Performance Improvement Plan for Panvel

Prepared by:
CEPT University and AIILSG in consultation with Panvel Municipal Council
2012

pas performance assessment system

Performance Improvement Plan for Panvel

Prepared by:

Centre for Environmental Planning and Technology (CEPT) University

and

All India Institute of Local Self Government (AIILSG)

in consultation with

Panvel Municipal Council (PMC), Panvel

2012

CONTENTS

List of photo plates

List of charts

List of figures

List of tables

List of Annexes

Abbreviations

AIILSG	*All India Institute of Local Self Government*
CEPT	*Centre for Environmental Planning and Technology*
CPHEEO	*Central Public Health and Environmental Engineering Organization*
ESR	*Elevated Service Reservoir*
GIS	*Geographic Information Systems*
GoI	*Government of India*
GW	*Ground water*
HH	*Households*
Hrs	*Hours*
LAI	*Local Action Indicator*
Lpcd	*Litres per capita per day*
MC	*Municipal Council*
MLD	*Million Litres per Day*
MoUD	*Ministry of Urban Development*
MSW	*Municipal Solid Waste*
NA	*Not applicable*
ND	*No data*
NP	*Nagar Panchayat*
NRW	*Non-Revenue Water*
O&M	*Operation and Maintenance*
PAS	*Performance Assessment System*
PMC	*Panvel Municipal Council*
SLB	*Service Level Benchmarking*
STP	*Sewage Treatment Plant*
SWM	*Solid Waste Management*
TPD	*Tonnes Per Day*
ULB	*Urban Local Body*
WDS	*Water Distribution Station*
WS	*Water Supply*
WTP	*Water Treatment Plant*
WW	*Waste Water*

Executive Summary

The preparation of this Performance Improvement Plan (PIP) for water supply and sanitation has been led by the Panvel Municipal Council (PMC) with support from the PAS Project through teams from All India Institute of Local Self Government (AIILSG), Mumbai and the CEPT University, Ahmedabad.

The preparation of PIP has been done in response to a request from the Government of Maharashtra. The two focus areas of 'making cities Open Defecation Free' and 'moving towards 24x7 water supply' were suggested by the Chief Secretary, Government of Maharashtra in an inception meeting, for starting the Government of India's Service Level Benchmarking (SLB) process in Maharashtra. In addition to that, the inherent theme for PIPs is improving coverage and service levels for un-served poor (slum dwellers) and improving financial sustainability. This PIP exercise uses the set of indicators given by the Govt. of India's Service Level Benchmark Initiative as a baseline to assess past performance and identify priorities.

City Profile: **Panvel** city is class-A municipal council in Raigad district in the state of Maharashtra. Panvel is also known as the gateway to the Konkan region. . It adjoins Navi Mumbai and Thane district border. Panvel is located on the Yashwantrao Chavan Expressway (Mumbai-Pune) at about 21 km from Mumbai. The Panvel Municipal Council is a corporate body for PMC area, while CIDCO is the development authority for New Panvel area.

The total population of PMC area is 111906 as per 2011 estimates with an area of 3.63 sq km. The estimated slum population in PMC is around 10% of the city's population which lives in 15 slum settlements. None of these settlements are notified.

Water supply: In PMC area, the supply, treatment, distribution, O&M, providing new connections and collection of water charges is done by PMC water department. Panvel receives 25.36 MLD water from its four surface sources. Bulk treated water is taken from Maharashtra Jeevan Pradhikaran (MJP), Maharashtra Industrial Development Corporation (MIDC) and CIDCO; while raw water is produced from its own source – Dehrang Dam. The distribution network covers 98% of PMC by area but the actual coverage of household level water supply connections is approx. 51% only. The average water supply is at 175 lpcd with good quality of water. There are no flow meters at the point of production, transmission, treatment and distribution. The meters at consumer end are installed for only 2% of the WS connections. Throughout the supply chain, the recorded NRW is ~20%. PMC needs to improve its efficiency in redressal of customer complaints and to upgrade the record keeping system. Though the efficiency of collection of water related charges is high, the cost recovery is low at 34%.

PMC is initiating steps to move towards 24x7 water supply through exploring options for augmenting sources and testing a 24x7 WS project in pilot zone selected by PMC. The water audit for leak detection and energy audit for pumps efficiency is already at a draft stage. PMC has also proposed project for reforms under MSNA. PMC is in process of undertaking Consumer End survey, GIS mapping and Hydraulic modeling, for which PMC is waiting for a technical sanction of these surveys from TS Office, MJP, Pune. PMC needs to repair major leakages in the system as recommended in water audit and repair/replace pumps and their accessories as recommended in energy audit to bring down the NRW through apparent and real losses. PMC should also increase the extent of metering at consumer end so as to impose telescopic tariffs for water usage which will eventually help to increase the cost recovery.

Sanitation: The coverage of toilets, which indicates the percent of population that has access to toilets (individual, community or pay & use), according to 2011 census for Panvel (including CIDCO) is 97.3%. The coverage of toilets as reported by PMC (excluding CIDCO) is 91% out of which 2.5% toilets are connected to sewerage network, 89% toilets have onsite sanitary disposal while 8.5% have none. The existing sewerage network was constructed in 1973. The sewage treatment plant with two oxidation ditches and four aerated lagoons were constructed but are not functional due to oppose from the villagers. Hence at present, PMC doesn't have any collection, treatment or reuse of waste water. A project under Urban Infrastructure Development Scheme for Small & Medium Towns (UIDSSMT) for underground drainage system and STP covering complete city is under construction which is almost 50% done (Status as of July 2012).

Though the coverage of toilets in PMC is high at 91%, while slum population is 10% but on ground survey by STAR NGO shows that around 30% of population doesn't have individual toilets hence they are dependent on pay-&-use and community toilets or resort to open defecation. According to 2011 Census, only 2.7% of total population resort to open defecation.

Services to slums: The coverage of individual water supply connections in the slums is zero. The slum dwellers are served only through group connections which are 397 in number. The average ratio is approx. 7-8 HHs per group connection. The coverage of individual toilets in slums is also zero. The door-to-door coverage of SWM services in slums is approx. 50%.

