

CITY SANITATION PLAN

NAGAPATTINAM MUNICIPALITY

Name of the Region: Thanjavur

Existing situation analysis

Sl. No	Name of the District / ULB	General Details					Population			
		Total No. of Wards	Area (Sq.km)	No. of Houses Holds (2011 Popoulation)	No. of Slums	No. of slum house holds	Year	Total Population	Slum Population	Floating Population (Assume 5% of local population or actuals based on survey record, Whichever is high)
1	Nagapattinam	36	14.92	23884	40	10080	2011	102813	43982	5141
							2019	117154	46862	5858
							2015	124654	49861	6233


 Commissioner
 Nagapattinam Municipality

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THANJAVUR REGION
NAGAPATTINAM MUNICIPALITY



PROPOSAL FOR CITY SANITATION PLAN
UNDER
SWACHH BHARATH MISSION
ESTIMATE COST – 480.80 Lakhs

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Acronyms

BPL	-	Below Poverty Line
CPHEEO	-	Central Public Health and Environmental Engineering Organisation
CSP	-	City Sanitation Plan
CSTF	-	City Sanitation Task Force
CT	-	Community Tollets
DEWATS	-	Decentralised Wastewater Treatment System
GIS	-	Geographic Information System
GOI	-	Government of India
GPCD	-	Grams Per Capita per Day
GPS	-	Global Postioining System
HHS	-	Households
ID	-	Identity Number
LPCD	-	Litres Per capita per Day
M&E	-	Monitoring and Evaluation
MIS	-	Management Information system
MLD	-	Million Litres Per DAY
MOUD	-	Ministry Of Urban Development
NGO	-	Non Governmental Organisation
NSS	-	National Service Scheme
CSP	-	National Urben Sanitation Policy
O &M	-	Operation and Maintenance
OHT	-	Over Head Tank
PPP	-	Public Private Partnership
PT	-	Public Toliets
SHG	-	Self Help Group
SLB	-	Service Level Benchmarks

- STP - Sewage Treatment Plant
- SWM - Solid Waste Management
- UGD - Under Ground Drainage
- ULB - Urban Local Body

1. Introduction to City Sanitation Plan and the process

1.1 Background

The expanding urbanisation and industrialisation exert great pressure on the already existing inadequate sanitation infrastructure in towns and cities in India. The Urban Scenario causes a great concern in terms of health and hygiene. Out of the total of 1210.2 million population in India, the size of urban population was 377.1 (or 31.16%). During 2001- 2011 the population of the country increased by 181.4 million and the increase in urban areas was 91.0 million.

India stands second amongst the worst places in the world for sanitation. Census India 2011 (provisional) results have indicated that nearly 17 million urban households (more than 20% of the total 79 million urban households) suffer from inadequate or no sanitation. This problem is compounded by the fact that as high as 70% of the waste water generated in urban areas is not treated. Coverage of waste collection in most of the cities is less than 50% and scientific disposal of the collected waste is almost non-existent. According to the report of the Central Pollution Control Board (2009), the estimated sewage generation from Class – I Cities and Class – II Towns is 38254.82 million liters per day (MLD) out of which only 11787.38 MLD (30%) is being treated and the remaining is disposed into the water bodies without any treatment. The Ministry of Urban Development (MoUD) under the National Urban Sanitation Policy ranked and categorized 423 cities in 2008 to evaluate their sanitary health and hygiene standards. As per these ranks, none of the cities studied by the MoUD can be categorized as “healthy and clean.” (Tamil Nadu Urban Sanitation Policy, 2012). Approximately 30% of the urban population still does not have water supply connection and has to rely on either community tap or ground water and other sources of water. Realising the vastness and implications of this serious environmental and socio economic issue, the Ministry of Urban Development (MoUD), Government of India (GOI) announced the National Urban Sanitation Policy (CSP) in October 2008. As directed by the policy, cities are to prepare City Sanitation Plans (CSPs) addressing all aspects of sanitation in the city.

1.1.1 THE CITY SANITATION POLICY

The CSP seeks to address the gap in sanitation infrastructure and move Indian cities toward ‘total sanitation’ through a ‘systems’ driven approach. CSP tries to create a more coordinated institutional roles and responsibilities to reach the poor and the un-served. the initiative to support the Municipality of Nagapattinam for the preparation of the CSP. Preparation of Nagapattinam Municipality city sanitation plan.

1.1.1.1 Vision of CSP

The CSP outlines the vision of urban sanitation as “All Indian cities and towns become totally sanitized, healthy and livable and ensure and sustain good public health and environmental outcomes for all their citizens with a special focus on hygienic and affordable sanitation facilities for the urban poor and women”.

1.1.1.2 Objectives of CSP

The overall goal of this policy is to transform Urban India into community driven, totally sanitized, healthy and livable cities and towns. The objectives are,

- ✓ Awareness generation and behavior change
- ✓ Open defecation free cities
- ✓ Integrated city-wide sanitation.
- ✓ Proper Operation & Maintenance (O&M) of all sanitary installations.

The Policy seeks to address the following issues:

- Poor Awareness: Sanitation has been accorded low priority and there is low level of awareness about its inherent linkages with public health.
- Social and Occupational aspects of Sanitation.
- Fragmented Institutional Roles and Responsibilities: there are considerable gaps and overlaps in institutional roles and responsibilities at the national, state, and city levels.

- Lack of an Integrated City-wide Approach: Sanitation investments are currently planned in a piece-meal manner and do not take into account the full cycle of safe confinement, treatment and safe disposal.
- Limited Technology Choices: Technologies have been focused on limited options that have not been cost-effective, and sustainability of investments has been in question.
- Reaching the Un-served and Poor: Urban poor communities as well other residents of informal settlements have been constrained by lack of tenure, space or economic constraints in obtaining affordable access to safe sanitation.
- Lack of Demand Responsiveness: Sanitation has been provided by public agencies in a supply – driven manner, with little regard for demands and preferences of households as customers of sanitation services.

1.1.1.3 Strategies of CSP

CSP provides a strategy for addressing the above issues with a focus on the following.

1. Awareness Generation and Behaviour Change

- Generating awareness about sanitation and its linkages with public and environmental health amongst communities and institutions.
- Promoting mechanisms to bring about and sustain behavioural changes aimed at adoption of healthy sanitation practices.

2. Open Defecation Free Cities

- Promoting proper functioning of network-based sewerage system, and ensuring connections of households to them, whenever possible.
- Promoting recycle and reuse of treated waste water for non potable applications, wherever possible, will be encouraged.
- Promoting proper disposal and treatment of sludge from on-site installations (septic tanks, pit latrines, etc..)
- Ensuring the all the human wastes are collected safely and disposed off after treatment so as not to cause any hazard to public health or the environment.

3. Integrated City – Wide sanitation.

- Re-orienting institutions.
- Sanitary safe disposal
- Operation and maintenance
- Strengthening ULBs to provide or cause sustainable sanitation services delivery.

1.1.2 STATE SANITATION STRATEGY OF TAMIL NADU

1.1.2.1 Situation in Tamil Nadu

The population has grown from 62.4 million in 2001 to 72.1 million in 2011 (Provisional Census of India 2011). Out of this, 34.9 million (48.45%) are urban population living in towns and cities. According to the census 2011, Tamil Nadu was the 3rd most urbanized state. It is projected that the urban population would peak at 69.1% in 2026. According to Census (2001 and 2011 provisional) figures there are 59 lakh urban households in Tamil Nadu out of which, 35.7%, 21.06 lakh urban households do not have access toilets, 7.77% use community toilets, 30% do not have access to drainage networks, and 35% are connected to open drains. (Tamil Nadu Urban Sanitation Policy 2012 draft).

1.1.2.2 State Sanitation Strategy

In the spirit of CSP, Tamil Nadu government has drafted Tamil Nadu Urban Sanitation Policy to address the gap in sanitation areas. The policy advocates “ all the cities to become free from open defecation and that all human waste and liquid waste be collected and safely treated. “The government is committed to make the State open defecation free by 2015.

The policy seeks to address the issues as mentioned in CSP.

The Specific goals outlined in the policy are:

- Awareness generation and behavior change
- Open defecation free cities

- Integrated city-wide sanitation (re-orienting institutions, sanitary safe disposal, operation and maintenance)

Tamil Nadu State Vision 2023 clearly mentioned that Tamil Nadu shall provide piped and pressurized 24 x 7 water supply to 100% of its residents and ensure that all of them have access to safe sanitation.

The following are the aspects covered under the strategy:

- ✓ IEC activities extremely important
- ✓ Menstrual Hygiene is important
- ✓ Public private partnerships will be critical in the future: Government cannot maintain all public toilets.
- ✓ Lack of communication has led to toilet provision failures
- ✓ Children need to be educated
- ✓ Sanitary ambassadors at schools to be promoted
- ✓ Illegal activities in toilets like – smoking, drinking need to be stopped
- ✓ Local solutions and local plans should be emphasized upon – decentralized plans-focus on the urban poor and informal sector workers
- ✓ Education needs to be imparted to women and children of the household
- ✓ Habitual changes need to take place through IEC activities
- ✓ Ownership issues of toilet need to be sorted out

1.2 Rationable for the Project

While the CSP aimed at 100% sanitation in all major Indian cities, the GOI advised all State Governments to prepare State Level Sanitation Strategies taking into consideration their own geographical, climatic and cultural considerations to suit the needs of the people. There are 125 Municipalities in Tamil Nadu. Though the CSP was announced in 2008, the concept of the policy has not been fully disseminated to all the municipalities and town Panchayats in Tamil Nadu.

The dissemination was carried out through conducting workshops for ULBs where CSP and concepts of CSP were explained to elected representatives, chairpersons of municipalities, municipal councilors, health officers, sanitation inspectors and others working in the public health and sanitation sectors. The workshops included details on government schemes for fund allocation for the implementation of sanitation infrastructure.

1.3 OVERVIEW ON SCOPE OF WORK

The board tasks in the scope of work for the preparation of the City Sanitation Plan include:

- Analysis of the sanitation situation of the city and preparing the project details
- Creation of a Geographic Information System (GIS) based database on sanitation in Aranthagi.
- The preparation of project proposals based on the situation analysis and consultations with the City Sanitation Plan
- Creation of health sanitation and good environment.

Primary Indicators as mandated by National Urban Sanitation Policy

- Every citizen has access to toilet, and the city is ‘Open Defecation Free(ODF)’
- All the sewage generated is collected, treated, and disposed off safely.

Secondary Indicators

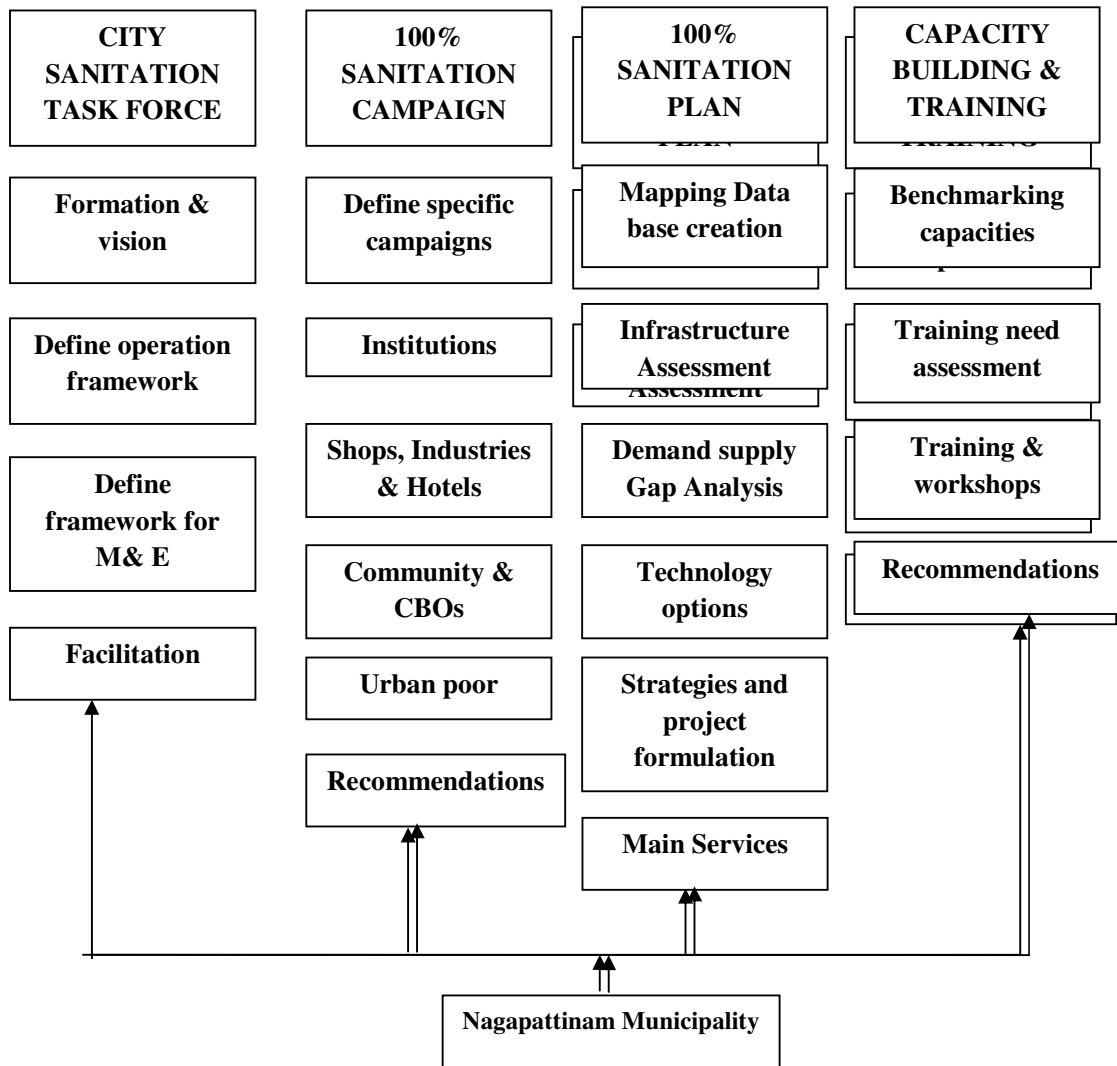
Secondary indicators are optional and are not mandated by the CSP. However, for holistic sanitation in a city it is important that the following indicators are also addressed. Our consortium will advocate for the inclusion of these indicators into the City Sanitation Planning.

