing Roads)***			
1	Tube Light	766	Nos.	34.47
2	High Power	104	Nos.	9.36
3	High Mast Lamps	3	Nos.	12.91
4	Power Saver Switches	3	Nos.	0.13
	Sub-Total (A)			***56.87***
B	***Distribution by Type (For New Formation of Roads)***			
1	Tube Light	818	Nos.	200.41
2	High Power	206	Nos.	59.74
3	High Mast Lamps	4	Nos.	17.91
4	Power Saver Switches	4	Nos.	0.18
	Sub-Total (B)			***278.24***
	Total (A+B)			**335.10**

Source: Analysis.

Table 8.32: Cost for Underground Multi-Utility Duct

Roads	**Cost**
	Rs. Lakh
Bus Route and Internal Roads (Maintained by Municipality & Highway Department)	3000.00
Total	**3000.00**

Source: Analysis.

7. Urban Services for Poor

(i) Sub-Project Components. There are 22 declared slums in Alandur having a population of 51,500, constituting roughly 35 percent of the total population. Declared slums in the town are considered for slum up gradation.

(ii) Cost Estimates. The capital investment estimated at Rs. 1,252.22 lakh is presented in **Table 8.33**.

Table 8.33: Projects Identified for Upgradation of Slum Infrastructure

Sr. No	Component	Value	Unit	Cost
				Rs. Lakh
1	No. of Public Taps / Hand pumps	651	Nos.	227.85
2	No. of Public Toilet Seats	1,614	Nos.	807.00
3	No. of Public Urinals	1,032	Nos.	175.44
4	No. of Dustbins/Temp. Waste Storage Points	189	Nos.	7.18
5	Roads and Pavements	2.50	Km	9.51
6	Storm Water Drains	0.83	Km	12.51
7	Streetlights	159	Nos.	12.72
	Total			**1,252.22**

Source: Analysis.

8. Other Municipal Projects

(i) Sub-Project Components. As per the Vision Plan, the local body has identified projects related to 4 parks (Officers Colony Adambakkam, Voltas Colony, Nanganallur, Bharath Nagar, Adambakkam and Independency Day Park), tree plantation along roadside and improvements to burial ground located at Thillai Ganga Nagar 1st Main Road.

(ii) Cost Estimates. The capital investment for other municipal projects is estimated at Rs. 41.00 lakh and is tabulated in **Table 8.34**.

Table 8.34: Projects Identified by the ULB

Sr. No	Description	Value	Unit	Cost
				Rs. Lakh
1	Improvements to Parks	4	Nos.	24.00
2	Tree Plantation		Nos.	8.00
3	Improvements to Burial Ground	1	Nos.	9.00
	Total			**41.00**

Source: Analysis.

9. Total Investments for Identified Projects

407. To improve and meet the future demand for the town's infrastructure facilities, the total investment is estimated at Rs. 17,840.31 lakh is furnished in **Table 8.35**.

Table 8.35: Total Investment Identified for Alandur Town

Sr. No	Component	Cost
		Rs. Lakh
1	Water Supply	1,950.09
2	Sewerage and Sanitation	333.10
3	Storm Water Drainage	2,062.34
4	Water Bodies	0
	Improvements to Water Bodies	33.24
	Supply Mechanism to OHTs	50.29
5	Solid Waste Management	580.58
6	Roads	0
	Municipal Roads	4,356.73
	Highway Department Roads	6,438.00
	Under Ground Multi-Utility Duct	3000.00
7	Traffic Management	0
	ULB Share	53.70
	Railway Share	177.00
8	Street Lighting and Under Ground Service Dust	
	Street Poles and Fixtures	335.10
9	Urban Services for Poor – Slums	1,252.22
10	Other Projects	41
	Total	20,663.39

Source: Analysis.

IX. ASSET MANAGEMENT

A. Overview

408. The basic objective of asset management is to define and describe the key elements, and principles of an Asset Management System. This chapter will deal with the elements that are essential in an asset management program for movable and immovable infrastructure, more specifically road networks, sidewalks, water supply networks, pumping, storage, treatment facilities, and storm water drains.

409. While the need for Asset Management is clearly felt, it is equally important to have appropriate management information on asset condition, infrastructure costs and performance, and the consolidated requirements for repairs and maintenance, as well as appropriate maintenance standards.

1. Asset Inventory

410. The first stage of implementation of an asset management program for municipal infrastructure relies on the essential element of inventory. For each element in each category of infrastructure it is fundamental to know about all as mentioned below:

(i) Available Assets
(ii) Location of Asset
(iii) Age of Asset
(iv) Quantity of Asset
(v) Physical Characteristics of Asset

411. Infrastructure Assets will include all movable and immovable equipment, properties including but not restricted to sectors like water supply drainage, sewerage, solid waste management, roads, street lighting etc. Unlike other assets of the municipality, these assets undergo constant use, wear and tear, addition, repair, etc. This correspondingly changes their values and hence, a constant value updating is necessary.

2 Information of Municipal Assets

412. *Water Supply*. The water supply assets basically comprise of all the assets from the headworks, treatment plant, sump, transmission mains, pumping mains, feeder mains, distribution mains and sub mains, including all valves, connections, meters and all related facilities for the efficient delivery service of water.

413. As Alandur Municipality is responsible for the distribution of water supply only, the assets related to the headwork and transmission does not fall under the list of ULB assets. The details of municipal maintained water supply distribution network are detailed out in **Annexure 9.1**. The distribution of water supply is met with 169.87 km of pipeline laid across the town. The municipality operates its water supply system through sluice valves.

They are around 133 in number. The age of valves, correspond to the age of the distribution network. However, it is the reliability over the age of these valves that is more important. The fact that most of the valves in the town are operational and functional through minimal repairs makes the reliability high.

Table 9.1: Details of Valves

Diameter	**Material**	**Number of Valves**	**Distribution**
Mm		*Nos.*	*%*
80	C.I	54	40.60
100	C.I	52	39.10
150	C.I	8	6.02
200	C.I	9	6.77
250	C.I	5	3.76
300	C.I	4	3.01
400	C.I	1	0.75
Total		**133**	**100.00**

Source: Alandur Municipality

414. In addition, the ULB has 6 storage reservoirs, 241 bore wells, 26 open wells and 236 public taps spread in all the wards of the town.

415. *Sewerage and Sanitation*. The town has a sewerage system with 120 km of sewer network. The municipal owned assets for sanitation system consist of public toilets and pay-and-use toilets. The ULB has provided 2,200 low cost sanitation units, 5 public toilets constructed under ISP and 9 under VAMBAY and 3 are community latrines.

416. *Land and Buildings*. The local body maintains both remunerative and non-remunerative assets. The ULB also possess vacant lands which could be given on lease to enhance their revenue income (elaborated in **Chapter IX**). The details on land availability with the municipality are given in **Table 9.2**. The municipal land has been categorized into Low Value, Medium Value and High Value based on the unit rate.

Table 9.2: Categorization of Land with respect to Unit Rate

Land Value	**Criteria**
Low Value	< 200
Medium Value	201-400
High Value	401 and Above

Source: Analysis

417. The maximum land used under general use has medium unit rate value while six lands have unit rates more than Rs. 401 per sq. m.

418. There are 25 vacant lands with the ULB, valuing to about Rs. 55 lakh.

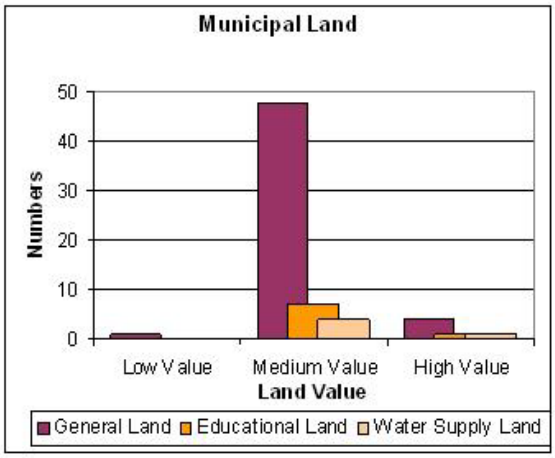


Table 9.3: Distribution of Land with respect to Unit Rate of Land

Land	Total	Low Value	Medium Value	High Value
General Land	53	1	48	4
Educational Land	8	-	7	1
Water Supply Land	5	-	4	1
Total	**66**	**1**	**59**	**6**

Source: Analysis

419. The ULB own buildings some of which are as old as 20 years. These buildings attract monthly rental incomes and deposits to the local body. The construction cost and the building value as on March 31, 1999 is given the following **Table 9.4**.

Table 9.4: Details of Municipal Buildings

Name of Building	Site Area	Plinth Area	Construction Cost	Year of Construction	Building Value as on 31/03/99
	Sq. m	*Sq. m*	*Rs. Lakh*		*Rs. Lakh*
Municipal Office Building	7,900	1,725	31.40	1987	15.31
Office cum Shopping Complex	8,965	1,675	46.57	1993	34.23
Super Bazaar		2,966	82.45	1993	60.61
Kalyana Mandapam		986	5.51		2.33
Kalyana Mandapam	2,350	600	9.39	1994	6.99
Elementary/Middle School Building	15,928	2,850	-		16.28
Noon Meal Centre	24,532	4,864	-		-
Ward Office	7,300	238	3.31		1.34
Public Latrine	1,327	435	11.39		8.27
TV Room	2,950	25	0.61		0.41
Building and Burial Ground	96	96	2.44		1.62
Hospital Building	11,568	1,536	36.60		23.67
Pump Room	40	20	0.50		0.27
Slaughter House	378	126	0.05		0.01
Total	**83,333**	**18,142**	**230.21**		**171.33**

Source: Schedule Register, Alandur Municipality

420. The annual revenue income from the remunerative assets (mainly kalyana mandapams and shopping complexes) works out to about Rs. 27 lakh (2004-05).

Table 9.5: Details of Municipal Owned Land

Sr. No	Location	Ownership	Status of Land	Area	Unit Rate (March, 1999)	Total Value
				Sq. m	*Rs. Per Sq. m*	*Rs.*
A	**General Land**					
1	Co-operative Nagar (Ward 15)	Gifted	Vacant (Fenced by Municipality)	858.00	222	190,476
2	N.C.B.S. 6th Main Road (Ward No. 20)	Gifted	Park (Compound Wall Constructed by Municipality	4,175.00	492	2,054,100
3	Hindu Colony (Ward 27)	Gifted (Market Site)	Vacant	2,669.00	222	592,518
4	Thiruvalluvar Street (Ward 33)	Owned	Vacant	35.00	286	10,010
5	Kannan Colony (Ward 35)	Owned	Playground	2,450.00	270	661,500
6	Morrison Street (Ward 35)	Gifted	Vacant	350.00	382	133,700
7	Sannathi Street (Ward 9)	Natham	Ward Office	203.50	384	78,144
8	Nehru Nedunchalai (Ward 28)	Road	NMC Building	3,508.00	481	1,687,348
9	M.K.N. Lane	Gifted	Ward Office	200.00	436	87,200
10	Ellamuthu Amman Koil Street (Ward 31)	Owned	Ward Office	290.00	279	80,910
11	Balakrishnapuram (Ward 6)	Kuttai	Municipal Kalyan Mandap Building	2,350.00	289	679,150
12	New Street (Ward 42)	-	Municipal Office Building	5,625.00	306	1,721,250
13	New Street (Ward 42)	-	Super Bazar Building	7,900.00	306	2,417,400
14	New Street (Ward 42)	Owned	Municipal Kalyan Mandap Building	1,709.00	306	522,954
15	Maduvankarai (Ward 2)	Owned	Municipal T.V. Room	500.00	393	196,500
16	M.K.N. Road (Ward 36)	Channel Poramboku	Municipal Public Latrine	107.00	256	27,392
17	Raja Street	Owned	Municipal Public Latrine	375.00	282	105,750
18	Appavu Street (Ward 40)	Owned	Municipal Hospital	150.00	309	46,350
19	Sowri Street (Ward 41)	Owned	Municipal Hospital	2,908.50	332	965,622
20	New Colony (Ward 34)	Owned	Municipal Hospital	1,800.00	332	597,600
21	N.C.B.S. 4th Main Road (Ward 19)	Road	Municipal Karumathi Mandap	96.00	494	47,424
22	Sowri Street (Ward 42)	Owned	Municipal Karumathi Mandap	710.00	332	235,720

Sr. No	Location	Ownership	Status of Land	Area	Unit Rate (March, 1999)	Total Value
				Sq. m	*Rs. Per Sq. m*	*Rs.*
23	Thalakkanancheri (Civil Aviation Colony)	Gifted	Vacant (Park) - Presently vaccant only	400.00	237	94,800
24	Thalakkanancheri (The National Co-operative Society Limited Lakshmi Nagar)	Possession from 1974	Vacant	550.00	293	161,150
25	Thalakkanancheri (SBI Layout Nehru Neduns)	Possession from 1974	Vacant	1,600.00	284	454,400
26	Thalakkanancheri (Voltas Colony Extension Ramakrishnan Layout)	Possession from 1974	Vacant	240.00	297	71,280
27	Thalakkanancheri (Lakshmi Nagar)	Possession from 1974	Vacant - Presently used as park (compound wall constructed by municipality)	900.00	298	268,200
28	Thalakkanancheri (Voltas Colony)	Possession from 1974	Vacant	625.00	297	185,625
29	Thalakkanancheri (Voltas Colony Extension)	Possession from 1974	Vacant	800.00	269	215,200
30	Thalakkanancheri (Lakshmi Nagar)	Possession from 1974	Vacant	450.00	272	122,400
31	Thalakkanancheri (Sri Ram Colony 100 ft Road)	Possession from 1974	Vacant	280.00	284	79,520
32	Thalakkanancheri (National Co-operative Building)	Possession from 1974	Vacant	190.00	298	56,620
33	Thalakkanancheri (Teachers Colony)	Village Site	Vacant	200.00	261	52,200
34	Officers Colony, Adambakkam (Ward 5)	Possession from 1974	Vacant	1,038.00	280	290,640
35	SBI Colony, Adambakkam (Ward 5)	Possession from 1974	Vacant	1,490.00	286	426,140
36	New Colony South Sector, 2nd Street Adambakkam (Ward 13)	Gifted	Vacant	690	342	235,980
37	Balaji Nagar Part 1, Balaji Nagar Main Road, Adambakkam (Ward 15)	Possession from 1974	Vacant	467.00	298	139,166
38	Balaji Nagar Part 2, Adambakkam (Ward 15)	Possession	Vacant	724.00	298	215,752

Sr. No	Location	Ownership	Status of Land	Area	Unit Rate (March, 1999)	Total Value
				Sq. m	*Rs. Per Sq. m*	*Rs.*
		from 1974				
39	Railway Colony Near Raghava Avenue, Adambakkam	Possession from 1974	Vacant	283.00	307	86,881
40	Railway Colony Near Nilamangai Nagar, Adambakkam (Ward 16)	Possession from 1974	Vacant	1,185.00	296	350,760
41	Thillai Ganga Nagar, 33 and 34 street (Ward 18)	Possession from 1974	Vacant	446.00	322	143,612
42	Thiruvalluvar Nagar, Alandur (Ward 36)	Possession from 1974	Vacant	1,718.00	339	582,402
43	T.N.G.O Colony, Adambakkam (Ward 10)	Possession from 1974	Vacant	1,100.00	343	377,300
44	N.C.B.S 11th Street	Possession from 1974	Vacant	475.00	290	137,750
45	Margo Street (Ward 2)	-	Vacant	378.00	290	109,620
46	Vembuliamman Koil Street (Ward 1)	Road	NMC Building	152.00	279	42,408
47	Karikalan Nagar 1st Street	Road	NMC Building	76.00	395	30,020
48	Parthasarathy Nagar 1st Street	Road	NMC Building	475.00	348	165,300
49	Mannadiamman Koil Street	Owned	NMC Building	382.00	224	85,568
50	Parthasarathy Nagar 8th Street (Ward 11)	Possession from 1974	NMC Building	221.00	348	76,908
51	Surendra Nagar, Adambakkam (Ward 14)	Possession from 1974	NMC Building	417.00	324	135,108
52	Lloyds Avenue, Adambakkam (Ward 10)	Possession from 1974	NMC Building	195.00	343	66,885
53	Nilamangai Nagar	Possession from 1990	-	61.32	-	-
	Sub-Total (A)			**57,177.32**		**18,598,613**
B	**Educational Land**					
1	Karuneegar Street (Ward 9)	Owned	Municipal School Building	1,500.00	468	702,000
2	North Pudu Street	Owned	Municipal School Building	416.00	325	135,200
3	K.K. Nagar (Ward 21)	Owned	Municipal School Building and	3,270.00	367	1,200,090

Sr. No	Location	Ownership	Status of Land	Area	Unit Rate (March, 1999)	Total Value
				Sq. m	*Rs. Per Sq. m*	*Rs.*
			NMC			
4	Gandhi Salai (Ward 30)	Owned	Municipal Hospital Building	1,390.00	286	397,540
5	Jal Street (Ward 41)	Owned	Municipal School Building and NMC	1,495.00	308	460,460
6	New Street (Ward 42)	Owned	Municipal School Building and NMC	1,637.00	306	500,922
7	Thalakkanancheri	Owned	Municipal School Building	3,270.00	261	853,470
8	Ram Nagar Nanganallur	Owned	Municipal School Building	1,204.00	290	349,160
	Sub-Total (B)			**14,182.00**		**4,598,842**
C	**Water Supply Land**					
1	Mastan Gori Street (Ward 8)	Owned		1,515.00	317	480,255
2	Erikarai Street, Parthasarathy Nagar 10th Street (Ward 11)	Gifted		650.00	348	226,200
3	N.C.B.S 29th Street (Ward 18)	Gifted		1,395.00	366	510,570
4	Nehru Nedunchalai (Ward 28)	Gifted		680.00	481	327,080
5	New Street (Ward 42)	Owned		3,546.00	306	1,085,076
	Sub-Total (C)			**7,786**		**2,629,181**
	Total			**79,145.32**		**25,826,636**

Source: Schedule Register, Alandur Municipality

421. *Other Assets*. Other assets of the municipality include the solid waste management facilities of disposal site at Pallikarnai (15 acres) and a fleet of 11 vehicles utilized by various departments of the ULB. It currently also owns 35 tricycles with bins, etc., for the primary collection.

422. The ULB also owns about 133.95 km of roads of which 81 percent is bitumen surface. Approximately 3,664 street light poles and the associated fixtures also form the assets of the municipality.

423. The municipality needs to take a policy decision on the product-mix they wish to have with respect to its assets, both remunerative and non-remunerative. The vacant municipal lands in Alandur are allocated specific uses under the Master Plan, which precludes any change in use. The option of leasing of such lands to the private sector for commercial development though considered by the consultants, had to be ruled out on these grounds. Hence, it is recommended that such lands be retained as open areas / lung spaces of the town. The possibility of private sector participation in the development and management of the larger parks/water bodies/lung spaces needs to be considered as a potential revenue generating option. This may be achieved through the development of theme parks on such lands, open-air exhibition spaces, drive-in theatre, etc. – options that would not require the areas to be fully ‘built-up’. The implications / modalities of such change need to be further discussed with stakeholders. The revenue earning potential of options that are likely to be considered could then be worked out. For social infrastructure like school buildings, tie-ups with NGOs may be considered. Asset management plans would have to be prepared to ensure maximization of returns from remunerative assets and maintenance and management of non-remunerative assets.

X. RESOURCE MOBILIZATION INITIATIVES

A. Scope in Savings and Revenue Generation

1. Infrastructure

424. The main objective of the Business plan is to generate revenue through the non-traditional sources with minimum investments. There is enormous scope to control expenditure in water supply, solid waste management and street lighting sector etc. The analysis will find the options for the replacement of inefficient existing pumps in terms of energy efficiency through Cost Benefit Analysis. Regarding street lighting, the analysis will be towards introducing technology of street lighting with the help of private participation.

2. Assets

425. The major assets for the ULB's are the immovable assets. This is one potential area to develop the asset values and increase the municipal revenue. The analysis includes find out the various options to make use of vacant lands on BOT basis and revising of rents for the remunerative assets up to market values.

B. Sector Wise Savings

1. Water supply

426. *Energy Saving*: A significant number of municipalities in Tamil Nadu rely on motive power for conveying water, either through significantly long distances (typically source to distribution point) or to meet contour gradient requirements within the distribution system. Pump Stations or Booster Stations achieve this objective by providing the necessary motive power to increasing the energy of the fluid to ensure water supply and distribution at required pressure and quantity.

427. Smooth functioning of the pump stations is highly critical, since they operate more than 12 hours and virtually form the heart of a system. Such pump stations consume a significant amount of electricity and result in high O & M costs for the Municipality that owns and operates such pumping system. It is common that over time, pumps and motors undergo severe wear and tear resulting in reduced operating efficiencies. This directly translates into higher power consumption for the same amount of output or even reduced output, which further results in a tangible increase in spending.

428. Energy Audit is an effective management tool to combat and control spiraling O &M and energy costs and to enable the municipality effectively uses the system at the optimum cost possible. There is scope to control expenditure with effective energy management, leak detection and unauthorized tap connections. Since the Metro Board operate and maintain the bulk water supply for the town and hence no energy savings are envisaged.

429. Unaccounted for water (UFW) is the difference between the volume of water delivered into the distribution system and the water sold/ billed or accounted for by legitimate consumption. UFW includes losses, physical losses and non-physical or commercial losses.

430. Waste is that water which having been obtained from a source and put into a supply and distribution system and into consumers' installation leaks or is allowed to escape or is taken there for no useful purpose. Leakage is that part of waste that leaks or escapes other than by deliberate or controllable action. Leakage from reservoir, mains, communication pipes and consumers' supply pipes are of major concern for water managers. The above waste results in the reduction in the revenue to the urban local body. Thus, the UFW is also referred to as non-revenue water. If there is any unauthorized /illegal connections in the town that needs to be regularized, this would generate significant revenue for the Municipality. However, this cannot be quantified accurately in the absence of data on the number of illegal connections in the town and hence municipality should take necessary action towards legalizing the illegal connections in the town.

2. Street lighting

431. In street lighting sector, there is large scope to minimize the expenditure towards power consumption and operation and maintenance. Related to street lighting the data has been collected as follows:

(i) Number and types of street lighting and its operation and maintenance
(ii) Expenditure towards salaries and Power charges

432. *Energy Savings.* This section reviews the current level of energy consumption, maintenance and establishment charges incurred in street light maintenance. Municipality has already initiated private sector participation in street lighting maintenance in Alandur to curtail energy consumption. As the municipality was incurring high expenses on the operation and maintenance of streetlights, entire town's operations and maintenance have been privatized since 2004. The scope of work for the private contractor includes switching on and off of the streetlights, maintenance of fixtures based on unit rate and attending to streetlight complaints. The municipality is paying a net amount of Rs. 1.18 lakh per month. The per month unit rates charged by the contractor is Rs. 210 for tube light and Rs. 935 for sodium vapor lamp 250 W. The contractor is delivering a satisfactory performance.

433. Alandur Municipality has 3,645 light fixtures out of which around 72 percent fixtures are tube lights and 27 percent sodium vapor lamps. The total cost of energy utilized is Rs. 21.58 lakh for FY 05-06 and average maintenance expenses of street lighting is Rs. 11.73 lakh per annum is being paid to the private contractor. The average cost of energy consumption per fixture is Rs. 322 per annum. The average maintenance expenditure paid to the private contractor is works out to Rs. 389 per annum per fixture. While before privatization ULB was spending Rs. 598 per annum per fixture, hence municipality is saving about Rs. 210 per fixture per annum. There are four skilled wiremen and three helpers to operate and maintain the entire street lighting fixtures in the town and all of them are permanent employee of the Municipality. The following table presents the

number of streetlights that have been privatized and the maintenance charges being paid to the contractor by the municipality.