Municipal Finance of PMC:

The municipal finances have been reviewed for the last seven years, from 2005-06 to 2011-12. The total budgeted revenue income for PMC in 2011-12 was Rs 36.03 Crores. Past trends shows that own revenue sources of income have formed an average of 43% share in revenue income. Property tax has been the main source of tax revenue income at 64% while water benefit tax is at 28% of own tax revenue income sources. External sources of revenue income such as assigned revenues, grants and contributions contributed about 57% of the total revenue income. In revenue expenditure, General administration and other municipal

services departments (excluding WS, WW & SWM) form ~23%, while Water Supply department, Sewerage department and SWM revenue expenditure form ~57% of total revenue expenditure of Panvel.

Over the study period, Capital income has grown at a compounded annual growth rate (CAGR) of 119% while Capital Expenditure has grown at a CAGR of 45%. In capital income, other than road grants and shopping complex construction grant, in 2009-10 and 2010-11 UIDSSMT has been the major grant contribution. From the assessment of Business-as-usual scenario, it was observed that PMC does not have any investible surplus before 2013.

Summary of Performance Improvement Plan for PMC: The proposals suggested are focused on two key areas of 'establishing 24X7 water supply system' and 'moving towards an open defecation free' PMC, as well as improvements in key processes and operations related to the above areas. Based on the analysis of the water and sanitation sectors in Panvel, the Performance Improvement Plan for PMC has been summarized below.

Table 1 Summary of Performance Improvement Plan for PMC

Key actions for improvement	Costs required	Current status
Water supply: towards 24X7 system		
Planning and implementation of 24X7 for entire city	Rs. 25.07 Crores (Table 15)	Awaiting technical sanction of TS officer, MJP-Pune for Hydraulic modelling, GIS mapping, Consumer survey and installation of flow meters at ESRs
		Water audit and energy audit has been completed
		PMC is in process of tendering DPR for 24x7 water supply for the city once the technical sanction as mentioned above is done
Sanitation: towards OD free city		
Construction of group and refurbishing existing community toilets (including IEC costs)	Rs. 3.16 Crores (Table 17)	Preparation of DPR is required
Total cost of PIP	**Rs. 28.23 Crores**	

PMC also has to undertake improvement actions related to processes followed in the water supply and sanitation operations. These actions being no or low cost can be immediately taken up by the Council. These include regularizing un-authorized WS connections, revision of 'new connection' format, IEC campaigns, appointing technical staffs, levying telescopic rates for water supply once the metering is done, drainage tax, SWM user charges and improving collection efficiency of these taxes, periodic surveys at source, treatment and consumer end, implementation of Septage Management Plan and improve complaint redressal system with systematic computerized record keeping of the complaints received and redressed.

Considering the decreasing revenue surplus, PMC should undertake revenue enhancement measures like improving cost recovery of water supply department, levy solid waste management tax through property tax and revision of tariff of all municipal services on a yearly basis. After implementation of above mentioned revenue enhancement actions, significant improvement in investible surplus is observed. Eventually, PMC would be in a position to invest in required performance improvement actions from its own investible surplus and will not have to depend on external funding.

The improvements for PMC have been proposed in two phases: Phase I Immediate interventions (from 2013 - 2014), and Phase II Long term interventions (from 2015 – 2018).

Phase I: Immediate interventions (from 2013 – 2014)

The interventions related to increase in revenue, process and policy changes which will not require capital investment is proposed to begin in early stage of this phase. PMC can start with regularizing illegal connections, increasing collection efficiency of charges, introducing drainage tax, SWM user charges, etc in Phase I.

Once the revenue augmentation measures and process improvements are in place, it is proposed that PMC can begin its capital intensive projects in Phase II.

- **Water Supply:** PMC can complete the required activities like consumer surveys, GIS mapping, Hydraulic modelling, etc which are ongoing projects to move towards 24x7 water supply by 2013. In 2013-14, PMC can initiate refurbishment of water supply distribution network and creation of pilot DMAs. PMC should also install bulk flow meters and consumer end meters to all connections by 2014, so that PMC can levy telescopic rates in water supply to achieve better cost recovery from 2014 onwards.
- **Community toilets:** The common issue observed in existing community toilets was operation and maintenance of these blocks. Before starting construction of new group toilet blocks, it is recommended that the council should first refurbish the existing functional and non-functional community toilets by 2014.
- Currently the O&M of Pay & Use toilets in PMC is contracted out to private operators. The condition in Pay & Use toilets is comparatively better than those of community toilets. Hence for the O&M of the community toilets similar arrangements with CBOs can be explored. Campaigns to bring awareness related to cleanliness and hygiene practices, safe sanitation practices and the negative health impacts due to open defecation needs to be conducted by the Council. The campaigns should begin by triggering initiation in the slum settlements and undertaking transect walk to the open defecation sites to highlight the above issues.

Table 2 Phase I of PIP for PMC (2013-2014) and Phase II (2015-2018)

Proposed improvement areas	2013	2014	2015	2016	2017	2018
Water Supply						
Regularizing un-authorized connection						
Revision of 'new connection' format						
Appoint technical staffs						
Periodic surveys at source, treatment and consumer end						
Proper sampling regimen for monitoring water quality						
Conduct consumer survey for entire city						
Undertake hydraulic modeling for the entire water supply network						
Installation of bulk flow meters and meters at consumer end						
Distribution network augmentation: creation of pilot DMAs						
Levy telescopic rates for water supply						
24x7 Water supply system for the city						
Sanitation (including sewerage)						
Regular surveys through zone sanitary inspectors						
Introducing drainage tax, environmental tax in property tax, and collection efficiency of charges						
Preparation of Septage Management Plan						
Implementation of Septage Management Plan						
Refurbish existing community toilets						
Preparation of DPR for ODF						
Improve cost recovery and collection efficiency of sanitation tax						
Towards OD Free through provision of group toilets (inclu. IEC costs)						

Phase II: Long term interventions (from 2015 - 2018)

Once the above measures of Phase-I are in place, PMC can begin implementation of 24X7 for the entire city from 2015. Similarly in Sanitation, once the surveys, refurbishing existing community toilets, Preparation of Septage Management Plan and Preparation of DPR for ODF is done in Phase I, PMC can start with implementation of Septage Management Plan and construction of new group toilets.