- All the solid waste generated is collected, treated, and disposed off safely.
- All water bodies and drainages are preserved and kept clean.
- All the storm water drains are kept clean

1.3.2 Building Local Institutions and Community Participation

The Creation of the City Sanitation Task Force, conduction of a 100% sanitation campaign, preparation of an integrated City Sanitation Plan, and carrying out capacity building and training programs are seen as the Four key services to accomplish the goal of 100% sanitation in a city.

The four key tasks are divided into sub-components as follows:



1.3.3 Centralised and Decentralised Approaches

Most local governments prioritize centralized collection and treatment systems for managing domestic wastewater and municipal solid waste. However, as rapid population growth in urban areas exceeds the supply of sanitation services, it has become increasingly evident that such conventional treatment systems are not optimal solutions to manage wastewater and solid waste in developing countries. The selection of appropriate technologies is one of the key challenges for achieving 100% sanitation access in urban areas. It is important that a holistic technical approach, which incorporates centralized and decentralized sanitation system, is chosen. The planning approach has to project - specific social, cultural, economic, health, and environmental priorities, which will influence the technology selection and the system design. Technologies that promote recycle and reuse of treated wastewater should be preferred.

1.4 METHODOLOGY FOR PREPARATION OF CITY SANITATION PLAN

Each of the key services has been broken down into a series of executable tasks as follows.

These tasks are not linear, and many of the activities are parallel activities.

1.4.1 The City Sanitation Task Force (CSTF)

To achieve the goals of CSP, the government encourages cities to introduce a CSTF at city level. The CSTF is conceptualized as a multi stakeholder platform for monitoring and evaluation of the interventions pertaining to city sanitation. The process of setting up a CSTF and their responsibilities for institutional functioning are:

- ✓ Stakeholder mapping and interaction
- ✓ Defining agenda, institutional structure, roles and responsibilities for the CSTF
- ✓ Conducting the CSTF formation meeting

- ✓ Preparing the Operations Manual
 - Detailed roles and responsibilities of the various entities involved
 - Standard operating procedures for meeting decision making carrying out of other functions etc.
- ✓ Preparation of Guidelines
 - For updating city sanitation GIS and data base
 - For facilitation and overseeing the implementation of awareness generation programs and meeting relevant stakeholders from time to time
 - For facilities and overseeing implementation of CSP proposals, managing bids and selection of consultants and contractors.
 - For facilitating and overseeing periodic capacity building activities
- ✓ Preparing the Monitoring and Evaluation (M&E) Manual
 - Procedures for evaluating CSP proposal
 - Procedures for periodically evaluating 100% sanitation status based on a set of objective indicators of outputs, processes and outcomes.
 - Procedures for monitoring sanitation status from time to time based on similar indicators in addition to preparing the material required for functioning of the CSTF.
- ✓ The members are to engage in preparation of csp document [providing data, sharing on the situation of town, critical area analysis, sharing the recommendation with community members, supporting field survey
- ✓ guide the council on implementation of sanitation project as per suggested recommendations

1.4.2 Initiating participatory process

One of the critical factors that contributes to inadequate, or non utilization, or misuse of sanitation facilities in cities and town is lack of ownership among communities where the facilities are located. lack of ownership is obvious wherever the community members were not part of the assessment, planning, decision making and maintenance process. taking this into consideration, the CSP advocated demand-response approach.

Towards ensuring the participatory process in preparing csp ,exnora conducted one council meeting ,2 cstf meetings and 4 ward laval meeting. in the council meeting, after the csp was explained the members approved the project, and then selected and ratified the members of cstf. the cstf members were explained of their roles and responsibilities. in the meeting with the cstf members , the sanitation situation and issues were discussed at length and their suggestions were incorporated into the preparation of csp. during the ward level meeting, the sanitation issues were discussed with cstf members and were shared with community members, and their suggestions were also incorporated into preparing the csp

The member list of city sanitation task force (CSTF) in Nagapattinam is as follows.

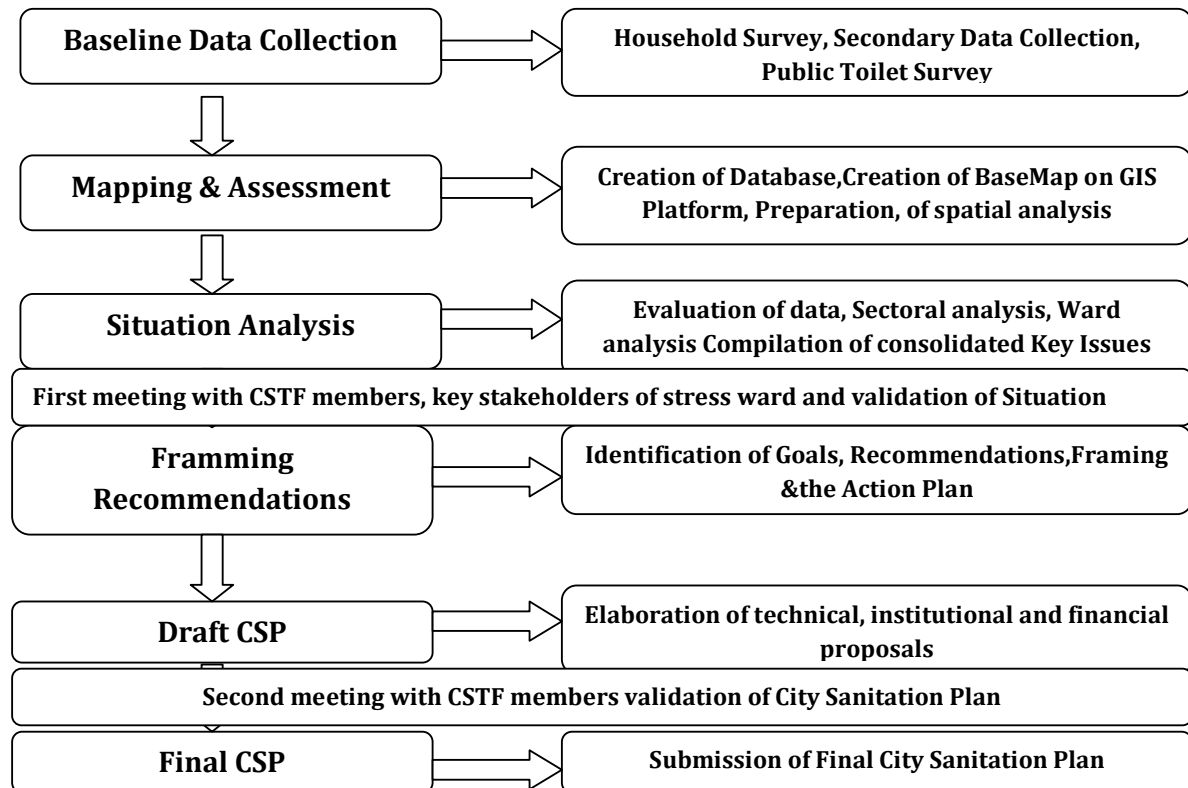
SL.NO	Name & Position	
1	C. Manjula Chandra Mohan, Chairman, Nagapattinam Municipality	Chairman
2	P. Johnson, Commissioner, Nagapattinam Municipality	Secretary
3	N. Chandrasekaran, Municipal Engineer, Nagapattinam	Executive member
4	Dr. D.A. Deepak Jude, Municipal Health officer, Nagapattinam Municipality	Executive member
5	R. Murugaiyan, Indian Chamber of Commerce, Nagapattinam	Executive member
6	K. Kannapiran, Indian Chamber of Commerce, Nagapattinam	Executive member
7	G. Sundar, Rotery Club, Nagapattinam	Executive member
8	P. Ramachandren, Indian Chamber of Commerce, Nagore	Executive member
9	K. Saravanaperumal, Rotery Club, Nagore	Executive member
10	S. Elamaran, Headmaster, Municipal Middle school	Executive member

1.4.3 Methodology and process

CSP of Nagapattinam Municipality

the CSP, its proven methodology, which encompasses the requirements of the CSP, and followed Central Public Health and Environmental Engineering Organisation (CPHEEO) standards.

The process of developing the city sanitation Plan for Nagapattinam is illustrated in Figure 1-2 The methodology involved independent and interconnected steps which could continually validate in consultation with the Nagapattinam Municipal Council, other stakeholders and civil societies. The City Sanitation Task Force (CSTF) played a major role in validating the process of the CSP. The following chapters describe the various instruments and methodologies applied in this process.



1.4.3.1 Sanitation Mapping

After completing the survey, house blocks were also digitized on the GIS platform for which an agency was engaged. These house blocks represent the smallest units with disaggregated data. The house block features are the key elements for the preparation of the base map and thematic maps on the GIS platform such as population distribution, density, water supply, access to toilets, mode of wastewater and solid waste disposal.

This database formed the basis for the calculation of existing & future demand-supply gap analysis and for the map preparation. This sanitation mapping shows the existing sanitation situation and the demand-supply gap of the project area. These were also used to visualize where sanitation interventions are required at what level and magnitude.

The following layers have been digitized for preparing the base map:

- Administrative boundaries-municipal corporation boundary and ward boundaries
- Transportation network-roads and railways
- Built Areas
- Water bodies, sewage system, sanitation facilities and natural drainage

Sl.NO	Layer	Remarks	Data type
1	Locations	Locations have been marked from base map provided by AMC map and on during the field survey.	point
2	Nagapattinam Municipal Boundary	Municipal Boundary extracted from base map provided by AMC	Line
3	Ward Boundary	Municipal Boundary extracted from base map provided by AMC and it was realigned in the imagery map based on the field survey done by ExNoRa.	Line
4	National High ways, state high ways and town roads	Road outlines are extracted from the base map provided by the AMC	Line

5	Build mass	Existing built mass has been digitized based on the high resolution Google images by ExNoRa	Polygen
6	Water bodies	All water bodies within the municipal boundary are marked from Google map	Polygen

1.4.3.3 Overlaying of secondary information on the base map

For the preparation of sanitation maps (including water supply, sewerage system, solid waste management and public sanitation) various primary (collected through field surveys) and secondary data were collected and overlapped on the base map in GIS platform. The following layers of information have been added to the base map for the purpose of preparing the thematic sanitation maps and thereafter for demand supply gap analysis:

- Urban poor areas
- Population Density
- Water supply coverage-individual taps connections
- Sewerage system- septic tanks, Sewage disposal mechanism, Underground Drainage System
- Solid waste Management- solid waste management service coverage, solid waste disposal mechanism
- Access to toilets- Access to individual toilets, open defecation prone areas, dependency on public toilets
- Special arrangements during festive occasions

The data available from the city authorities regarding existing water supply system, sewerage system, solid waste management system and public sanitation is mostly at the ward level (aggregated data).

Since no DPRs are available, the mapped information is based on the drawings and verbal information provided by the ULB officials.

1.4.3.4 Demand Assessment

To assess water demand, sewage generation, solid waste generation and demand for toilets, there must be specifically defined factors to calculate the demands. The water supply demand in early was 90 lpcd (liltres per capita per day). However, present estimations place water supply demand at 135 lpcd . Taking into account a rise in the quality of life and water consumption in Nagapattinam , the water supply demand applied in this report is assumed as 90 lpcd, as per CPHEEO norm and the Service Level lBenchmarks by MoUD.

The total wastewater generated per capita is estimated as 80% of the total water demand. To assess the supply and demand of public toilets, a ration of 100 persons per toilet seat is applied for public places and a seat-user ratio of 1:35 is assumed as benchmaqrk for predominantly residential areas. In any case, a spatially detailed analysis of the distribution of public toilet is required for a meaningful demand-supply gap analysis of public toilets.

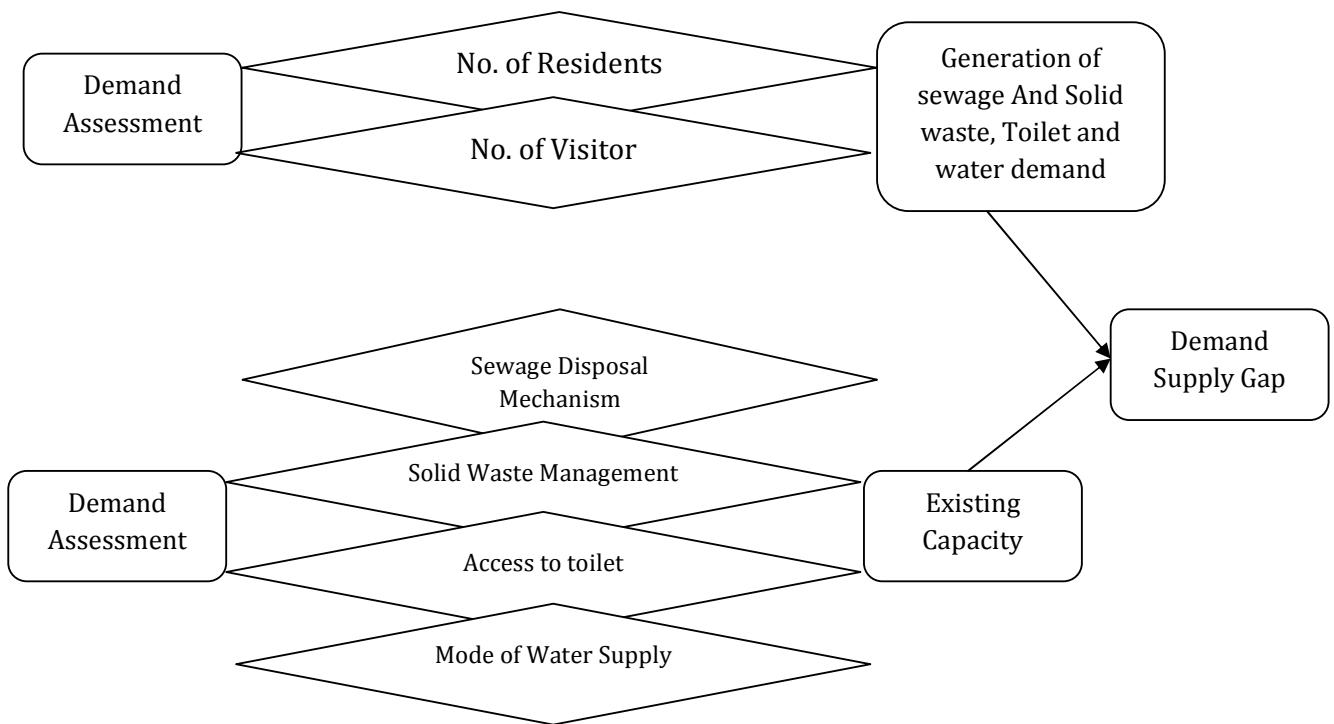
For solid waste generation, 250 grams per capita per day (gpcd) is assumed to calculate the actual demand for solid waste management services. As per the CPHEEO norm, towns of the size of Nagapattinam have an average daily waste generation of 350 grams per capita. However, the calculated quantity of daily waste generation in Nagapattinam is 350 grams per capita per day. Working with a projected timeframe of 30 years, it is most essential to take into account increasing and changing consumption patterns. Thus, a generation of 450 gram per capita per day is considered for the next 20 years.