Table 10.1: Maintenance Charge of Street Lighting Payable to Private Contractors

Type of Fixture	**Numbers**	**Maintenance Charges**
	Nos.	*Rs/Year*
Privatized Lights		
High Mast Lamps	1	22,440.00
Tube lights	2,609	547,890.00
Sodium Vapour Lamps 70W	448	282,240.00
Sodium Vapour Lamps 150W	523	489,005.00
Sodium Vapour Lamps 250W	60	72,000.00
Halogen Lamps 250W	3	2,805.00
Mercury Vapour Lamps 250W	1	22,440.00
Total	**3,645**	**1,438,820.00**

Source: Alandur Municipality and Analysis.

3. Assets

434. Details of remunerative assets owned by Alandur municipality are presented in **Table 10.2**. Current year demands of remunerative assets were collected from municipality and the same were compared with the market rental value. Nanganallur remunerative asset rental value was less than market value. There is a scope of revenue maximization through lease and rentals from remunerative assets of Alandur Municipality. The ULB should follow the market value as minimum for lease and rentals of remunerative assets. Through this process municipality can fetch additional revenue to the tune of Rs. 9,900 Rupees per annum. The rentals and lease amounts have to be revised every 3 year once to a minimum of 15 percent from FY 2006-07. The collection performance of leases and rentals are inconsistent over the assessment period and hence collection efficiency also needs to be improved.

C. Additional Resource Mobilization

1. Parking Fees

435. Land-use and economic activity drives the parking demand in Alandur. Town attracts two-wheeler and four-wheeler traffic, which puts up specific parking requirement. Private vehicles can be seen parked haphazardly along G.S.T. Road, Station Road, and Gandhi Road. Based on the field visit four locations were identified for on street parking of four wheelers. For estimating the parking fee, it was assumed that 40 percent of the total vehicle will be parked less than or equal to one hour and 60 percent of the total vehicle will be parked more than one hour. Vehicles that are parked more than an hour can be charged ten rupees per vehicle and for other vehicles five rupees can be charged. An annual vehicle increment of three percent has been assumed to calculate the future revenue generation. The estimated parking fee is presented in **Table 10.2.**

Table 10.2: Estimated Parking Fee

Year	Medavakkam Main Road	MKN Road	Mandi Street	Karunerkar Street	Station Road	Total
Approx. No of veh./day	100	125	100	100	150	575
	Rs. Lakh					
2007	3.29	4.11	3.29	3.29	4.93	18.89
2008	3.35	4.19	3.35	3.35	5.03	19.27
2009	3.42	4.27	3.42	3.42	5.13	19.65
2010	3.49	4.36	3.49	3.49	5.23	20.04
2011	3.56	4.44	3.56	3.56	5.33	20.45
2012	3.63	4.53	3.63	3.63	5.44	20.85
2013	3.70	4.62	3.70	3.70	5.55	21.27
2014	3.77	4.72	3.77	3.77	5.66	21.70
2015	3.85	4.81	3.85	3.85	5.77	22.13
2016	3.93	4.91	3.93	3.93	5.89	22.57
2017	4.00	5.01	4.00	4.00	6.01	23.03
2018	4.08	5.11	4.08	4.08	6.13	23.49
2019	4.17	5.21	4.17	4.17	6.25	23.96
2020	4.25	5.31	4.25	4.25	6.37	24.43

Source: Analysis.

2. Advertisement Fee

436. Lease amount fixed by the council for advertising on lampposts and hoardings erected within the Municipal limit are accounted in advertisement fee. In case of Alandur Municipality average revenue generated through the advertisement fee is low. Hence, there is a scope to increase the advertisement fee by extending the coverage net. The following (**Table 10.3)** presents detailed estimation of advertisement fee for Alandur municipality. The total estimated advertisement fee is Rs. 10 lakh per annum with an annual increment of 2 percent on total advertisement fee adopted to forecast the future revenue. This minimum increase is assumed to accommodate increase in the number of advertisement hoardings/ boards that are likely to come in future.

3. Conservancy Fee

437. Conservancy establishment cost works out to 55 percent of total establishment cost of Alandur municipality. To meet at least a part of solid waste collection expenses conservancy fee is introduced. It is proposed to cover at least 50 percent of the residential properties and 100 percent of non-domestic properties like hotels, lodges, commercial establishments, etc, in the town. It is proposed that for residential properties, a fee of Rs. 20 per month and for non domestic properties, a fee of Rs. 75 per month may be charged with an upward revision of 15 percent every 3, starting 2006-07. **Table 10.4** presents estimated additional revenue mobilization through conservancy fee for Alandur municipality.

4. Summary

438. Summary of additional revenue mobilization through expenditure control measures and additional revenue generation is presented in **Table 10.5**.

Table 10.3: Estimation of Advertisement Fee

Description	Unit	Major Arterial Roads	Other Roads	Markets/ Bus Stands	Street Light Poles
Average Size of Hoardings	Sq. m	20.00	5.00	10.00	
Average Rate/sq. m/half yearly	Rupees	100.00	50.00	100.00	50.00
Total Length of Road	Km	154	-	-	-
Length of Road	%	20%	50%	-	-
Total Length of Road	Km	31	77	-	-
Spacing of Hoardings/Boards per km	Nos.	5	5	-	-
Total no of Hoardings/Boards	Nos.	154	385	50.00	1,822
Total Revenue per annum	Rs. Lakh	6.16	1.93	1.00	0.91

Source: Analysis.

Table 10.4: Estimation of Conservancy Fee

Description	Coverage	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Domestic (No)	50%	15,673	16,299	16,952	17,630	18,247	18,885	19,546	20,230	20,938	21,671	22,321
Non Domestic (No)	100%	2,786	2,898	3,014	3,134	3,244	3,357	3,475	3,596	3,722	3,853	3,968
Total Revenue(Rs. Lakh)		*50.15*	*58.43*	*63.90*	*81.00*	*86.30*	*90.55*	*108.72*	*114.63*	*119.69*	*142.21*	*149.08*

Source: Analysis.

Table 10.5: Estimated Additional Revenue from Resource Mobilization

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	Rs. Lakh											
Additional Resource Mobilization												
Leases/Rentals from Assets	0.10	0.10	0.10	0.11	0.11	0.11	0.13	0.13	0.13	0.15	0.15	0.15
Parking Fee	18.89	19.27	19.65	20.04	20.45	20.85	21.27	21.70	22.13	22.57	23.03	23.49
Advertisement Fee	10.00	10.20	10.40	10.61	10.82	11.04	11.26	11.48	11.71	11.95	12.19	12.43
Conservancy Fee	50.15	58.43	63.90	81.00	86.30	90.55	108.72	114.63	119.69	142.21	149.08	154.86
Total Revenue	**79.14**	**88.00**	**94.05**	**111.76**	**117.68**	**122.55**	**141.38**	**147.94**	**153.66**	**176.88**	**184.45**	**190.93**

Source: Analysis.

XI. FINANCIAL OPERATING PLAN

A. Financial Sustainability

1. Financial Sustainability

439. *Sustainability Analysis*. The sustainability analysis assumes that the municipality will carry out reforms indicated as assumptions for financial projections. A financial and operating plan (FOP) prepared for Alandur Municipality then evaluates the municipal fund status for the following scenarios:

(i) Full Project Scenario. The Full project investment scenario is based on investments identified for Alandur Municipality and the requirement for upgrading the town's infrastructure is estimated and phased based on the construction activity. Implications of this investment in terms of external borrowings required, resultant debt service commitment, and additional operation and maintenance expenditure are worked out to ascertain sub-project cash flows. Revenue surpluses from the Base Case Scenario are applied to sub-project cash flows emerging from full project investments – the municipal fund net surpluses indicates the ULB's ability to sustain full investments. FY 2020 is assumed as the reference year to determine the net surpluses and whether the Municipality maintains a debt/revenue surplus ratio as an indication of the ULB's ability to sustain investments.

(ii) Sustainable Investment Scenario. The sustainable investment scenario is worked out when the full project investment scenario indicates inability of the municipality to sustain the full identified investment. In this case, the identified investment is sized down to immediate felt need for the municipality to sustain on its own. Implications of this investment in terms of external borrowings required, resultant debt service commitment, and additional operation and maintenance expenditure are worked out to ascertain sub-project cash flows. Revenue surpluses from the Base Case Scenario are applied to sub-project cash flows emerging from sustainable investments – the municipal fund net surpluses indicates the ULB's ability to sustain the investments. FY 2020 is assumed as the reference year to determine the net surpluses and whether the Municipality maintains a debt/revenue surplus ratio as an indication of the ULB's ability to sustain investments. The outcome of this scenario will give an indication of the actual level of investment sustainable by the municipality without any additional external support.

2. Basic Assumptions for Projections

440. The FOP is based on a whole range of assumptions related to income and expenditure. These are critical to ascertain the investment sustenance and would also provide a tool to test certain specific policy decisions regarding revenue and expenditure drivers on the overall municipal fiscal situation. This section elucidates the key assumption adopted for the three FOP scenarios.

441. In order to determine the financial viability of the project, two instruments were used – the Modified Internal Rate of Return (MIRR) and the Financial and Operating Plan (FOP). The MIRR determines the rate of return based on surplus cash flows from project account being invested at market rates. The FOP is a cash flow stream of the ULB based on the regular municipal revenues, expenditures, and applicability of surplus funds to support project sustainability. The FOP horizon is determined to assess the impact of full debt servicing liability resulting from the borrowings to meet the identified interventions. The proposed capital investments are phased over ten years investment from FY 2006-07 to 2015-16 implying that the last loan draw down would occur in FY 2020-21. Considering a five-year moratorium period, the debt servicing commitment will commence in the FY 2011-12 for the first phase (1st five year) and 2016-17 for the second phase (2nd five year) of investment.

442. *Revenue Income*. The assumptions for forecasting revenue income comprise:

(i) Taxes and charges. In cases like property related taxes, water charges and sewerage charges, where the base and basis of revenue realization are known and predictable, the likely revenue is forecast based on certain assumptions regarding growth in number of assessments, revision in ARV (in case of property-related taxes), revision in charges/tariffs and improvement in collection efficiencies. The assumptions with regards basis for forecasting revenue income of taxes and charges are the same for all three scenarios. However, the tax base (number of connections) varies for the three scenarios, assuming that the new investments in water supply and sewerage schemes will result in increased coverage of the infrastructure systems. In the sustainable investment scenario the increase in tax base is scaled down pro rata with the scaled down (sustainable) investment. **Table 11.1**, **Table 11.2**, **Table 11.3** & **Table 11.4** list the assumptions adopted with regards forecasting income from property tax, water charges and drainage charges respectively under the three FOP scenarios.

Table 11.1: Key Assumptions for Forecasting Income from Property Tax

Description	Current Level	Base Case Scenario	Investment Scenarios
Annual growth in number of assessments (%)	3.56%	4.00%	4.00%
Average ARV per Property (Rs. Per Annum)	5,067	5,067	5,067
Tax Rate (% of ARV)	27%	27%	27%
Periodic increase in ARV (%)			
2006-07	-	30.00	30.00

Description	Current Level	Base Case Scenario	Investment Scenarios
2011-12	-	30.00	30.00
2016-17	-	30.00	30.00
Collection Performance (% of Demand)			
Arrears	12.00	50.00	50.00
Current	76.00	80.00	80.00

Source: Analysis.

Table 11.2: Key Assumptions for Forecasting Income from Water Charges

Description	Current Level	Base Case Scenario	Investment Scenarios
% water connections to property tax assessments	44.11%	44.11%	80%
Monthly water charge per connection (Rs.)			
Domestic	50.50	50.50	50.50
Non Domestic	120.50	120.50	120.50
Industrial	120.50	120.50	120.50
Periodic revision in water charges			
2006-07	-	15.00	15.00
2009-10	-	15.00	15.00
2011-12	-	15.00	15.00
2015-16	-	15.00	15.00
2018-19	-	15.00	15.00
Collection Performance (% of Demand)			
Arrears	18%	50%	50%
Current	51%	80%	80%
One time connection fee (Rs.)			
Domestic	3,000	3,000	3,000
Non Domestic	5,000	5,000	5,000
Industrial	10,000	10,000	10,000
Periodic revision of one time connection fee	-	20 % - 3 yrs once	20 % - 3 yrs once

Source: Analysis.

Table 11.3: Key Assumptions for Forecasting Income from Sewerage Charges

Description	Current Level	Base Case Scenario	Investment Scenarios
% Sewerage connections to PT assessments	39.98 %	39.98 %	80.00 %
Monthly sewerage charge per connection (Rs.)			
Domestic	150.00	150.00	150.00
Non Domestic	300.00	300.00	300.00
Industrial	300.00	300.00	300.00
Periodic revision in sewerage charges			
2006-07	-	-	15.00
2009-10	-	-	15.00

Description	Current Level	Base Case Scenario	Investment Scenarios
2011-12	-	-	15.00
2015-16	-	-	15.00
2018-19	-	-	15.00
Collection Performance (% of Demand)			
Arrears	-	-	50.00
Current	-	-	80.00
One time connection fee (Rs.)			
Domestic	6,000	6,000	6,000
Non Domestic	12,000	12,000	12,000
Industrial	12,000	12,000	12,000
Periodic revision of one time connection fee	-	20 % - 3 yrs once	20 % - 3 yrs once

Source: Analysis.

Table 11.4: Key Assumptions for Forecasting Income from Solid Waste Conservancy Fee

Description	Current Level	Base Case Scenario	Investment Scenarios
% Coverage to PT assessments			
Domestic	-	-	50.00
Non Domestic	-	-	100.00
Monthly conservancy fee per PT assessment (Rs.)			
Domestic	-	-	20.00
Non Domestic	-	-	75.00
Periodic revision in conservancy fee			
2006-07	-	-	15.00
2009-10	-	-	15.00
2011-12	-	-	15.00
2015-16	-	-	15.00
2018-19	-	-	15.00
Collection Performance (% of Demand)			
Arrears	-	-	50.00
Current	-	-	80.00

Source: Analysis.

(ii) Other revenue income from own sources. All revenue income from own sources other than property-related taxes, and water and sewerage charges, where the base and basis is not clearly defined, are forecast based on the observed trend during the assessment period (2000-01 to 2003-04), subject to minimum and maximum annual growth rates of 5 percent and 20 percent, respectively. Though the income from the municipal properties and markets past trend has witnessed a high growth trend, on a conservative side 20 percent has been adopted.

Table 11.5: Key Growth Rate Assumptions for Income from Other Own Sources

Description	Current Level	Assumption
Profession Tax	5.34 %	5.00 %
Income from Municipal Properties and Markets	85.23 %	20.00 %
License Income (Trade, etc.)	5.88 %	5.00 %
Income from Special Services	(100.00 %)	5.00 %
Income from Fees and Fines	32.70 %	10.00 %
Income from Interest on Deposits	27.90 %	6.00 %
Income from Investments(Excl. Interest)	--	5.00 %
Miscellaneous Income	9.18 %	9.00 %

Source: Analysis.

(iii) Assigned Revenue. Items of assigned revenue such as surcharge on stamp duty, entertainment tax share, etc. are forecast based on the observed trend during the assessment period (2001 to 2003-04), subject to minimum and maximum annual growth rates of 5 percent and 15 percent, respectively. Entertainment tax observed trend during the assessment period was negative growth rate, which attributes to inconsistent transfer of ULB share during the review period. Hence a nominal growth rate of 5 percent assumed to forecast the revenue. In case of surcharge on stamp duty witnessed a negative growth rate of 20.65 percent during the review period, which is very low. This low growth trend attributed to uneven transfers of stamp duty to municipality. Considering high property value appreciation in the town a maximum of 15 percent has been adopted to forecast the revenue.

Table 11.6: Key Growth Rate Assumptions for Income from Assigned Sources

Description	Current Level	Assumption
Entertainment Tax	(32.79 %)	5.00 %
Surcharge on Stamp Duty	51.92 %	15.00 %
Other Transfers	855.84 %	5.00 %
Total- Assigned Revenue	**50.16 %**	

Source: Analysis.

(iv) Grants and Contributions. Revenue income in the form of grants and contributions are also forecast based on the observed trend during the review period (2000 - 01 to 2003-04), subject to minimum and maximum annual growth rates of 5 percent and 15 percent respectively. SFC devolution observed trend during the review period was very high growth rate, due to inconsistent transfer of grant to ULB. Considering the states tax revenue growth trend forecast, population growth trend and reforms measures initiated by the municipality will fetch constant devolution fund. In this perspective a maximum of 15 percent growth per annum adopted.

Table 11.7: Key Growth Rate Assumptions for Income from Grants & Contributions

Description	Current Level	Assumption
State Finance Commission Grant	162.91 %	15.00 %
Other Grants	(100.00 %)	5.00 %
Total- Grants & Contribution	**50.53 %**	

Source: Analysis.

(v) Additional Revenue Income due to Sub-Projects. The sub-projects – in case of water and sewerage projects – are expected to fetch additional revenue by way of increase in number of assessments and levy of user charges (in cases where a new sewerage system is proposed). The sewerage charge is adopted as per **Table 11.3** starting from 2007-08 and a revision of 15 percent is proposed every three years, beginning from 2007-08. The additional revenue income due to water supply and sewerage sub-projects is computed based on the proposed number of new connections, proposed tariffs and assumed collection performance. In addition solid waste conservancy fee also planned to levy on property assessments.

443. *Revenue Expenditure*. Key assumptions for forecasting revenue expenditure comprise:

(i) Expenditure on Municipal Services. Expenditure on municipal services including general administration, revenue collection and service delivery are forecast based on the observed trend during the assessment period (2000-01 to 2003-04), subject to minimum and maximum annual growth rates of 5 percent and 20 percent, respectively.

Table 11.8: Key Growth Rate Assumptions for Forecasting Revenue Expenditure

Description	Current Level	Assumption
General Administration & revenue Collection		
Staff Salary and Employee Related Expenses	1.46 %	8.00%
Allowances to Elected Representatives	(2.67 %)	5.00%
General Expenses	(5.76 %)	5.00%
Pensions and Gratuities	(2.91 %)	5.00%
Education - Staff Salary	--	5.00%
Miscellaneous	21.76 %	15.00%
Total-General Admin. & Revenue Collection	**2.01 %**	
Municipal Services excl. W&D		
General Expenses	55.55 %	20.00%
Public Works and Roads	2.81 %	20.00%
Public Health and Conservancy	123.82 %	20.00%
Street Lighting (including Electricity Charges)	46.51 %	20.00%
Education	(100.00 %)	5.00%
Vehicle and Equipment Maintenance	4.27 %	5.00%
Miscellaneous	41.10 %	15.00%
Total- Municipal Services excl. W&D	**49.56 %**	

Source: Analysis.

Table 11.9: Key Growth Rate Assumptions for Forecasting Water Supply Revenue Expenditure

Description	**Current Level**	**Assumption**
Staff Salary & Employee Related Expenses	2.29 %	8.00%
Equipment Maintenance & Repairs	55.61 %	15.00%
Administration Expenses	14.04%	10.00%
Board Payment	2.97 %	10.00%
Electricity Charges	(100.00 %)	10.00%
Vehicle Maintenance & Repairs	28.66 %	15.00%
Miscellaneous	(56.10 %)	5.00%
Total- Water Supply & Drainage	**12.09 %**	

Source: Analysis.

(ii) Outstanding Non-debt liabilities. The outstanding non-debt liabilities like payments due to employees, TNEB, TWAD, State Government cess, etc. are assumed to be cleared in equal installments over a 5-year period from 2006-07 to 2010-11. Where data was provided by the ULB, it was considered for preparing the FOP.

(i) Outstanding Debt Liabilities. The outstanding debt liabilities are proposed for clearance over a 10-year period beginning 2006-07 to 2021-22 with the furnished interest rate adopted otherwise at a constant interest of 9.50 percent per annum was assumed.

(iv) Additional O&M Expenditure due to Sub-Projects. While each sector identifies the O&M costs applicable for asset maintenance (manpower, consumables, power charges, etc.), a proportion of the capital cost was derived for projections.

Table 11.10 presents the assumptions regarding O&M expenditure on new assets.

Table 11.10: Assumptions for O&M Expenditure

Sector	***As % of Capital Cost***
Water Supply	*6.00*
Sewerage & Sanitation	*4.00*
Roads and Traffic Management	*3.00*
Storm Water Drainage	*2.00*
Solid Waste Management	*10.00*
Street Lighting	*10.00*
Slum Upgradation	*1.00*
Others	*2.00*

Source: Analysis.

(v) Additional Debt Servicing Expenditure due to Sustainable Investment. The loans for the sustainable investments are assumed to spread over 20 years, carrying an interest burden as indicated in **Table 11.11**, with a five year moratorium on interest and principal repayment – interest during the moratorium period being capitalized. Considering a five-year loan draw down schedule (2006-07 to 2010-11) and a 20-year tenor, debt servicing will commence from 2011-12 for a period of 15 years. According to the project implementation schedule, the loan drawn and repayment schedule will differ.

Table 11.11: Proposed Financing Pattern

Infrastructure Type	Loan	Grant	ULB + Consumer	Interest Rate
	Percentage			
Water Supply	40	30	30	8.50
Sewerage & Sanitation	40	30	30	8.50
Roads and Traffic Management	60	30	10	8.50
Storm Water Drainage	60	30	10	8.50
Solid Waste Management	60	30	10	8.50
Street Lighting	60	30	10	8.50
Slum Up gradation	60	30	10	8.50
Others	40	10	50	8.50

Source: Analysis.

444. *Capital Account*. In case of capital account, no capital transactions are considered in the base case scenario, as this scenario is aimed at ascertaining the ULB's capacity to generate internal resources that would be leveraged to undertake identified sub-projects. In the identified investment and sustainable investment scenarios, sub-project cash flows are loaded onto the FOP and their impact on municipal finances in corresponding scenarios are tested. Key assumptions regarding capital account are investment phasing and project financing/funding structures.

445. *Capital Expenditure*. The estimated expenditure for implementing sub-projects is phased over a five-year period beginning 2006-07. Based on the above phasing the actual investment requirement over the five-year period is ascertained adopting a physical contingency of seven percent and a price contingency of six percent per annum. Following tables presents the base full project cost and implementation schedule.

Table 11.12: Summary of Estimated Investment Requirement and Phasing Schedule

Sector	Base Cost	Investment Phasing (%)				
	Rs. Lakh	*2006-07*	*2007-08*	*2008-09*	*2009-10*	*2010-11*
Water Supply	1,950.09	30%	30%	40%	0%	0%
Sewerage & Sanitation	333.1	0%	30%	30%	40%	0%
Roads	11,025.43	20%	20%	20%	20%	20%
Storm Water Drains	2,145.87	20%	20%	20%	20%	20%
Solid Waste Management	580.58	30%	30%	40%	0%	0%
Street Lighting	512.02	10%	20%	30%	20%	20%
Slum Upgradation	1,252.22	10%	20%	20%	30%	20%
Others	41	20%	20%	20%	20%	20%
Grand Total Investment	17,840.31					

Source: Analysis.

Table 11.13: Summary of Phased Investment in Full Project Investment Scenario

Sector	Base Cost	Investment Phasing – Rs. Lakh at Current Price				
	Rs. Lakh	*2006-07*	*2007-08*	*2008-09*	*2009-10*	*2010-11*
Water Supply	1,950.09	585.02	585.027	780.036	0	0
Sewerage & Sanitation	333.10	0	99.93	99.93	133.24	0
Roads	11,025.43	2205.08	2205.08	2205.086	2205.086	2205.086
Storm Water Drains	2,145.87	429.174	429.174	429.174	429.174	429.174
Solid Waste Mgmt	580.58	174.174	174.174	232.232	0	0

Sector	Base Cost	Investment Phasing – Rs. Lakh at Current Price				
	Rs. Lakh	*2006-07*	*2007-08*	*2008-09*	*2009-10*	*2010-11*
Street Lighting	512.02	51.202	102.404	153.606	102.404	102.404
Slum Upgradation	1,252.22	125.222	250.444	250.444	375.666	250.444
Others	41.00	8.2	8.2	8.2	8.2	8.2
Grand Total Investment	**17,840.31**	**1,770.61**	**2,036.43**	**2,338.53**	**1,410.70**	**1,152.24**

Source: Analysis.