Group Toilets: As individual toilets option is not feasible due to space constraints in slums and chawls of PMC hence group toilets option is suggested along with community toilets. It is also important to undertake detailed on ground survey of slums and chawls to carve out spaces for group toilets. This survey will help in planning and designing required number of seats (4/6/8/10/12) as per the area available.

As discussed earlier, PMC can generate substantial amount of surplus after taking steps for potential increase in revenue. Table 3 provides the details of sources of revenue to fund 24x7 water supply and ODF city.

Table 3 Sources of revenue to fund 24X7 water supply and ODF in PMC (in Rs. Crores)

Performance Improvement Actions	2015	2016	2017	2018
Implementation of 24X7 system for PMC	6.26	6.26	6.26	6.26
Open Defecation Free City	1.58	1.58		
Investible surplus after increasing the revenue	11.23	10.71	10.12	9.44
External funds required	No external funding required			
Reference from Table 19 and Table 21				

Some of the additional measures PMC need to undertake includes augmentation of staff at PMC, mobilization of external support through Project Management Consultants (PMC), NGOs and CBOs, setting up of PIP taskforce and performance monitoring through regular target setting.

1. INTRODUCTION

The preparation of this Performance Improvement Plan (PIP) for water supply and sanitation has been led by the Panvel Municipal Council (PMC) with support from the PAS Project through teams from All India Institute of Local Self Government (AIILSG), Mumbai and the CEPT University, Ahmedabad.

The preparation of PIP has been done in response to a request from the Government of Maharashtra. The two focus areas of **'making cities Open Defecation Free'** and **'moving towards 24x7 water supply'** were suggested by the Chief Secretary, Government of Maharashtra in an inception meeting, for starting the Government of India's Service Level Benchmarking (SLB)(MoUD, 2010) process in Maharashtra. In addition to that the inherent themes for PIPs are improving coverage and service levels for un-served poor (slum dwellers) and improving financial sustainability. This PIP exercise uses the set of indicators given by the Govt. of India's Service Level Benchmark initiative as a baseline to assess past performance and identify priorities. During the preparation of PIPs several dialogues, periodic consultations and meetings with Panvel Chief Officer and officials from respective departments were held.

Preparation of the PIP has been done in following stages:

Initial Performance Assessment: Based on the data from the PMC, an initial assessment of all SLB indicators for the past three years was done. As a part of the preparatory work, a preliminary profile of PMC using SLB indicators was prepared. The PMC teams were assisted to generate a city profile based on comparative performance assessment of PMC for last three years based on their data in PAS benchmarking system. This involved past trends as well as comparison with other Class-A Municipal Councils in Maharashtra. The existing service levels are assessed along with their respective reliabilities against service level benchmarks to be achieved.

This was discussed with the PMC officials at the first PIP consultative workshop in July, 2011 at Panvel. The workshop was attended by Panvel Chief Officer, respective heads of water supply department, sanitation department and tax department. Preliminary priorities were identified at this workshop. Particular focus was also placed on the issues around making the city open defecation free and exploring the possibility of introducing 24x7 water systems. The outcome of the consultation was initiating diagnostic assessment of PIP in Panvel.

Detailed Diagnostics and Issues Identification: The diagnostic assessment was prepared by taking into consideration the ground realities, local conditions, and assessment of the present situation. A detailed field guide developed for purpose of PIP preparation included data templates, survey formats, transect walks, schedules of interviews, Focus Group Discussions (FGD) guidelines, areas for digital documentation, dimensions of stakeholder consultations etc.

The emphasis was on understanding the current data record systems and measures to improve the performance data reliability.

Detailed discussions with PMC engineers and support staff were held to assess water and sanitation situation. City level reconnaissance surveys and dedicated field visits were undertaken by teams to facilities including water source as well as treatment and distribution/ collection systems for water supply, sanitation and solid waste management to validate secondary data and identify performance issues.

For detailed qualitative insights the teams visited all slums and conducted FGDs with slum dwellers. Transect walks in slum settlements and along city roads helped in mapping slum locations, open defection sites, public and community toilets, solid waste dumping sites etc. In addition to that key person interviews, FGDs and consultations were held with safai-karamcharis, contractors and private parties to identify service delivery issues from consumers' perspectives.

Action Planning and Preliminary Costing: Consultations with sector experts were also held in August 2011 for proposing actions and estimating the required capital cost/ investment based on identified improvement areas. At the end of the expert consultations the options for improving water supply, sanitation and SWM scenario were discussed with concerned PMC officials and Chief Officer. The diagnostic study, detailed assessment and preliminary strategies for improvement were shared with PMC officials during second PIP consultative workshop in September 2011 at Panvel. The suggestions by PMC officials were taken and incorporated in the PIP.

On identification of city priorities, consultations were held with the Chief Officer, opinion leaders, Municipal councillors, PMC officers, and representatives of water and sanitation committees to discuss priorities for municipal water supply and sanitation.

While proposing strategies and actions for improvement the assessment of on-going projects was done. The actions for improvement were identified, prioritised and streamlined in consultation with PMC officials to achieve both priority/ focal areas - 'Open Defecation Free PMC' and '24 X 7' water supply.

In this PIP report the identified interventions are classified as minimal capital expenditure and short term in phase I and substantial capital expenditure and long term in Phase II. Process and policy related actions to improve reliability of performance indicators are also identified. Block cost estimates have been developed for the actions identified.

The proposed strategies and actions for improvement and estimated capital cost required to implement actions was discussed with PMC officials during the third PIP consultative workshop in November 2011 at Panvel.

Preliminary Validation of Draft Performance Improvement Plan by PMC: The proposed draft PIP was shared with PMC and finalised by incorporating the revisions suggested. The Panvel PIP has been validated by Panvel CO & PMC officials.