For the floating population, only 50% of all factors used for the residential population have been taken as the basis for the calculations. Floating population includes pilgrims, tourists, workers, students and shoppers. The difficulty in calculating their actual use of water and solid waste generation is obvious, as individual patterns vary widely. As the majority of the people classifield as visitors do not spend more than half a day at a place, it is assumed that they only need 50% of the residential water supply demand (this corresponds to 45 lpcd) and generate 50% of the solild waste generated by residents (450 gpcd for the next 20 years). Sewage generation by visitors will also be 80% of the water demand. For the access to toilets, a seats user of 1:100 is aspired for the floating population, according to MoUD Service Level Benchmarks.

1.4.3.5 Demand-supply Gap Analysis

An overall supply gap analysis of the sanitation infrastructure is made at the city level. The gap gives an idea of the additional infrastructure needed for Nagapattinam to achieve the status of a 100% sanitized city. The demand for sanitation infrastructure is determined by the extent of water required for daily activities, total wastewater and solid waste generated, as well as the provision of public and community toilets for residents and visitors. The assessment of the sanitation infrastructure supply is determined by the aggregation of supplied water, sewage and solid waste collected, transported, and safely disposed and the number of existing public toilets.

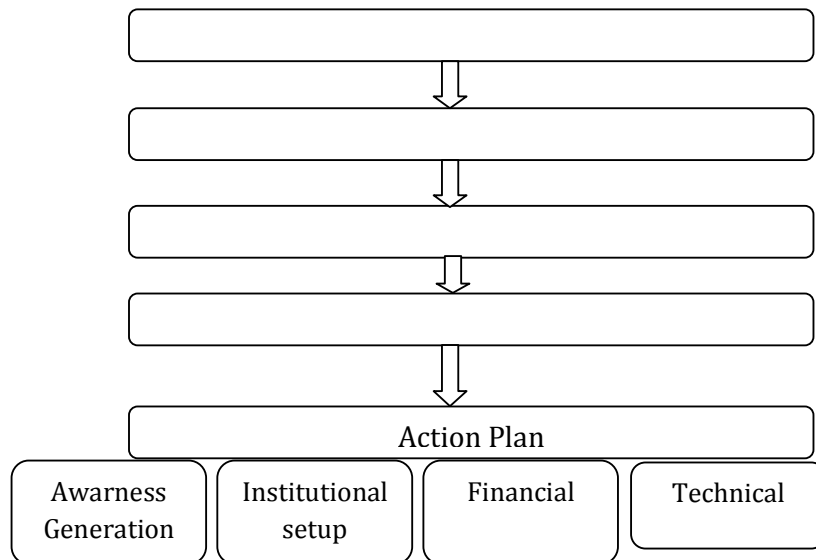
This analysis is done at two different levels: on the disaggregated house block level, as well as on a ward level to facilitate a good information basis for the Ward Councillors. The following figure 1-3 shows the flow-diagram of the demand-supply gap analysis.



In addition, a spatial analysis to identify most critical areas for each sector was conducted. For this, mostly qualitative data was analyzed on the GIS platform to identify high concentrations of problematic sanitation conditions.

1.4.3.6 Framing Recommendations

The methodology applied to develop recommendations and strategies for Nagapattinam is visualized in Figure 1-4. The vision describes the expected sanitation situation in the Nagapattinam Town after implementing the CSP. Principles are set by ExNoRa, which are to be applied during the elaboration of recommendations and implementation of projects



The goals respond to the identified key issues of the different sectors given in Section.

II.

The detailed description of each goal provides the base for recommendations and action plan.

Vision of Nagapattinam CSP-Aims and Objectives

1.5 Vision of Nagapattinam CSP-Aims and Objectives

The Nagapattinam City Sanitation Plan aims at becoming a clean town within 30 years where every individual will have access to a toilet facility, where people are aware of health and hygiene related diseases and opt for appropriate sanitation practice instead of resorting to open defecation. Thus, Nagapattinam becomes a 100% open defecation free city. Other goals of the csp are:

1. Every person has adequate clean and safe water within close proximity
2. Wastewater in the town is treated and safely disposed off in an environment-friendly manner so that the river and other water bodies will be safe and hygienic
3. The Operation and Maintenance (O&M) activities of sanitation infrastructure is vested with the users and Municipality and, adequate funds are allocated for these activities.
4. The existing system of solid waste management is improved and extended to the entire town starting from source segregation to revenue generation through vermin compost and sale of recyclables.
5. The planning process and implementation of the CSP is conducted with the participation of all stakeholders and the residents of Nagapattinam

2. Present Sanitation Situation of the Town

2.1 Town profile

2.1.1 Location

Nagapattinam municipality is one of the Oldest Municipalities in Tamilnadu, This Municipality was formed in the year 1866 as a grade II Municipality. It is located at 10° 46' North latitude and 79° 5' East longitude. The town is located 84 km towards east from Thanjavur and 350 km towards south from Chennai, and also at the costal side of Bay of Bengal. Presently Nagapattinam Municipality is a Selection Grade Municipality having population of 102813 This Municipality maintained 123.274Km length of roads 62.14 length of Storm Water Drain. The present area of the Municipality is 14.92. sq.km and the above 14.92 sq.km divided into 36 wards having 23884 of House holds.

Temperature

Nagapattinam has a tropical climate with summer season from april to july and December to January marks the winter season. The average temperager ranges from a maximum of 38 *C to a minimum of 24 *C during summer and a maximum of 33 .c to a minimum of 21 *C during winter. Throughtot the year the climate is generally dry and hot apart the months of December and January due to bay of bangal of east. the town receives an average rainfall of 315mm which is low mostly from the south-west monsoon and north east monsoon in the months of October, November and December.

Rain Fall

The town gets major rainfall during the North east monsoon period. The Annual normal rainfall varies from 300 mm to 800 mm.

2.1.2 Linkages and connectivity

2.1.3 Demography

year	Population	variation	Decadal growth rate (%)
1951	69370		
1961	74965	5,595	7.46%
1971	77763	2,798	3.60%
1981	80560	2,797	3.25%
1991	86155	5,155	5.98%
2001	93148	6,993	7.51%
2011	102813	9,665	9.40%

Nagapattinam Municipality was constituted in 1866. It was upgraded to Selection grade municipality in 1988. The town is divided into 36 wards. The area of the town is 14.92 sq.km. As per census of India, in 1961, the population of this town was 74,965 and it grew to 1,02,813 in 2011. The high growth rates were seen between 1971 and 1981 but it declined considerably in each decade and it reached 3.25% between 1991 and 2001. Overall population density was 5,734 persons per square kilometre as per 2011 census and it was 4,794 persons per square kilometre in 2001. It is expected that the growth of the population for next decade will be maximum 19.61%. Based on this the population projection for 2021, 2031 & 2041 has been shown in the table.

Ward No.	No.of Families	population			Population Projection		
		Male	Female	Total	2021	2031	2041
01	637	1342	1253	2595	2958	3461	3876
02	815	1766	1808	3574	4074	4767	5339
03	478	1048	1061	2109	2404	2814	3152
04	431	936	961	1897	2163	2530	2834
05	239	598	616	1214	1384	1619	1813
06	570	1474	1470	2944	3356	3926	4397
07	780	1964	1908	3872	4414	5164	5784
08	417	1130	1202	2332	2658	3110	3483
09	587	1244	1381	2625	2993	3501	3921
10	1087	2582	2636	5218	5949	6960	7795
11	1687	3747	3658	7405	8442	9877	11062
12	1455	2764	2928	5692	6489	7592	8503
13	929	1769	1849	3618	4125	4826	5405
14	631	1400	1321	2721	3102	3630	4066
15	707	1284	1331	2615	2981	3488	3907
16	884	1789	1877	3666	4179	4889	5476
17	884	1627	1840	3467	3952	4624	5179
18	674	1300	1249	2549	2906	3399	3807
19	595	1126	1147	2273	2591	3031	3395
20	827	1526	1613	3139	3578	4187	4689
21	506	1041	1096	2137	2436	2850	3192
22	508	1002	1007	2009	2290	2680	3002
23	562	1196	1240	2436	2777	3249	3639
24	152	289	334	623	710	831	931
25	464	1099	1190	2289	2609	3053	3419
26	492	1052	1028	2080	2371	2775	3108
27	541	1001	1037	2038	2323	2718	3044
28	700	1275	1349	2624	2991	3500	3920

29	684	1281	1288	2569	2929	3427	3838
30	501	925	1009	1934	2205	2580	2890
31	344	617	702	1319	1504	1759	1970
32	353	664	679	1343	1531	1791	2006
33	560	992	1130	2122	2419	2831	3171
34	470	1057	1059	2116	2412	2823	3162
35	1618	3459	3433	6892	7857	9193	10296
36	700	1418	1339	2757	3143	3678	4119
Total	24469	50784	52029	102813	117207	137133	153589

2.1.4 Oorani details

Nagapattinam is famous in Oorani's (ponds). There is very good rain water harvesting system in the town. Devanathi River passes 1 km away from the town. The Oorani had been well connected to the river. When the river is filled with rain water, the ponds receive water.

The town is beautified with numerous Ooranies, which occupy 10% of the total town area.

The names of Ooranies are given below:

1. Thamarai Kulam
2. Akkarai Kulam West
3. Akkarai Kulam East
4. Ramanayakkan Kulam
5. Vannan Kulam
6. Gandhi Nagar Kulam
7. R.D.O office Kulam
8. New Nambiyar Nagar Kulam
9. Vannan Kulam Nagore
10. Perumal Vadampokki Kulam

Presently, the connectivity between the Ooranies is completely broken by the encroachments. The major issues related to these Ooranies are discharge of domestic sewer, usage from bathing and washing ghats and silting.

2.1.5 Land use

Land use table of Nagapattinam Municipality has been given below. It seems that residential area agricultural area. If presently agricultural land area are now becoming for becoming residential plots.

Sl no	Land use	Exetent in hecters
1	Residential	840.05
2	Commercial	44.00
3	Industrial	57.00
4	Educational	76.00
5	Public and semi public	307.00
6	Transportation	59.86
	Total developed area	356.84
7	Wet lands	111.00
8	Dry lands	111.00
9	Water bodies	66.72
10	Vacant	9.36
	Total	1435.05

2.1.6 Urban slums

Nagapattinam Municipality has 40 Notified slums and 6 unnotified slums. Name and population details are given in the following table.

Sl.No	Ward No.	Name of the slums	Population	No. of Families
1	1	Kuyavar street	367	97
2	1	MGR Nagar	388	96
3	1	Perumal Kulam West	659	162
4	2	Alavukaran Thotam	1330	301
5	2	Vannan Kulam Vada Karai	628	147

6	3	Rettakamala Street	210	51
7	4	Mela Pattinacherry 1	454	107
8	4	Pandagasalai Street	503	120
9	5	Pattinacherry 2	482	122
10	9	Kadar Maideen Thotam	342	85
11	10	Ambedkar Nagar South	1033	230
12	10	Sambathottam	1957	473
13	11	Samanthan Pettai	1866	430
14	10	North Palapanaicherry	1333	343
15	11	South Palapannai Chery	1534	396
16	11	Mahalakshmi Nagar	1340	363
17	12	Severiyar Kovil Street	2087	562
18	13	Sebasthiyar kovil Street	984	269
19	14	Nambiyar Nagar - 1	1426	362
20	14	Nambiyar Nagar - 11	563	120
21	14	Nambiyar Nagar - 111	497	121
22	16	Thiyagarajapuram	1071	288
23	17	Nagathopu	918	238
24	17	Vandipettai	1019	259
25	18	Nalliyar ThottamSouth	357	107
26	18	Nalliyar Thottam North	379	107
27	18	Cooks Road	365	112
28	19	Dharma kovil St	1253	327
29	20	Nadukkan Theertha Vinayagar St	110	29
30	20	Maruthuvar St	276	75
31	20	Sivan South St	672	179
32	21	Thamaraikulam St	959	233

33	21	VOC street	909	240
34	23	Semmaraikadai St	741	170
35	24	Arriya Nattu St-1	324	83
36	24	Arriya Nattu St-11	290	80
37	28	Sunnambu Kalvai st	727	189
38	28	Marunthu Kothalam St	1006	254
39	28	Kattu Nayakkan St	633	154
40	29	Akkarai Kulam Keel Karai	1309	353
41	29	Akkaraikulam Vadakarai	1390	421
42	30	Attaikulam	648	152
43	34	Old St 1-4 Lane	976	260
44	35	Tata Nagar	2909	729
45	35	Seva Bharathi	2254	565
46	35	Kottai metu street	1357	348
47	36	Keerakollai Street	1057	279
		Grand Total	43892	11188

2.1.7 Institutional setup

Elected wing Administration wing

Chairman

Municipal Commissioner

Vice Chairman	Engineering department	Revenue Department	General Department	Public health department	Town planning department
36 ward Councilors	Municipal Engineer 1/1	Revenue Inspector 2/2	Manager 1/1	Municipal Health officer 1/1	Town planning officer 0/1
	Assistant Engineer 1/1	Revenue assistant 4/5	Noon meal Assistant 1/1	Sanitary Inspector 4/4	Town planning inspector 1/1
	Work inspector 0/1		Assistant 1/1	Sanitary Supervisor 13/14	
	Electrician 3/3		Junior Assistant 6/6	Field assistant	
	Fitter 1/1		Typists 1/1	Maternity assistant 1/1	
	Wireman 2/2		Record Clerk 0/1	Driver 7/7	
	Wireman Helper 2/2		Community Organizer 0/1	Maternity Ayah 0/1	
	Driver 1/1		Office Assistant 2/4		
	Turn Cock 1/2		Jeep Driver 1/1		
	Fountain Cleaner 1/1		Night watchman 1/1		
	OHT Watchman 3/3				
	Tank Watchman 0/2				
	OHT Helper 5/7				
	Park Watchman 0/3				

3. Access to water supply

3.1 Baseline information

3.1.1 Water sources

The water supply scheme was implemented in 1926 to a designed population of 102813 to a tank capacity of 65,000 liters at Vettar River source and Kollidam source.

In the year 1989, one additional scheme was implemented with a reservoir capacity of 1.00 lakh liters at L.N.Puram with a source from 10” dia bore well at 1200 feet depth for the L.N.Puram areas.