446. *Capital Income*. Capital income is forecast based on actual requirement to meet proposed capital expenditure.

Table 11.14: Financing Pattern for Proposed Projects

Sr. No	Sector	Government Grant	Financial Institution Loan	ULB Share	Other Department
		% Share			
1	Water Supply	30.00	40.00	30.00	-
2	Sewerage & Sanitation	30.00	40.00	30.00	-
3	Roads and Traffic Management	30.00	60.00	10.00	-
4	Storm Water Drainage	30.00	60.00	10.00	-
5	Solid Waste Management	30.00	60.00	10.00	-
6	Street Lighting	30.00	60.00	10.00	-
7	Slum Upgradation	30.00	60.00	10.00	
8	Others	10.00	40.00	50.00	-
9	Traffic & Transportation	-	-	-	100.00

Table 11.15: One-time Charges for Water & Sewerage Connections

Sr. No	Description	Water Supply	Sewerage
1	Domestic	3,000	6,000
2	Non Domestic	5,000	12,000
3	Industrial	10,000	12,000

Source: Analysis.

447. In summary, the following key assumptions were made while preparing the cash flows:

(i) Revenue Income.

a. *Property Tax*: Projected based on ARV per property; number of assessments to grow a nominal rate of 4 percent per annum; ARV for all properties revised once in 5 years beginning 2006-07 at 30 percent; and collection performance assumed at 50 percent against arrears demand and 80 percent against current demand.

b. *Water Charges*: At 4 percent per annum (proportionate to property tax assessment growth rate) regular connections are envisaged in the base case

scenario and increase in water connections is a result of the availability of additional water for distribution – it is assumed that 80 percent of the property tax connections would have water connections by FY 2013; the current rate of water charge is maintained till 2005-06, and from 2006-07 a 15 percent increase is assumed every 3 years; collection performance is assumed at 50 percent against arrears demand and 80 percent against current demand; and new (one-time) connection charges are collected as per the current rate till 2005-06, and from 2006-07 a 20 percent increase in every 3 years.

c. *Sewerage Charges*: No new connections envisaged in base case scenario and sewer connections are provided under the Project – it is assumed that 100 percent of the water connections would have sewer connections by FY 2013; monthly flat rate of Rs. 150, Rs, 300 & Rs. 300 per connection for domestic, non domestic and industrial connections respectively, it is assumed for sewerage charge starts from 2005-06, and from then on a 15 percent increase is assumed every 3 years; collection performance is assumed at 50 percent against arrears demand and 80 percent against current demand; and new (one-time) connection charges are adopted as per **Table 11.3**.

d. *All other revenue income items*. (Including municipal own sources, grants and assigned revenues): past trend is adopted, subject to minimum and maximum ceilings of 5 and 20 percent per annum, respectively.

(ii) Revenue Expenditure.

a. Past trend is adopted, subject to minimum and maximum ceilings of 5 and 20 percent per annum, respectively.
b. Additional O&M expenditure is estimated based on ascertained percentages of capital costs.
c. All outstanding non-debt liabilities are to be cleared off in the next 5 years.
d. All outstanding debt liabilities are to be cleared off in the next 10 years at an interest rate provided by the ULB, otherwise at an average interest rate of 9.50 percent. .
e. New loans are to be serviced over a 20-year tenor (including a five-year principal plus interest moratorium) at interest rates indicated in **Table 11.10**.

(iii) Capital Expenditure.

a. Capital expenditure is forecast based on the identified investments.
b. The base costs estimated are at 2005-06 prices, which are then indexed by 7 percent for physical contingencies, and 6 percent for price contingencies.

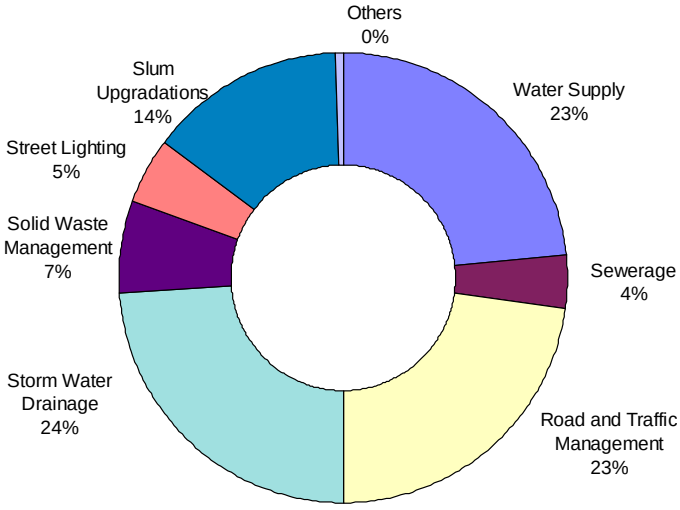
(iv) Capital Income.

a. Based on the past trend regular capital grants are estimated.
b. Capital Income is ascertained based on assumed project financing patterns as detailed in **Table 11.14**.

3. Project Cash Flows and FOP Results

448. The impemetable investment scenario is worked out considering only the revenue account transactions to assess the municipal capacity to generate revenue surpluses that could be leveraged to undertake capital investments. Detailed cash flows are worked out for each of the sub-projects based on the assumptions with regard to investment phasing, financing pattern, additional O&M expenditure and additional income due to proposed capital investments, for the Sustainable Investment Scenario. The net project cash flows are then loaded onto the base case scenario to test their impact on the overall municipal fiscal situation.

Figure 11.1: Sector-wise Sustainable Investment -Base Cost



(i) *Implementable Investment Scenario*. **Table 11.17** presents a summary of total project cash flows due to the full project scenario. Detailed sub-project cash flows are presented in **Annexure 11.1**. Alandur Municipality would accumulate a negative closing balance of Rs. 6,042 lakh by the end of 2019-20 due exclusively to the full project investment. The total net project cash flows due to full project when loaded onto the base case Scenario FOP indicate that Alandur Municipality would end up with a positive closing balance of Rs. 36,433 lakh by the FOP horizon year 2019-20. The debt servicing ratio is maintained below 30 percent and operating ratio is also maintained be one the forecast period and hence ULB can sustain the entire identified investment. **Table 11.17** presents a summary of the municipal fiscal status in the Full Project Scenario. The full project (municipal share) investment proposed for Alandur is to the tune of Rs. 8,708.52 lakh, out of which 24 percent of the total investment is proposed for storm water drainage improvement works, 23 percent for water supply and road and traffic management each.

Table 11.16: Financial Operating Plan Results - Alandur Municipality

Item Heads	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Rs. Lakh														
Base Case - Municipal Fund															
Opening Balance	1,021	2,550	4,052	5,639	7,317	9,170	11,130	13,686	16,490	19,445	22,544	25,916	29,710	33,692	37,998
Revenue Income*	2,240	2,570	2,745	2,942	3,237	3,483	3,935	4,370	4,738	5,135	5,704	6,471	7,062	7,863	8,592
Additional Revenue Mobilization**	0	29	30	31	32	32	33	34	34	35	36	36	37	37	38
Total Revenue Income	2,240	2,599	2,775	2,973	3,269	3,516	3,968	4,404	4,772	5,170	5,740	6,507	7,099	7,900	8,630
Revenue Expenditure	712	1,097	1,189	1,294	1,416	1,555	1,412	1,600	1,817	2,071	2,367	2,713	3,118	3,594	4,153
Status	1,529	1,502	1,586	1,678	1,853	1,960	2,556	2,804	2,955	3,099	3,373	3,794	3,981	4,306	4,477
Closing Balance	2,550	4,052	5,639	7,317	9,170	11,130	13,686	16,490	19,445	22,544	25,916	29,710	33,692	37,998	42,474
Project Account - Full Project Scenario															
Total Net Project Cash Flow (after deducting ULB equity from cash flow)	-	(396)	(1,038)	(1,814)	(2,278)	(2,734)	(3,139)	(2,524)	(3,025)	(3,575)	(4,074)	(4,588)	(5,129)	(5,574)	(6,042)
Overall Closing Balance	2,550	3,656	4,600	5,503	6,892	8,396	10,546	13,966	16,420	18,968	21,842	25,122	28,562	32,423	36,433
Financial Viability Ratios															
Sustainable Investment Scenario															
Debt Equity Ratio- New Projects		3.10	2.91	2.09	1.88	1.82	-	-	-	-	-	-	-	-	-
Debt Service Coverage Ratio (DSCR) – Min. 150%		1076%	486%	346%	321%	288%	341%	520%	343%	336%	358%	406%	420%	464%	474%
Operating Ratio (<1)		0.74	0.84	0.89	0.77	0.77	0.64	0.51	0.65	0.67	0.66	0.65	0.66	0.65	0.67
DSR (Max. 30%)															
Full Project Investment Scenario															
Debt Equity Ratio- New Projects		3.10	2.91	2.09	1.88	1.82	-	-	-	-	-	-	-	-	-
Debt Service Coverage Ratio (DSCR) – Min. 150 %		1076%	486%	346%	321%	288%	341%	520%	343%	336%	358%	406%	420%	464%	474%

Item Heads	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Rs. Lakh														
Operating Ratio (<1)		0.74	0.84	0.89	0.77	0.77	0.64	0.51	0.65	0.67	0.66	0.65	0.66	0.65	0.67
DSR (Max. 30%)		4%	9%	13%	14%	15%	15%	12%	14%	14%	13%	12%	11%	10%	9%

Source: Analysis.

Note: * including projected regular capital grant and with out project scenario regular connection deposit fee.

** excluding conservancy fee, since it is loaded on to the SWM sub project cash flow.

Table 11.17: Summary of Full Project Cash Flow

	Description	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
		Rs. Lakh													
	Full Sub Project Cash Flow														
1	Water Supply	(24)	(103)	(195)	(217)	(203)	(295)	(318)	(490)	(671)	(840)	(1,018)	(1,210)	(1,393)	(1,589)
2	Sewerage	-	13	178	427	723	1,087	2,438	2,875	3,325	3,850	4,387	4,929	5,549	6,179
3	Roads and Traffic Management	(24)	(87)	(192)	(344)	(545)	(777)	(1,026)	(1,291)	(1,574)	(1,875)	(2,184)	(2,499)	(2,822)	(3,153)
4	Storm Water Drainage	(25)	(85)	(183)	(323)	(508)	(717)	(941)	(1,181)	(1,436)	(1,709)	(1,987)	(2,269)	(2,557)	(2,850)
5	Solid Waste Management	40	56	40	8	(23)	(59)	(87)	(121)	(156)	(174)	(191)	(210)	(200)	(188)
6	Street Lighting	(2)	(15)	(46)	(99)	(172)	(261)	(355)	(456)	(564)	(679)	(798)	(923)	(1,052)	(1,187)
7	Slum Upgradation	(7)	(32)	(77)	(152)	(251)	(358)	(473)	(596)	(731)	(876)	(1,021)	(1,169)	(1,318)	(1,468)
8	Others	(0)	(1)	(3)	(5)	(7)	(10)	(14)	(17)	(20)	(23)	(27)	(30)	(34)	(37)
	Total Sub Project Cash Flow	(43)	(253)	(478)	(705)	(986)	(1,391)	(775)	(1,277)	(1,827)	(2,326)	(2,840)	(3,381)	(3,826)	(4,293)
	Total Full Project Cash Flow														
	Opening Balance		(43)	(253)	(478)	(705)	(986)	(1,391)	(775)	(1,277)	(1,827)	(2,326)	(2,840)	(3,381)	(3,826)
A	**Sources of Fund**														
1	Debt Drawdown	1,096	1,335	1,599	1,138	1,017	-	-	-	-	-	-	-	-	-
2	Equity Drawdown	353	432	551	238	175	-	-	-	-	-	-	-	-	-
3	Govt. Grant	618	754	918	586	507	-	-	-	-	-	-	-	-	-
4	User Charges	50	64	114	214	303	385	696	744	770	894	918	932	1,071	1,096
5	New Connection Fees	-	26	213	366	383	314	1,091	-	-	-	-	-	-	-
	Total- Inflow	**2,118**	**2,610**	**3,395**	**2,541**	**2,385**	**699**	**1,787**	**744**	**770**	**894**	**918**	**932**	**1,071**	**1,096**

	Description	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
		Rs. Lakh													
B	**Disposition of Funds**														
1	Project Capex	2,068	2,521	3,068	1,962	1,699	-	-	-	-	-	-	-	-	-
2	Operation & Maintenance	-	93	209	367	442	514	545	577	612	649	687	729	772	819
3	Debt Servicing-Repayment	-	-	-	-	-	590	627	668	708	744	744	744	744	744
4	Interest During Construction	93	207	343	439	526	-	-	-	-	-	-	-	-	-
	Total- Outflow	**2,161**	**2,820**	**3,620**	**2,769**	**2,666**	**1,104**	**1,171**	**1,246**	**1,320**	**1,393**	**1,432**	**1,473**	**1,517**	**1,563**
	Net Cash Flow	(43)	(210)	(224)	(227)	(281)	(405)	616	(502)	(550)	(499)	(514)	(541)	(445)	(467)
	Closing Balance	(43)	(253)	(478)	(705)	(986)	(1,391)	(775)	(1,277)	(1,827)	(2,326)	(2,840)	(3,381)	(3,826)	(4,293)

Source: Analysis.

449. The phasing/ scheduling of investments have been carried out through an iterative process and the principles of phasing have taken into account:
   (i) Priority needs, with developed areas getting priority over future development areas,
   (ii) Inter- and intra service linkages, viz. water supply investments shall be complemented by corresponding sewerage/ sanitation improvements,
   (iii) Size and duration of the requirements, including preparation and implementation period,
   (iv) Project linked revenue implications, such as installing house connections where supply and distribution capacities have been increased.

450. The Capital Improvement Program involved the identification of public capital facilities to cater to the demand of the town population by the year 2026.

Table 11.18: Sustainable Project Funding Option- Base Cost (Rs. Lakh)

Sectors	**Loan**	**Grant**	**ULB /Beneficiaries Contribution**	**Total**
	2006-11			
Water Supply	813.45	610.09	610.09	2,033.62
Sewerage and Sanitation	133.24	99.93	99.93	333.10
Road and Traffic Management	1,199.36	599.68	199.89	1,998.94
Storm Water Drainage	1,237.40	618.70	206.23	2,062.34
Solid Waste Management	348.35	174.17	58.06	580.58
Street Lighting	244.03	122.02	40.67	406.72
Slum Upgradation	751.33	375.66	125.22	1,252.22
Others	16.40	4.10	20.50	41.00
Total	**4,743.57**	**2,604.35**	**1,360.60**	**8,708.52**

Source: Analysis.

451. The phasing of investments for components of all sectors are presented in the following tables.

Table 11.19: Phasing of Investment for Water Supply Sector

Sector-Water Supply	**Total Cost**	**2006-07**	**2007-08**	**2008-09**
	Rs. Lakh			
System Rehabilitation				
Distribution Network	432.93	173.17	129.88	129.88
Leak Detection	33.97	33.97		
New Infrastructure				
Augmentation of Headwork	1,043.70	260.93	274.46	508.32
Storage Reservoir	8.18		8.18	
Distribution Network with road over lay	288.19	108.78	100.87	78.54
Water Treatment Plant	143.12		71.56	71.56
Improvements to Lakes	33.24	33.24		
Water Supply to OHT (Required Infrastructure)	50.29		25.15	25.15
Total	**2,033.62**	**610.09**	**610.09**	**813.45**

Source: Analysis

Table 11.20: Phasing of Investment for Sewerage and Sanitation Sector

Sector-Sewerage and Sanitation	**Total Cost**	**2006-07**	**2007-08**	**2008-09**	**2009-10**
	Rs. Lakh				
New Infrastructure					
Sewer Network with Road Overlay	333.10		99.93	99.93	133.24
Total	**333.10**	**-**	**99.93**	**99.93**	**133.24**

Source: Analysis

Table 11.21: Phasing of Investment for Road and Traffic Management

Sector-Road and Traffic Management	**Total Cost**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
	Rs. Lakh					
Roads						
Upgradation (Excludes the Bus Route and Major Links)						
Black Top to Concrete	34.61			34.61		
WBM to Black Top	112.44	56.22	56.22			
Earthen to Black Top	77.49	27.12	27.12		23.25	
New Formation (Excludes the Bus Route and Major Links)						
Concrete	66.24	13.25	13.25	13.25	16.56	9.94
Black Top	791.60	158.32	237.48	237.48	142.49	15.83
WBM	63.29	12.66	12.66	22.15	15.82	
Widening/ Strengthening (Excludes the Bus Route and Major Links)	165.57	41.39	16.56	33.11	44.62	29.89
Widening/ Strengthening for the Bus Route and Major Links (Maintained by Municipality)	457.00	87.33	6.31	39.19	68.55	255.62
Traffic & Transportation						
Junction Improvements	40.00		20.00	20.00		
Parking facility	3.50	3.50				
Footpath	10.20		10.20			
Subway at LC 15 near Neetish School	177.00				88.50	88.50
Total	**1,998.94**	**399.79**	**399.79**	**399.79**	**399.79**	**399.78**

Source: Analysis

Table 11.22: Phasing of Investment for Storm Water Drainage

Sector-Storm Water Drainage	**Total Cost**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
	Rs. Lakh					
Rehabilitation						
Rehabilitation of Existing Storm Water Drains	94.48	47.24	47.24			
Upgradation of Kutcha to Pucca						

Sector-Storm Water Drainage	Total Cost	2006-07	2007-08	2008-09	2009-10	2010-11
	Rs. Lakh					
Kutcha to Pucca Open	-					
Kutcha to Pucca Closed	-					
Pucca Open to Pucca Closed	72.72	36.36	36.36			
Formation of New Drains						
New Pucca Open Drains	489.03	146.71	146.71	195.61		-
New Pucca Closed Drains	1,318.28	135.99	140.50	216.86	412.47	412.47
Primary Drains						
Desilting & Strengthening of Primary Drains	4.50	4.50				
Diversion of Floodwater from Airport to Adyar River	83.33	41.67	41.67			
Total	**2,062.34**	**412.47**	**412.47**	**412.47**	**412.47**	**412.47**

Source: Analysis

Table 11.23: Phasing of Investment for Solid Waste Management

Sector-Solid Waste Management	Total Cost	2006-07	2007-08	2008-09
	Rs. Lakh			
Containerised Tricycles (6 bins)	9.52	4.76	4.76	
Push Carts	17.35	6.94	5.21	5.21
Dumper Bins (7 Cum Capacity)	7.70		7.70	
Dumper Placer	70.00		28.00	42.00
Land Fill Capacity Development	323.51	113.23	80.88	129.40
Compost Facility Development	152.50	49.24	47.63	55.63
Total	**580.58**	**174.17**	**174.17**	**232.23**

Source: Analysis

Table 11.24: Phasing of Investment for Street Lighting

Sector-Street Lighting	Total Cost	2006-07	2007-08	2008-09	2009-10	2010-11
	Rs. Lakh					
Tube Light	234.88	35.23	46.98	63.05	44.08	45.55
High Power	69.10		25.03	13.82	30.25	
High Mast Lamps	30.82	5.44	9.25	9.25	6.89	
Power Saver Switches	0.31		0.09	0.09	0.12	
Providing Under Ground Multi-Utility Duct	71.61			35.81		35.81
Total	**406.72**	**40.67**	**81.34**	**122.02**	**81.34**	**81.35**

Source: Analysis

Table 11.25: Phasing of Investment for Slum Upgradation

Sector-Slum Upgradation	**Total Cost**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
	Rs. Lakh					
No. of Public Water Tanks/ Taps/ Handpumps	227.85	91.14	113.93	22.79		
No. of Public Toilet Seats	807.00	32.28	73.45	177.54	316.67	207.07
No. of Public Urinals	175.44		52.63	26.80	52.63	43.38
No. of Dustbins/ Temporary Waste Storage Points	7.18			7.18		
Roads and Pavements	9.51		4.76	4.76		
Storm Water Drains	12.51	1.80	2.50	8.21		
Streetlights	12.72		3.18	3.18	6.36	
Total	**1,252.21**	**125.22**	**250.44**	**250.44**	**375.66**	**250.45**

Source: Analysis

Table 11.26: Phasing of Investment for Others

Sector-Others	**Total Cost**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
	Rs. Lakh					
Development of Parks	24.00	3.95	3.95	3.95	3.95	8.20
Tree Plantation	8.00	2.00	2.00	2.00	2.00	-
Improvements to Burial Grounds	9.00	2.25	2.25	2.25	2.25	-
Total	**41.00**	**8.20**	**8.20**	**8.20**	**8.20**	**8.20**

Source: Analysis

XII. INITIAL ENVIRONMENTAL AND SOCIAL SCREENING

A. Introduction

452. Recognizing the environmental and social issues that can arise in urban infrastructure projects, TNUIFSL has evolved an Environmental and Social Framework (ESF-originally named as Environmental and Social Report (ESR)). The ESF provides an overall framework to identify, assess and manage the environmental and social concerns at the sub project level. The ESF outlines the policies, assessments and procedures that will enable TNUIFSL to ensure that a sub-project that it funds is developed in accordance with ESF and is adequately protected from associated risks.

453. Based on the magnitude and implications of environmental issues that can arise in the projects an indicative categorization of various types of urban infrastructure projects has been prepared based on their environmental sensitivity. This indicative categorization has been developed to serve as a guidance tool. It is expected that adequate judgment will be applied to determine the category while preparing the DPRs and undertaking EAs, Guidance has also been provided for categorization for those projects, which are not categorized upfront.

Categorization of Urban Infrastructure Projects

454. TNUIFSL has categorized urban infrastructure projects into three categories viz. E-1, E-2 and E-3 (guidelines for categorization presented in **Table 12.2**).

455. 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 12.1**. Those projects/activities, which require environmental clearance as per the EIA notification published by Ministry of Environment and Forest will also be categorized as E1.

Table 12.1: List of Sensitive Environmental Components

Sr. No	Sensitive Environmental Component
1	Religious, heritage historic sites and cultural properties
2	Archaeological monuments/sites
3	Scenic areas
4	Hill resorts/mountains/ hills
5	Beach resorts
6	Health resorts
7	Coastal areas rich in corals, mangroves, breeding grounds of specific species
8	Estuaries rich in mangroves, breeding ground of specific species
9	Gulf areas
10	Biosphere reserves
11	National park and wildlife sanctuaries and reserves
12	Natural lakes, swamps Seismic zones tribal Settlements

Sr. No	Sensitive Environmental Component
13	Areas of scientific and geological interests
14	Defense installations, specially those of security importance and sensitive to pollution
15	Border areas (international)
16	Airport (for solid waste management projects)
17	Tiger reserves/elephant reserve/turtle nestling grounds
18	Habitat for migratory birds
19	Lakes, reservoirs, dams
20	Streams/rivers/estuary/seas

456. E-2 projects are expected to have only moderate environmental issues. A project is categorized as E2 if its potential adverse environmental impacts are less adverse than those of E1 projects. These impacts are mostly generic impacts in nature and in most cases mitigation can be designed more readily than for E1 projects. Although the scope of assessment for an E2 project is project specific and examines the project's potential negative and positive environmental impacts, it recommends measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

457. No environmental issues are expected in E-3 projects and can be termed 'environmentally benign'. Hence, no environmental assessment is required for an E3 project beyond screening.