The PIP describes improvement actions and the costs that will have to be incurred to implement the identified actions. The proposals have been reviewed by technical teams at the AIILSG and CEPT University. This PIP report will be submitted to the state government for review and guidance. It is anticipated that the Panvel Municipal Council will identify low-cost actions that can be taken immediately and provide funds for these actions from their budget. For actions that require significant capital expenditure, the PMC will prepare detailed project reports and seek assistance under state and national programmes.

Photo Plate 1 Overview of Panvel & PMC

Photo Plate 2 Slums in Panvel







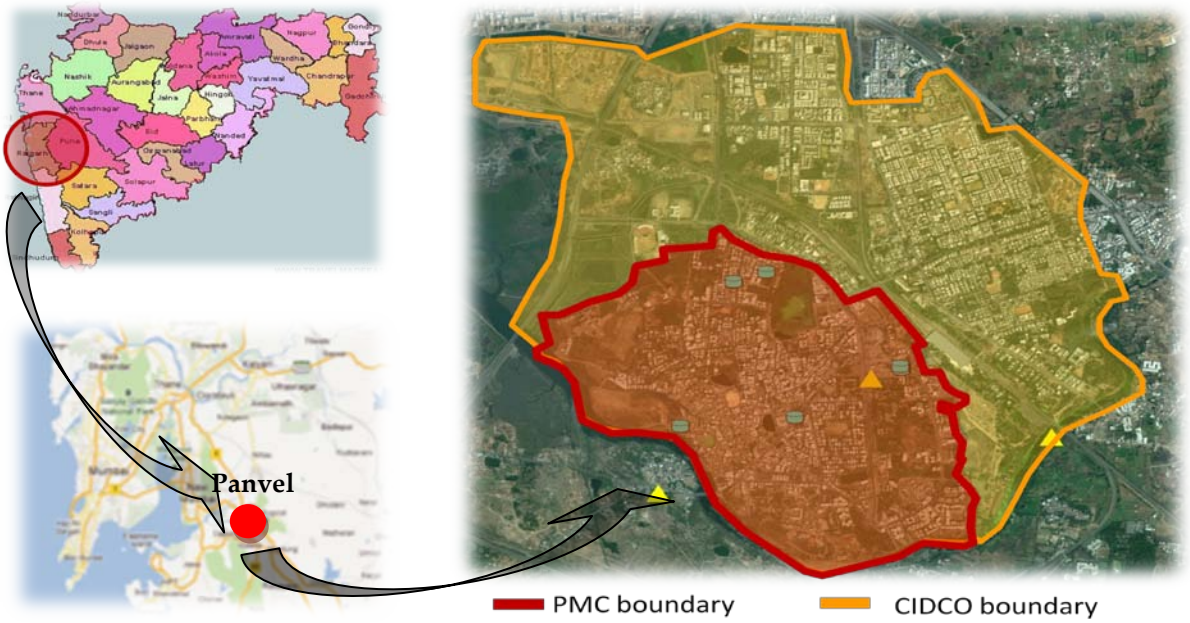
2. CITY PROFILE

This section discusses general characteristics of Panvel related to location, population and area, aspects related to slum settlements and human resources in PMC. Also, aspects related to municipal finances specifically with respect to water supply and sanitation services and extent of private sector participation is discussed here.

2.1 Location

Panvel city is class-A municipal council in Raigad district in the state of Maharashtra. Panvel is also known as the gateway to the Konkan region. It adjoins Navi Mumbai and Thane district border. Panvel is located on the Yashwantrao Chavan (Mumbai-Pune) Expressway at about 21 km from Mumbai. In-spite of its closeness to Mumbai, Panvel is an independent urban centre. The city is located at latitude 18°59′ N and longitude 73°06′ E, at an elevation of 92 ft from the mean sea level. Panvel city is part of the MMR region. All services in Panvel city are provided and maintained by the Panvel Municipal Council (PMC). The Panvel Municipal Council is a corporate body constituted under the Maharashtra Municipal Council, Nagar-panchayats and Industrial Township Act, 1965. The development authority for New Panvel is CIDCO whereas the development of the villages around Panvel comes under the purview of the Raigad Zilla Parishad.

Figure 1 Panvel City Map showing PMC & CIDCO Area



Panvel has total area of 12.17 sq km which includes CIDCO area (New Panvel) with 8.54 sq km area and PMC with 3.63 sq km area. As per the 2001 census, the population of Panvel (PMC + New Panvel) was 104058 and has increased to 180464 in 2011. The population of PMC in 2001 was 79000 and population as per 2011 estimates 111906. The table below

provides details on the break-up of the population and the household details for the Panvel and PMC.

Table 4 City profile

General Details	2001		2011 (Est.)	
	Panvel (incl. CIDCO)	PMC	Panvel (incl. CIDCO)	PMC
Area (Sq.km)	12.17	3.63	12.17	3.63
Population	104058	79000	180464	111906
No. of HHs	23894	15133	43231	28319
No of properties	-	17604	-	29935
HH Size	4.35	5.22	4.17	3.95
Number of Election Wards	38	22	10*	6*
No. of Slums		15		15
Slum Population (%)				9.78

*After 2011-12 elections

Source: (CEPT University, 2009 - 2011)

The economic base of Panvel is dominated by the industrial and commercial activities. Panvel is surrounded by some major MIDC managed regions including Patalganga, Taloja, Nagothane, Roha and Khopoli. Some of the major Indian companies including Larsen & Toubro Limited, Reliance, Hindustan Organics Chemicals Ltd., ONGC and IPCL are based around Panvel which provides mass employment. The JNPT port is also located near Panvel.

The Proposed Panvel Mega City Project will divide Panvel in three parts including Energy City, Information Technology & Telecom City and Entertainment City and is expected to generate employment for approximately 8 lakh people by 2020. In the future, Panvel is also expected to generate income and employment from the Special Economic Zones, Free Trade Zones, Free Trade and Warehousing Zones proposed to be developed around Panvel. The new Navi Mumbai International Airport proposed to be developed around the Panvel-Kopra area is expected to accelerate the economic growth and development of Panvel. (CRISIL Advisory Services)

2.2 Services in Slums of Panvel

The provision of basic services to the urban poor is regarded as one of the important focal area for improvement under the PAS program. While the performance measurement tool captures information at city level on services provided to slums, a more detailed measurement tool was also developed to capture settlement level services. As part of the PIP diagnostic assessment, quick field visits to some of the slum settlements were also carried out to understand the characteristics of the slums in the city.