Due to scarcity of water, third additional scheme was implemented in the year 1991 with an additional reservoir capacity of 5.00 lakh liters source from 10” dia deep bore well to a depth 1200 feet in Arugankulam. The existing water supply improvement scheme was implemented in year 1997-98 at a total cost of 37.00 lakhs of which 30.00lakhs from MUDF scheme and 7.00 lakhs from Basic amenities scheme at N.G.G.O colony with a capacity of 4.00 lakh liters reservoir with a source from 10” dia deep bore well to a depth of 1200 feet, and it serves N.G.G.O colony and Kalappakadu areas. In addition, in the year 1998-99 an additional source was created by providing 10” deep bore well of 1200 feet depth at Gopalamuthiram to a total cost of 7.00 lakhs and it serves Gopalamuthiram, Manivillan and Mandikulam areas.

Through the Cauvery combined water supply system, the municipality receives 70 lakh liters every day own source water supply 20 lakhs lit. The water supply with a total capacity of 90 lakh liters from reservoir in 8 Nos of various capacities has a service level of 86 LPCd.

S.No	Ward No.	Location of the source	Capacity of pump	Capacity in Mld
1		Odacherry	50 HP	1.50 MLD
2		Kurumanakudi	50 HP	0.50 MLD
3		Cauvery Combined Water Supply Scheme	–	6.50 MLD
		Total		8.50 MLD

3.1.2 Storage

There are 2 sumps directly pumped into Over Head Tanks. The entire over Head tanks are located at the town itself. Capacity of OHTs and location is given the table 3-2.

SI NO.	Ward No	Name of OHT location	Capacity of OHT	Gps Location of OHT
1	17	Velipalayam	9.50 lakh litres	
2	24	Soloman Park	20 lakh litres	
3	4	Vandipettai	9 Lakh liters	
4	11	Palpannaicherry	4.50 lakh liltres	
5	17	Velipalayam new	6.00 lakh liters	
6	35	TATA Nagar	2.5 lakh litres	
7	29	Akkaraikulam	3 lakh liters	
8	36	Kerraikollai street	2 lakh liters	
9	12	Sawriyar koil street	2.5 lakh liters	
10	11	Sampanthanpettai	3 lakh liters	
11	14	Nambiyar Nagar	3 lakh liters	
			65.00 lakh litres	

3.1.3 Distribution

3.1.3.1 Pipe line details

There is good connectivity between source sump and OHT to households. CI, PSC and AC pipes are used on need based. Table 3-3 shows the pipe line details.

SI No.	Particulars	Size of the pipes	Lenth of the pipes
1	From bore well source to sump/OHT	300mm dia AC 400mm dia CI	18.00 KM
2	Distribution Main	250 mm, 200 mm & 160, 110 and 90 dia PVC and AC pipes	115 KM

3.1.3.2 Coverage

The whole municipality is covered by 11 OHT

The capacity of OHT is insufficient to cover the area at one time Now 2 New OHT was sanctioned the construction work will be complete by the year 2015. Hence, through the valve, two or three areas have been divided. Each area gets water at different time.

SI No.	Ward No.	Name of OHT location	Capacity of OHT	Coverage Area
1	17	Velipalayam	9.50 lakh litres	Ward No. 12,13,15,16,17, 18,19,20, 21 & 22
2	24	Soloman Park	20 lakh litres	Ward No. 23,24,25,26,27,28,29,30,31,32, 33,34,35 & 36
3	4	Vandipettai	9 Lakh liters	Ward No. 1,2,3,4,6,7 & 8
4	11	Palpannaicherry	4.50 lakh liltres	Ward No.7,8,9,10 & 11
5	17	Velipalayam new	6.00 lakh liters	Ward No. 12,13 & 14
6	35	TATA Nagar	2.5 lakh litres	Ward No.35
7	29	Akkaraikulam	3 lakh liters	Ward No.29
8	36	Kerraikollai street	2 lakh liters	Ward No.36
9	12	Sawriyar koil street	2.5 lakh liters	Ward No.14
10	11	Sampanthanpettai	3 lakh liters	Ward No.11
11	14	Nambiyar Nagar	3 lakh liters	Ward No.14
			65 lakh litres	

3.1.3.3 Usages by community

The municipality distributes water from OHT for households and commercial centre _____ use holds have own individual tap connections, and there are 39 govt. building connections. There are 660 public fountains for those who do not have the individual tap connection, ;and in addition, municipality has provide 513 hand pumps and _____ Table shows the ward level distribution of above mentioned infrastructure during the survey it was found that some of these infrastructure were in unused condition and it is also mentioned in the table.

Ward no	Families	Individual Tap connection	Water source		
			Public Tap	Hand Pump	Mini tank
1	637	243	34	19	
2	815	254	31	16	
3	478	257	18	18	
4	431	89	27	11	
5	239	5	18	13	
6	570	131	15	15	
7	780	197	17	17	
8	417	113	19	19	
9	587	202	21	12	
10	1087	86	13	13	
11	1687	319	23	13	
12	1455	587	19	19	
13	929	212	16	16	
14	631	49	17	17	
15	707	424	26	17	
16	884	378	18	18	
17	884	278	19	19	

18	674	268	24	15	
19	595	154	14	14	
20	827	342	13	13	
21	506	116	19	14	
22	508	225	18	15	
23	562	281	19	13	
24	152	36	21	13	
25	464	270	10	10	
26	492	250	11	11	
27	541	319	14	14	
28	700	177	19	13	
29	684	183	11	11	
30	501	243	17	10	
31	344	255	13	13	
32	353	266	9	9	
33	560	312	10	10	
34	470	240	11	11	
35	1618	141	24	14	
36	700	248	32	18	
Total	24469	8,150	660	513	0

3.1.4 Usage of water by the community

3.1.4.1 Drinking purpose

Out of the total number of 24469 households, 8,150 households have access to individual tap water, 15766 households depend on Municipal public tap water and Municipal Hand pump.

3.1.4.2 Domestic purpose

For domestic purposes like washing, bathing etc. 5,437 households use water from individual tap, 3,510 households use individual bore well water, 1,230 households use municipal public tap water and 163 households use municipal bore well water.

3.1.4.2 Ward level assessment

3.1.4.3.1 Drinking purpose

3.1.4.3.2 Domestic purpose

3.1.5 Timings

The Municipality supplies water one hour every day

3.1.6 Tariff

Nagapattinam Municipality follows flat rate system. The deposit charges are fixed for households, small shops, hotels and marriage halls. Road cutting charges will be based on the type and length of roads. Materials are to be purchased by the owners.

Deposit for New connection		Water Charges	
		Tap Rate	Metered
Domestic	5000.00	Rs. 100/ month	-
Commercial	10000.00	Rs. 150/ month	-
Industrial	10,000.00	Rs. 150/ month	-

3.1.7 Treatment and Quality of water

In two places, the bore well water is little brown colour. The aeration is done for removing the colour and then it is pumped into OHT from the sump. Chlorination is done in all OHT.

3.1.8 Non revenue water

In Nagapattinam Municipality, 1,968 households completely depend on the Municipal public tap. Municipality has provided 150 public taps, 14 mini power pumps and 75 hand pumps for the public. As per the Government norms, only 20% of water is to be used for non revenue purpose, in Nagapattinam Municipality 18% of water is used for non revenue purpose.

3.2 Demand supply Gap analysis

3.2.1 Supply

At present, the municipality supplies 90 Ipcd of water, a total of 3,815 MLD for the community and floating population.

In context of development of life style, the water requirement will be 135 Ipcd. Municipality supplies 90 Ipcd. The community uses the bore well for additional water requirement. Through baseline survey, the average usage of the bore well water is 0.3MLD/DAY

3.2.2 Demand Gap Analysis

2011

	Total Population	Target Population	Demand (90 Ipcd)	Supply	Gap
Residents	102813	102813	8.60 MLD	8.00 MLD	-
Visitors (45 Ipcd)	10,500	10,500	0.40 MLD	-	-
Total	113313	113313	9.00MLD	8.00MLD	-

2041

	Total Population	Target Population	Demand(135 Ipcd)	Supply	Gap
Residents	133656	133656	10.5MLD	8.50MLD	-
Visitores (45ipcd)	25,000	25,000	1.00MLD	-	-
Total	158656	158656	11.50MLD	8.80MLD	-

	No of households	Demand	Supply (own individual Tap/borewell)	Gap(do not have individual tap Or borewell)
Current-2011	24469	8150	8,502	1,838
Future-2041 increase	29362			

Projected household is calculated at the rate of 16% per decade

Based on the following criteria the critical zones were identified

- On sanitation situation survey and ward level meeting, the community registered their issues
- Ratio between the public tap and beneficiaries

Zone	Name of the area	Ward No	Remarks
Zone-1	Ezhil Nagar, Pattukottai Road	3	Water timings and period are irregular.
Zone-2	NGGO colony, Rajaji Nagar, Silon colony	5	Water shortage due to low pressure and irregular timing
Zone-3	Vadakku Veethi	23	Shortage of public tap and shortage of water
Zone-4	Ghandhi Nagar	11	Water timings are irregular, shortage of water & public tap
Zone-5	Avuliya nagar	14	Shortage of public tap and shortage of water
Zone-6	Gopalamudhiram	15	Shortage of public tap and shortage of water

3.4 Institutional Assessment

Nagapattinam Municipality has shortage of man power for operation and management of water supply No specific staff has been appointed for operation of water supply. The sanitary workers are trained and allotted for this work.

Category	As Per Norms Persons Required	Existing Persons Available	Additional Persons Required	Remarks
Municipal Engineer	1	1	0	Share the responsibility of Water Supply System
Assistant Engineer / Junior Engineer	1	0	1	
Electrician Grade II	3	3	0	
Fitter	0	0	0	
Turn cock / Tap Cleaner / Wireman	20	20	0	
Watchman (OHT)	12	12	0	
Total	28	27	1	

3.5 Service level Benchmark

Component	As per norms	Present situation	Proposed (year 2041)
Coverage of water Supply connection (population)	100%	39%	100%
Per capita availability of water supply at consumer end	90lpcd	86lpcd	135lpcd
Extent of non revenue water connection	100%	0%	100%
Extent of non revenue water	20%	12%	20%
Continuity of water supply	24×7	Two hours	24×7
Quality of water supply	100%	100%	100%
Cost recovery			
Cost recovery in water supply services	100%	26%	100%
Efficiency in collection of water supply charges	100%	71%	100%
Customer services			
Efficiency in redressal of customer complaints	80%	79%	100%

3.6 SWOT Analysis

Strength	Weakness
<ul style="list-style-type: none"> • Availability of 99% pipe line laid for water supply. • Sufficient storage capacity (OHT) 	<ul style="list-style-type: none"> • Not all families have water connection or own bore well. • No metered connection. • No data on water quality • Lack of staff for water supply and pump operation. • Lack of awareness in community on proper usage and prevention of wastage of water • Lack of awareness on water usage and preservation among municipality staff
opportunity	
<ul style="list-style-type: none"> • All the streets have water mains Easy to give water connection. 	<ul style="list-style-type: none"> • Ground water contamination due to discharge of untreated sewage water by the community • Contamination of water source. • Breakage of public taps and hand Pumps • Water wastage • More Maintenance and personnel will be involved to operate the check valves

3.7 Key issues

Sanitation situation of Nagapattinam Municipality was presented to CSTF members council members and stress wards. Key issues were discussed and prioritized in the meeting as shown below.

3.7.1 Technical Issues

- Currently 1,968 households do not have individual water connection or own bore well.
- In the projected 2041, additional 2,837 households may not have water connection or own borewell.
- By 2041, an additional 5.525 MLD water would be required.
- Groundwater pollution due to septic tanks and soak pits.
- More number of public taps (Non revenue water supply)
- Some hand pumps are not working properly.
- Monitoring and evaluation is inadequate, and complaints related to water supply are not addressed sufficiently.
- Water meter system is not regularized.
- Inadequate personnel for O and M.

3.7.2 Social Issue

- Lack of ownership and commitment resulting in wastage of water in the community. In most places, the control mechanism of tap is removed and water is fetched directly. It causes loss of water.
- Lack of proper motivation and incentives among municipal operator leading to inadequate operation and maintenance.

3.7.3 Institutional issues

- Lack of man power for operation and maintenance of water supply
- Revenue loss to the municipality due to too many public taps, hand pumps and mini tank.
- Expenses for operation & maintenance is high

3.8 Vision for water supply

- Community ownership and participation in the water project
- Adopting 'demand-response' approach
- provision of water that is safe and hygienic
- Adequate and proper treatment of water
- Continuous monitoring and testing of quality of water
- 100% connectivity of Municipal water pipelines
- 100% households are provided with individual municipal water connection and 24x7 water supply
- 100% affordability to the services
- 100% efficiency-planning, design
- 100% efficiency – planning, design (simple technology & less capital intensive), monitoring and evaluation for desired services
- Efficient cost recovery systems.
- Adequate man power for operation and maintenance

3.9 Key recommendations

3.9.1 Policy level changes

- The Municipality , however, maintains that it cannot give tap connections unapproved slum areas and for those living in the railway land.
- Water is a basic need for life. The Municipality can taken steps to get special permission from the government for the slum dwellers in unapproved layouts since they already have ration card and electricity connection to their houses. The Municipality can represent the matter to the MAWS Secretary and take necessary follow up action through the proper channel to get the permission for provision of individual tap connection for them.

3.9.2 Monitoring and evolution

- An efficient and transparent grievance redressed mechanism needs to be established in the Municipality. The current method of attending to complaints should be documented and based on the experience. A structure and format for grievance redressed be developed. This will help the Municipality to ensure water supply system and win the support and confidence of the community.
- The Municipality is not able to meet the full expenses for distribution of water. An efficient water supply system and immediate action to attend to the complaints will result in full cooperation from the public in maintenance of the hardware pave the way for an increases in water charges. It will help the Municipality in reducing the financial burden of water budget.
- During the ward level meetings, it was stated that in some places the pressure of water was low, The engineering department should attend to all such grievances without any delay.
- There should be regular and periodic cleaning of OHT s to ensure that the supplied is clean and hygienic.

3.9.2.1 Water meters to all consumers

At present out of total of 10,829 households in Nagapattinam Municipality, only 8,502 houses use individual water supply connections. Water is supplied on fixed flat rate of Rupees 60 / month No meter system is regularized. This results in loss to the Municipality. Meter system for water supply should be regularized throughout the town. All plans for new houses should be approved only on the condition that meter will be installed for water supply. All existing houses with water supply should be asked to install meters within a specified time. (The current water supply system does not support the meter supply system does not support the meter system. Any particle in the water affects the meter and there is no role clarity as to who will repair the meter.)