Table 12.2: Guidelines for Environmental Categorization of Projects

Sr. No	Project	Environmental Category
I	***Water Supply and Sewage***	
a	Water Supply	
i	Water Supply Augmentation	E-2[2]
ii	Water Supply Distribution Lines	E-2
iii	Water Tankers	E-3
iv	Overhead Tanks	E-3
v	Water Treatment Plants	E-1
vi	Upgradation of Existing Headworks	E-3
vii	Generators	E-3
viii	River Intake Works	E-1
b	Storm Water Drainage	
i	Open Drains	E-2
ii	Closed / Underground Drains	E-2
c	Sewerage / Sanitation	
i	Only Sewer Network	E-2[3]
ii	Sewerage Network and Pumping Stations	E-2[3]
iii	Sewerage Network, Pumping Station and Treatment Plant	E-1
iv	Public Conveniences	E-2
v	Pay & Use Latrines	E-2

[2] In case of development of a new sources, head works, intake works/channels, the project will be categorized as E-1

[3] Projects without adequate treatment and disposal facilities (meeting the requirements of TNPCB or other applicable laws) to cater to the sewage collected due to the extension of sewerage system or network shall be categorized as E1.

Sr. No	Project	Environmental Category
vi	Septic Tanks	E-2
II	***Solid Waste Management***	
a	Landfill Sites	E-1
b	Compost Yard	E-1
c	Solid Waste Mgmt, including Collection & Transportation Vehicles	E-2
III	***Transportation***	
a	Roads	
i	New Roads	E-1
ii	Widening of Roads Outside ROW	E-1
iii	Widening of Roads Within ROW Affecting Environmental Sensitive Components	E-1
iv	Widening of Roads Within ROW Without Affecting Environmental Sensitive Components	E-2
v	Improvement of Surface	E-2
vi	Traffic Islands	E-3
vii	Road Divider	E-3
viii	Other Traffic and Transport Management measures	E-3
ix	Footpaths	E-3
b	Street Furniture	
i	Traffic Signals	E-3
ii	Streetlights	E-3
iii	Sign Boards	E-3
c	Road Structures	
i	Subways	
	- Pedestrian	E-2
	- Cycle Lanes	E-2
	- Fast Moving	E-2
ii	ROBs/RUBs	E-1
iii	Culverts	E-2
iv	Small Bridges	E-2
d	Terminals / Shelter[4]	
i	Bus Shelters	E-2
ii	Bus Terminals/Stands	E-2
iii	Truck Terminals	E-2
iv	Workshops	E-2
v	Parking Complexes	E-2
e	Fleet Expansion >100 buses	E-2
	<100 buses	E-3
f	Construction & Maintenance Equipment	E-3
g	Inland Water Ways / Lakes / Water Bodies	E-1
IV	***Commercial Complexes***	
a	Shopping /Office Complexes (for < 1000 persons or with a sewage discharge < 50,000 litres per day)	E-2
b	Shopping /Office Complexes (for > 1000 persons or with a sewage discharge > 50,000 litres per day)	E-1
c	Vegetable/Fish Markets	E-2
d	Slaughter Houses	E-1
e	Marriage Halls	E-2

[4] In case of construction of new bus/truck terminals, the project will be categorized as E1

Sr. No	Project	Environmental Category
f	Lodge / Dormitory	E-3
g	Municipal Community Complexes (for < 1,000 persons or with a sewage discharge < 50,000 litres per day)	E-2
h	Municipal Community Complexes (for > 1000 persons or with a sewage discharge .> 50,000 litres per day	E-1
V	***Non Comm./Community Amenities***	
a	Parks	E-3
b	Playgrounds	E-3
c	Maternity and Child Centers	E-2
d	Educational Institution/Reading Room	E-3
e	Burial Grounds	E-2
f	Electric Crematorium	E-2
VI	***Integrated Area Development***	
a	Housing (Sites & Services)	E-1
b	Guided Urban Development	E-1
c	TRAMP	E-1
VII	***General***	
a	Computer Facilities	E-3
b	Weigh Bridge	E-3

458. The details of Environmental Laws and Regulations applicable for TNUIFSL's Projects and their obligations are presented in **Annexure 12.1**.

459. Based on the number of PAPs who may be affected by the project and magnitude of social impact, TNUIFSL has categorized projects as either S-1, S-2 or S-3 projects (Refer **Table 12.3**).

460. S-1 projects are those that will affect 200 PAPs or more or if PAPs are physically displaced and will require a detailed Social Assessment Report (SAR) that would include a resettlement plan.

461. S-2 projects are those in which no PAP is physically displaced and less than 10 percent of their productive assets are lost (or) less than 200 PAPs are affected. In this case, the borrower can submit a Social Management Plan (SMP) that would include an abbreviated resettlement plan.

462. S-3 projects, on the other hand will not have any households affected at all i.e. they can be classified as 'socially benign'. However, the borrower will have to submit a Social Status Report (SSR).

Table 12.3: Categorization of Projects Based on Social Sensitivity

Category	Description		Type of Project
	Level of Issues	**Management Measures**	
S-1	Serious social issues expected	Project specific SAR along with a RP essential	200 PAPs are involved

Category	Description		Type of Project
	Level of Issues	**Management Measures**	
S-2	Moderate social issues expected	Adopt generic design guidelines and norms in ESF along with a project specific abbreviated plan essential	< 200 PAPs are involved
S-3	No social issues expected hence socially benign	No social mitigation measures required, need to submit SSR	No PAPs are involved

463. The details of Social Safeguard and Entitlement Framework are presented in **Annexure 12.2**.

B. Initial Environmental and Social Screening of Implementable Projects

464. The initial environmental and social screening of implementable projects under CCP for Alandur municipality is given in **Table 12.4**.

Table 12.4: Initial Environmental and Social Screening

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
A	**Water Supply**							
	1	Augmentation of Headworks	E - 1	S - 3	Over Exploitation of water sources, issues relating to conflicting water users.	To prepare Environmental Assessment Report and Environmental Management Plan	ULB/Design consultant	ULB
	2	Distribution Network	E - 2	S - 3				
					Development and Design Phase			
					Since the location of rehabilitation work will be at existing facilities, and the existing environment is a built environment, no design-specific impacts are envisaged	Not Applicable	ULB/Design consultant	ULB
					However, improper design of distribution network may lead to pressure problems, overflow and leakages	Ensure proper design as per CPHEEO guidelines	ULB/Design consultant	ULB
					Construction Phase			

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Soil erosion / silt run off from construction operations	Silt traps are suggested to avoid silt run off and soil erosion	ULB/ contractor	ULB
					Road blocking due to laying of water supply network and increased traffic flow due to vehicle movement for construction activities; inconvenience to the local community	Construction material shall be stockpiled to minimize traffic blockages	ULB/ contractor	ULB
					Most of the proposed network will be laid in fringe and extension areas, which are at present un served. As these areas are not densely populated areas the impacts due to construction activities may not be significant	Construction material shall be stockpiled to minimize traffic blockages	ULB/ contractor	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
						Poor performance of the contractor may potentially exacerbate these impacts and therefore qualified contractors to be appointed. The contracted work includes the implementation of construction site management plan, which will address these issues	ULB	ULB
					Dust and noise from construction activities. Due to the climatic condition the dust generation may be considerable	The practices such as spraying of water to arrest dust shall be employed	Contractor	ULB
						Ensure usage low noise generating equipment; use standard equipment to comply with the	Contractor	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
						noise levels of construction equipment laid out by the CPCB. High noise generating activities including material unloading shall be avoided during nights		
					Health and safety concerns of workers while laying the pipelines	Adequate safety precautions such helmets, safety shoes, gloves, etc., should be provided to the labor and provide appropriate signage near the construction activities to sensitize the community and minimize accidents	Contractor	ULB
					Impact on public/private properties and other	Proper planning is required during the	ULB/ contractor	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					sensitive receptors along the water supply lines during construction	construction phase to avoid such situations		
					Operation Phase			
					Recurrence of blockage and leakage problems	The leak detection and restoration time shall be minimized. The water audit and leak detection surveys are proposed under the present project to improve the system efficiency	ULB	ULB
	3	Elevated Storage Reservoir	E - 3	S - 3				
					Development and Design Phase			
					Failure of reservoir structure and flooding of nearby areas	Proper design of the structure taking into consideration terrain and other physical characteristics	ULB/ Design consultant	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Construction Phase			
					Land required for Pump house construction and Elevated storage reservoir	Compensation in the form of land (or) money as per the TNUIFSL ESF guidelines.	ULB	PMC / ULB
					Noise, vibration and dust from construction activities	Use of less noise generating equipment for all activities; provision for personal protective equipment, ear muffs, etc. during construction; and avoiding construction activities during nights	ULB/ contractor	PMC / ULB
						Sprinkling of water and removal of excess matter/construction debris from the site as soon as possible	ULB/ contractor	PMC / ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Safety hazards to laborers and nearby resident population	Adequate safety precautions such helmets, safety shoes, gloves, etc., should be provided to the labor and provide appropriate signage near the construction activities to sensitize the community and minimize accidents	ULB/ contractor	PMC / ULB
					Operation Phase			
					Excessive algae growth in storage reservoirs	Flow in the reservoir should be continuous to prevent stagnant of water, which lead to algal growth	Engg from water supply section of ULB	ULB
					Possibilities for insect breeding in case of the cracks (or) not properly sealed	Make sure its well ventilated and properly covered	Engg from water supply section of ULB	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Chances of mis-happenings like mixing water with chemical substances	To avoid mishappenings, it should be prohibited from local (or) unauthorized reach	Engg from water supply section of ULB	ULB
	4	Water Treatment Plant	E - 1	S - 3		To prepare Environmental Assessment Report and Environmental Management Plan	ULB/Design consultant	ULB
B	**Water bodies**							
	1	Lake improvements	E - 1	S - 3		To prepare Environmental Assessment Report and Environmental Management Plan	ULB/Design consultant	ULB
C	**Sewerage and Sanitation**							
	1	Additional New Sewer Network	E - 2	S - 3				
					Development and Design Phase			

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Construction Phase			
					Nuisance due to dust and noise; road blocking due to laying of sewer network; and, increased traffic flow due to vehicle movement for construction activities	Construction material shall be stockpiled to minimize traffic blockages. In case of excavations for sewer lines in busy streets, adequate arrangements for traffic diversion including prior intimation and by erecting proper sign boards	Contractor / ULB	PMC / ULB
					Dust generation may be significant during day time	Construction activities include significant quantities of earthwork. Dust generation must be arrested by water spraying. Use standard equipment to comply with the noise levels of construction	Contractor / ULB	PMC / ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
						equipment laid out by the CPCB. High noise generating activities including material unloading shall be avoided during nights. The surrounding people shall be informed, especially in densely populated area, of nature and schedule of the high noise generating activities, if any		
					Disposal of excavated soil during construction	Excavated soil can be used for filling low lying area (or) landscaping	Contractor / ULB	PMC / ULB
					Proposed laying of additional sewers is very minimal and would cover extension areas in	Not Applicable		

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					future, thus, impact may be insignificant			
					Poor performance of the contractor may potentially exacerbate these impacts and therefore qualified contractors to be appointed. The contracted work includes the implementation of construction site management plan, which will address these issues	In consideration with the densely populated areas and arterial and sub-arterial roads, a construction site management plan, incorporating the above suggested mitigation measures, shall be implemented	Contractor / ULB	PMC / ULB
					Operation Phase			
					Surface runoff during the rainy seasons leads to blockage of sewage and overflow problems	Sewers should be frequently checked for the blockage	ULB / Contractor	ULB
					Surface and groundwater contamination due to leakages	Frequent testing of groundwater quality	ULB	ULB
					Health and safety concerns while working in closed	Adequate safety precautions such gloves, oxygen	ULB	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					drains/pipes	masks, etc., should be provided to the labor		
					Disposal of sludge and sewer silt during operation and maintenance	Sludge and the sewer silt can be disposed at sanitary landfill	ULB	ULB
D	**Roads & Storm Water Drains**							
	1	Upgradation (Excludes the Bus Route and Major Links)	E - 2	S - 3				
					Development and Design Phase			
					Construction Phase			
					Emission of air pollutants from construction vehicles and machinery	All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that the pollution emission levels are as per norms of SPCB	Contractor / ULB	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Noise, vibration and dust from construction activities	Use of less noise generating equipment for all activities; provision for personal protective equipment, ear muffs, etc. during construction; and avoiding construction activities during nights. • Vehicles delivering material should be covered	Contractor / ULB	ULB
						Sprinkling of water and removal of excess matter/construction debris from the site as soon as possible	Contractor / ULB	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Safety hazards to laborers and nearby resident population	Adequate safety precautions such helmets, safety shoes, gloves, etc., should be provided to the labor and provide appropriate signage near the construction activities to sensitize the community and minimize accidents	Contractor / ULB	ULB
					Road block and increase in traffic on the alternative routes and traffic congestion	Alternate routes are suggested to control the traffic load during construction	Contractor / ULB	ULB
					Nuisance due to noise	Noise limits for construction equipments such as compactors, rollers shall not exceed 75 dB(A), as specified in the	Contractor / ULB	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
						Environment (Protection) Rules, 1986		
						High noise generating activities, if any, shall not be carried out during the nights	Contractor / ULB	ULB
					Operation Phase			
					Contamination from spills due to traffic and accidents	Cleaning of the spills at the accidental site and the left over spill may be scrapped to a small nearby pit within ROW	ULB	ULB
	2	New Formation (Excludes the Bus Route and Major Links)	E - 1	S - 1		To prepare Environmental Assessment Report and Environmental Management Plan	ULB	ULB
	3	Widening/ Strengthening of Roads	E - 1	S - 2		To prepare Environmental Assessment Report and	ULB	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
						Environmental Management Plan		
	4	Desilting & Strengthening of Primary Drains	E - 2	S - 3				
					Development and Design Phase			
					Improper design may lead to overflowing or siltation	Ensure proper design of section; design shall as per the CPHEEO Guidelines	ULB/Design consultant	ULB
					Construction Phase			
					Exposure of workers to contaminated soil during desilting and exactions	The personal protection equipment such as gloves, boots shall be provided	Contractor / ULB	PMC / ULB
					Disturbance to traffic due to storage of construction material/waste and material transport vehicles and other equipment	Construction material shall be stockpiled to minimize traffic blockages	Contractor / ULB	PMC / ULB
					Nuisance due to noise			

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Dust generation during construction activity may be significant	Dust suppression activities such as water sprinkling shall be employed	Contractor / ULB	PMC / ULB
					Impacts due to disposal of organic contaminated silt	It can be used as manure	Contractor / ULB	PMC / ULB
					Operation Phase			
					Silting and pollution of water bodies due to non-clearance of construction work site	Ensure clearing of debris/waste and material from the drainage bed and from the banks before pressing into operation	Contractor / ULB	ULB
	5	Storm Water Drains	E - 2	S - 3				
					Development and Design Phase			
					Regularization of drain sections may lead to overflowing or silting of section due to improper design	Ensure proper design of section; design shall as per the CPHEEO Guidelines	ULB/Design consultant	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Construction Phase			
					Exposure of workers to contaminated soil during desilting and exactions	The personal protection equipment such as gloves, boots shall be provided	Contractor / ULB	ULB
					Disturbance to traffic due to storage of construction material/waste and material transport vehicles and other equipment	Construction material shall be stockpiled to minimize traffic blockages	Contractor / ULB	ULB
					Nuisance due to noise			
					Dust generation during construction activity may be significant	Dust suppression activities such as water sprinkling shall be employed	Contractor / ULB	ULB
					Impacts due to disposal of contaminated silt			
					Pollution and silt loading of water bodies			
					Public and worker safety			
					Operation Phase			

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Silting and pollution of water bodies due to non-clearance of construction work site	Ensure clearing of debris/waste and material from the drainage bed and from the banks before pressing into operation	Contractor / ULB	ULB
					Health and safety concerns while working in closed drains/pipes	Adequate safety precautions such gloves, oxygen masks, etc., should be provided to the labor	Contractor / ULB	ULB
E	**Street Lighting**							
	1	Provision of New Lamp Posts	E - 3	S - 3				
					Development and Design Phase			
					No major impact is anticipated	Not Applicable		
					Construction Phase			
					No major impact is anticipated	Not Applicable		
					Operation Phase			
					No major impact is anticipated	Not Applicable		

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
	2	Providing Under Ground Multi-Utility Duct	E - 2	S - 3				
					Construction Phase			
					Road blocking due to laying of water supply network and increased traffic flow due to vehicle movement for construction activities; inconvenience to the local community	Construction material shall be stockpiled to minimize traffic blockages	Contractor / ULB	ULB
					Dust and noise from construction activities. Due to the climatic condition the dust generation may be considerable	The practices such as spraying of water to arrest dust shall be employed	Contractor / ULB	ULB
						Ensure usage low noise generating equipment; use standard equipment to comply with the noise levels of construction equipment laid	Contractor / ULB	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
						out by the CPCB. High noise generating activities including material unloading shall be avoided during nights		
					Health and safety concerns of workers while laying the pipelines	Adequate safety precautions such helmets, safety shoes, gloves, etc., should be provided to the labor and provide appropriate signage near the construction activities to sensitize the community and minimize accidents	Contractor / ULB	ULB
					Impact on public/private properties and other sensitive receptors along the supply lines during construction	Proper planning is required during the construction phase to avoid such situations	Contractor / ULB	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Operation Phase			
					No major impact is anticipated			
F	**Traffic & Transportation**							
	1	Junction Improvement, Parking Facilities & Footpath	E - 3	S - 3				
					Development and Design Phase			
					No major impact is anticipated			
					Construction Phase			
					No major impact is anticipated			
					Operation Phase			
					No major impact is anticipated			
G	**Solid Waste Management**							
	1	Collection and Transportation Vehicles	E - 2	S - 3				
					Development and Design Phase			

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
					Nuisance due to location of waste collection containers. During the monsoon the waste may mix with the runoff and may potentially create unhygienic conditions around the site.	Containers shall be located at appropriate location; place the containers on a slightly elevated plot form. Waste shall be regularly collected and no overflowing must be allowed. The collection, storage and transportation of solid waste shall confirm to Schedule II of MSWM Rules, 2000	ULB/Design consultant	ULB
					Operation Phase			
					Change in surface and ground water quality due to leachate	Segregation of waste		
					Nuisance due to waste collection residue and waste spillage during transportation	The waste collection, storage and transportation system shall in	Contractor / ULB	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
						consistent with State Policy on Integrated Solid Waste Management and Schedule II of MSW Rules, 2000		
					Health and safety hazards to workers during waste collection, transportation and at compost and disposal site	Occupational safety plan shall be prepared. This includes: • Provision of appropriate personal protection equipment (PPE) such as gloves, boots, etc. • Manual handling of waste shall be avoided as far as possible. • Training of workers on safe handling of waste and potential dangers such as safety and health	Contractor / ULB	ULB

Sectors			Environmental Category	Social Category	Potential (Environmental) Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
						hazards. • Prepare a health risk mitigation plan incorporating health check up program		
	2	Disposal Site						
	i	Land Fill Area	E - 1	S - 3		To prepare Environmental Assessment Report and Environmental Management Plan	ULB/Design consultant	ULB
	ii	Compost Facility Area	E - 1	S - 3		To prepare Environmental Assessment Report and Environmental Management Plan	ULB/Design consultant	ULB

XIII. PROJECT IMPACTS AND POLICY INTERVENTIONS

A. Project Benefits and Impacts

1. Financial

465. A financial analysis was undertaken for direct revenue-generating components, i.e. water supply, sewerage and SWM. Sewerage projects are proposed in the view of environmental improvement and currently no scheme in place and hence, in view of the plausible tariff applicable – initial connection and monthly rent – water supply and sewerage projects indicate either negative cash flows or low FIRRs. A similar scenario is experienced in case of solid waste management project, where there is no history of tariffs. Hence, all sub-projects identified have a strong economic rationale but indicate poor financial returns. On a stand-alone basis, none of the projects other sewerage project is financially viable but at the municipal/local-level, the municipal fund bears the financial burden of sub-project cash flows. However, municipal funds are not robust enough to bear the entire investment identified, hence, implementable projects have been identified.

466. Outstanding liabilities – debt and non-debt – of ULBs play a critical role in the long-term sustainability of sub-projects and determining the ULB's ability to manage resources. Electricity charges, staff pensions and debt towards water and sewerage sub-project components constitute liabilities, which are often borne by the State (through SFC devolution). This approach of State subsidy frees the ULB of the responsibility of performing its role of mobilizing local resources to deliver basic services.

2. Economic

467. The economic rationale is based on three key principles: (i) basic human requirements for urban services, both for social development and for economic activity; (ii) t*he contribution of* efficient *and integrated urban services to sustainable economic* development and poverty reduction; and (iii) prioritization of need and cost effective (least cost) solutions

468. All sub-projects have a strong economic rationale since they provide minimum acceptable standards for basic living conditions and assist in removing existing constraints on social development and economic growth. Similarly, all sub-projects were designed along sound principles of priority need; consultation and targeting; demand management and rehabilitation before new investment.

469. Alternatives considered in sub-project design included types of wastewater treatment process, sites and location and design of sewer network; and sites and type of solid waste disposal process. In all cases, the most appropriate technical and least cost solution was preferred. Reduction of UFW and ground water recharge are key recommendations for water augmentation. Without the sewerage/sanitation, solid waste and drainage components, the prevailing unhygienic and unacceptable living conditions will continue.

3. Social

470. The Project is designed to maximize the number of poor beneficiaries, aimed specifically at improving conditions in under-served areas. The project should benefit 100 percent of the notified slum population. It will extend or improve the service delivery to previously unserved or under-served areas, particularly for poor settlements. The combination of project components will lead to sustained poverty reduction through demonstrable health, livelihood benefits.

471. Institutional components of the project should empower and lead to demonstrable improvement in "Quality of Life" of women. Awareness of affected population in particular the poor will be increased and improved through dedicated education programs, thereby increasing the quality of dialogue and informed participation between communities and local government.

472. Indirect benefits will be available to residents of the project ULBs through improved living conditions, a healthier living environment and the prospect of improved health status of the population. This and the prospect of accelerated economic development should increase employment and raise living standards. The capacity-building initiatives should lead to a more efficient, effective and responsive state and local government, better able to understand and respond to the needs of the population, especially the poor.

473. Negative impacts will be minimized in requiring minimum resettlement or loss of productive or non-productive assets. A social impact assessment was carried out for identified sub-projects and translated as a risk mitigation matrix. The sub-project minimizes other negative impacts on poor men and women such as an increased cost for services (time and money), unemployment, and health risks.

4. Environmental Screening

474. The proposed Project is fundamentally aimed at environmental improvement in the urban areas, and as such, the overall impact should be beneficial to the urban population and their environment. The Project will thus contribute significantly to achieving one of its overall objectives, which is to improve the living conditions and thus well-being of the urban poor. The urban population will run less risk of incurring infectious diseases through exposure to waste and contaminated water.

475. Based on an initial evaluation, the proposed Project is unlikely to result in any direct adverse environmental impacts. Adverse impacts relate almost entirely to the construction phase, and particular attention will need to be paid to ensuring that contractors comply with good engineering practice and avoid creating unnecessary inconvenience to the public during construction. Thus, on the assumption that the construction process is well managed, the short-term negative impacts of the project will be far outweighed by the major positive impacts of a more sanitary urban environment. The study identifies environmental categories for sub-project components and has developed Environmental Safeguard Frameworks for sub-projects proposed; EIA/EMP/IEE will need to be done accordingly, during the detailed design phase. An Environmental Monitoring Plan captures

the prospective environmental risks and the associated mitigation measures along with institutional roles and responsibilities.