Panvel has 15 slum settlements and all of which are non-notified. The total population in slums is approx. 0.11 lakh which is ~10% of the total population of Panvel. Out of 15 Slum settlements, 14 are in PMC area while Panchasheel Nagar Slum settlement is near CIDCO area. Neither of the slums have individual water supply connection or individual toilets. The door-to-door coverage of SWM services in slums is approx. 50%.

Table 5 Slum profile of Panvel

Description	2010-11
Number of slum settlements	15
Number of Non Notified slum settlements	15
Population in slums	10,947
HHs in slums	3,055
HH size in slums	3.58
Slum Population percent to total population	9.78%
Source (CEPT University, 2011)	

Chart 1 Land ownership by Area

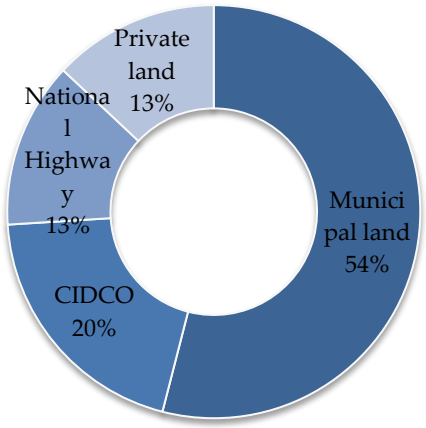
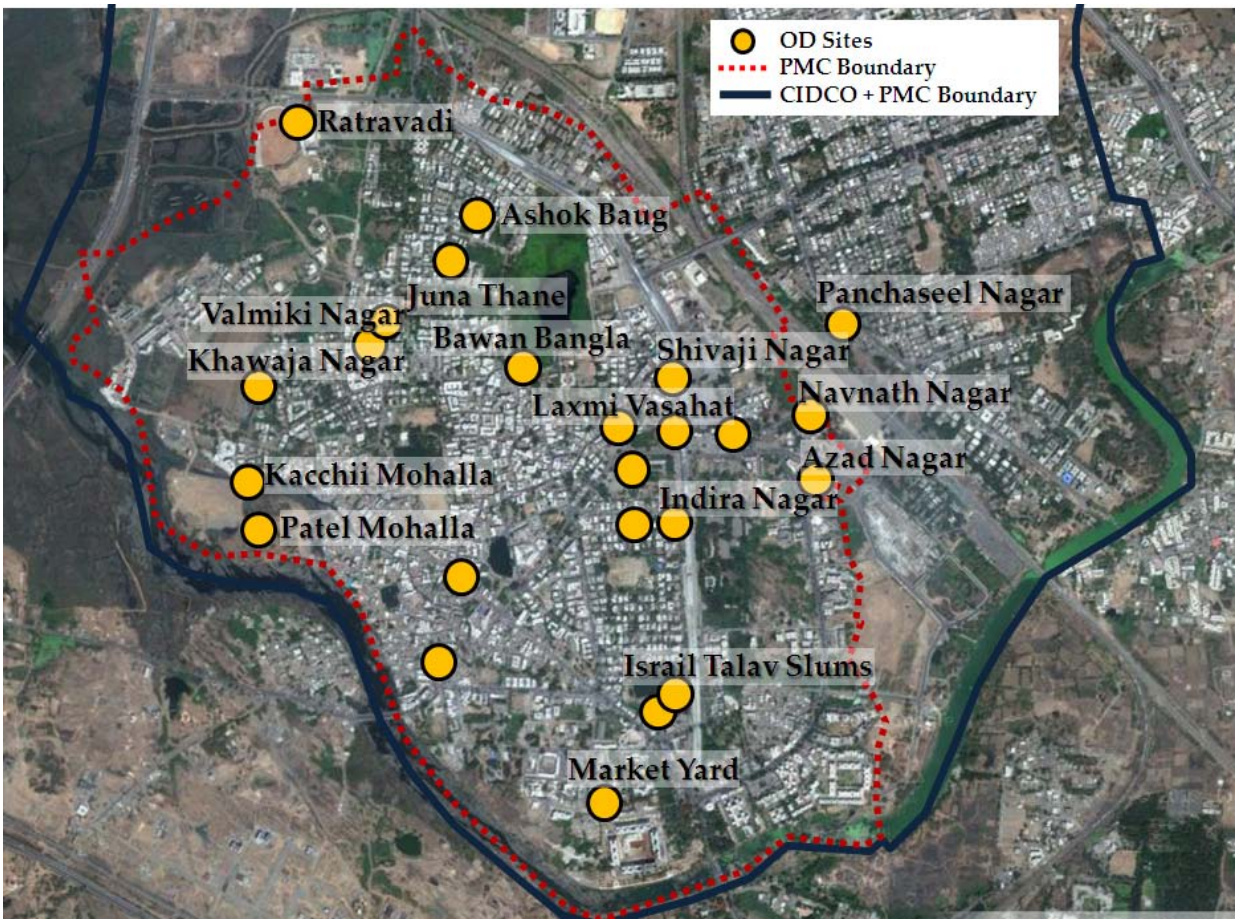


Chart 1 shows the land ownership of these slum settlements by Area & by population respectively. More than 50% of slums by area are on municipality land followed by CIDCO as 20% and then on National Highway land & private land. Similar trend was found in ownership of land by population with approx. 75% of slums on Municipal & CIDCO land.