3.9.2.2 Infrastructure creation

The capacity of Treatment unit is to be increased for providing water every day. However, at the same time, it will increase the maintenance cost. Municipality can explore the possibilities to increase the water charges.

3.9.2.3 Rain water harvesting

Already the town has good rain water harvesting system through the numerous ponds. But as the wastewater is mixed with these ponds the water is polluted. When the UGD system is implemented the ponds will serve as good rain water harvesting system.

3.10 Time schedule

Time Schedule	Activities
Immediate 2013-2015	<ul style="list-style-type: none">• Policy level changes in reference to slum areas, deposit charges• Repair the broken pipe connections water taps• Stop wastage of water through proper operation and maintenance• Upgrade the capacity of personnel for operation and maintenance• Allocate funds for operation and maintenance and ensure 100 % tax and water collection.• Awareness and motivation training for operations• Awareness building among community members on proper utilization of water• Building ownership among community members through their participation in designing and decision making process of water related issues.• Periodical testing of quality of water and monitoring system

Midterm 2013-2023	<p>Ongoing motivating training for operators and Municipal staff</p> <p>Awareness building for new households on their participation in water project and proper utilization of water</p> <p>Proper redressed mechanism in place</p> <p>Efficient operation and maintenance system</p>
Long term 2013-2041	<p>0% reduction in wastage of water</p> <p>Plan t meet the demands of 5.35MLD water supply by 2041</p> <p>Efficient and sustainable operation and maintenance system</p> <p>Adequate funds for maintenance of water sypply</p>

4. Access to toilet

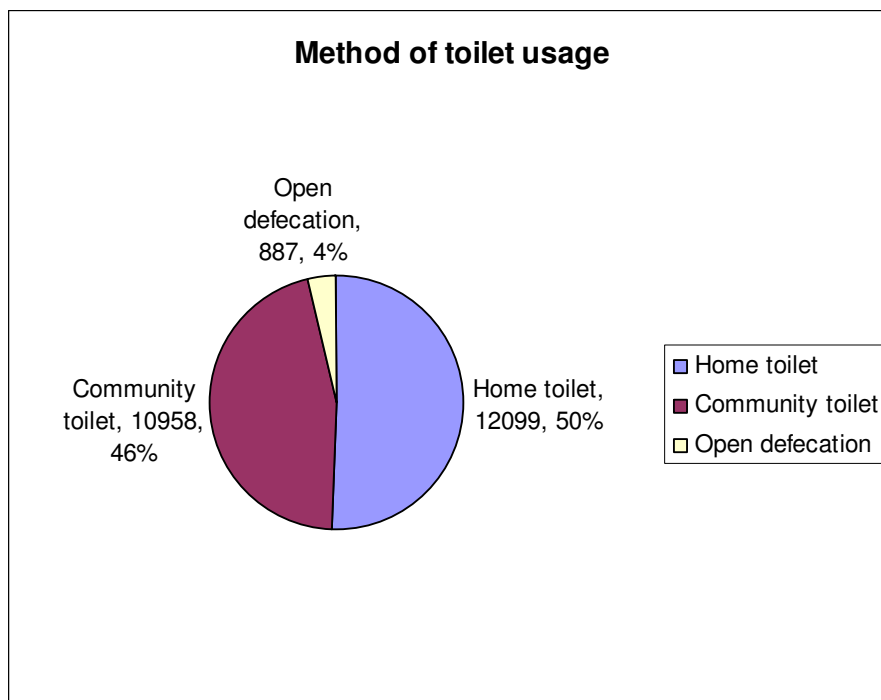
4.1 Present Situation

4.1.1 Household toilet

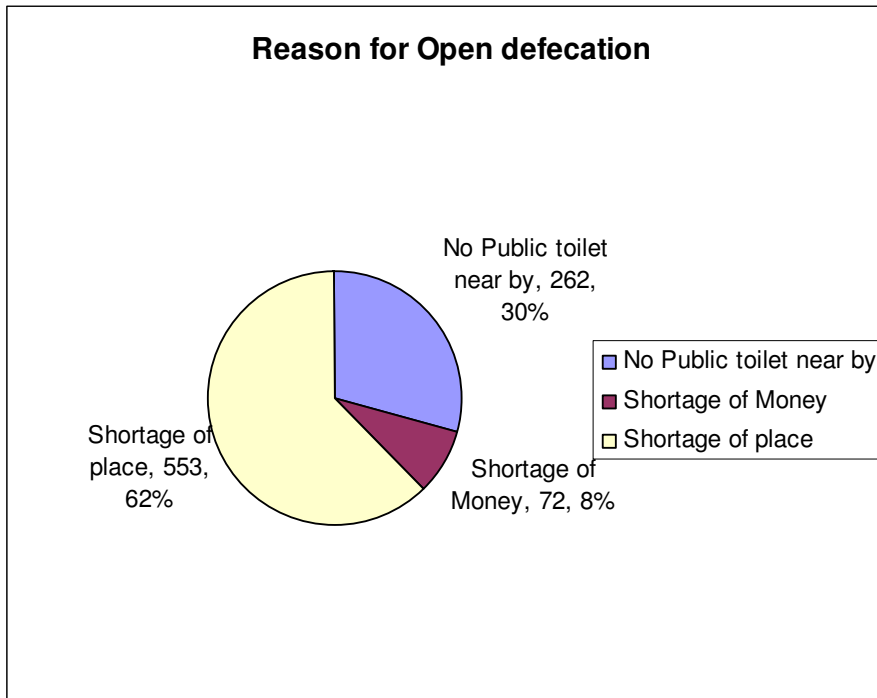
The coverage of individual toilet is 52% in Nagapattinam Municipality. The majority of the community uses individual toilet. However, 40% of the population in the Municipality are slum dwellers and most of them do not have an individual toilet.

Of total 23884 households, 12039 households have individual toilets.

Community toilets are used by 10958 households and open defecation is practiced by 887 households.



4.1.1.1. Reasons for open defecation



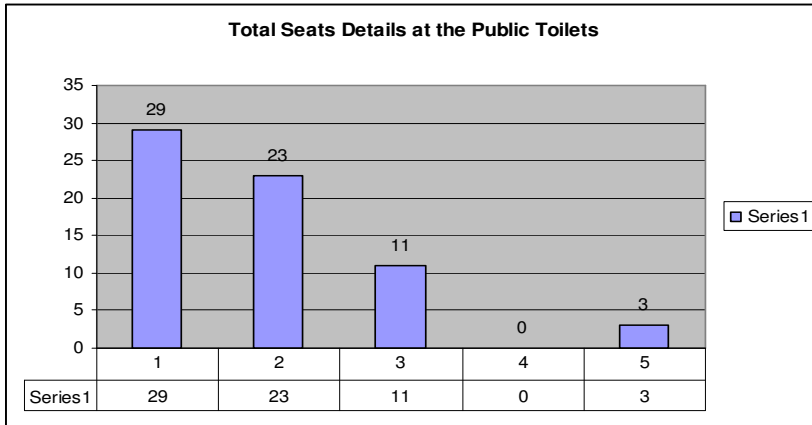
4.1.1.2 Household toilet usage at ward level

Community Toilet:-

Total Toilet	-	31
Total Seats	-	124

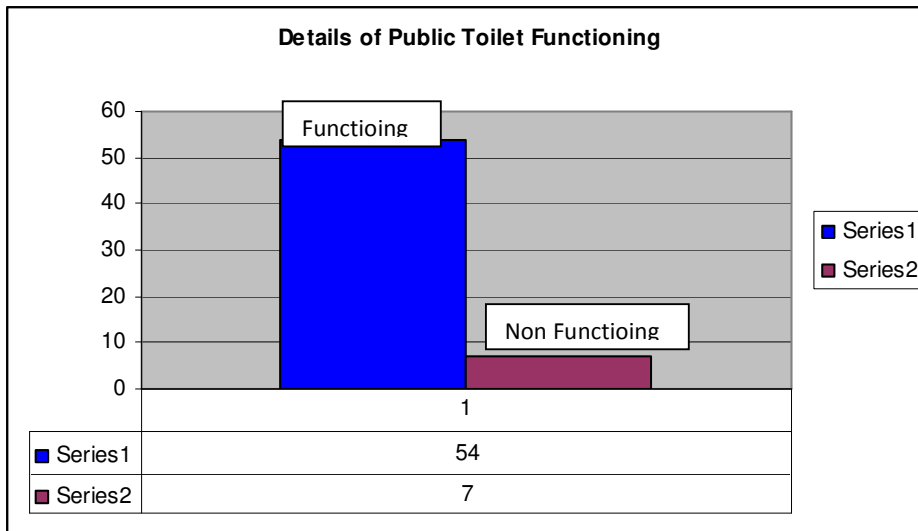
4.1.2 Public toilet

Total Public toilet	-	9
Total seats	-	52
Toilet seat for male	-	29
Toilet seat for female	-	23
Bathroom	-	11
Urinals	-	0
Toilet seat for children	-	3



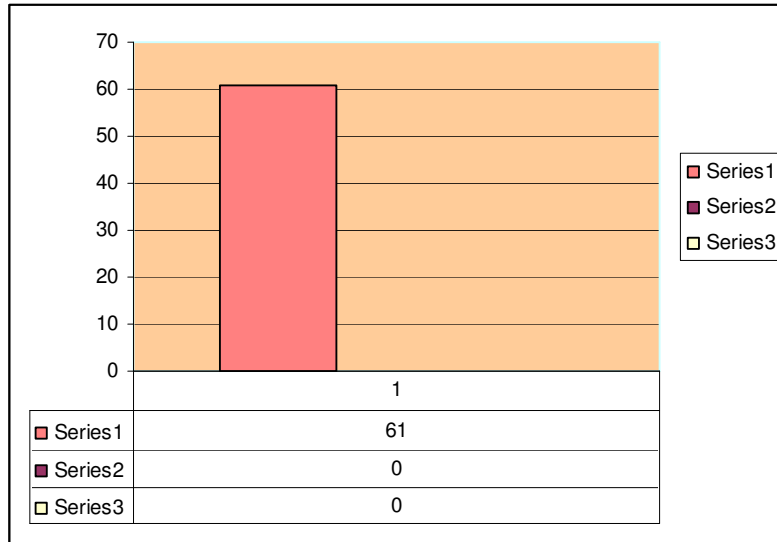
4.1.2.1 Usage for the Public toilet

Out of 9 public toilets 52 toilets are for the community (of which 7 toilets are not functioning) and 4 toilets are for the floating population



4.1.2.2 Operation & Maintenance

Municipality – 61, Private – 0 and Self Help Group - 0



4.1.2.3 Pay & use

Pay & use system is practiced in public toilets, which are maintained by private and self help group.

4.1.2.4 Ward level analysis

4.1.2.5 Disposal of Wastewater

The entire public toilet is connected to septic tank. Septic tanks are desludged as and when they are filled.

4.2 Situation in Slums

Ward No.	Name of the slums	Population	No. of Families	Individual Toilet	Community Toilet	Open Defecation
1	Kuyavar street	367	97	39	58	0
1	MGR Nagar	388	96	47	7	42
1	Perumal Kulam West	659	162	100	62	0
2	Alavukaran Thotam	1330	301	170	131	0
2	Vannan Kulam Vada Karai	628	147	58	62	27
3	Rettakamala Street	210	51	14	37	0
4	Mela Pattinacherry 1	454	107	28	79	0
4	Pandagasalai Street	503	120	105	15	0

5	Pattinacherry 2	482	122	10	47	65
9	Kadar Maideen Thotam	342	85	0	85	0
10	Ambedkar Nagar South	1033	230	226	4	0
10	Sambathottam	1957	473	85	388	0
11	Samanthan Pettai	1866	430	28	300	102
10	North Palapanaicherry	1333	343	229	114	0
11	South Palapannai Chery	1534	396	165	231	0
11	Mahalakshmi Nagar	1340	363	198	165	0
12	Severiyar Kovil Street	2087	562	253	309	0
13	Sebasthiyar kovil Street	984	269	177	92	0
14	Nambiyar Nagar - 1	1426	362	131	138	93
14	Nambiyar Nagar - 11	563	120	2	54	64
14	Nambiyar Nagar - 111	497	121	1	77	43
16	Thiyagarajapuram	1071	288	102	131	55
17	Nagathopu	918	238	75	96	67
17	Vandipettai	1019	259	89	170	0
18	Nalliyar Thottam South	357	107	47	7	53
18	Nalliyar Thottam North	379	107	35	72	0
18	Cooks Road	365	112	97	5	10
19	Dharma kovil St	1253	327	78	249	0
20	Nadukkan Theertha Vinayagar St	110	29	14	15	0
20	Maruthuvar St	276	75	53	22	0
20	Sivan South St	672	179	109	70	0
21	Thamaraikulam St	959	233	30	203	0
21	VOC street	909	240	130	110	0

23	Semmaraikadai St	741	170	143	27	0
24	Arriya Nattu St-1	324	83	48	35	0
24	Arriya Nattu St-11	290	80	54	26	0
28	Sunnambu Kalvai st	727	189	84	105	0
28	Marunthu Kothalam St	1006	254	149	105	0
28	Kattu Nayakkan St	633	154	56	98	0
29	Akkarai Kulam Keel Karai	1309	353	160	131	62
29	Akkaraikulam Vadakarai	1390	421	186	149	86
30	Attaikulam	648	152	98	54	0
34	Old St 1-4 Lane	976	260	169	91	0
35	Tata Nagar	2909	729	677	52	0
35	Seva Bharathi	2254	565	238	327	0
35	Kottai metu street	1357	348	204	96	48
36	Keerakollai Street	1057	279	148	61	70
	Grand Total	43892	11188	5339	4962	887

4.2 Demand supply gap Analysis

4.2.1 Household toilet

Demand – individual toilet for 23,884 families

Supply – 12,039 families use the individual toilet

Gap – 11,845 families do not have individual toilet (10,958 households use Community toilet)

4.2.2 Toilet

4.4.2.1 Community Toilet

The family size in Nagapattinam is 4.3 people. For 11,845 families (3,715 members), 31 toilet are available (1 seat for 35 person). 124 (32 toilet seats have been closed) toilet seats have been constructed. Hence there is no gap of toilet seats. But due to some technical and

social problems 32 seats are not in use. If they are repaired, then there would be no gap, and the community could benefit.

4.4.3 Public Toilet

Average floating population is 5141/- day. Toilet available for this floating population is 9 toilets (1 seat for 100 people). Which contain 52 toilet seats.