B. Policy Interventions

1. Institutional Arrangements

476. Institutions at the State-level and local-level play an important role in project implementation. At the State-level, the TNUIFSL and CMA would manage infrastructure investments and institutional development. At the local-level, the Project ULB would undertake reforms (tax rationalization, expenditure control and resource base enhancement), TWAD/Metro Water Board would construct water and sewerage systems on behalf of ULB, TNPCB would provide environmental clearances (focused on EIA/EMP for municipal waste processing and disposal, and sewage treatment plants), and TNSCB would approve slum upgradation programs and identify target beneficiaries. While the above arrangements define roles of each institution, the mechanism to coordinate the responsibilities is critical for project success.

2. Resource Mobilization and Expenditure Control

477. Analyses indicate that sub-project viability is dependent on equity contributions (ULB and customer) and debt servicing capabilities of ULB. Since the cash flow at the municipal fund level determines investment sustenance, it is imperative that adequate resources are mobilized to meet sub-project sustenance. Hence, prior to project implementation, it is pertinent that ULBs undertake resource mobilization drives including but not limited to enhancing the tax base, raising tariffs and taxes, enhancing the water connection database (detecting illegal/unauthorized connections), and planning for accurate management information systems to capture the demand for revenue. Water charge enhancement and revisions are proposed on a nominal and pragmatic basis, with due consideration to the prevailing political environment; a similar approach was adopted while recommending sewerage charges and connection fees. Expenditure controls on establishment, staff salary and pensions, and energy savings in street lighting, maintenance and repairs are key to long-term sustainability of sub-projects – lack of data on non-debt outstanding liabilities hampered analyses but it is recommended that the State undertake to issue a policy regarding liability management and encourage ULBs to commit themselves to prudent fiscal management.

3. Land Acquisition and Clearances

478. Typical problems in project construction are land availability and approvals/clearances from State and Central Government agencies. While this study identifies risk mitigation measures, site conditions may vary during technical investigations and surveys, e.g., soil conditions affecting foundations of proposed structures. The ULB would require confirming site conditions and the Implementing Agency along with the CMA would procure approvals and clearances in addition to initiating land acquisition processes.

4. Asset Maintenance and Debt Service

479. Considering that the project assets would be created through good operating practices, it is recommended that the State initiate a system of performance benchmarking and internal controls regarding asset maintenance and continued resource mobilization. While the ULB would continue to report sub-project O&M performance through the tenure of the loan and sub-project life, as system of checks require institutionalization in order to regulate ULB's commitment to asset maintenance and debt servicing.

XIV. URBAN GOVERNANCE

A. Urban Governance

480. This chapter outlines the various best practices world over regarding good urban governance. The strategies presented in this chapter, are an integrated whole and none of them can be seen are understood in an isolated section. Commitment of the municipality to civic, secure and transparent administration will realize the dream of any city/town where the citizens will be those who govern and the municipality as an institution is one who facilitates and provides the service.

1. Current Initiatives

481. The other initiatives that are being adopted by the municipality to enhance its performance and capacity building are computerization of its activities and involving private sector in the delivery of civic services.

482. *Computerization*. GoTN has initiated steps to computerize municipal administration in the state. The entire process consists of four modules: Revenue and Taxation, Record Maintenance, Personnel Management System, Financial Management System.

483. As a start up, data relating to property tax has been computerized and the assessments are now handled by using computers. The billing and collection system of the property taxes is also computerized in the town. However, the computerization efforts are slow owing to the absence of technical capabilities with the municipality.

484. *Private Sector Participation.* The municipality has initiated the involvement of private sector in service delivery through part privatization of the solid waste collection system. The initiative has received good response from the citizens of the town and further privatization of certain other components of services is in active consideration of the municipality.

2. Strategies

485. *Decentralization*. In conformity to the 74th CAA, the Government of Tamil Nadu has made necessary legislative changes to devolve functional domains of the 18 listed items in the 12th schedule of the constitution. However only seven functions are made obligatory functions of urban local bodies and important functions like urban planning including town planning, regulation of land use and construction of buildings, slum improvement, urban poverty alleviation remain discretionary functions with rather little say for ULB. Consequently, the funds and concerned staff continue to remain under the control of the State Government. Financial powers as envisaged in the 12th Schedule of the Constitution also need to be immediately devolved to urban local bodies.

486. The local bodies should have control over the land in their jurisdiction and other

infrastructure including roads in their area. They should have power to remove encroachment from public land, construct and maintain roads within their respective municipal areas.

487. The municipality shall divide the area into zones/ divisions for better service delivery and management control. Such a mechanism is already being implemented in water supply and public health sectors.

488. *Urban Environmental Management*. The costs of maintaining a healthy urban environment needs to be recovered through various municipal taxes and user charges following the "Polluter Pays" principle. For this, the functional role of the ULB as envisaged in Item 8, 12th Schedule of the Constitution have to be resolved keeping in view the role of Tamil Nadu Pollution Control Board and the organizational and fiscal strength of the ULB.

489. *Access of Urban Services to Poor*. Since "Ability-to-Pay" for the full cost of environmental infrastructure services' provision is the important criterion, cross-subsidization of tariffs, innovative project structuring and user/ community participation are the means towards ensuring access of these services to the poor. Again, the functional and financial role of ULB with respect to the items 10 and 11 of 12th Schedule against those of central and state government agencies need to be resolved.

490. *Streamlining and Strengthening of Revenue Base of Local Bodies*.

(i) The recommendations of the State Finance Commissions must be made mandatory and should be implemented as a matter of course. Law enforcement powers should be given to local bodies to compel payments of taxes and other charges levied by them.
(ii) Property Tax base should be de-linked from rental value method and should be linked to Unit Area or Capital value method.
(iii) Fiscal powers of municipal bodies to fix tax rates, fee structure and user charges should be strengthened through specific guidelines and notifications. Prepare model guidelines for the town to allow greater flexibility in levying taxes, fees and user charges, borrowing funds and incurring expenditures.
(iv) The annual report of the municipality shall devote a section highlighting the amounts of subsidy given to a particular service, how was the subsidy funded and who were its beneficiaries.
(v) Adopting Zero-based budgeting shall be carried out supported by the already computerised accounting system for continual monitoring of budgets and cash flow management.
(vi) Implementation of MIS to provide relevant information on accounts, commercial and operating systems for better decision making and information dissemination to citizens.
(vii) Auditing of Accounts should be carried out effectively and regularly to promote transparency and accountability.
(viii) Application of e-governance is equally important for municipal finance. Adequate software in the financial management is required at different levels.

491. *Transparency and Civic Engagement in Municipal Management*.

(i) Laws/ rules/ regulations specific to town/ local issues should be tried to facilitate effective implementation. These should be lucid and easily understood.
(ii) Participatory mechanisms should be so structured that they have legal entity and administrative power. Local bodies should be responsive and innovative and involve community participation in civic engagement.
(iii) Specific code of conduct for municipal executives and elected representatives.
(iv) Public education, resource mobilisation, good leadership and transparent processes apply in municipal finance and development work.
(v) Closer networking with media and their engagement in creating public awareness and creating demand for good governance. Cautious engagement of private sector with continuous monitoring is necessary.
(vi) Setting in place an active and online public Grievances' Redressal System, with automated department wise complaint loading and monitoring system.
(vii) Instruments to improve the efficiency of local bodies through enhanced technical, administrative, and financial capacities.
(viii) Credit Enhancement options other than state guarantees need to be adopted.
(ix) Preparation of annual Environmental Status Reports through a multi-stakeholder consultation process.

492. *Capacity Building of Local Bodies*.

(i) The municipality shall maintain data to generate indicators as suggested in this document for evaluating their performance.
(ii) Prepare and conduct capacity building programs for elected representatives, especially women representatives with a view to enable them to focus on gender based issues.
(iii) Promote the creation of interactive platforms for sharing municipal innovations, experiences among municipal managers.
(iv) Better Human Resource Management through assessment of the training needs of personnel involved in urban administration to enhance the management and organizational capabilities.
(v) Assessment of fund requirement and resource persons to tackle the training needs of all the personnel.
(vi) Development of Training Material in the local language and Impact and Evaluation Studies of the Training Programs.
(vii) Capacity building to position the ULB in a better place to employ highly qualified staff and seek superior quality of out-sourced services.

XV. PROJECT RISKS AND ASSUMPTIONS

A. Overview

493. Every project has its risks, and these can be much greater and numerous with a multi-city, multi-sector project involving a multitude of stakeholders and responsible authorities. However, early acknowledgement of the potential risks will help in mitigating or even eliminating the problems that they may cause during project implementation and beyond. The potential risks and assumptions come in a number of different categories and are classified below for better appreciation.

B. Physical Component Risks

- Land transfers and affected person (AP) compensation agreed and completed before scheduled construction;
- Temporary relocation of street vendor and hawkers likely during civil works construction; adequate provision for compensation to be allocated in the Project;
- Different sector contract conflicts to be avoided through careful contract management and supervision. Tender and contract documents to clearly specify contractor responsibilities;
- Environmental clearances completed before scheduled construction;
- Environmental pollution and nuisance to the public to be minimized during construction through diligent site supervision and monitoring. Tender and contract documents to clearly specify contractor responsibilities;
- Contractors perform competently, to time and budget; and
- ULB may not have the resources or skills to manage the operation of the new facilities (mainly STP and sanitary landfill sites) in an environmentally sound way.

C. Policy Risks

- State and local governments' commitment to necessary decentralization reforms in urban management to provide improved services;
- GoTN continues to provide adequate guidance and capacity building to support the devolution process of decision making and financial independence of the urban local bodies; and
- Political acceptance of required changes in tariffs, taxes, and rates.

D. Institutional Risks

- GoTN, through the CMA, TNUIFSL, and ULBs to ensure that the ULB are fully staffed and capable of undertaking duties prior to and during Project implementation;
- Delays will occur unless there is timely recruitment and satisfactory performance of Project Consultants;

- Project ownership will suffer unless there is effective consultation with stakeholders and others government agencies;
- Public awareness and community mobilization programs must be effective for getting the participation of local stakeholders into implementation;
- Adequate training opportunities for elected officials and municipal staff must be available;
- Implementing agencies must be amenable to capacity building; and
- There should be no legal obstacles to slum infrastructure upgrading.

E. Social Risks

- Adequate training facilities and technical support system must be available to help the agency in implementing poverty alleviation activities;
- The ULB Council must actively support the initiatives under the poverty alleviation component;
- Poor communities must be willing and able to participate in project planning activities;
- Investment provided by the Project should be converged with other programs to target the urban poor more effectively and for maximum benefit;
- Improved services will only benefit the urban poor and vulnerable groups if included in the physical design and if any financial cost recovery is affordable; and
- Project funds must not be diverted from the social programs to pay for loan charges.

F. Financial Risks

- Financial Improvement Action Plan not implemented to scale or schedule necessary for sustained operation and maintenance;
- Willingness of beneficiaries to pay for proper management, maintenance and operation of infrastructure facilities;
- Tariffs for services not set at appropriate levels or collected efficiently; and
- Un-timely provision of counterpart funds.

G. Economic Risks

- Overrun of project construction costs due to delays;
- Indirect economic costs are significant, e.g., negative environmental impacts on agricultural production, net loss of income due to shutdown of street vendors/hawkers;
- Underachievement of Project outputs, i.e., population coverage of improved services is below target or infrastructure improvements not as effective as planned;
- Effective demand for the services provided by the improved infrastructure is less than projected due to lack of consumer affordability or willingness to accept change; and
- Operation and maintenance of the infrastructure and equipment provided by the Project are not funded and/or carried out at levels sufficient to sustain Project benefits

Annexure

Annexure 2.1: Ward-wise Density Pattern

Ward	Area	Population	Population Density	Density Pattern	Comparison with Chennai City's Density
	Ha	*Nos.*	*Persons per Ha*		
1	100.10	2,500	25	Low Density	Below
2	23.48	2,892	123	Medium Density	Below
3	23.04	2,931	127	Medium Density	Below
4	23.07	2,628	114	Medium Density	Below
5	52.78	3,827	73	Moderately Less Dense	Below
6	19.65	3,348	170	High Density	Below
7	14.44	2,268	157	High Density	Below
8	19.70	2,803	142	Medium Density	Below
9	21.06	2,216	105	Medium Density	Below
10	40.56	3,032	75	Moderately Less Dense	Below
11	32.47	3,557	110	Medium Density	Below
12	9.57	3,536	369	Very High Density	Above
13	75.47	4,490	59	Moderately Less Dense	Below
14	28.17	2,106	75	Moderately Less Dense	Below
15	82.94	5,182	62	Moderately Less Dense	Below
16	31.71	4,124	130	Medium Density	Below
17	93.06	3,843	41	Low Density	Below
18	37.54	4,418	118	Medium Density	Below
19	57.31	5,773	101	Medium Density	Below
20	84.72	8,166	96	Moderately Less Dense	Below
21	136.50	3,730	27	Low Density	Below
22	109.13	4,028	37	Low Density	Below
23	78.34	5,779	74	Moderately Less Dense	Below
24	15.06	2,265	150	Medium Density	Below
25	52.12	3,918	75	Moderately Less Dense	Below
26	21.42	3,244	151	High Density	Below
27	69.62	2,592	37	Low Density	Below
28	27.80	4,116	148	Medium Density	Below
29	56.97	3,710	65	Moderately Less Dense	Below
30	24.88	2,511	101	Medium Density	Below
31	39.95	2,519	63	Moderately Less Dense	Below
32	20.22	3,774	187	High Density	Below
33	53.84	3,597	67	Moderately Less Dense	Below
34	32.16	3,982	124	Medium Density	Below
35	99.45	3,446	35	Low Density	Below
36	78.97	3,052	39	Low Density	Below
37	15.43	3,160	205	Very High Density	Below
38	23.58	1,765	75	Moderately Less Dense	Below
39	23.23	2,701	116	Medium Density	Below
40	11.21	2,385	213	Very High Density	Below
41	27.00	4,364	162	High Density	Below
42	62.26	2,009	32	Low Density	Below
Total	**1,950.00**	**146,287**	**75**	**Moderately Less Dense**	**Below**

Annexure 5.1: Details of Ward wise Distribution Network

Ward No	Municipal Roads	Distribution Network			Total
		AC	C.I.	PVC	
	m	*m*	*m*	*m*	*m*
1	1,632.00	4,139.20	-	-	4,139.20
2	1,921.00	2,007.20	-	223.60	2,230.80
3	1,809.00	2,225.60	-	-	2,225.60
4	1,206.00	2,007.20	-	-	2,007.20
5	2,885.00	3,941.60	509.60	161.20	4,612.40
6	2,983.00	2,288.00	-	296.40	2,584.40
7	1,539.00	873.60	-	1,731.60	2,605.20
8	1,204.00	1,710.80	296.40	218.40	2,225.60
9	1,814.00	1,981.20	982.80	197.60	3,161.60
10	3,264.00	878.80	-	2,516.80	3,395.60
11	2,787.00	400.40	130.00	4,836.00	5,366.40
12	1,905.00	-	520.00	561.60	1,081.60
13	6,296.00	2,350.40	-	5,392.40	7,742.80
14	2,453.00	156.00	260.00	4,076.80	4,492.80
15	7,210.00	-	-	7,722.00	7,722.00
16	3,725.00	2,334.80	-	1,430.00	3,764.80
17	4,484.00	2,277.60	-	1,918.80	4,196.40
18	5,737.00	260.00	-	1,960.40	2,220.40
19	3,676.00	5,704.40	-	1,918.80	7,623.20
20	7,104.00	4,482.40	-	5,278.00	9,760.40
21	5,046.00	-	-	8,996.00	8,996.00
22	6,799.00	1,710.80	-	8,075.60	9,786.40
23	6,433.00	478.40	-	5,673.20	6,151.60
24	2,756.00	421.20	-	1,232.40	1,653.60
25	3,560.00	535.60	868.40	3,250.00	4,654.00
26	2,927.00	826.80	-	1,768.00	2,594.80
27	4,204.00	5,413.20	712.40	2,392.00	8,517.60
28	2,828.00	639.60	-	4,128.80	4,768.40
29	4,329.00	1,393.60	-	2,438.80	3,832.40
30	1,923.40	2,667.60	-	-	2,667.60
31	2,859.00	3,213.60	-	421.20	3,634.80
32	2,698.00	1,586.00	-	681.20	2,267.20
33	2,797.00	3,837.60	-	852.80	4,690.40
34	4,208.40	-	-	2,808.00	2,808.00
35	3,821.00	3,447.60	-	-	3,447.60
36	2,617.40	2,891.20	-	-	2,891.20
37	1,179.00	1,523.60	-	130.00	1,653.60
38	1,168.00	1,102.40	514.80	-	1,617.20
39	1,158.00	3,406.00	358.80	-	3,764.80
40	1,168.80	322.40	556.40	-	878.80
41	2,177.00	2,418.00	462.80	-	2,880.80
42	1,662.00	2,558.40	-	-	2,558.40
Total	**133,953.00**	**80,412.80**	**6,172.40**	**83,288.40**	**169,873.60**

Source: Alandur municipality

Annexure 5.2: Ward wise Coverage of Water Supply HSCs w.r.t. Households

Ward	Households	Water Supply Connections	Percentage	Coverage
1	576	272	47%	Medium Coverage
2	636	155	24%	Low Coverage
3	665	240	36%	Medium Coverage
4	567	127	22%	Low Coverage
5	934	409	44%	Medium Coverage
6	764	296	39%	Medium Coverage
7	516	212	41%	Medium Coverage
8	676	201	30%	Medium Coverage
9	521	208	40%	Medium Coverage
10	751	377	50%	High Coverage
11	869	395	45%	Medium Coverage
12	849	305	36%	Medium Coverage
13	1132	597	53%	High Coverage
14	507	250	49%	Medium Coverage
15	1271	759	60%	High Coverage
16	1003	361	36%	Medium Coverage
17	986	374	38%	Medium Coverage
18	1126	521	46%	Medium Coverage
19	1527	1,033	68%	High Coverage
20	2061	956	46%	Medium Coverage
21	923	491	53%	High Coverage
22	946	607	64%	High Coverage
23	1361	265	19%	Low Coverage
24	535	379	71%	High Coverage
25	917	301	33%	Medium Coverage
26	734	207	28%	Medium Coverage
27	621	610	98%	High Coverage
28	959	315	33%	Medium Coverage
29	870	356	41%	Medium Coverage
30	587	177	30%	Medium Coverage
31	631	271	43%	Medium Coverage
32	906	280	31%	Medium Coverage
33	895	321	36%	Medium Coverage
34	1003	453	45%	Medium Coverage
35	778	84	11%	Low Coverage
36	698	182	26%	Medium Coverage
37	687	70	10%	Low Coverage
38	388	116	30%	Medium Coverage
39	524	169	32%	Medium Coverage
40	548	153	28%	Medium Coverage
41	992	238	24%	Low Coverage
42	487	112	23%	Low Coverage

Source: Alandur municipality and analysis

Annexure 5.3: Coverage of Municipal Roads

Ward No	Bitumen	CC	WBM	Earthen	Total	Percentage to Total Municipal Roads	Per Capita Roads
	m	*m*	*m*	*m*	*m*	*%*	*m*
1	1,330.00	-	-	302.00	1,632.00	1.22	0.65
2	1,243.00	678.00	-	-	1,921.00	1.43	0.66
3	1,708.00	-	-	101.00	1,809.00	1.35	0.62
4	633.00	573.00	-	-	1,206.00	0.90	0.46
5	2,446.00	439.00	-	-	2,885.00	2.15	0.75
6	1,754.00	635.00	594.00	-	2,983.00	2.23	0.89
7	974.00	565.00	-	-	1,539.00	1.15	0.68
8	1,043.00	161.00	-	-	1,204.00	0.90	0.43
9	488.00	1,054.00	272.00	-	1,814.00	1.35	0.82
10	3,264.00	-	-	-	3,264.00	2.44	1.08
11	2,430.00	276.00	-	81.00	2,787.00	2.08	0.78
12	1,905.00	-	-	-	1,905.00	1.42	0.54
13	5,308.00	-	988.00	-	6,296.00	4.70	1.40
14	1,935.00	286.00	101.00	131.00	2,453.00	1.83	1.16
15	4,837.00	-	2,373.00	-	7,210.00	5.38	1.39
16	3,479.00	246.00	-	-	3,725.00	2.78	0.90
17	4,333.00	151.00	-	-	4,484.00	3.35	1.17
18	4,965.00	-	261.00	511.00	5,737.00	4.28	1.30
19	2,423.00	-	1,253.00	-	3,676.00	2.74	0.64
20	6,912.00	61.00	131.00	-	7,104.00	5.30	0.87
21	4,403.00	-	542.00	101.00	5,046.00	3.77	1.35
22	5,664.00	154.00	348.00	633.00	6,799.00	5.08	1.69
23	4,850.00	372.00	896.00	315.00	6,433.00	4.80	1.11
24	2,069.00	287.00	99.00	301.00	2,756.00	2.06	1.22
25	3,560.00	-	--	-	3,560.00	2.66	0.91
26	2,527.00	400.00	-	-	2,927.00	2.19	0.90
27	4,028.00	-	176.00	-	4,204.00	3.14	1.62
28	2,053.00	106.00	669.00	-	2,828.00	2.11	0.69
29	2,940.00	506.00	676.00	207.00	4,329.00	3.23	1.17
30	1,513.00	145.00	254.00	11.40	1,923.40	1.44	0.77
31	2,094.00	493.00	176.00	96.00	2,859.00	2.13	1.13
32	2,055.00	643.00	-	-	2,698.00	2.01	0.71
33	2,594.00	147.00	-	56.00	2,797.00	2.09	0.78
34	3,694.00	142.00	372.40	-	4,208.40	3.14	1.06
35	3,038.00	-	-	783.00	3,821.00	2.85	1.11
36	1,805.00	246.00	397.40	169.00	2,617.40	1.95	0.86
37	602.00	501.00	-	76.00	1,179.00	0.88	0.37
38	801.00	367.00	-	-	1,168.00	0.87	0.66
39	464.00	694.00	-	-	1,158.00	0.86	0.43
40	768.00	286.00	114.80	-	1,168.80	0.87	0.49
41	2,006.00	171.00	-	-	2,177.00	1.63	0.50
42	1,662.00	-	-	-	1,662.00	1.24	0.83
Total	**108,600.00**	**10,785.00**	**10,693.60**	**3,874.40**	**133,953.00**	**100.00**	**0.92**

Source: Alandur municipality and analysis

Annexure 5.4: Ward wise Distribution of Streetlights

Ward No	Tube lights	High mast Lamps	Sodium Vapor Lamp			Mercury Vapor Lamp			Total
	40W		*70W*	*250W*	*Total*	*70W*	*250W*	*Total*	
1	33	-	23	8	31	4	-	4	68
2	38	-	10	4	14	-	-	-	52
3	38	-	20	18	38	2	-	2	78
4	34	-	5	9	14	4	1	5	53
5	72	-	13	19	32	-	-	-	104
6	57	-	12	4	16	5	-	5	78
7	41	-	7	2	9	4	-	4	54
8	36	-	3	4	7	4	-	4	47
9	28	-	1	6	7	5	-	5	40
10	94	-	12	14	26	-	-	-	120
11	44	-	6	3	9	-	-	-	53
12	41	-	7	19	26	-	-	-	67
13	106	-	14	19	33	-	-	-	139
14	38	-	9	8	17	-	-	-	55
15	144	-	17	17	34	-	-	-	178
16	62	-	8	26	34	-	-	-	96
17	76	-	19	25	44	-	-	-	120
18	108	-	16	24	40	-	-	-	148
19	15	-	5	-	5	5	-	5	25
20	258	1	44	100	144	1	2	3	406
21	82	-	13	2	15	-	-	-	97
22	124	-	17	28	45	-	-	-	169
23	101	-	15	10	25	-	-	-	126
24	54	-	4	2	6	4	-	4	64
25	67	-	8	9	17	-	-	-	84
26	56	-	29	17	46	-	-	-	102
27	73	-	7	8	15	3	-	3	91
28	67	-	13	2	15	-	-	-	82
29	75	-	9	10	19	-	-	-	94
30	43	-	1	11	12	5	-	5	60
31	19	-	6	2	8	5	-	5	32
32	52	-	13	5	18	-	-	-	70
33	65	-	4	12	16	4	-	4	85
34	87	-	5	7	12	-	-	-	99
35	27	-	-	16	16	5	-	5	48
36	62	-	9	15	24	-	-	-	86
37	23	-	6	5	11	-	-	-	34
38	24	-	12	3	15	-	-	-	39
39	47	-	5	4	9	-	-	-	56
40	25	-	5	6	11	-	-	-	36
41	37	-	9	8	17	-	-	-	54
42	36	-	7	12	19	-	-	-	55
Total	**2,609**	**1**	**448**	**523**	**971**	**60**	**3**	**63**	**3,644**

Source: Alandur municipality.