Figure 2 Locations of Slums in Panvel



Source (CEPT University, 2011)

PMC doesn't have a separate policy for WSS service provision in slums and all the slums are non-notified, which could have been the reason for zero Coverage of individual water supply connections in those slums and zero Coverage of individual toilets in slums. PMC has earmarked 5% of budget towards servicing the poor however past 4 years trend shows the average expenditure of less than 0.5% to total Budget. (CEPT University, 2009 - 2011)

2.3 Staffing of Panvel Municipal Council

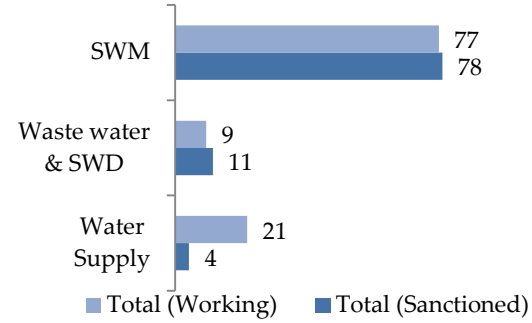
PMC has 19 departments for different functions and all the departments are under the Chief Officer. Chart 4 shows the organizational structure of PMC. The responsibilities of the various departments are with the City Engineers which are further sub-divided among Junior Engineers. The Water Supply Department is responsible for water supply, treatment and maintenance of pipelines, while Health Department is responsible for sanitation, operations & maintenance of drains and solid waste management.

Water Supply:

The sanctioned posts in Water Supply department are only 4 against which 21 are working in the department. The technical staff includes engineer, accountant & electricians. There are

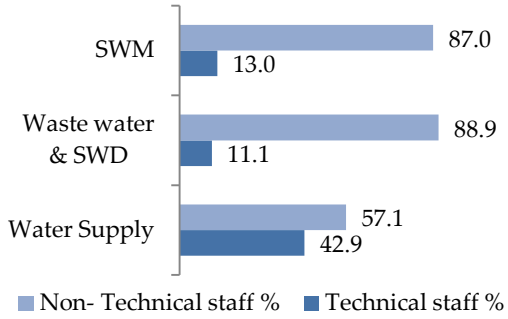
no senior management staff, plumbers and meter readers in the department. 57% of the working staff is labour in WS department but none of labour post is sanctioned.

Chart 3 Staff working against Sanctioned in WS, WW & SWM



Source (CEPT University, 2009 - 2011)

Chart 2 Technical & Non-technical staff in WS, WW & SWM



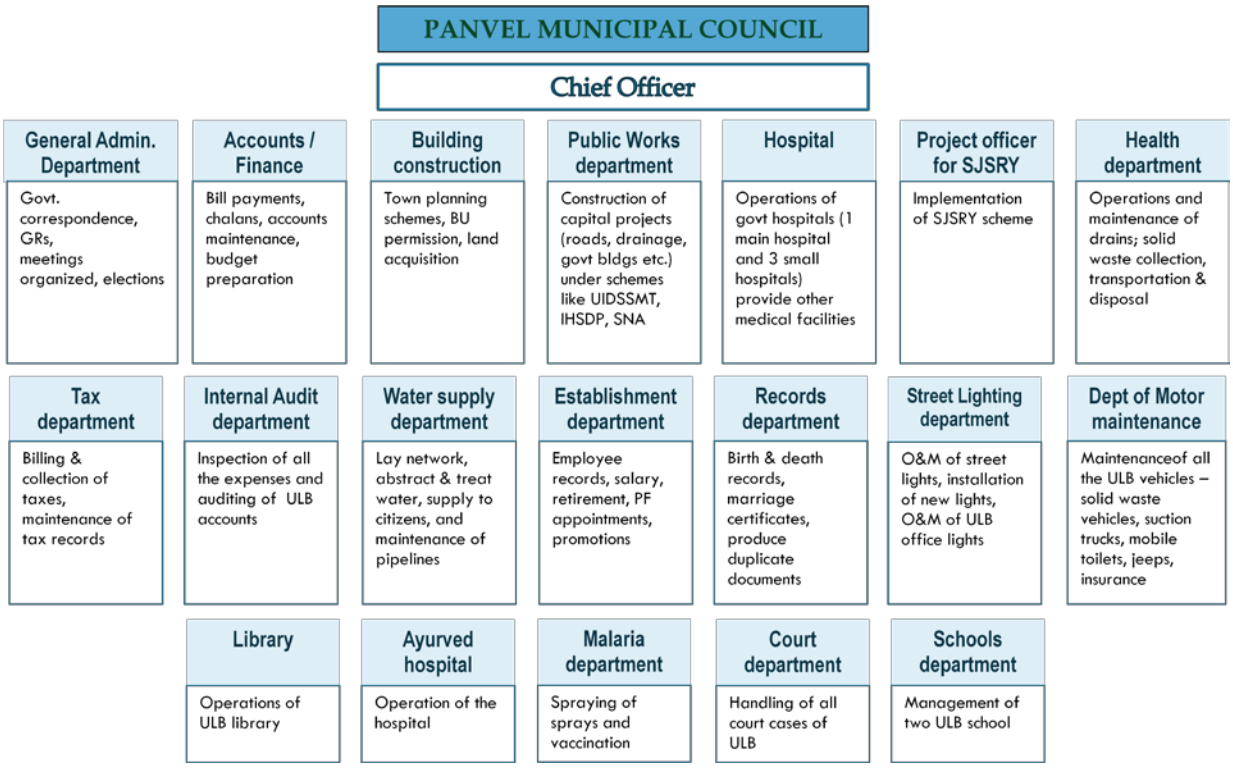
Source (CEPT University, 2009 - 2011)

Waste Water & SWM:

In Waste water, 2 posts out of 11 sanctioned are vacant. The technical staff i.e. engineer is 11% while remaining are labours. There are no senior management staff and accountants post sanctioned or working in waste water.

There are 78 sanctioned post in SWM department out of which 77 are working. Sanitary inspector and supervisor which forms the technical staff is 13% while remaining are Safai Karamcharis. There is no senior management staff in SWM. As the service is outsourced, the department doesn't have Cleaners/drivers and labours.

Chart 4 Organization Structure of PMC



2.4 Municipal Finance Assessment

Panvel Municipal Council maintains a consolidated general budget that includes all the functions of the council. Thus Municipal transport, slums and urban poor, water supply and sewerage etc. have not been budgeted separately but are included under the same consolidated budget. The Accounting and the Budgeting system adopted by the Panvel Municipal Council records the various line items of receipts i.e. income and expenditure under three broad categories including Revenue Account, Capital Account and Extra-ordinary Account as per their sources and applications.