4.4.4 Operation & Maintenance

There is no regular deputed staff. Whenever necessary a staff is deputed for cleaning. There is a lack of maintenance system except in those places maintained by the private and SHG. The major gap in the O&M is where toilets are maintained by the municipality.

4.4.5 School sanitation

Analysis of the school sanitation is very important. Based on this benchmark, demand supply gap has been analyzed.

Girls' toilet squatting pan	1:40	For day school without residential facility
Girs' urinal	1:20	
Girls' toilet for children with special needs (CWSN)	1 in a girl toilet block	In case only 1 girls' toilet is needed in a toilet block school, this single toilet must be designed for CWSN. In case more toilets are needed, the others need not cater to CWSN.
Boys' toilet squatting pan	1:80	For day school without residential facility
Boy's toilet for children with special needs (CWSN)	1 in a boys toilet block	

Boys' urinal	1:20	
Hand wash	1:20, minimum 2	
Soap tray with soap	1 with every two wash taps	
Wash water storage tank	Minimum 500 liters for a school of up to 100 children	Subsequent calculation @5 liters per child.

4.5 Demands for O&M

Table 4.5 – Demand supply gap for staff in O&M activities of public toilet

No.of Public Toilets	Maintenance of public toilet			Demand of care taker for Municipality maintenance toilets	Supply of care taker for maintenance	Gap
	Municipality	Private	SHG			
14	10	2	2	2	0	2

4.7 Service level Benchmark

Table 4.7 – Service level benchmark for Access to toilet

Component	Norms, Assumption	Specification,	Present Situation
Household sanitation			
Coverage	100%		85%
Toilet connected to sewer line/septic tank	1 per toilet		68% connected to septic tank/soak pit
Community Sanitation			
Accessibilit	24x7		24x7
Toilet seats, if used round the clock	1 seat for 35 users		1 seat for 35 person
Urinals units	1 seat for 200-300 users		Not available
Public sanitation			
Toilets for floating population	1 seat for 100 users		210 users per seat

4.8 Analysis

Table – for access to toilet

Strength	Weakness
85% of the community have individual toilet	<ul style="list-style-type: none"> • Lack of operation and maintenance for public sanitation • Less toilets in area of high percentage of floating population • Inadequate seat capacity in public toilets • Open defecation • Lack of awareness among communities on health and hygiene practices, and proper utilization of sanitation facilities • Lack of participation and ownership among communities in O&M of Public toilet • Non adaptation of appropriate toilet and septic tank design • Lack of awareness among communities on usage of toilets.
Opportunity	
New government schemes for construction of public toilets	<ul style="list-style-type: none"> • Deterioration of public toilet infrastructures • Non acceptance by the community for payment of user fee. • Environmental pollution and water contamination due to unhygienic practice of open defecation • Serious health and hygiene issues

4.9 Key issues

- Due to absence of regular cleaning, the closets are blocked and doors are damaged resulting in low utilization of available toilets
- Lack of awareness on sanitation practices
- Less utilization of available infrastructure.

- Practice of open defecation is still prevalent
- Faulty construction of septic tank toilets

4.10 Vision for access to toilet

- 100% open defecation free Nagapattinam
- 100% access to sanitation
- 100% access to individual toilets for residents
- 100% access to clean and adequate public sanitation for floating population
- Affordability of construction of individual household toilets
- Affordability of use of public sanitation infrastructure for floating population and low income households
- Proper O&M systems in place to ensure clean and hygiene conditions
- 100% compliant – All pertinent rules and regulations
- Good Public Health and Environmental Outcomes

4.11 Key recommendation

4.11.1 Promoting Individual Toilet

- For construction of individual household toilets, the families should be motivated by SHGs, NGOs and municipal staff, and it should be linked to the funds provided under the ODF schemes. Revolving fund of NGOs also could be used for funding toilet construction.
- For families not having adequate land, community toilets or cluster toilets could be constructed.

4.11.2 Strengthening and streamlining of maintenance of Toilets

- Based on the NUSI study, out of 9 public toilets and 31 Community toilets. However, lack of proper O&M mechanism is delaying the functioning of the toilets.
- Awareness meeting has to be conducted in areas where toilets remain closed. SHG which is close to community toilet could be requested to take over the O&M. Recently; the Municipality came out with the strategy paper for handing over the public infrastructure to local O&M committees. Municipality should initially support the O & M committees for paying the electricity bill, wages for cleaners, and purchase of cleaning material.

4.11.3 Awareness programmes

- Municipality with the support of NGOs and SHG should organize awareness programmes to prevent open defecation and explain the possibilities of constructing individual toilets and disposal system.

4.11.3.1 Immediate Plan (1 to 2 years)

- Rehabilitate the 8 defunct public toilet
- Repair all the public toilet infrastructure
- Eradicate open defecation by awareness building among the community members to use public toilet
- Appoint staff to clean and maintain public toilets on a regular basis
- Initiate awareness campaign on health and hygiene practices
- Encourage the Schools to maintain the toilets hygienic and clean
- Awareness programme on health and hygiene & sanitation for school children and management

4.11.3.2 Short term plan (3 to 5 years)

- Awareness programme for entire community on proper utilization of sanitation infrastructure, health and hygiene issues, responsibility towards maintenance of public toilets.
- Initiate the process of encouraging people to opt for individual toilets
- Formation of O and M committee and involvement of SHG in operation and maintenance
- Increase seat coverage in public toilet
- Ensure adequate water supply and facility for hand wash and flushing
- Ensure that septic tanks are periodically and regularly desludged
- Ensure that new individual toilets are constructed as per technical norms
- Ensure that School sanitation facilities are adequate and proper.

4.11.3.3 Medium term plan (5 to 10 years)

- Total eradication of open defecation
- Total coverage of population by individual toilet, wherever possible, and public toilet
- & M is in place, and operates efficiently
- Increased awareness in the community on sanitation issue, and improved cooperation of community members in maintenance of public toilets.

4.11.3.4 Long term plan (10 to 20 years)

- 100% free of open defecation
- Significant improvement in health and hygiene of people

- Efficient maintenance of O and M by committees or SHG
- People participate in user pay system

Proposal for Individual Toilets

In Nagapattinam Municipal limit 74 Nos of Individual Household space available for Construction of Individual to Improve the Open Defecation of Town

Estimate Amount:

No of Toilet x Rs. 20000/-

= 74 Nos of Toilets x Rs. 20000/-

= Rs. 1480000/-

Proposed construction of Individual Toilet = Rs. 14.80 Lakhs

5. Wastewater Management

5.1 Present situation

At present, Nagapattinam Municipality Construction work in process this year end commissioning will be start. Under Ground Drainage system, Open storm water drains carry the kitchen water, bathing water (grey water) and black water from septic tank outlet. Nagapattinam Municipality has only 42% of drainage. Hence, most of the households have soak pit to drain their wastewater. The constructed drainage is connected to Ooranies, which are filled with grey and black water.

5.2 Black water (outlet of toilet)

Nagapattinam Municipality, out of 24469 households, 12350 households have individual toilets with septic tanks, and 49 households discharge into municipal drain directly. House holds are slum area not having individual toilets in that place 31 community toilet are covered.

5.3 Grey water (kitchen water, Bathroom water and floor washing)

Out of 23884 households, grey water from 5,555 houses is let into open drain, and from 399 houses it is let into soak pit. 1964 houses use grey water for gardening, 2037 houses let waste water into open place and 385 houses let grey water into septic tank.

5.4 Discharge of sewage from septic tank

The sanitation 8,891 households' toilets are connected to individual septic tank. Most of these Septic tank works as soak pits. Sewage collect by municipal sludge tank lorry. Municipality collecting charge Rs. 900 per load.

5.5 Duration of the desludging

Septic tanks are being used as one of the treatment modules for black water. Regular desludging of septic tanks is required. Desludging of the septic tank every two year once removing by the municipal sludge tankers.

5.6 Initiatives of UGD System

TWAD Board made a survey for an Underground drainage system for Nagapattinam and get sanction from the government G.O(2D) No.237 dated 11/12/2007 Rs. 49.43 crore and G.O (D) No.132 dated 28.02.2011 for Rs. 79.31 crore UGD system is following

Project cost	:	Rs.79.31 crores
DPR value	:	Rs.79.31 crores
Execution	:	TWAD Board
Quantity	:	1) 9.63 MLd (Nagapattinam) 2) 2.96 MLD (Nagore)
Technology	:	ASP
No.of zones in DPR	:	7 zones
No.of pumping station	:	7 Nos
Lifting station	:	2
No.of.STP	:	2 No.

5.7 Demand supply gap analysis

At present, Municipality supplies 8.60 MLD of water, and the communities use an average of 0.3 MLD ground water for general purpose. Total water usage is 9.40 MLD/ day. As per the norms 80% of water used will be generated as wastewater.

5.7.1 Current generation of sewage

- Sewage generation by residents- 6.88 MLD
- Sewage generation by others - 0.64 MLD

- Total sewage generation - 7.52 MLD

5.7.2 Projected for 2041

- Sewage generation by residents – 102813 x 135 LPCD =
- Sewage generation by visitors - 0.59 MLD
- Total sewage generation - 7.47 MLD

5.7.3 Supply

Since there is no UGD system in the municipality, grey water is discharged to storm water drainage, which is 20.5 km long. Septic tank is used as a treatment unit. 8,891 households discharge black water into septic tank.

5.7.4 Gap

- Out of 12399 toilets, only 12350 households have the septic tanks and 49 households discharge directly into the storm drain.
- Most of households' domestic wastewater (grey water) is discharged directly into storm water drainage.
- The storm water drainage carries the wastewater and is discharged into the Ooranies (ponds) without being treated.

Critical Zones are identified based on wastewater stagnation and where toilet's outlet is directly discharge.

Critical zone for wastewater management

All Wards

5.9 Institutional Assessment

Sanitation department headed by Sanitation Officer is in - charge of drainage cleaning. At present, 13 sanitary works are engaged in cleaning the drainages.

Demand Supply gap analysis for staff cleaning the drainage

No.of wards	Length of the drainage (in km)	Demand for workers	Available worker for claning	Gap
36	62.14	35	23	-12

5.10 Service level Bench Mark

Service level benchmark in wastewater management

Component	Norms, specification / Assumption	Existing situation
Coverage	100%	70%
Collection	1 per household	0
Street collection sewer	1.50m per household	0
Branch sewers	0.75m per household	0
Trunk sewer	0.4m per household	0
Adequachy of wastewater treatment capacity	100%	0%
Quality of wastewater treatment	100%	0%
Extend of reuse and recycling of wastewater	20%	0%
Disposal into rivers / natural water bodies	80%	80%
Clearance by suction pump	100%	100%
No of septic tanks cleared per day per vehicle	3 tanks per vehicle per day	6 Septic tank
Frequency of septage clearance	Once in two years	2 Years

5.11 Analysis for

Wastewater management

Strength	
Vacant land is available for treatment plant	<ul style="list-style-type: none"> • No septage treatment • No sewage treatment plant • No underground drainage • Lack of awareness in the community about wastewater handling. • Lack of regularization in desludging of septic tanks • Lack of monitoring mechanism for sewage system • Lack of trained personnel for sewage management. • Lack of Willingness to pay deposit for UGD connection
Topography is conducive for collection and conveyance of wastewater	<ul style="list-style-type: none"> • Public health risks due to direct discharging of wastewater into river, Ooranies and open space • Contamination of drinking water • Contamination of ground water • Direct discharge of black wastewater into open storm drain – danger of waterborne diseases

5.12 Key Issues

- existence of an Underground drainage system.
- Untreated wastewater is directly discharged into storm water drainage and open fields and lakes.
- Septic Tanks are not designed properly and they work more like soak pits.
- Roadside drains carry both storm water and wastewater. This holds a risk of flooding in the rainy season.
- Open drains filled with garbage that produce odor, breed mosquitoes and flies.
- No septage treatment facility, Septage waste is directly discharged into open land & reiver
- Lack of awareness among people on maintenance of the drainage.
- Lack of wareness among people on health and hygiene issues

5.13 Vision for wastewater management

- 100% coverage of the sewerage system including collection, conveyance, treatment and disposal
- 100% connectivity to the sewerage system
- 100% affordability of the services
- 100% efficiency – planning, design (simple technology & less capital intensive), operations and maintenance, monitoring and capacity building for the workers / staff.
- 100% compliant – All pertinent rules and regulations with respect to wastewater collection, treatment and disposal
- Good public health and Environmental outcomes
- Efficient Cost Recovery Mechanism

5.14 Key Recommendation

- At present, the bulk of the wastewater and grey water are drained into the storm water drainage system. The storm water drainage system in the town is not working very efficiently because of blockage in many places. The Municipality should clear the blockage to ensure proper flow of the storm water.
- Lack of man power for cleaning the drainage regularly. Staff should be allotted for specific area. On alternate days drainage should be cleaned. Since there is a lack of motivation among the workers, motivational activities are to be planned (like orientation trainings, competitions, exposure visit etc.,)
- The drainage has to be closed to prevent accumulation of garbage and mosquito breeding. In most of the places, road side gutter is lower than the road level. This has to be raised above the road level. The gully has to be fixed at regular intervals to drain the rain water.
- Special campaign has to be planned for revamping of the existing system with permanent and casual labour. The blockage of the drains could be considerably reduced by solid waste management with segregation and collection at the source and institutional level.
- Large number of septic tanks constructed in the houses and the septic tank in houses under construction are not fully aware of the construction method of septic tank. Awareness programme for the officials and training programme for the masons for the construction of septic tank toilets must be conducted. (There is no data available on contamination of ground water)
- The rules regarding the design, construction and O&M of septic tank toilets should be enforced by the Town Planning Department.
- Plants like cana indigo, Colocasia and reeds could be planted in the path of drainage at the stretch close to the river and lakes to reduce the pollution load.

Infrastructure Creation

- Municipality adopted the UGD system to avoid the pollution of Ooranies
- Municipality can construct sludge treatment plant at existing compost yard.

5.14.1 Awareness and --*capacity building programme

- Training on sewage management system for municipality staff
- continuous awareness program for entire community on sewage management

5.15 Framework

Indicators for sewage system

indicators as per CSP	Guidelines for CSP
<ul style="list-style-type: none"> • Output Related 	<ul style="list-style-type: none"> • proposals to ensure safe collection of the total human excreta generation • proposals to ensure total black water (sewage) generated is treated and safely disposed off • proposals to ensure total grey water (sullage) generated is treated and safely disposed off • proposals to ensure 20% treated wasted water is recycled and reused for non-postable applications
<p>peocess related</p>	<ul style="list-style-type: none"> • proposals to ensure all sewerage systems in the city are working properly • proposals to ensure septage/sludge is regularly colleted , treated and safely disposed off • proposals to ensure there is a clear assignment of instuitutions responsibility • proposals to ensure competent documentation of the operation and monitoring systems

	<ul style="list-style-type: none"> proposals to ensure the formulation of prudent sanction for deviances/violations of the system both at individual/institutional level and ensure the enactment
outcome related	<ul style="list-style-type: none"> proposals to ensure the systems facilitate and sustain good public health and environmental condition

5.16 Time line for Action plan

Recommendations for the access to sanitation sector encompass 30 years but are divided in phases. A phased approach helps to prioritise the action that need to be taken in order to achieve the set goals taking institutional, financial communal restriction into account. The time line for the access to sanitation strategy is as follows.