Annexure 6.1: Tests Results of Waste Characterization Study

Parameters	**Units**	**Residential**			**Commercial**		
		Sample 1	**Sample 2**	**Average**	**Sample 1**	**Sample 2**	**Average**
Ash	%w/w	80.84	13.82	47.33	82.76	13.80	48.28
Bulk Density	Kg/cum	104.00	394.80	249.40	114.00	368.00	241.00
Carbon	%w/w	4.14	24.80	14.47	5.63	25.20	15.42
Fixed Carbon	%w/w	2.33	2.59	2.46	2.28	20.66	11.47
Gross Calorific Value	Kcal/Kg	688.00	3,894.00	2,291.00	685.00	4,047.00	2,366.00
Nitrogen as N	%w/w	0.54	1.76	1.15	1.00	1.75	1.38
Phosphorous as P	%w/w	0.01	0.26	0.14	0.05	0.21	0.13
Ash & Fine Earth	%w/w	64.64	-	32.32	69.80	-	34.90
Garden Waste	%w/w	4.45	36.35	20.40	5.56	39.24	22.40
Glass & Ceramics	%w/w	0.20	-	0.10	0.20	-	0.10
Inorganic Matter	%w/w	12.70	-	6.35	5.40	-	2.70
Metal	%w/w	-	-	-	1.30	0.80	1.05
Organic Matter	%w/w	4.45	42.94	23.70	5.86	45.67	25.77
Other Inert Materials	Nil	-	-	-	-	-	-
Paper	% w/w	-	6.58	3.29	0.30	6.30	3.30
Plastic	%w/w	1.58	14.12	7.85	0.25	8.00	4.13
Rubber & Leather	%w/w	11.95	-	5.98	11.34	-	5.67
Volatile matter	%w/w	14.53	77.59	46.06	12.52	59.96	36.24
Cadmium as Cd	mg/Kg	0.60	0.17	0.39	0.28	0.17	0.23
Lead as Pb	mg/Kg	37.50	7.50	22.50	30.50	6.40	18.45
Arsenic as As	BDL (DL: 0.10 mg/Kg)	0.12	BDL	0.12	0.51	BDL	0.51
Nickel as Ni	mg/Kg	10.72	6.70	8.71	6.75	1.74	4.25
Zinc as Zn	mg/kg	0.12	13.00	6.56	11.10	22.70	16.90
Copper as Cu	mg/Kg	127.50	24.70	76.10	18.60	18.00	18.30
Mercury as Hg	BDL (DL: 0.10 mg/Kg)	BDL	BDL	BDL	BDL	BDL	BDL
pH (@25^{0}C)	(10% Suspension)	8.27	5.94	7.11	6.61	7.74	7.18
Moisture	%w/w	72.00	75.00	73.50	77.00	73.30	75.15

Annexure 8.1: Ward wise Water Supply Assets – Distribution Network

Ward No	Distribution Network	Year of Construction	Present Market Rate	Depreciated Value
	m		*Rs.*	*Rs.*
1	4,139.20	1972	1,207,624	37,319
2	2,230.80	1972, 1987	486,164	17,660
3	2,225.60	1972	364,776	11,273
4	2,007.20	1972	529,140	16,352
5	4,612.40	1972, 1987	1,798,264	56,880
6	2,584.40	1972, 1987	571,241	21,147
7	2,605.20	1972, 1987	390,611	26,124
8	2,225.60	1972, 1987	895,717	29,453
9	3,161.60	1972, 1987	2,084,117	66,009
10	3,395.60	1972, 1987	460,166	34,646
11	5,366.40	1972, 1987	583,554	58,427
12	1,081.60	1972, 1987	754,383	27,871
13	7,742.80	1972, 1987	785,072	68,025
14	4,492.80	1972, 1987	718,373	55,286
15	7,722.00	1987	525,791	78,918
16	3,764.80	1972, 1987	642,668	31,466
17	4,196.40	1972, 1987	505,071	31,314
18	2,220.40	1972, 1987	176,098	21,352
19	7,623.20	1972, 1987	1,658,955	67,259
20	9,760.40	1972, 1987	1,285,642	82,565
21	8,996.00	1972, 1987	612,538	91,939
22	9,786.40	1972, 1987	871,818	93,169
23	6,151.60	1972, 1987	464,698	60,403
24	1,653.60	1972, 1987	176,286	15,450
25	4,654.00	1972, 1987	3,419,659	132,054
26	2,594.80	1972, 1987	496,776	29,701
27	8,517.60	1972, 1987	3,802,656	136,927
28	4,768.40	1972, 1987	385,960	45,436
29	3,832.40	1972, 1987	489,192	34,910
30	2,667.60	1972	450,444	13,920
31	3,634.80	1972, 1987	613,281	22,371
32	2,267.20	1972, 1987	625,865	24,870
33	4,690.40	1972, 1987	687,050	28,153
34	2,808.00	1987	191,197	28,698
35	3,447.60	1972	808,734	24,992
36	2,891.20	1972	739,178	22,843
37	1,653.60	1972, 1987	258,570	9,046
38	1,617.20	1972	1,095,226	33,846
39	3,764.80	1972	1,195,652	36,949
40	878.80	1972	1,066,179	32,948
41	2,880.80	1972	1,250,323	38,639
42	2,558.40	1972	593,725	18,348
Total	**169,873.60**		**36,718,432**	**1,814,958**

Source: Alandur municipality and analysis

Annexure 8.2: Minutes of Consultation Meeting for Inception Report

Minutes of Meeting on Inception report submitted by Wilber Smith Associates Pvt. Ltd for preparation of CCCBP for Alandur, Pallavaram and Tambaram held at TNUIFSL on November 18, 2005.

List of Participants:

(i) Mr. Shashi Shekar, MD&CEO, TNUIFSL
(ii) Mr. Mukundan, SVP, IL&FS
(iii) Dr. M.S. Srinivasan, Advisor, TNUIFSL
(iv) Mr. Ravikumar, Head TNUIF – Southern Region, IL&FS
(v) Mr. S. R. Raja, Chairman, Tambaram
(vi) Mr. A.B. Dhyalamoorthy, M. Commissioner, Alandur Municipality
(vii) Mr. G. Sivakumar, Town Planning Officer, Alandur Municipality
(viii) Mr. N. M. Krishnamurthy, Asst Engineer, Alandur Municipality
(ix) Mr. L. A. Papa, M. Commissioner, Tambaram Municipality
(x) Mr. J. Balasubramanian, M. Engineer, Tambaram Municipality
(xi) Mr. M.G. Gnaneswaran, Urban Planner, WSAPL
(xii) Mr. Nidhish Nair, Senior Planner, WSAPL
(xiii) Mr. Anbuchezhiyan, Senior Planner, WSAPL
(xiv) Mr. Dinesh, WSAPL
(xv) Ms. R. Gayathri, AVP, TNUIFSL
(xvi) Mr. Rajendiran, DPE, TNUIFSL
(xvii) Mr. K. Balaji, Manager, TNUIFSL
(xviii) Mr. I. Rajkumar, Manager, TNUIFSL

The following are the salient points discussed.

(i) Commonalities between Alandur, Pallavaram and Tambaram to be addressed.
(ii) The Common projects to be identified for these three towns.
(iii) Integration of services needs to be identified for these 3 towns like integrated landfill, integrated STP etc.
(iv) Economic growth of these towns has to be plotted
(v) Growth towards suburbs needs to be addressed for both domestic as well as commercial purpose.
(vi) Possibility of reclamation of existing dump site for scientific landfill
(vii) Road links between the major roads and municipality roads to be addressed
(viii) Necessity on energy efficiency needs to be addressed
(ix) Detailed sector wise income expenditure statement to be produced, which would help in identifying sectors of huge expenditure and sectors where income can be raised.
(x) Collection efficiency on all receipts to be evaluated
(xi) Possibilities of privatization across sectors may be looked up and cost benefit analysis of the same to be carried out

Annexure 8.3: Minutes of Consultation Meeting for Assessment Report

Minutes of Meeting on the Assessment Report submitted by Wilbur Smith Associates Pvt Ltd for preparation of CCC& BP for Alandur, Pallavaram and Tambaram held at TNUIFSL on December 7, 2005.

List of Participants:

(i) Mr. Shashi Shekar, MD&CEO, TNUIFSL
(ii) Mr. Makwana, JCMA
(iii) Mr. Mukundan, SVP, IL&FS
(iv) Mr. S. R. Raja, Chairman, Tambaram
(v) Mr. Bharathi, Chairman, Alandur
(vi) Mr. Chairman, Pallavaram
(vii) Mr. A.B. Dhyalamoorthy, M. Commissioner, Alandur Municipality
(viii) Mr. G. Sivakumar, Town Planning Officer, Alandur Municipality
(ix) Mr. N. M. Krishnamurthy, Asst Engineer, Alandur Municipality
(x) Mr. L. A. Papa, M. Commissioner, Tambaram Municipality
(xi) Mr. J. Balasubramanian, M. Engineer, Tambaram Municipality
(xii) Mr. S. Ravindra, Vice President, WSAPL
(xiii) Mr. G. Dinesh, Senior Manager, WSAPL
(xiv) Mr. V.N.K. Satyasai Tata, Senior Planner, WSAPL
(xv) Ms. Jeena, Transportation Planner, WSAPL
(xvi) Ms. R. Gayathri, AVP, TNUIFSL
(xvii) Mr. K. Balaji, Manager, TNUIFSL
(xviii)Mr. I. Rajkumar, Manager, TNUIFSL

The following are the salient points discussed.

(i) Population projection should be revised considering the proposed and planned economic activities in nearby areas, particularly in the case of Tambaram
(ii) Growth management strategy to focus on existing landuse characteristics and developmental activities
(iii) As the capacity of Palar Water Supply System at the source cannot be augmented, alternate sources such as Eris, Tanks and quarries have to identified for their feasibility in supplying potable water
(iv) Possibility of common treatment plant with recycling of waste water should be considered
(v) Waste Characterization studies to be initiated immediately after the rains
(vi) Evaluation of disposal technologies/options to be considered including common disposal facility
(vii) Privatisation of collection, transportation and disposal options to be explored
(viii) Mapping of existing eris/tanks to be carried out with the help of satellite imageries from CMDA. The same can be used to assess the landuse characteristics of the municipalities
(ix) A comprehensive traffic and transportation plan should be proposed considering the connectivity to NH, SH and other major arterial corridors in CMA. In addition, other transport infrastructure facilities, intra-municipal connectivity and missing links to be addressed

Annexure 8.4: Minutes of Consultation Meeting for Rapid Urban Assessment Report

Minutes of Meeting on Rapid Urban Assessment submitted by Wilbur Smith Associates Pvt Ltd for preparation of CCCBP for Alandur, Pallavaram and Tambaram held at TNUIFSL on March 7, 2006.

List of Participants:

(i) Mr. Shashi Shekar, MD&CEO, TNUIFSL
(ii) Mr. Chairman, Alandur Municipality
(iii) Mr. Chairman, Pallavaram Municipality
(iv) Mr. Commissioner, Pallavaram Municipality
(v) Mr. Municipal Engineer, Pallavaram Municipality
(vi) Mr. Municipal Engineer, Alandur Municipality
(vii) Mr. Assistant Engineer, Alandur Municipality
(viii) Mr. Ramamurthy, Pallavaram Municipality
(ix) Mr. S. Ravindra, Vice President, WSAPL
(x) Mr. G. Dinesh, Senior Manager, WSAPL
(xi) Mr. V.N.K. Satyasai Tata, Senior Planner, WSAPL
(xii) Mr. Anbuchezhiyan, Senior Planner, WSAPL
(xiii) Ms. R. Gayathri, AVP, TNUIFSL
(xiv) Mr. I. Rajkumar, Manager, TNUIFSL
(xv) Mr. K. Balaji, Manager, TNUIFSL

The following are the salient points discussed during the Rapid Urban Assessment presentation on CCPBP study for Alandur, Pallavaram and Tambaram.

(i) The consultants have presented that most of the water bodies in theses municipalities were owned by the revenue department and PWD, and all the water bodies were encroached.
It was discussed that a pre-feasible study to be conducted for using those water bodies with the following two alternatives
Alternative 1: Using the water body by removing encroachment
Alternative 2: Using the water body with out removing the encroachment
(ii) The water bodies available in the mine areas have to be tested for potable and/or non-potable purpose. The consultants have to conduct a pre-feasibility study for considering this as an additional source of supply during the drought period
(iiii) Leak deduction study for water supply distribution system can be suggested for rehabilitation in the near future
(iv) The consultants can suggest an integrated approach to rehabilitate the existing water supply network along with the ongoing under ground drainage works to reduce the road restoration charges
(v) While developing a comprehensive plan for these municipalities the consultant have to consider the facilities in the cantonment area
(vi) It was discussed that all the existing RUB's were become unusable during the rainy season. Hence, in order to avoid this problem ROB's can be suggested for the areas were ever it is required. In Alandur municipality possibility of constructing a flyover along the proposed MRTS lines can be studied

(vii) The consultants have to conduct a pre-feasibility study for laying underground cables for streetlights and various funding arrangements can be explored
(viii) The consultants have to give a pre-feasibility report for solid waste management project
(xi) The consultants have to suggest cost reduction measures in all the areas

Annexure 8.5: Minutes of Consultation Meeting for Draft Final Report

Minutes of the meeting on Draft Final Report presentation of the City Corporate Plan for Alandur, Pallavaram and Tambaram held in TNUIFSL on 8th June 2006

List of Participants:

(i) Mr. Vikram Kapur, CEO, TNUIFSL
(ii) Mr. K. Mukundan, Sr. Vice President, IL & FS (Special Invitee)
(iii) Dr. M.S. Srinivasan, Advisor, TNUIFSL
(iv) Mr. A. Jayaraman, VP & CS, TNUIFSL
(v) Mr. A. Janakiraman, Chairman i/c, Tambaram Municipality
(vi) Mr. L.A. Papa, Commissioner, Tambaram Municipality
(vii) Mr. G. Sivakumar, Town Planning Officer, Alandur Municipality
(viii) Mr. S.V. Maran, Town Planning Inspector, Alandur Municipality
(ix) Mr. R. Krishnamoorthy, Director, Traffic & Transportaiton, WSAPL
(x) Mr. V.S. Ganesan, Head, Tamilnadu Operations, WSAPL
(xi) Mr. V.N.K. Satyasai Tata, Group Sr. Manager, WSAPL
(xii) Mr. A. Hariprasad, Principal Planner, WSAPL
(xiii) Ms. Saswati Belliappa, Sr. Vice President, WSAPL
(xiv) Mr. P. Thankamony, AEE (Designs), TNUDP III, CMA
(xv) Ms. R. Gayathri, TNUIFSL

The following are the salient points discussed during the Draft Final Report presentation on CCPBP study for Alandur, Pallavaram and Tambaram.

(i) Basically the consultants need to foresee a vision on how the three municipalities would be after 20 years, taking into consideration the future growth, like looking into the possibilities of these towns growing into a Corporation, as urban nodes of Chennai, etc.
(ii) The consultants presented their plan for Alandur, Pallavaram and Tambaram Municipalities independently. The Committee felt that the consultant while identifying projects specifically for each of them, it is also important to look into common problems (like representative of Alandur Municipality opined that because of unprecedented floods last year, Palavanthangal subway got flooded and also suggested that the storm water drains could be let out in Adyar river) and prospects of these three towns in macro level and come with solutions / projects which can have mutual benefits and cost sharing. A comprehensive plan may be prepared for the three adjacent municipalities under the study
(iii) The Committee also suggested that consultants while preparing plan will have to come with project proposal, which can earn revenue to Municipality / reduce expenses / possible private sector participation and including proposals to regulate bus / truck terminals.
(iv) The consultants may deepen their consultations not restricting themselves with the council and the residents' associations, as they may restrict their ideas to their immediate requirements and not generate new ideas or a vision for the city, and which is already available in the report. While preparing strategy plan for these three neighborhood municipalities, emphasis is required to develop plans based on

consultative process among stakeholders, exchange of thought process through press and media, discussion with thoughtful planners and visionary. This is essentially required to facilitate focus on area development in a comprehensive manner, not merely for immediate needs but for future too. It is also opined that the integrated strategy may be given on a project mode (meaning the common projects can be given a lead to take up implementation), which will facilitate immediate attention of the Government and early take off is possible.

(v) Once the common strategy is in place, TNUIFSL proposes to pose it in their website, in order to invite more suggestions and views for a period of 2 weeks. The report will be finalized after incorporating these views.

(vi) The consultants are requested to give a note on their understanding of the report at the earliest and also do one more report and a presentation in the above lines in the next 15 days (by 28th of June 2006). In view of the integrated study envisaged, it is opined that in addition to 3 separate reports which provides the requirements of the towns individually, and one common report covering the commonalities would be more meaningful.

Annexure 8.6: List of Stakeholders Met

Sr. No	Name	Indititution / Departments	Designation	Contact
1	Mr. Merlin Isac	Tambaram MCC (Madras Christian College)	Lecturer, Department of Economics	9841118468
2	Mr. Remchy Koshy	Tambaram MCC (Madras Christian College)	HOD, Department of Social Work	22790035
3	Mr. C. Senthil Kumar	Department of Aerospace Engineering, MITE, Anna University, Chromepet, Chennai - 44	Lecturer, Department of Aerospace Engineering	22237276-221, 9444123628
4	Mr. Elangovan	Department of Aerospace Engineering, MITE, Anna University, Chromepet, Chennai - 44	Asst. Proffosser, Department of Aerospace Engineering	22237038
5	Mr. N. Elangovan	Chennai Director of Industries & Commerce, O/o. Director of Industries & Commerce, Department of Industries and Commerce, Chepauk, Chennai - 05	Deputy Director (Technical)	28548173
6	Mr. Ramakrishnan	Chennai Metropolitan Development Authority	Senior Planner	28414855-402
7	Dr. V. M. Marudachalam	SAP,Department of Planning, Anna University	Head of Department, Department of Planning	22203707
8	Mr. K. Perumal	Officers Colony Civic Exnora, No. 22, 3rd Main Road, Officers Colony, Adambakkam, Chennai-88	President	22457011, 9841057011
9	Mr. V. Kuppan	Exnora Innovators Club of Adambakkam, Polt No. 27, 2nd Main Road, Jeevan Nagar, Adambakkam, Chennai-88	Secretary	9381028497
10	Mr. V. Parthasarathy	No. 34, State Bank Colony Welfare Association, State Bank colony, Adambakkam, Chennai - 88	President	22452243
11	Mr. Muthukrishna Rao	No. 34, State Bank Colony Welfare Association, State Bank colony, Adambakkam, Chennai - 88	Secretary	22454790

Sr. No	Name	Inditution / Departments	Designation	Contact
12	Mr. Santhanam	The Chromepet New Colony Resident's Welfare Society and Peoples Awareness Centre, 3/20, 16th Cross Street, Newcolony, Chromepet, Chennai - 44	President	22388612, 9444254850
13	Mr. Chandrasekaran	Balaji Nagar Welfare Association,Plot No. 5, Balaji Nagar, Chromepet, Chennai -45	President	9444074440
14	Mr. R.Rathinakumar	Periyar Nagar Welfare Association, No. 8, 4th Street, Periyar Nagar, Irrumbuliyur, West Tambaram, Chennai - 46	President	9841166896
15	Mr. Balasubramanian	State Bank (Old) Colony, Welfare Association, 4-Old S.B.I. Colony, Tambaram West	President	65196596 / 223632850
16	Mr. Sunil Kumar	Traffic Police Department	Joint Commissioner of Police, Chennai	25612625
17	Mr. K. S. Balasunder	Traffic Police Department	Assistant Commissioner of Police (Traffic Investigation)	9840971110

Annexure 8.7: Comments/Suggetions Recieved from Identified Key Stakeholders

A. Government Departments and Educational Institutions

Department: Chennai Metropolitan Development Authority (CMDA)
Person: Mr. Ramakrishnan, Senior Planner, CMDA
Date: 28/09/2006
Time: 11.00 AM
Contact No: 28414855-402

(i) Road. Pallavaram-Thorapakkam road is an important link to G.S.T. Road but lacks proper connectivity. The road stretch linking Pallavaram-Thorapakkam ends at Ponds along G.S.T. Road and no link is provided between Thorapakkam Road to Chrompet

Suggestion from Stakeholder. Link should be provided from Ponds road along G.S.T. Road to Chrompet so that people have an easy access from airport to Old Mahaballipuram and Seruseri Roads.

(ii) Road. NH-Bypass and Outer-ring road in Tambaram do not have proper connectivity.

Suggestion from Stakeholder. NH-Bypass and Outer Ring Road to Maduravoyal at Tambaram can be inter connected or any other option can be worked to reduce the traffic problem.

(iii) Road. Road from Tambaram Old State Bank Colony to Kishkinta road is in poor condition. In addition, no proper approach road is available.

Suggestion from Stakeholder. Kishkinta theme park is located along the above stretch and if a proper connectivity is done then these areas can be developed.

(iv) Traffic and Transportation. No proper bus bay and bus stand is provided near Velachery MRTS Station.

Suggestion from Stakeholder. Proper bus bay and bus stand should be arranged at MRTS near the proposed Inner Ring Road between G.S.T. Road and Taramani.

Department: Department of Industries and Commerce
Person: Er. N. Elangovan, Deputy Director (Technical), Department of Industries and Commerce
Date: 27/09/2006
Time: 4.40 PM
Contact No.: 9444114223

(i) Industries. Industries lack basic infrastructure facilities like water supply, roads and power, etc.

Suggestion from Stakeholder. Once the new industries are setup, the basic infrastructure facilities like water supply, roads & power should be provided for better development.

(ii) Solid Waste Management. Present disposal of solid waste especially e-waste is not done properly.

Suggestion from Stakeholder. E-waste concept should be introduced in all IT industries as more
IT industries coming up in the project region.

(iii) Solid Waste Management. No proper mechanism of industrial waste disposal is done. Reuse and recycling of waste is not done.

Suggestion from Stakeholder. Re-use of wastewater should be introduced in all industries and reusable materials like coir, fly-ash brick, etc. should be recycled.

(iv) Industries. Lack of self-sustained industrial parks/estate.

Suggestion from Stakeholder. Location for industrial park should be identified in such a manner that all processing activities should be done at on place/industrial park. Industrial park should be self-sustained with infrastructure facilities without any dependence on others.

Place: Tambaram MCC (Madras Christian College)
Person: Lecturer Merlin Isac, Department of Economics
Date: 26/09/2006
Time: 10.35 AM
Contact No.: 9841118468

(i) Storm Water Drains. No proper storm water drains exist in Tambaram as a result most of the areas get flooded during rainy seasons. Many of the drains are encroached and are poorly maintained.

Suggestion from Stakeholder. Construction of proper drains from Tambaram to St. Thomas Mount to avoid flood problem during rainy season is an important measure to avoid flooding.

(ii) Under Ground Drainage. At present, there is no UGD facility in Tambaram Municipality and there is a delay in implementing the scheme.