The municipal finances of PMC have been reviewed for the last seven years, from 2005-06 to 2011-12. While for 2005-06 to 2009-10 the information is from 'actuals', while budget estimates are given for the remaining two years.

Table 6 Municipal Finance summary of PMC (in Rs Crores)

Budget Head	2005-06 (A)	2006-07 (A)	2007-08 (A)	2008-09 (A)	2009-10 (A)	2010-11 (B)	2011-12 (B)
Opening Balance	1.44	1.31	5.42	1.60	3.05	10.59	0.63
Revenue Account							
Revenue Income	16.43	24.25	18.89	24.96	25.89	33.68	36.03
Revenue expenditure	13.34	16.62	20.07	21.37	20.08	29.83	34.31
Revenue surplus / (Deficit)	3.09	7.62	(1.18)	3.59	5.80	3.84	1.71
Operating ratio	0.81	0.69	1.06	0.86	0.78	0.89	0.95
Capital Account							

Capital Income	0.99	8.06	6.52	2.95	23.02	36.74	25.21
Capital expenditure	4.98	11.86	8.57	6.24	22.24	50.67	32.65
Capital surplus / (Deficit)	(3.99)	(3.80)	(2.05)	(3.29)	0.78	(13.93)	(7.44)
Overall surplus / (Deficit)	(0.90)	3.82	(3.23)	0.30	6.58	(10.08)	(5.73)
Source: (Panvel Municipal council Budgets, 2005-06 to 2011-12)(CRISIL Advisory Services)							

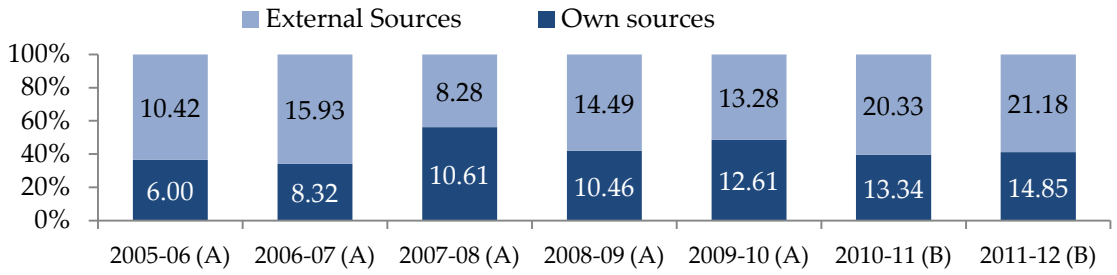
Revenue Account:

For 4 out of 5 years, the operating ratio was less than 90%. Hence, PMC has been able to meet its revenue expenditure from 2005-06 to 2009-10 expect in 2007-08 (Chart 8).

Revenue income:

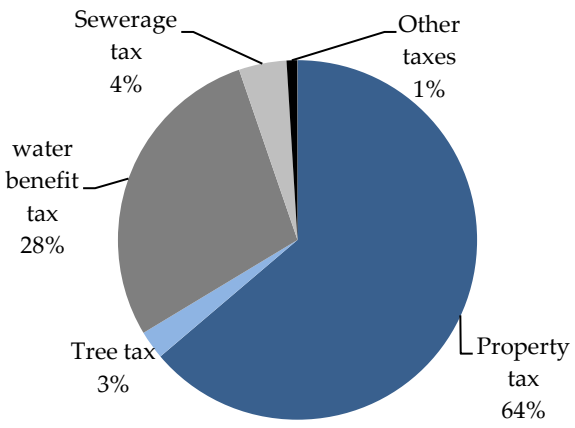
The total budgeted revenue income for PMC in 2011-12 was Rs. 36.03 Crores. Main sources of revenue include taxes and charges levied under various acts, service charges, land property rents and fees, grants and contributions etc. These revenue income can be classified into own sources (tax & non - tax based income sources) & external sources (grants/contributions). Own sources include property tax (comprising general tax, water, sewerage and sanitation taxes), other taxes and non-tax income in the form of development charges, income from municipal properties, fees & fines and other miscellaneous tax and non - tax items. Tax revenue formed 30% share (CAGR 19%) and non-tax revenue at 14% share (CAGR 23%). Past trends shows that own sources of income formed an average of 43% share in revenue income.

Chart 5 Trend of own and external sources of revenue income of PMC (in Rs Crores)



Source: (Panvel Municipal council Budgets, 2005-06 to 2011-12)(CRISIL Advisory Services)

Chart 6 Composition of tax income (2005-06 to 2009-10)



Source: (Panvel Municipal council Budgets, 2005-06 to 2011-12) (CRISIL Advisory Services)

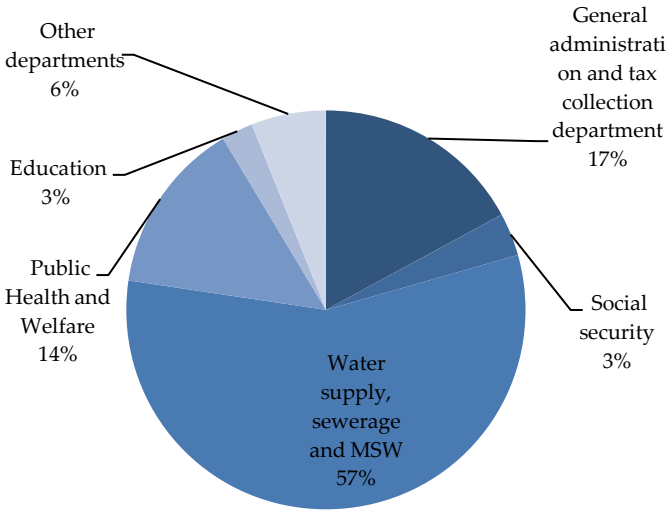
Property tax has been the main source of tax revenue at 64% while water benefit tax at 28%. Sewerage tax forms only 4% while there is no revenue through SWM user charges.