Time line for action plan

Immediate (2013-2015)	Short term (2015-2020)	Mid term (2020to2030)	Long term (Beyond 2030)
<ul style="list-style-type: none"> clear the blockage in the drainage complete 70% of storm drainage cement the drainage lines wherever it is required Close the open drainage septage treatment insatiate construction of UGD Stop the overflow from septic tank to oprn land and lakes 	<ul style="list-style-type: none"> Construction of 6 MLD sewage Treatment plan to meet the demand for next 30 years separate drains for black and grey water prevent direct discharge of sewage into open land rivers Regular desludging of septic tanks Formalise septage Management systems 	<ul style="list-style-type: none"> UGD is completed Regular operation of treatment plant Operation and monitoring system in place Documentaion of the management system maintained Ongoing training for staff on sewage management system 	<ul style="list-style-type: none"> Effective Management of the wastewater system

<ul style="list-style-type: none"> • separate drains for storm water • Increase manpower for cleaning the drainage • Awareness building among communities on the health and hygiene • Training for staff on sewage management system • Training for officials and masons on construction of toilets and septic tanks as per norms 	<ul style="list-style-type: none"> • PPP contract with contractor for seepage management • Motivational training for staff on sewage treatment hygiene and health • Monitoring and documentation of sewage operating and maintenance 		
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6. Solid Waste Management

6.1 Existing Scenario

Nagapattinam Municipality is one among the oldest municipality in the state of Tamil Nadu. The municipality is a Selection Grade Municipality having population of 102813 as per 2011 censuses, Mid-year population is 109654. This municipality maintained 123.274 Km length of roads and 62.14 Km length of Storm Water Drain. The present area of the Municipality is 14.92 sq.km and above 14.92 sq.km divided into 36 wards having 23884 of households. This Municipality contains 40 authorized Slum areas, 40% of the population living in the slum area.

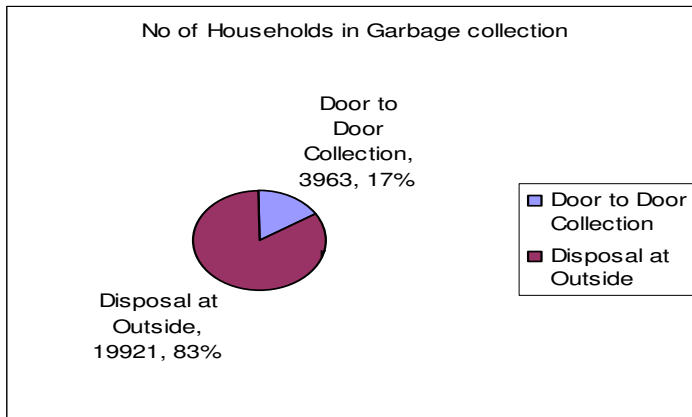
6.2 Present garbage generation

Both primary and secondary collection work is carried out by the municipal staff in the entire 36 wards and the above 36 wards divided into 4 administrative divisions under the control of Sanitary Inspectors. This municipality having Temporary Posted 1 Municipal Health Officer, 4 Sanitary Inspectors, 13 Sanitary Supervisors, 164 permanent sanitary workers and 70 outsourcing workers. Total Quantity of Garbage generated is 46 MT per day out of which 40 MT garbage has transported to compost Yard daily by using 4 No. of tipper lorry and 4 No. of dumper Placer Vehicle. This municipality is having its own compost Yard at TS 1560/1A, 1560/2A, 1560/2C1, 1560/2C3 measuring about 15.80 acres in the municipality.

6.3 Collection

6.3.1 Door to door Collection

Door to door collection has been ensured for 6 wards only. In rest of the wards, municipal bin has been kept and the community puts the garbage in the bin. In some places the community puts the garbage in the street corner. Door to door collection is done in the morning and common collection is done in the afternoon. On festivals and VIP visits, the afternoon garbage collection is sometimes not done.



6.3.3 Street sweeping

There are 76% specific workers allocated for street sweeping. The workers for door to door collection are doing the street sweeping based on needs. Three workers are allocated for bus stand cleaning.

6.3.4 Secondary Collection

Garbage from street sweeping and door to door collection is kept in a nearby Municipal bin. These bins are cleared by the vehicle, 147 bins with a capacity of 0.75 tons have been placed in the town. Segregated waste from the eight wards and the market is collected separately.

6.3.5 Transportation

0.75 ton metal dumper palcer bins for dumper lorries have been placed in 147 places. Dumper palcer lorry removes the garbage whenever the bins are filled. In Peripheral areas, the garbage is heaped in the street corner and cleared by the mini lorry manually. And, it is transported to the dump yard, which is within the town premises.

6.3.6 Treatment

Segregated waste from the model wards and the market is brought to the compost yard. Bio degradable waste is being composted by windrow method. After processing it is sewed and the compost is collected. An average of 8MT of bio degradable waste is processed every day. There is no any treasury segregation happening for recyclable. The mixed recyclable is sold to the recycler, an average of 100kg every month.

6.3.7 Disposal

Mixed waste collected from the wards in which there is no source segregation is directly dumped in the dump yard without any treatment. Municipality has 15.80 acres for garbage processing in the town. The garbage gets heaped up in this yard.

Establishment norms for sanitary workers

As per **Go.No.101.MAWS** Date. 30/4/1997 Sanitary Worker Establishment as per norms.

Sl.no	Employment categorized	Number of Members	Sanitary Workers Details
1.	250 Hosehold or 3 km roads 23,884 X 3 / 250		287
2.	Large Tipper Lorry	4 x 4	16
3.	Dumper Placer	4 x 1	4
4.	Tractor	2 x 3	6
5.	Bus stand Pay & Use Toilet (Nagapattinam, New & Old Bus stand & Nagore Bus stand)	5 x 1	5
6.	New Bus stand Free Toilet	3 x 2	6
7.	Public Toilet	11 x 1	11
8.	ISP Toilet	6 x 1	6
9.	Vambay Toilet	15 x 1	15
10.	Bus stand	3 x 2	6
11.	Angadi Toilet	2 x 1	2
12.	Sullage Water Removed Vehicle	2 x 2	4
13.	Compost Yard 20 Metric Per Day	1 x 2	2
14.	Compost Yard 20 Metric Per Day above	1 x 4	4
15.	No Road Facilities in Household 1 km	10 x 1	10
16	Total No Sanitary Workers		384

6.3.8 Man Power, assets and equipments

Table 6-1 Details of SWM infrastructure

Sl.No	Staff list	Approval	Present condition	Vacancy
1	Municipal Health Officer	1	1	0
2	Sanitary Inspector	4	4	0
3	Sanitary Supervisor	14	13	1
4	Drivers	7	7	-
5	Field Assistant	1	-	1
6	Sanitary Worker	197	164	33
7	Out sourcing Workers	200	70	130

Sl.No	Particulars	Nos
1	Staff details	
1.1	Bus stand cleaning	2
1.2	Drainage Tanker lorry	2
1.3	Composting Purpose	8
2	Equipments	
2.1	Push cart	80
2.2	Tipper Lorry (2.5 tons)	4
2.3	Tractor	2 (hire)
2.4	Dumper placer lorry	4
2.5	Dumper placer bin	147
3	Compost yard	2
3.1	Nagapattinam	14.80 acres
3.2	Nagore	1.00 acres

6.3.9 User charges

At present, no user charge is collected from establishments and households. Operation & maintenance is managed with tax revenue generated and the revenue under Government schemes.

6.3.10 Operation and Maintenance

Public Health department is responsible for operation and maintenance. The Municipality takes care of 36 wards for collection, transportation and maintenance of the vehicles.

6.5 Demand Supply gap analysis

6.5.1 Collection

Waste generation is phase 46MT / day and waste collected is 43 tons / day. Hence the gap in collection is 3 MT.

In 2040, the waste generation will be 71 MT. The gap would be 4 MT. So the system has to be established to cover the gap.

Table 6-2 Demand supply gap of solid waste collection

Year	Waste generated	Waste collected	Gap collection
2015	46 MT / Day	43 MT / day	3 MT / Day
2040	71 MT / Day	67 MT	4 MT / Day

6.5.2 Door to door collection

At present, 6 wards 4285 families are providing the garbage for door to door collection. Balance families do not provide for door to door collection. Though the coverage is ensured by the municipalities, due to lack of awareness, the garbage is dumped outside.

6.5.4. Solid Waste Disposal

6.5.4.1 Primary Collection

Primary Collection of waste is the second essential step of solid waste Management activity. Primary collection system is necessary to ensure that waste stored at source is collected regularly and it is not disposed of on the streets, Drains, Water bodies, etc.,

- a) Door to Door collection through tricycles/push carts using segregated bins.
- b) Containers placed on streets and will be collected through tipper lorries and dumper placers

At present 23884 households are in existence in this town. Push carts required for the collection of waste from door to door steps for organic waste daily ,

As per Ready Reckoner Norms:

One pushcart covers 40 houses in a trip – 4 trips/day totally covered -160 houses/day

Total No of pushcarts needed= Total No of Households/Pushcart/Day

$$= 23884/160 = 149.28 = 150 \times 50\% = 75 \text{ Nos}$$

one tricycle covers 80 houses in a trip – 3 trips/day totally covered 240 houses/day

Total No of Tri-cycles needed= Total No of Households/Tri- cycle/Day

$$= 23884/240 = 99.52 = 100 \times 50\% = 50 \text{ Nos}$$

Sl no	No of Household	Type of vehicle	Requirement	Available	No of trips per day	Covered houses	Shortfall
1	23884	Pushcarts	75	80	4	12800	Nil
2		Tricycle	50	8	3	1920	42

6.5.4.2 Secondary collection

Secondary collection of waste is being carried out through community bins, Containers placed in common collection points (Sub depot). Waste collected from the house hold will normally be stored in containers located in a common place and subsequently it will be transported to Compost yard.

As Per Ready Reckoner Norms:

The distance between two (Dumber bin or compactor bin) container should not exceed 400 meters.

In Nagapattinam municipality,

Total road length =123.274 km

No of bins needed =123274m / 400m

=308 bins (say 300 bins)

Type of bins	Requirement	Available	Shortfall
Dumper bin	200	141	59
Compactor bin	110	Nil	110

Daily collection of Garbage - 46 MT

6.5.4.3. Transportation:

Available vehicles - Tipper lorry – 4 Nos
 Dumper placer lorry – 4Nos

Daily removal of Garbage - Tipper lorry – 4 Nos x 2 trips x 2.50MT = 20.00 MT
 - Dumper placer – 4 Nos x 5 tripsx 1.00MT= 20.00 MT
 - Total = 40.00MT

Requirement of Vehicle:-

Hence, it is proposed to purchase 1 No. of 6cum capacity Compactor vehicle With 110 Nos Compactor bins for shortfall 6 mt.

Table 6-5 Demand Supply gap in Treatment & Disposal

Demand	Supply	Gap
Compost yard - 4 acres	Compost yard - 6.5 acres	Nil
Windrow concrete yard - 9,000 sq ft	2,000 sqft	7,000 sqft
Vermi compost shed - 2,000 sq ft	---	Vermi compost shed
Shed for recyclable segregation - 2,000 sq ft	---	Shed for recyclables
Stock room - 1,500 sq ft		Stock room

Stress areas are those where there are inadequate solid waste management systems resulting in open disposal of garbage.

Table 6-7 Critical zones for SWM

Zone	Name of the area	Ward no	Remarks
			Source collection to be improved Garbage disposal in outside Garbage burning by few households
	Wards 12,14 and 35		

6.9 Bench Mark Survey

Table 6-8 Bench mark survey for SWM

Component	Norms, Specification/Assumption	Existing situation
Household coverage of Solid Waste Management Services	100%	20%
Efficiency of collection of Municipal solid waste management	100%	92%
Extent of Municipal Solid Waste recovered / recycled	80%	10%
Extent of scientific disposal of Municipal solid waste	100%	30%
Extent of Processing of Treatment	100%	30%
Area with door or door collection services	100%	35%
Extent of cost recovery in SWM services	90%	10%
Extent of cost collection of SWM services	80%	
Efficiency in redressal of customer complaints	80%	No data available

Requirement of Funds for the improvement of SWM

Sl.No	Description	Quantity	Unit Rate in Rs	Total (Rs. in Lakhs)
1	TRI CYCLE WITH BINS	42 NOS	37000	15.54
2	COMPACTOR BINS	25	30000	7.50
3	COMPACTOR VEHICLE	1	2800000	28.00
4	TRACTOR WITH TIPPER and self propelled turner	1	1500000	15.00
5	FEEDING CHUTE	1	700000	7.00
6	MANUAL SEGREGATION CONVEYOR	2	1300000	26.00
7	FEEDER CONVEYOR	1	900000	9.00
8	TROMMEL	1	2600000	26.00
9	TROMMEL REJECT CONVEYOR	1	700000	7.00
10	PULVERIER FEEDING CONVEYOR	1	700000	7.00
11	ORGANIC PULVERISER	1	1500000	15.00
Sl.No	Description	Quantity	Unit Rate in Rs	Total in Lakhs
12	Vibro screen output Conveyor	2	350000	7.00
13	Baling Machine	2	200000	4.00
14	Refinement section feeder chute	1	350000	3.50

15	Vibro screen feeder conveyor	1	700000	7.00
16	Mechanical Sieving machine/ Vibro Output	1	1300000	13.00
17	Electrical Control Panel Switch Boxes	1	1500000	15.00
18	Plastic Pulverizer	1	500000	5.00
19	CC Road in Compost Yard	500.00 mtr		25.00
20	Construction of Toilet at Compost yard	2		7.00
21	Segregation shed (220 M2)	1		15.00
22	Providing RCC pavement Machinery Platform (60m x 20m)	1		15.26
23	Construction of Compound wall	1		12.70
24	Compost pad	1420M2	4750/M2	67.50
25	1/3 compost pad with roof	1300 M2	7000/M2	91.00
26	IEC Activities			15.00
	TOTAL			466.00

6.10 Analysis

Table 6-9 SWM

Strength	
Available area for composting yard	8 % of waste is not collected
Available infrastructure for secondary collection	Segregation of waste is not practiced at all household and institutional levels
The Municipality intends to set up a treatment unit in compost yard	Inadequate infrastructure for processing of waste and primary collection.
Shortage of Human resources is very minimum	Lack of awareness and commitments for source segregation
Opportunity	
Major schemes are available	Unwillingness of the community to segregate the waste
Participation of Self Help Group in collection, secondary segregation and composting	Unwillingness to pay the user charge from community
Land availability for treatment plant	Environmental degradation due to dumping of garbage in open land Depreciation of collection vehicles

6.11 Key issues

1. Lack of commitment for source segregation
2. Inadequate man power for processing the waste
3. Inadequate infrastructure for treatment
4. Garbage thrown in open field (garbage observed near drainage)
5. Lack of a mechanism whereby waste is converted into wealth
6. Fitness of the sanitary workers is low
7. Absence of the sanitary workers is considerable

6.12 Vision for Solid Waste Management

- 100% coverage of the services - segregation, collection, storage, transportation, treatment and disposal
- 100% accessibility and affordability to the services
- 100% efficiency - planning, design - less technology & capital intensive, operations, management, monitoring and capacity building for the workers / staff, compliant to desired service levels
- 100% compliant - all pertinent rules and regulations
- Promotion of 5R Principle – Recover, Refuse, Reduce, Reuse and Recycle
- Good Public Health and Environmental Outcomes
- Efficient Cost Recovery Mechanism
- Community participation, especially women SHGs, in solid waste management process

6.13 Key recommendation

Primary collection

- Municipality can allocate sanitary workers at the ratio for one person for 250 households and define clear route map for each worker.
- Push cart with 4 bins to be provided for each worker
- A whistle that signals the coming of push cart in street
- Uniforms and handgloves
- Trained and knowledgeable personnel in classification of bio and non bio degradable waste.