Suggestion from Stakeholder. Municipality should implement the UGD scheme as early as possible.

(iii) Traffic and Transportation. As there is no proper traffic regulation and road arrangement, traffic congestions are more prevalent near Madras Christian College (MCC). The road lacks level crossing.

Suggestion from Stakeholder. Fly-over should be constructed from Hindu Mission Hospital to Tambaram railway station to regulate traffic. A proper arrangement of level crossing near MCC should be provided and a ROB to connect West and East Tambaram to reduce traffic related problems.

(iv) Solid Waste Management. Present collection and disposal of solid waste is poor in the three towns.

Suggestion from Stakeholder. More number of persons should be involved in solid waste management. A proper waste management should be followed.

Place: Tambaram MCC (Madras Christian College)
Person: Remchy Koshy, HOD, Department of Social Work
Date: 26/09/2006
Time: 11.05 AM
Contact No.: 22790035

(i) Roads. Major roads passing through towns lack approach roads and also the margins of the roads are reduced due to encroachments.

Suggestion from Stakeholder. Encroachments should be removed and the roads should be widened wherever required.

(ii) Parks and Playgrounds. Parks and playgrounds are in bad condition and not maintained properly. Few of them are also encroached.

Suggestion from Stakeholder. Encroachments should be removed and the municipality should maintain green spaces properly.

Place: Madras Institute of Technology, Anna University, Chrompet, Chennai -44
Person: C. Senthil Kumar, Lecturer, Department of Aerospace Engineering
Date: 26/09/2006
Time: 12.10 PM
Contact No.: 9444123628

(i) Traffic and Transportation. The vehicular traffic is more on Chrompet-MIT Bridge as people commuting to Tambaram also uses the bridge. There are no proper traffic regulations.

Suggestion from Stakeholder. Vehicular traffic near MIT should be regulated with proper traffic management arrangements. People commuting to Tambaram should be diverted to G.S.T. Road, which would help in reducing load on the bridge. Task Mark shop near MIT should be removed, construction of Tambaram-Sanitorium Bridge should be completed soon and it should be constructed from Hindu Mission Hospital to Tambaram Railway Station. Proper arrangement of level crossing at MCC-Tambaram should be made.

(ii) Roads. The width of the road linking Chitlapakkam-Velachery main road with G.S.T. Road near Chrompet-MIT Bridge is less due to encroachments and needs to be widened. The road is not constructed as per the design and lacks proper maintenance.

Suggestion from Stakeholder. Encroachments should be removed and the road should be maintained properly. The existing 40 ft road should be laid as per the suggested design width of 100 ft with proper pedestrian facilities.

(iii) Roads. Generally, the roads are poorly maintained. Roads are dig many times by departments like highway authorities, electricity board and telephone department, and are not relayed after the completion of the work, which makes the road non-moterable.

Suggestion from Stakeholder. An integrated approach by various departments should be followed during formation of the new road. This would minimize frequent digging of roads. Roads, which are dig, should be re-laid properly by the respective departments after the completion of the work.

(iv) Solid Waste Management. The solid waste collection and disposal is poor. Many of the streets are not swept regularly. The waste is disposed without any treatment.

Suggestion from Stakeholder. A proper waste disposal site should be identified with provision of treatment facilities. The waste should not be dumped on open lands. Street dogs should be given treatment and taken care by municipality so that accidents can be avoided. Self Help Groups can be involved for door-to-door collection and reuse & recycling of waste should be done.

(v) Electricity. Frequent power cut/failure in Gomathi Nagar and Vasavi Nagar.

Suggestion from Stakeholder. Frequent power cut/failure should be reduced in Gomathi Nagar and Vasavi Nagar.

(vi) Parks. Parks maintained by promoters and other agencies restrict the entry of lower class people even though parks are meant for people belonging to all sections of the society.

Suggestion from Stakeholder. Municipality should be responsible for the maintenance of parks and open spaces.

(vii) Traffic and Transportation. Presently, the parking fee collected for parking a vehicle is Rs. 6 per day but receipt/voucher is given for only Rs. 2.50. This results in the loss of revenue to the government.

Suggestion from Stakeholder. Parking fee should be regularized and the receipt/voucher should be given for the amount paid by vehicle owner as per the parking rules.

Place: Madras Institute of Technology, Anna University, Chrompet, Chennai -44

Person: Mr. Elangovan, Asst. Professor, Department of Aerospace Engineering
Date: 26/9/06
Time: 12.40 PM
Contact No.: 22237038

(i) Roads. Major arterial roads lack approach roads and most of these roads are encroached by street vendors.

Suggestion from Stakeholder. Encroachments should be removed and as far as possible, the roads should be widened.

(ii) Traffic and Transportation. The three towns lack proper traffic management.

Suggestion from Stakeholder. A comprehensive traffic management plan should be prepared in consultation with various government departments. Strict enforcement of traffic laws and regulations is necessary.

(iii) Under Ground Drainage. During laying of sewers, roads are dig and damaged and are not relayed properly.

Suggestion from Stakeholder. The roads should be re-laid properly once the work is over.

Place: Department of Planning, SAP, Anna University, Chennai
Person: Dr. V. M. Marudachalam, HOD, Department of Planning, SAP, Anna University, Chennai
Date: 29/09/2006
Time: 10.30 AM
Contact No.: 22203707

(i) Alandur, Pallavaram and Tambaram are situated very close to Chennai City and come under Chennai Metropolitan Area. The Project towns predominantly act as residential zones especially for people working in Chennai but these three towns lack basic infrastructure facilities.

Suggestion from Stakeholder. Adequate infrastructure facilities should be provided in the Project towns. The facilities should be capable of taking additional load due to increase in migration of people from Chennai City to these towns.

(ii) Solid Waste Management. The present system of collection and disposal of solid waste is poor. There is no proper designated site for the waste disposal site with treatment facilities.

Suggestion from Stakeholder. Vermin-composting system can be introduced initially in few wards and later on, the entire town can be covered. Social welfare groups should be involved in solid waste management, awareness should be created among people about solid waste management and the concept of reuse and recycle of waste should be brought in. Organic cultivation should be introduced, as there is a good

demand for organic products in the market.

(iii) Roads. Major roads in the Project towns lack approach roads. Poorly maintained roads in the towns is causing problem in the smooth movement of vehicular traffic.

Suggestion from Stakeholder. Generally, the roads in project towns are in poor condition for example Nanganallur-Minambakkam road in Alandur.

(iv) Industries. IT industries lack basic infrastructure facilities like water supply, solid waste management, etc. Development of IT corridor would pressurize these three towns in case of infrastructure facilities.

Suggestion from Stakeholder. Provision of infrastructure facilities in these towns should be adequate to hold the pressure from developmental impacts due to the development of IT corridor. Proper institutional and administration arrangements should also be made in providing infrastructure facilities.

(v) Parks and Playgrounds. Project towns have very limited parks and playgrounds. The existing parks and open spaces are poorly maintained due to lack of funds and manpower.

Suggestion from Stakeholder. Parks can be maintained by banks, NGOs, welfare associations and industries. Due to lack of funds with ULBs, the above-mentioned groups can take up the responsibility to maintain parks and open spaces, for example, construction of a compound wall can be entrusted with one association and another association can be responsible for the provision of infrastructure facilities.

(vi) The local economy in these three towns is poor and needs exploration. Industries are not set-up based on locally available resources but are more dependent on other places for the manufacture. This hampers or suppresses the potential for the growth of local economic.

Suggestion from Stakeholder. Potential economy of each town should be identified and based on that industries should set up to increase the local economy, for example Bodinayakam is famous for Cardamom and is called as capital city of Cardamom, which is the main economy of the town. The villages from neighboring villages also bring their products to sell in Bodinayakam, which helps to improve the local economy of the town.

Place: Traffic Police Department, Chennai
Person: Mr. K. S. Balasunder, ACP (Traffic Investigation)
Date: 12/12/2006
Time: 10.30 AM
Contact No.: 9840971110

(i) Anna Salai – M.K.N. Road junction in Alandur needs a pedestrian subway.
(ii) Halda junction, which has more traffic problem due to all the traffic coming from Guindy Bridge, needs a flyover to be constructed.
(iii) In Velachery main road near Pallikaranai the encroachment should be removed on

the bazaar road and the road widening and automatic signals should be provided.

(iv) Incomplete work in Pallavaram-Thorapakkam Road (100 ft road) at Pallavaram, which links to G.S.T. Road, should be completed as early as possible and the streetlights should be provided on both side of the road.

(v) Tiruneermalai road should be widened and it should be connected with Tambaram-Maduravoyal by-pass road.

(vi) Tambaram bus stand should be replaced to some open place; this would also help to reducing traffic congestion.

(vii) Street lights should be provided at Meenambakkam to avoid accidents

(viii) Valacherry main road, which links Selaiyur – velachery, should be widened

(ix) In Medavakkam main road (Medavakkam to St. Thomas Mount and Alandur Subway) the encroachments should be removed for providing footpaths and two-way traffic should be provided with center median

(x) M.K.N. Road should be widened by removing encroachments

(xi) Pammal main road should be widened upto Kundrathur

(xii) Automatic traffic signal should be provided at English Electrical company, Meenambakkam old airport entrance and in Velachery main road at Kamatchi Amman Koil, Medavakkam bazaar road, Quaide-Milleth College and Sellaiyur near camp road

(xiii) The level crossing at Vaishnava College in G.S.T. Road should be removed and the vehicle movement subway should be provided

(xiv) Pedestrian subway needs to be provided opposite to Chromepet railway station and automatic signals should be provided along CLC workers road in G.S.T. Road

(xv) Signals should be provided along TB hospital, Siddha hospital, Mudichur Road junction, Peerakangranai Police Station opposite to Perungaluthur railway station

(xvi) Tambaram-Maduravayal by-pass road compulsorily to be provided with street lights and parking - bay

(xvii) Cantonment area from St. Thomas Mount to Pallavaram should be improved in all aspects

B. Voluntary Organizations

494. *The Exnora Club*. The consultants met Mr. K. Perumal (President, Officers Colony Civic Exnora, Adambakkam, Chennai -88), Mr. V. Kuppan (Secretary, Exnora Innovators Club of Adambakkam, Adambakkam, Chennai -88), and Mr. Mathan Mohan (Environmental Engineer) and explained them the need and necessity of their contributions to the project. Based upon our discussion a brief note was prepared by them on different issues related to various sectors like water supply, sewage and sanitation, storm water drains, solid waste management, roads, traffic & transportation, etc., and the same is given below.

495. Report regarding City Corporate Plan for Alandur Municipality sponsored by Tamilnadu Urban Infrastructure Financial Services Ltd. (TNUIFSL), Chennai – 17. We are submitting here with our proposals under various heads to make Alandur Municipality area into a clean green livable condition. For more than a decade, we have been associated with the people and civic conditions of this area. We are involved in community awareness program, etc.

(i) Water Supply. Since the water supply position has improved Municipality should arrange 24 hours domestic supply by providing additional sump on Adambakkam

side, some more overhead tanks wherever required. Municipal authorities should check the water quality periodically and report to be published for public notice.

(ii) Sewage and Sanitation. UGD scheme implemented by Alandur Municipality seems to have inadequate. The pumping station at Nilamangai Nagar is not functioning during monsoon. It should be rectified immediately. Still about 25 percent households not given connection, they should be given connections. Public should be strictly warned not to let the bathroom water out side. All storm water drainage should be desilted and cleared. When no sewage, bathroom water are into the storm water drains sufficient rain water harvesting structures can be provided in the storm water drains. Pay and use toilets should be provided sufficiently in the slum area and other public places. Serious mosquito eradication program should be under taken.

(iii) Solid Waste Management. Supreme Court has already given ultimatum to municipalities to adopt scientific methods for solid waste management. It is obvious that 90 percent of garbage in urban areas is only throwaway plastic carry bags. So once we ban the manufacture of plastic carry bags and insisting the people to use cloth bags. More than 50 percent of solid waste management will be achieved, so that Govt. may be advised to ban the plastic carry bags.

Our Exnoras zero garbage scheme will solve the rest of the problems. Source segregation of biodegradable and non-degradable waste and home composting the biodegradable waste are to be advocated among the public. Even this may be made compulsory by Govt. orders. Govt. encourage self-help group also in this endour. The above two steps are most essential and should be adopted through out the state and country.

(iv) Roads. The following roads are to be improved in the Alandur Municipal area,

- MKN road – it is a very important link connecting Guindy and Meenambakkam, bypassing congested Kathipara junction. It should be widened to four-lane width.
- St. Thomas Mount – Medavakkam High Road – it should be widened to four – lane with drain cum footpath on either side
- The road stretch linking Mount sub-way and Medavakkam High Road via, S. P. Hospital should be widened
- Long pending inner ring road link from G.S.T. road (Meenambakkam to Velachery) should be formed
- Pazhavanthangal side approach road (Vembali Amman Koil Street) of Pazhavanthangal sub-way should be widened
- Meenambakkam sub-way work should be restarted and completed early
- A link road extending Adambakkam New Colony main road to connect Velachery by-pass (100 ft road) to widened and improved
- The road stretch linking Thilaiganga Nagar (100 ft Road) and Medavakkam road which connects to G.S.T. road should be restarted and completed early
- ROB between St. Thomas Mount Station and Guindy (Near Chakrapandi Street) should be restarted and completed early to reduce the traffic problem and the problem due to buffalos which roam at roads should be rectified to reduce the traffic problem.

(v) Traffic and Transportation. Existing bus terminus near St. Thomas Mount railway station should be shifted to more spacious along the Adambakkam lake bund where encroachments were cleared long back. Roadside parking should be prohibited.

(vi) Water Bodies. There are number of water bodies in Alandur area such as Mankulam, Adambakkam, Sivan Koil Kulam, Naganallur Eswarwn Koil Kulam and more prodominantly Adambakkam and Velacheri lakes. All these water bodies should be widened, deepened and restored to their original position. The storage at Thirusooalm during monsoon can be improved can improved by constructing checkdam and this can be treated and used for drinking purposes. The tank located at Sivan temple opposite to St. Thomas Mount railway station has been encroached, so the encroachments should be removed or at least the remaining part should be preserved with rainwater harvesting to avoid the flood problem during rainy season.

(vii) Parks and Playground. The encroachments in large area along the Adambakkam lake bund have been removed. This area should be taken over by revenue department and a beautiful park and playground should be developed. More parks should be developed. Massive tree planting should be done in all the street in the Municipal area.

(viii) Street Lights. Over-head cables should be changed to under ground cables for all the streetlights in Alandur Municipality area. A separate sub-station for Adambakkam area and more transformer units are to be provided for giving quality power supply.

(ix) Burial Grounds. Gasified crematory system in burial grounds have to be provided and burial ground area should be kept clean and green with more trees and flowering plants. The unused burial grounds should be converted as public parks. Municipality should provided sufficient vans for last journey of decreased.

496. Our views and proposals may be considered and suitable reports may be prepared and sent to government for implementation.

Place: State Bank (Old) Colony, Welfare Association, 4-Old S.B.I. Colony, Tambaram West
Person: Mr. Balasubramanian, President, Welfare Association, 4-Old S.B.I. Colony, Tambaram West
Date: 28/09/06
Time: 2.30 PM
Contact No.: 65196596/223632850

(i) Solid Waste Management. Present disposal of solid waste is not done properly. There is no proper segregation of waste in source; waste disposal is open type, diseases due to mosquitoes, no sufficient dustbins.

Suggestion from Stakeholder. Segregation of waste should be done and it should be reused, nets should be used while the garbage is transferred to the disposal site, sufficient number of dustbins should be provided, Exnora can be introduced in SWM

(ii) Street Lights. Present maintenance of streetlights is not done properly. No proper maintenance of lampposts, lights, etc.

Suggestion from Stakeholder. Solar energy can be introduced and the proper maintenance should be done by municipality by replacing the damaged lampposts, lights, etc.

(iii) Parks and Playground. Lack of infrastructure facilities to parks and playground. Poor maintenance of parks and playground.

Suggestion from Stakeholder. Compound wall should be constructed in all parks to avoid the dogs, pigs and other animals and more anti-social activities and infrastructure facilities like water supply, electricity, etc., should be provided.

(iv) Traffic and Transportation. Shanmuga Road – it is a very important road in Tambaram with more congestion. Very often there will be traffic problem due to Political and other meeting in the main road.

Suggestion from Stakeholder. This problem has to be rectified by avoiding meeting on the main road.

(v) No proper road network between Tambaram (State Bank Colony) – Kishkinta road. Poor maintenance of roads, pedestrians.

Suggestion from Stakeholder. As the Kishkinta theme park is located and if the proper connectivity is done then these areas can developed as more places are available in these areas, pedestrians should be provided, lorries should diverted from these roads because the width of the road is small and due to this lorries have broken many compound wall of near by areas and it is the most shortest route for Sriprembadur

(vi) No Proper Maintenance of Water Bodies. Encroachments and sewage are mixed in water bodies.

Suggestion from Stakeholder. Encroachments should be removed and mixing of drainage water in lakes should be stopped, if possible it can be used as source for water supply

(vii) Storm Water Drains. No proper maintenance of storm water drains. Mixing of sewage water in SWD and closing the drains by dumping the waste in drains, no proper maintenance by municipality.

Suggestion from Stakeholder. Mixing of sewage water in SWD should be stopped; proper maintenance by municipality should be done.

(viii) General - Markets, Share Autos. Cows roams in market area as they wish which cause problems to the public, high fare of autos for inner areas.

Suggestion from Stakeholder. Entry of Cows in markets should be avoided so that sellers may not beat the cows and there are no bus facilities for inner areas in West Tambaram and auto fare is high, share auto concept can be introduced.

Place: No. 8, 4th Street, Periyar Nagar, Irrumbuliyur, West Tambaram, Chennai - 45
Person: Mr. R. Rathinakumar, President
Date: 30/09/06
Time: 11.30 AM
Contact No.: 22265134 / 9841166895

(i) Water Supply. No proper water supply facilities in Tambaram. No adequate source, low pressure.

Suggestion from Stakeholder. Desilting of lakes should be done, encroachments should removed, water saved by rain water harvesting in buildings should made it to flow in lakes, while laying the cement road the proper arrangement should be made for rain water harvesting in road also, same pressure level should be maintained in all areas while laying the distribution network.

(ii) Storm Water Drains. Present disposal of storm water drain is not done properly. No proper arrangement for storm water drains, mixing of sewage, dumping the waste.

Suggestion from Stakeholder. There should be proper arrangement to divert the rainwater to the water bodies, the mixing of sewage should be avoided, open type drains should be constructed in such a manner that it should used to flow for both sewage and rain water i.e., one layer for sewage and another for rain water

(iii) Traffic and Transportation. No proper road network, traffic regulation and transportation. No proper links, maintenance of roads.

Suggestion from Stakeholder. The roads should be laid as per the design because while laying the roads the contractors are not laying the roads according to their specifications so the contractors should put the specifications on the board and keep it in the work site so the public will have awareness about that and see to that work is carried in same manner so that quality of road will be good, heavy vehicles should not allow to pass through residential areas as it would damage the roads

(iv) Solid Waste Management. Present disposal of solid waste is not done properly. No proper garbage collections in the project towns and no disposal site to dump the waste.

Suggestion from Stakeholder. Awareness should be created among people about SWM by reusing and recycling waste to prepare manure, energy, etc., within 5 sq. ft / 2 to 3 wards combine.

(v) Parks and Playground. Non-availability of lands for parks & playground and lack of infrastructure facilities. Poor maintenance of Parks, no lands are available.

Suggestion from Stakeholder. As there is no lands are available, lands should be

identified by municipality for parks and playground, and it should be maintained with the local support and contribution to provide infrastructure facilities.

(vi) Streetlights. Present maintenance of streetlights is not done properly. Power shutdown, low voltage.

Suggestion from Stakeholder. Voltage should be maintained by the norms, solar system could be introduced to save energy, automatic power switches can put for on / off of street light.

Place: New Colony Welfare Association, 20-3, 16th Cross Street, New Colony, Chrompet, Chennai -44
Person: Mr. Santhanam, President, New Colony Welfare Association
Date: 28/09/06
Time: 3.30 PM
Contact No.: 9444254850

(i) Water Supply. Lack of water supply facilities and poor maintenance of water bodies. There is no proper source for water supply and mixing of sewage into water bodies.

Suggestion from Stakeholder. Lakes can be used as source by desilting and protecting from mixing of sewage to water bodies, rainwater harvesting should be given more importance to raise the ground water level. While constructing bridges in lakes proper plan should be done so that during rainy seasons the near by areas should not get affected.

(ii) Newly developing areas. No proper layouts.

Suggestion from Stakeholder. CMDA should prepare proper layouts with all infrastructure facilities, building rules should be regularized, devolution of power should be with in the local bodies.

(iii) Electricity. Present maintenance of electricity is not done properly. No sufficient number of transformers and EB bills.

Suggestion from Stakeholder. As the width of roads are very small sufficient number of transformers cannot be provided so widening of roads should be done, EB bills paid by local bodies should taken by Government itself because local bodies are unable to the amount.

(iv) Markets/Commercial Complexes. No separate markets.

Suggestion from Stakeholder. Multi-Complex should be constructed, separate markets for vegetables and fruits, slaughter houses and fish markets, daily markets in separate places

(v) Parks, Play Grounds and Burial Ground. Poor maintenance of Parks, play grounds and burial ground.

Suggestion from Stakeholder. Parks, play grounds should be improved and electric crematorium should be provided for all places

(vi) Solid Waste Management. Present maintenance of solid waste is not done properly. No proper garbage collections in the town and no disposal site to dump the waste.

Suggestion from Stakeholder. Burial grounds and water bodies should not used for dumping the waste separate disposal site should be identified, segregation of waste should be done, waste collection should done daily, society can handled the SWM, awareness should be created among people about SWM by reusing and recycling waste to prepare manure, energy, etc.

(vii) Storm Water Drains. Present maintenance of storm water drains is not done properly. Mixing of sewage water in SWD and closing the drains by dumping the waste in drains, no proper maintenance by municipality.

Suggestion from Stakeholder. Mixing of sewage water in SWD should be stopped, proper maintenance by municipality should be done.

(viii) No proper link roads, traffic regulations and transportation. No proper maintenance of roads, signals, bus shelter.

Suggestion from Stakeholder. Internal service roads should be improved, proper signals should be provided (Near MIT bridge), provision of bus shelters at all bus terminals.

(ix) General. No proper system of Revenue collection by municipality, Community hall. No proper revenue collection system by municipality.

Suggestion from Stakeholder. Tax should be collected at regular intervals and kalyanamandams by government itself and community hall for public meetings

Place: No. 5, Balaji Nagar, Chrompet
Person: Mr. Chandrasekaran, President
Date: 29/09/06
Time: 4.00 PM
Contact No.: 9444074439

(i) Water Supply. Inadequate water supply facility. No adequate source, 90 lpcd is not provided.

Suggestion from Stakeholder. 90 lpcd should be provided, rainwater harvesting should be given more importance to increase the GL, lakes should be improved to use it as source for water supply, public wells should be maintained properly, lake near Royapetta (Chrompet) is fully mixed with sullage it should be rectified, there should be proper flow arrangement between the lakes so flood can be avoided during rainy season, encroachment should be removed, sufficient OHT should be constructed

(ii) Under Ground Drainage. Lack of awareness among people about UGD. Only few connections are taken by residences, mosquitoes due to open system of drainage

Suggestion from Stakeholder. All houses should get UGD connections because the people who are not getting connections they allow the sewage to flow into SWD, which will be mixed in, water bodies.

(iii) Roads, Traffic and Transportation. No proper links, maintenance of roads, bus terminals, ROBs.

Suggestion from Stakeholder. Roads should be strengthen, to avoid traffic ROB or subway can be constructed near Vaishnava College and Radha Nagar (Chrompet) so the that train speed can be increased by closing the level crossing, bus facility to local areas because auto fares are more, on both side of Chrompet railway station autos and car stand can be arranged because it will be easy for the people coming from out station and escalators can be introduced in railway station to help the handicraft peoples.