Secondary Collection

- Strategic location for secondary collection point has to be decided for placing the bins. One bin for two workers would be desirable.
- Two types of bins to be placed in one collection point. One bin for bio degradable and the other for non bio degradable.
- Lorry route is to be planed and systemized.

6.13.1 Immediate (2013-15)

- Mass cleaning of the entire town
- Strategies to immediately prevent dumping of waste in street, drainage and open place, and burning of garbage
- Increase the No.of push cart for collection
- Repair the damaged push carts
- Systemizing the collection route and man power allocation
- Intensive door to door awareness campaign for men, women, SHGs, school students and traders
- Plan and implement household segregation and collection
- Initiate the process for setting up a treatment unit in compost yard
- Set up operation and maintenance system / mechanism
- Get SHG women involved in waste management process
- Explore options for transforming waste into wealth as income generation programmes
- Capacity building training for sanitary workers, supervisors and sanitary Inspectors
- Make arrangements to collect the garbage from drainage separately

6.13.2 Short term (1 to 5 years)

- Achieve 100% source segregation
- Achieve 100% waste collection
- Complete sanitary landfill for scientific disposal of waste
- An additional lorry for transportation would be necessary in case of repairs for existing lorries

6.13.3 Mid term (2 to 10 years)

- Continuous awareness campaign with visuals / videos in all wards on importance and process of solid waste management
- Awareness programme on health and hygiene among community members
- Exposure visit for SHG women to other places where solid waste is managed well
- The segregation, composting and vermin composting tasks could be entrusted. The sale of compost would generate income for the municipality.
- Separate fee can be collected from business and institutions generating waste, and a separate account can be maintained from which money can be allotted for solid waste management.

6.13.4 Long term (10 to 30 years)

- Periodic closure of landfill cells and creation of new one for future need
- Stabilising solid waste management and treatment system
- Stable flow of income from compost for the municipality
- Total participation of community in segregation and keeping the area clean
- The area is 100% clean of pollution and contamination
- Improved hygiene and health in the community
- The good practices are replicated in other municipalities

8. Storm Water Management

8.1 Present situation

8.1.1. Collection, Conveyance and Disposal

Nagapattinam Municipality has constructed 62.14 km length of storm water drainage. Total length of the road is 148.594 km. Storm water drainage has to be constructed on both sides of the road. In most of the places storm water drainage is not constructed. In most the slums the drainage has been constructed. In other areas, the waste water is discharged into septic tanks and soak pits.

In Nagapattinam Municipality, 49 households discharge black water directly into storm water drainage and households discharge grey water into storm water drainage. Most of the drainage is open. Discharge of sewage is a issue for the municipality. Now UGSS is construction is under progress soon the work will be complete. Both black water and grey water will be collect treat and disposal at river.

8.1.2 The improvement schemes

Through IUDM, IUDM scheme, Nagapattinam Municipality amount received for road and storm water drainage. In that existing is damage drainages are constructed. Though the municipality constructed the drainage, the storm water stagnates in open field or in the ponds.

8.2 Institutional set up

Engineering department in Nagapattinam is responsible for planning, construction and maintenance of physical infrastructure of storm water drainage. The public health department is responsible for maintenance of the storm water drainage for cleaning solid waste and clearing the clogging of the drains. Only when there is good coordination between the two departments, the operation and maintenance of storm drainage will be ensured.

8.3 Service level benchmarks

Component	Norms, specification / Assumption	Existing situation
Coverage	100%	42%
Incidence of water logging / flooding	0	
Length of the storm water drainage	2 x length of the road, if road width is equal or greater than 5 m	62.14Km

8.5 Sectoral Vision

Nagapattinam Municipality can develop a strategy to establish sustainable, accessible and efficient Storm Water Drainage Development and Management system.

8.5.1 Goals

- 100% coverage of the services
- 100% efficiency – planning, design, operations and maintenance, monitoring and capacity building for the workers
- 100% compliant – all pertinent rules and regulations
- Good public health and environmental outcomes

8.5.2 Improvements

- Construction of Storm water drainage and collection point for recharging
- Nagapattinam Municipality to assess the existing roads' width and gaps and to construct the storm water drainage
- up gradation and repair works to be carried out,
- separate the storm water drainage from sewage line and prevent draining of sewage into storm water drainage
- measures to collect and reuse or recharge the ground water or water bodies with storm water
- Awareness creation for the community not to clog the drainage.
- capacity building training for sanitary workers on maintenance of the drainage.

9. Financial Assessment

9.1 Revenue and Expenditure

9.1.1 Revenue

Table 9-1 Revenue for the year 2008 to 2011

Particulars	Income for the years (Rupees in lakh)	
	2009-2010	2010-2011
Property tax	146.963	150.91
Other taxes	52.93	61.70
Assigned revenue	46.29	41.87
Devolution fund	498.64	725.61
Service charges fees	46.31	54.97
Sjsry	7.50	15.39
Sale hire charges	0	0
Other income	89.54	98.16
Excess of expenditure over income	57.54	-
Grand total	945.68	1133.22

9.1.2 Expenditure

Particulars	Income for the years (Rupees in lakh)	
	2009-2010	2010-2011
Personnel cost	393.81	481.98
Terminal retirement benefits	197.23	206.11
Operating expenses	56.92	45.20
Repairs maintenance	23.19	28.44
Program me expenses	0.63	3.46
Administrative expenses	83.96	108.93
Financial expenses	7.47	14.64
Depreciation	194.86	260.76
Excess of income over expendit	0	20.86
Grand total	958.07	1170.38

9.2 Water Supply

9.2.1 Income for Water Supply

Particulars	Income for the years (Rupees in lakh)	
	2009-2010	2010-2011
Property tax	61.86	63.54
Service charges fees	47.35	49.77
Other income	1.95	5.80
Grand total	111.16	119.11

9.2.2 Expenditure for Water Supply

table 9-4 expenditure for water supply

Particulars	Income for the years (Rupees in lakh)	
	2009-2010	2010-2011
Personnal cost	35.39	37.95
Terminal retirement benefits	0.13	-
Operating expenses	10.20	8.86
Repairs maintenance	109.78	96.35
Administrative expenses	12.41	-
Financial expenses	0.01	-
Depreciation	14.22	7.55
Excess of income over expenditure	-	-
Grand total	182.14	150.71

ABSTRACT

1. Proposal for Construction of Individual Toilet	= 14.80 Lakhs
2. Proposal for Solid Waste Management	= 466.00 Lakhs
Total	= 480.80 Lakhs

Approach for State Sanitation Strategy

	Components	Please elaborate the details of efforts to be made on the approach, technology, financing, action to resolve tenure issues for IHHL, Institutional Development, O&M and cost recovery etc., by the State Govt. to achieve the proposed target in about 500 words for each of the components
1	Individual Household Toilets	In Nagapattinam Municipality contains without individual Household Toilet 845 but 74 households only having space for construction of individual toilets balance households are covered by Community Toilet.
2	Community Toilets	Nagapattinam Municipality have 31 community toilets. In this 31 community toilets are covered slum areas and communal areas. Addition of 2 community toilets for proposed for the construction of communal area and slum areas.
3	Public Toilets	Nagapattinam Municipality having 9 public toilets located at the public surrounding places like Bus stand, Markets and Tourist spots etc.
4	Solid Waste Management	In Nagapattinam Municipal around coastal area so push cart was not suitable. So it is replaced by tricycle for primary collection is more suitable and narrow roads. Dumber placer segregation carry out manually so it is not successful so machinery will purchase for successful segregation waste will be converted to manure.
5	IEC and Public Awareness	Public awareness about Solid Waste Management and Open defecation in the Municipal limit.
6	Capacity Building & Training	This capacity building is contacting training program and awareness about the sanitation of the town.

Template for City Sanitation Plan under Swachh Bharat Mission

I. Existing Situation Analysis

SI.No.	Particulars			General Details	
1.	Name of the City	Nagapattinam		Statutory Town (Yes / No)	Yes
2.	District	Nagapattinam	State	Tamilnadu	
3.	General profile of the city	Total No. of wards	Area of the City (Sq.km)	No. of households 2011 census	No. of Slums/slum Households
		36	14.92	23884	46/11188
4.	Population	Year	(i) Total Population	(ii) Slum Population	(iii) Floating population (assume 5% of total population or actuals based on survey records, whichever is high)
		2001	93148	37259	4658
		2011	102813	43892	5141
		2019 (Projected)	117154	46862	5858
		2025 (Projected)	124654	49861	6233
5.	Status of Latrine availability	As per 2011 census		Projected upto 2019	Justification of the projection
5.1	No. of Urban HHs resorting to open defecation	845		845	845 House holds not having latrines as per 2011 survey. Hence 845 IHH latrines are to be constructed during the year 2015 to 2019
5.2	No. of Urban HHs having pit latrines	-		-	-
5.3	No. of Urban HHs having insanitary latrines	49		0	All insanitary latrines are now converting into sanitarylatrines

6	Solid waste management (tentative quantity based on per capita waste generation)	
6.1	Total Solid waste generated (In MT)	46.00 MT / Daily
6.2	Total waste collected (In MT)	43.00 MT / Daily
6.3	Total waste transported (In MT)	40.00 MT / Daily
6.4	Total waste treated (In MT)	8.00 MT / Daily

II. Proposed Target under SBM

1	Targets	Baseline 2011		Cumulative Projection upto 2019		Reasons/ Justification based on 2001-2011 data and other factors	Target 2015	Target 2016	Target 2017	Target 2018	Target 2019	Cumulative Target (2014-19)		
		Toilet	Seat	Toilet	Seat									
A	a	Construction of new individual household latrines (IHL)		845 Nos	74 Nos	Site available for construction of IHH Latrines in 74 Houses	-	30 Nos	44 Nos	-	-	74 Nos		
	b	Conversion of pit latrines into sanitary latrines		-	-	-	-	-	-	-	-	-		
	c	Conversion of Insanitary Latrines into sanitary latrines		49 Nos	-	Notice given to concerned house hold to convert as sanitary latrines	20 Nos	29 Nos	-	-	-	-		
B		Construction of Community toilets (NORM:1 seat/25 women and 1 seat/35 men)		Toilet 31	Seat 248	Toilet 2	Seat 16	There is no site for construction of IHH Latrines. Hence,7 locations of open defecation area 6 No. of Community Toilets to be constructed	1 No (8 seats)	1 No (8 seats)	-	-	-	2 Nos (16 Seats)
C		Construction of Public Toilets (NORM:1 seat/50 women and 1 seat/100 men upto specified numbers*)		Toilet 9	Seat 72	Toilet --	Seat --	Sufficient Public toilets are available	-	-	-	-	-	-

D	Solid waste Management	46.00 MT	51.00 MT	purchase of 42 Nos Tricycles, 1 No Compactor vehicle with bins and Segregation Machinery with shed	purchase of 42 Nos Tricycles, 1 No Compactor vehicle with bins	Segregation Machinery with shed	-	-	-	purchase of 42 Nos Tricycles, 1 No Compactor vehicle with bins and Segregation Machinery with shed
E	Capacity Building	10	10	-	2	2	2	2	2	10
F	Public awareness & IEC	10	10	-	2	2	2	2	2	10

III. Tentative Financial Requirements

(Rs. In lakhs)

2.	Funding (As per the funding pattern in the SBM Urban Guidelines)	2014-15	2015-16	2016-17	2017-18	2018-19	2014-2019 (Total)	Cost/unit as per city specific norms*
A	Construction of new individual household latrines (IHL)	0	6.00	8.80	0	0	14.80	Rs.20000/Unit
B	Conversion of unsanitary latrines into sanitary latrines	0	0	0	0	0	0	-
C	Conversion of pit latrines into sanitary latrines	0	0	0	0	0	0	-
D	Construction of Community toilets (Norm:1 seat / 25 women and 1 seat / 35 men)	0	10.00	10.00	0	0	20.00	Rs.65000/Seat
E	Construction of Public Toilets (Norm:1 seat / 50	0	0	0	0	0	0	-

	women and 1 seat / 100 men upto specified numbers*)							
F	Solid Waste Management (based on per capita cost)	0	66.04	356.96	0	0	423.00	Tricycle – Rs.40000/1No Compactor vehicle – Rs.3835000/1No Segregation Machinery with shed and Composting.
G	Capacity Building & A&OE	0	12.00	56.06	0	0	68.06	Rs.10000/Programme
H	Public Awareness & IEC	0	4.00	18.68	0	0	22.68	Rs.15500/Programme
	Total	0	98.04	450.50	0	0	548.54	

* Per capita cost for individual HH Toilets, seat for community & public toilets and solid waste management may be assumed as per State norms

Commissioner
Nagapattinam Municipality