(iv) Storm Water Drains. Present maintenance of storm water drain is not done properly. No proper arrangement for storm water drains, mixing of sewage, dumping the waste.

Suggestion from Stakeholder. There should be proper arrangement to divert the rainwater to the water bodies; the mixing of sewage should be avoided.

(v) Parks and Playground. Poor maintenance of parks, no lands are available.

Suggestion from Stakeholder. As there is no lands are available, lands should be identified by municipality for parks & playground, if possible stadium can be setup, tree plantation along roads to provide green belt through out the city.

(vii) Streetlight. Present maintenance of streetlight is not done properly. Power shutdown, low voltage.

Suggestion from Stakeholder. Low voltage problem should be given more attention because due to this more fluctuation problems occur which damage more electronics items like computer, TV, etc.

(viii) Health & Education. No sufficient facilities.

Suggestion from Stakeholder. 2 or more government schools should setup because in private schools fees are more, Tambaram govt. hospital should be upgraded and the ground floor in should be made as parking facility for hospital because during rainy this floor gets flooded, small dispensaries by municipality for first aid because the private hospital charges are more and community hall for public meetings.

Place: 34, State Bank Colony, Adambakkam

Person: Mr. V. Parthasarathy (President) & Mr. P. Muthukrishna Rao (Secretary), State Bank Colony Welfare Association, Adambakkam, Chennai
Date: 29/09/06
Time: 1.00 PM
Contact No.: 22452243/22454790

(i) Water Supply. Since the water supply position has improved, municipality should arrange 24 hours domestic supply by providing additional sump and more overhead tanks wherever required. No adequate source.

Suggestion from Stakeholder. There is no problem with the system of water supplied by Alandur municipality, hope the alternative days supply is made to daily supply then there will be no problem at all.

(ii) Under Ground Drainage. Pumping station at Nilamangai Nagar. 70 percent of the area in and around Alandur municipality (Alandur, Adambakkam, Keelkatalai, Madipakkam) is flooded during rainy season because the pumping station designed is not in proper manner

Suggestion from Stakeholder. The design of pumping station should be reworked and some kind of arrangement should be made to avoid the flood during rainy season, the capacity of well should be increased, the pumps setup for pumping the should be capable, there should be right protection in pumping station because during the rainy season water enters into the pumping station and toilet facilities for the workers in pumping station.

(iii) Roads, Traffic and Transportation. No proper links (Velachery-Adambakkam, Vandikarran Street, Chakarapandi Street, Gnash Nagar- Vandikarran Street & City Link road),maintenance of roads, bus terminals, ROB between St. Thomas Mount and Guindy.

Suggestion from Stakeholder. While digging the road for laying any cable connection it should be properly laid once the work is completed, there should be separate arrangement for each connections for example SWD, UGD, water supply, etc., because if all the connection are laid in same place the mixing of storm water with sewage will take place, bus terminal at NGO colony should be improved because the terminal is not used by government buses it is mainly occupied by the private vehicles and most of the part is used for garbage dumping, and the above mentioned roads need immediate attention for proper linkage, ROB between St. Thomas Mount and Guindy should be restarted and completed earlier.

(iv) Storm Water Drain. No proper arrangement for storm water drains, mixing of sewage, dumping the waste.

Suggestion from Stakeholder. There should be proper arrangement to divert the water from Kathipara junction at Guindy to Velachery lake, in same manner Alandur subway water should be diverted to the Temple tank opposite to SB hospital, the mixing of sewage should be avoided by creating awareness to people to take UGD connection at all houses

(v) Parks. Poor maintenance of parks, no lands are available.

Suggestion from Stakeholder. As there is no lands are available, lands should be identified and the private owners should come front to provide lands for park development.

(vi) General – Taskmark and Hospital. Taskmark is located near temple and school.

Suggestion from Stakeholder. Taskmark should be removed because it is located near the temple and school, government hospital should be constructed at the Eastern part of Adambakkam.

Annexure 11.1: Abstract of Accounts and Project Cash Flows

Annexure 12.1: Environmental Laws and Regulations Applicable for TNUIFSL's Projects and their Obligations

Project	**Applicable Legislations**	**Obligations***	**Responsibility***
I) Water Supply & Sewage			
A. Water Supply			
1. Water Supply Augmentation	None		
2. Water Supply Distribution Lines	None		
3. Water Tankers	None		
4. Overhead Tanks	None		
5. Water Treatment Plants	Water Act, 1974 Hazardous Chemicals Rules, 1989 Hazardous Waste Mgt. Rules 1999	Secure the following from TNPCB • Consent to Establish • Consent to Operate	ULB / Project Implementing Agency ULB / Operating Agency
6. Upgradation of Head Works	Groundwater Regulation Act 2002	Ensure that the water of the Tanks / water bodies is as per the act and augment ground water level	ULB / Project Implementing Agency
7. Generators	Air Act, 1981 & Noise Rules as per EP Act, 1986	Secure the following from TNPCB • Consent to Establish • Consent to Operate	ULB / Project Implementing Agency ULB / Operating Agency
8. River Intake Works	None		
B. Storm water Drainage			
1. Open drains	None		
2. Closed / Underground drains	None		
C. Sewerage / Sanitation			
1. Only Sewer Net Work	None		
2. Sewerage Network and Pumping Stations	Air Act, 1981& Noise Rules as per EP Act, 1986	Ensure Air and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation

Project	Applicable Legislations	Obligations*	Responsibility*
3. Sewerage Network, Pumping Station and Treatment Plant	Water Act, 1974 Hazardous waste Management Rules 1999	Secure the following from TNPCB for treatment plant Consent to Establish Consent to Operate, and Ensure Air and Noise quality is within the stipulated limits of TNPCB	ULB / Project Implementing Agency ULB / Operating Agency Contractor during construction and ULB / operating agency during operation
4. Public Conveniences	None		
5. Pay & Use Latrines	None		
6. Septic Tanks	None		
II) Solid Waste Management			
A. Landfill Sites	MSW Rules, 2000 Air Act, Water Act and EPA	Secure the following from TNPCB • Consent to Establish • Consent to Operate	ULB / Project Implementing Agency ULB / Operating Agency
B. Compost Yard	MSW Rules, 2000 Air Act, Water Act and EPA	Secure the following from TNPCB • Consent to Establish • Consent to Operate	ULB / Project Implementing Agency ULB / Operating Agency
C. Vehicles (More than 5 nos.)	None		
III) Transportation			
A. Roads			
1. Widening of Roads	EIA Notification, 1994 Tamil Nadu Timber Transit Rules, 1968 Air Act, Forest Act, CRZ Notification and EPA	Clearances, consents and Reporting Obtain Permit wherever cutting of trees is involved to transport timber under Rule, 4	ULB / Project Implementing Agency
2. Improvement of Surface			
3. New Roads			
4. Traffic Islands			
5. Road Divider			
6. Foot Paths			
B. Street Furniture	None		
1. Traffic Signals	None		
2. Street Lights	None		
3. Sign Boards	None		

Project	Applicable Legislations	Obligations*	Responsibility*
C. Road Structures			
1. Subways			
- Pedestrian	None		
- Cycle	None		
- Fast Moving	None		
2. ROBs	Air Act, Noise Rules		
3. Culverts	None		
4. Small Bridges	None		
D. Terminals / Shelter			
1. Bus Shelters	None		
2. Bus Terminals/Stands	Water Act, 1974 Air Act, 1981& Noise Rules as per EP Act, 1986	Ensure water, air and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation
3. Truck Terminals	Water Act, 1974 Air Act, 1981& Noise Rules as per EP Act, 1986	Ensure water, air and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation
4. Workshops	Water Act, 1974 Air Act, 1981& Noise Rules as per EP Act, 1986	Ensure water, air and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation
5. Parking Complexes	Air Act, 1981& Noise Rules as per EP Act, 1986	Ensure air and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation
E. Fleet Expansion >100 buses	Water Act, 1974 Air Act, 1981& Noise Rules as per EP Act, 1986	Ensure water, air and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation

Project	Applicable Legislations	Obligations*	Responsibility*
<100 buses	Water Act, 1974 Air Act, 1981& Noise Rules as per EP Act, 1986	Ensure water, air and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation
F. Construction & Maintenance Equipment	None		
G. Inland Water Ways / Lakes / Water Bodies	Water Act, 1974 & EP Act, 1986	Ensure water, air and Noise quality is within the stipulated limits of TNPCB	Contractor during construction and ULB / operating agency during operation
IV. Commercial Complexes			
A. Shopping /Office complexes (for < 1,000 persons or with a Sewage Discharge < 50,000 litres per day)	None		
B. Shopping /Office complexes (for > 1,000 persons or with a Sewage Discharge > 50,000 litres per day)	Water Act, 1974	Secure No Objection Certificate from TNPCB	ULB or Project Implementing Agency
C. Vegetable/Fish Markets	Water Act, 1974	Secure No Objection Certificate from TNPCB	ULB or Project Implementing Agency
D. Slaughter Houses	Water Act, 1974	Secure No Objection Certificate from TNPCB	ULB or Project Implementing Agency
E. Marriage Halls	Water Act, 1974	Secure No Objection Certificate from TNPCB	ULB or Project Implementing Agency
F. Lodge / Dormitory	Water Act., 1974	Secure No Objection Certificate from TNPCB	ULB or Project Implementing Agency
G. Municipal Community Complexes (for < 1,000 persons or with a Sewage Discharge < 50,000 liters per day)	None	Secure No Objection Certificate from TNPCB	ULB or Project Implementing Agency
H. Municipal Community Complexes (for > 1,000 persons or with a Sewage Discharge > 50,000 liters per day	Water Act, 1974	Secure No Objection Certificate from TNPCB	ULB or Project Implementing Agency
V. Non Comm./Community Amenities			
A. Parks	None		

Project	Applicable Legislations	Obligations*	Responsibility*
B. Playgrounds	None		
C. Maternity and Child Centers	None		
D. Educational institution/Reading Room	None		
E. Burial Grounds	None		
F. Electric Crematorium	Air Act, 1981		
VI. Integrated Area Development			
A. Housing (Sites & Services)	Water Act, 1974 & EP Act 1986	Secure No Objection Certificate from TNPCB	ULB or Project Implementing Agency
B. Guided Urban Development	Water Act, 1974 & EP Act 1986	Secure No Objection Certificate from TNPCB	ULB or Project Implementing Agency
C. TRAMP	EP Act, 1986	Secure No Objection Certificate from TNPCB	ULB or Project Implementing Agency
VII. General			
A. Computer Facilities	None		
B. Weigh Bridge	None		
Note: *For Category E 1 or E 2 projects, the obligations and responsibilities as identified in the EAR or generic EMP shall be adhered to, by the respective agencies			

Annexure 12.2: Social Safeguard and Entitlement Framework

Type of Issue/Impact	**Entitlement Beneficiary**	**Entitlement Options**	**Respon-sibility**
I – Rural PAPs 1. Loss of Homestead	a) Title holder	1) For the land, the PAP will have two options a) Land for land of equivalent extent, if possible, will be provided and the purchase price will be negotiated between a willing seller and the willing PAP. The project will bear registration charges in addition to paying for land. Or b) Replacement cost in cash for the extent lost as per the guideline value. 2) For the building, the PAP will have two options a) An alternate built house in the resettlement site (resettlement site will be developed provided not less than 20 families opt to move into a particular resettlement site) as per Government norms (as per Indira Awaas Yojana (IAY) norms i.e. Rs. 25,000/- in plain area and Rs. 27,200/- in hilly terrain and difficult places and plinth area not less than 20 sq. m). Or b) Replacement cost for the affected dwelling unit, in cash, calculated based on the scheduled rates of the PWD without depreciation. 3) One time shifting allowance of Rs. 5000/- (as prescribed in NPRR 2003) and 4) Right to salvage material.	Govt/ Sponsor
	b) Encroacher	1) Right to salvage material.	

Type of Issue/Impact	Entitlement Beneficiary	Entitlement Options	Respon-sibility
	c) Squatter	1) For the building, the PAP will have two options a) An alternate built house in the resettlement site (resettlement site will be developed provided not less than 20 families opt to move into a particular resettlement site) as per Government norms (as per Indira Awaas Yojana (IAY) norms i.e. Rs. 25,000/- in plain area and Rs. 27,200/- in hilly terrain and difficult places and plinth area not less than 20 sq. m). Or b) Replacement cost for the affected dwelling unit, in cash, calculated based on the scheduled rates of the PWD without depreciation. 2) One time shifting allowance of Rs. 5000/- (as prescribed in NPRR 2003) and 3) Right to salvage material.	
	d) Tenant and lease holder	1) Six month rental allowance to re-establish residence.	

Type of Issue/Impact	Entitlement Beneficiary	Entitlement Options	Respon-sibility
2. Loss of Income / Sources of livelihood a) Agricultural	a) Title holder b) Tenant / lease holder / sharecropper	1) The PAP will have two options a) Land for land on the basis of replacement of land on equal basis (1 Ha of dry land for 1 Ha of dry land or ½ Ha of wet land for 1 Ha of dry land), upto a maximum of 3.00.00 Ha of dry land or 1.50.00 Ha of wet land. The purchase price will be negotiated between a willing seller and the willing PAP. The project will bear registration charges in addition to paying for land. Or b) A rehabilitation grant (adjusted for inflation every year by the TNUDP) of Rs. 24,661/-* per Ha of dry land lost or Rs. 41,420/- per Ha of wet land lost, upto a maximum of 3.00.00 Ha of dry land or 1.50.00 Ha of wet land. 2) In addition, all project affected families will be paid a maintenance allowance of Rs. 1,000/- per month. Payment would start from the date the project takes over the land for construction, when the landowner loses his right to cultivate on the land, and ends with either the possession of replacement land or one year after the payment of rehabilitation grant.	Govt/ Sponsor
	e) Agricultural laborers	1) One time livelihood assistance equivalent to 625 days of minimum wages (as prescribed in NPRR 2003) (minimum wages are fixed by the respective District Collector in accordance with Minimum wages fixed by Ministry of Labor under Minimum Wages Act, 1948. Rates will be revised by TNUDP every year.)	

Type of Issue/Impact	Entitlement Beneficiary	Entitlement Options	Respon-sibility
b) Shops and Businesses	a) Title holder	1) For the land, the PAP will have two options a) Land for land of equivalent extent, if possible, will be provided and the purchase price will be negotiated between a willing seller and the willing PAP. The project will bear registration charges in addition to paying for the land. Or b) Replacement cost in cash for the extent lost as per the guideline value. 2) For the building, the PAP will have two options a) An alternate built shop in the resettlement site (resettlement site will be developed provided not less than 20 families opt to move into a particular resettlement site) of plinth area of 9 sq. m. Or b) Replacement cost for the affected shop, in cash, calculated based on the scheduled rates of the PWD without depreciation 3) Livelihood assistance a) if income is declared and records of Income Tax returns are available, then a cash grant equivalent to one year income calculated as an average of past three years income Or b) if income details are not available, then cash grant equivalent to 750 days (as prescribed in NPRR 2003) of minimum wages (minimum wages are fixed by the respective District Collector in accordance with Minimum wages fixed by Ministry of Labor under Minimum Wages Act, 1948. Rates will be revised by TNUDP every year) 4) One time shifting allowance of Rs. 5000/- and 5) Right to salvage material	Govt/ Sponsor

Type of Issue/Impact	Entitlement Beneficiary	Entitlement Options	Respon-sibility
	b) Encroacher	1) Right to salvage material.	
	c) Squatter d) Tenant / Lease holder	1) For the building, the PAP will have two options a) An alternate built shop in the resettlement site (resettlement site will be developed provided not less than 20 families opt to move into a particular resettlement site) of plinth area of 9 sq. m. Or b) Replacement cost for the affected shop, in cash, calculated based on the scheduled rates of the PWD without depreciation 2) Livelihood assistance a) if income is declared and records of Income Tax returns are available, then a cash grant equivalent to one year income calculated as an average of past three years income Or b) if income details are not available, then cash grant equivalent to 750 days (as prescribed in NPRR 2003) of minimum wages (minimum wages are fixed by the respective District Collector in accordance with Minimum wages fixed by Ministry of Labor under Minimum Wages Act, 1948. Rates will be revised by TNUDP every year) 3) One time shifting allowance of Rs. 5000/- and 4) Right to salvage material	

Type of Issue/Impact	Entitlement Beneficiary	Entitlement Options	Respon-sibility
	e) Employee and Hawker	1) One time livelihood assistance equivalent to 625 days of minimum wages (as prescribed in NPRR 2003) (minimum wages are fixed by the respective District Collector in accordance with Minimum wages fixed by Ministry of Labor under Minimum Wages Act, 1948. Rates will be revised by TNUDP every year.)	
II – Urban PAPs**			
1) Loss of Homestead	a) Title holder	1) For the land, the PAP will have two options a) Land for land of equivalent extent, if possible, will be provided. The Government will identify the land and the purchase price will be negotiated between a willing seller and the willing PAP. The project will bear registration charges. Or b) Replacement cost in cash for the extent lost as per the guideline value. 2) Replacement cost for the affected dwelling unit, in cash, calculated based on the scheduled rates of the PWD without depreciation. 3) One time shifting allowance of Rs. 5000/- (as prescribed in NPRR 2003) and 4) Right to salvage material.	Govt/ Sponsor
	b) Encroacher	1) Right to salvage material.	

Type of Issue/Impact	Entitlement Beneficiary	Entitlement Options	Respon-sibility
	c) Squatter	1) For the building, the PAP will have two options a) Replacement cost for the affected dwelling unit, in cash, calculated based on the scheduled rates of the PWD without depreciation Or b) an alternate built house in the resettlement site which will be developed provided not less than 20 families opt to move into a particular resettlement site) as per Government norms (as per Indira Awaas Yojana (IAY) norms i.e. Rs. 25,000/- in plain area and Rs. 27,200/- in hilly terrain and difficult places and plinth area not less than 20 sq. m) 2) One time shifting allowance of Rs. 5000/- (as prescribed in NPRR 2003) and 3) Right to salvage material.	
	d) Tenant and lease holder	1) Six month rental allowance to re-establish residence.	

Type of Issue/Impact	Entitlement Beneficiary	Entitlement Options	Respon-sibility
2) Loss of Income / Sources of livelihood a) Shops and Businesses	a) Title holder	1) For the land, the PAP will have two options a) Land for land of equivalent extent, if possible, will be provided. The Government will identify the land and the purchase price will be negotiated between a willing seller and the willing PAP. The project will bear registration charges. or b) Replacement cost in cash for the extent lost as per the guideline value. 2) Replacement cost for the affected shop, in cash, calculated based on the scheduled rates of the PWD without depreciation 3) Livelihood assistance a) if income is declared and records of Income Tax returns are available, then a cash grant equivalent to one year income calculated as an average of past three years income or b) if income details are not available, then cash grant equivalent to 750 days (as prescribed in NPRR 2003) of minimum wages (minimum wages are fixed by the respective District Collector in accordance with Minimum wages fixed by Ministry of Labor under Minimum Wages Act, 1948. Rates will be revised by TNUDP every year) 4) One time shifting allowance of Rs. 5000/- and 5) Right to salvage material	Govt/ Sponsor
	b) Encroacher	1) Right to salvage material.	

Type of Issue/Impact	Entitlement Beneficiary	Entitlement Options	Respon-sibility
	c) Squatter d) Tenant / Lease holder	1) Replacement cost for the affected shop, in cash, calculated based on the scheduled rates of the PWD without depreciation 2) Livelihood assistance a) if income is declared and records of Income Tax returns are available, then a cash grant equivalent to one year income calculated as an average of past three years income or b) if income details are not available, then cash grant equivalent to 750 days (as prescribed in NPRR 2003) of minimum wages (minimum wages are fixed by the respective District Collector in accordance with Minimum wages fixed by Ministry of Labor under Minimum Wages Act, 1948. Rates will be revised by TNUDP every year) 3) One time shifting allowance of Rs. 5,000/- and 4) Right to salvage material	
	e) Employee and Hawker	1) One time livelihood assistance equivalent to 625 days of minimum wages (as prescribed in NPRR 2003) (minimum wages are fixed by the respective District Collector in accordance with Minimum wages fixed by Ministry of Labor under Minimum Wages Act, 1948. Rates will be revised by TNUDP every year.)	
III. Rural and Urban 1) Other land	a) Title holder	1) Replacement cost in cash for the extent lost as per the guideline value.	Govt/ Sponsor

Type of Issue/Impact	Entitlement Beneficiary	Entitlement Options	Respon-sibility
2) Loss of access to common resources and facilities			
a) Common resources	Unit	1) The affected common resources will be provided / created afresh	Govt/ Sponsor
b) Social and Cultural property	Unit	1) Wherever possible, the property will be relocated in consultation with the community 2) When relocation of the property is not feasible, will be provided afresh	
3) Losses to Host communities			
a) Amenities/Services	(i) Amenities / services	1) Will be entitled to restoration of losses as a result of additional consumption due to resettlement 2) Will be provided amenities/services equivalent to those provided to PAPs	Govt/ Sponsor

Note: * Based on consumer price index for agricultural laborers for Tamil Nadu - September 2003 Index 362.

** If any agricultural land is affected in Urban area, the entitlements prescribed for Rural area will be applicable.

Annexure 13.1: Draft Memorandum of Agreement

DRAFT MEMORANDUM OF AGREEMENT BETWEEN URBAN LOCAL BODY AND TAMILNADU URBAN INFRASTRUCTURE FINANCIAL SERVICES LIMITED

Dated _____

THIS AGREEMENT is made on this _____ day of _____,2006 _____ between the Tamilnadu Urban Infrastructure Financial Services Ltd., and Urban Local Body.

WHEREAS the projects identified in the City Corporate Cum Business Plan seeks financial assistance from the TNUIFSL under the World Bank AID.

WHEREAS the projects identified in the City Corporate Cum Business Plan, in pursuance of the requirements for Comprehensive City Development, fully detailed in the City Corporate Cum Business Plan:

AND WHEREAS the comprehensive infrastructure projects identified in the City Corporate Cum Business Plan has to prepare feasibility and detailed project reports:

AND WHEREAS municipality has to implement the reform agenda, as per the timeline indicated in the reform agenda.

AND WHEREAS the projects identified in the City Corporate Cum Business Plan has considered the City Corporate cum Business Plan Report and found them consistent with the goals and objectives of CCP-BP:

NOW THE PARTIES WITNESSED as follows:

1. That the sustainable prioritize infrastructure projects identified in the City Corporate cum Business Plan report will be taken up as given in the Memorandum of Agreement.

(a) _____

(b) _____

(c) _____

2. The TNUIFSL and the Local Body should engage Third party quality control agency to check quality and audit.

3. Local Body is the responsible agency to see the progress of the projects, progress of the ongoing projects and also the implementation of reforms agenda.

4. That the parties to the agreement further covenant that in case of a dispute between the parties the matter will be resolved to arbitration within the provisions of the arbitration and conciliation Act, 1996 and the rules framed there under and amended from time to time. The matter in dispute shall be referred to _____ (Insert a name of an arbitrator) as arbitrator, however, in case such person refuses to act as arbitrator, or is rendered, unable because of sickness or otherwise, or dies, _____ (name of the second person for arbitrator) shall act as arbitrator between the parties and the dispute shall be referred to such person and still in case this second person is not available for any reason to act as arbitrator between the parties, both parties shall name one person of their choice as arbitrator and decision such arbitration shall be final and binding on the parties.

IN WITNESS HEREOF all the parties have put their hands on these presents of Memorandum of Agreement in the presence of witnesses.

WITTNESES:

1. _____ TNUIFSL

2. _____ Or

Urban Local Body

(Government of Tamilnadu)