External sources of revenue income such as assigned revenues, grants and contributions contributed 57% of the total revenue income (Chart 5). It is budgeted to grow to Rs. 21.18 Cr in 2011-12 from Rs. 13.28 Cr in 2009-10, thus registering a CAGR of 6% in the seven years period of consideration.

Revenue expenditure:

The revenue expenditure has grown at CAGR of 11%. As seen from Chart 7, Water supply, sewerage and MSW department forms 57% followed by general administration and tax collection department which contributes 17% of the total revenue expenditure. Public health and welfare forms 14%. Other departments include garden department, crematorium, guesthouse, maintenance of buildings, birth death certificate section etc. Establishment costs forms the major part of expenditure among all the departments.

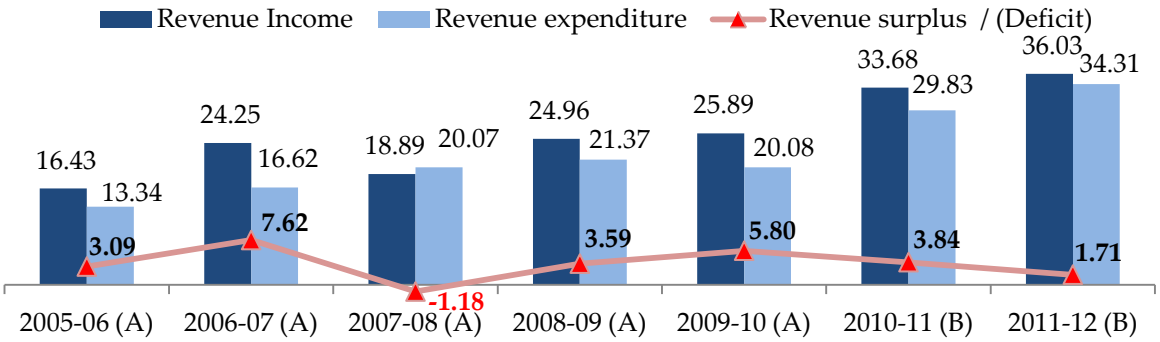
Chart 7 Composition of revenue expenditure (2005-06 to 2009-10)



Source: (Panvel Municipal council Budgets, 2005-06 to 2011-12)

The per capita revenue expenditure in PMC is Rs. 2944 (CAGR 6%) with per capita revenue expenditure on WS, WW and SWM is about Rs. 1439 (CAGR 15%) as of 2011-12.

Chart 8 Revenue income vs. expenditure of PMC (in Rs Crores)



Source: (Panvel Municipal council Budgets, 2005-06 to 2011-12)(CRISIL Advisory Services)

CAPITAL ACCOUNT:

The Capital Account records the Capital Receipts/Income and the Capital Expenditure for the various departments of the PMC.

Table 7 Capital account of PMC (in Rs Crores)

Budget Head	2005-06 (A)	2006-07 (A)	2007-08 (A)	2008-09 (A)	2009-10 (A)	2010-11 (B)	2011-12 (B)	CAGR (A)
Capital Income	0.99	8.06	6.52	2.95	23.02	36.74	25.21	119%
Capital Expenditure	4.98	11.86	8.57	6.24	22.24	50.67	32.65	45%
Capital surplus / (Deficit)	(3.99)	(3.80)	(2.05)	(3.29)	0.78	(13.93)	(7.44)	
Revenue surplus / (Deficit)	3.09	7.62	(1.18)	3.59	5.80	3.84	1.71	
Overall surplus / (Deficit)	(0.90)	3.82	(3.23)	0.30	6.58	(10.08)	(5.73)	

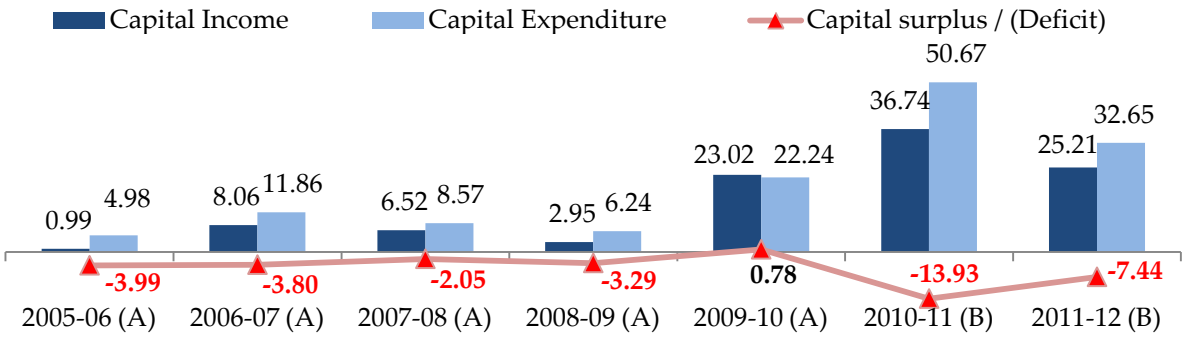
Capital income:

The Capital Receipts/Income is contributed by the funds received in the form of grants, contributions and borrowings under various Central and State sponsored schemes for the implementation of the projects, creation of the assets and generation of employment meant to generate benefits over multiple years. The Capital Receipts/ Income also accounts for the income generated from the sale of assets.

Capital expenditure:

The Capital Expenditure accounts for the expenditure incurred pertaining to the acquisition of permanent assets such as purchase of land, building, machinery, vehicles etc. The Capital Expenditure also includes the expenditure incurred pertaining to the improvement or refurbishment of the existing assets like pipelines, treatment plants etc.

Chart 9 Capital income vs. expenditure of PMC (in Rs Crores)



As seen from the Table 7 and Chart 9 assessment, the capital income has grown at a far greater CAGR (119%) than capital expenditure. The capital income was less than the expenditure in all the 7 years barring 2009-10.

2.5 Private Sector Participation in Panvel

Pay & Use Toilets: Some of the Pay & Use toilet blocks constructed under PMC funding is maintained and operated by private operators.

Septage Management: The cleaning and disposal of septage from the septic tanks within the city limits and outside the limits are managed by both Private agencies and PMC.

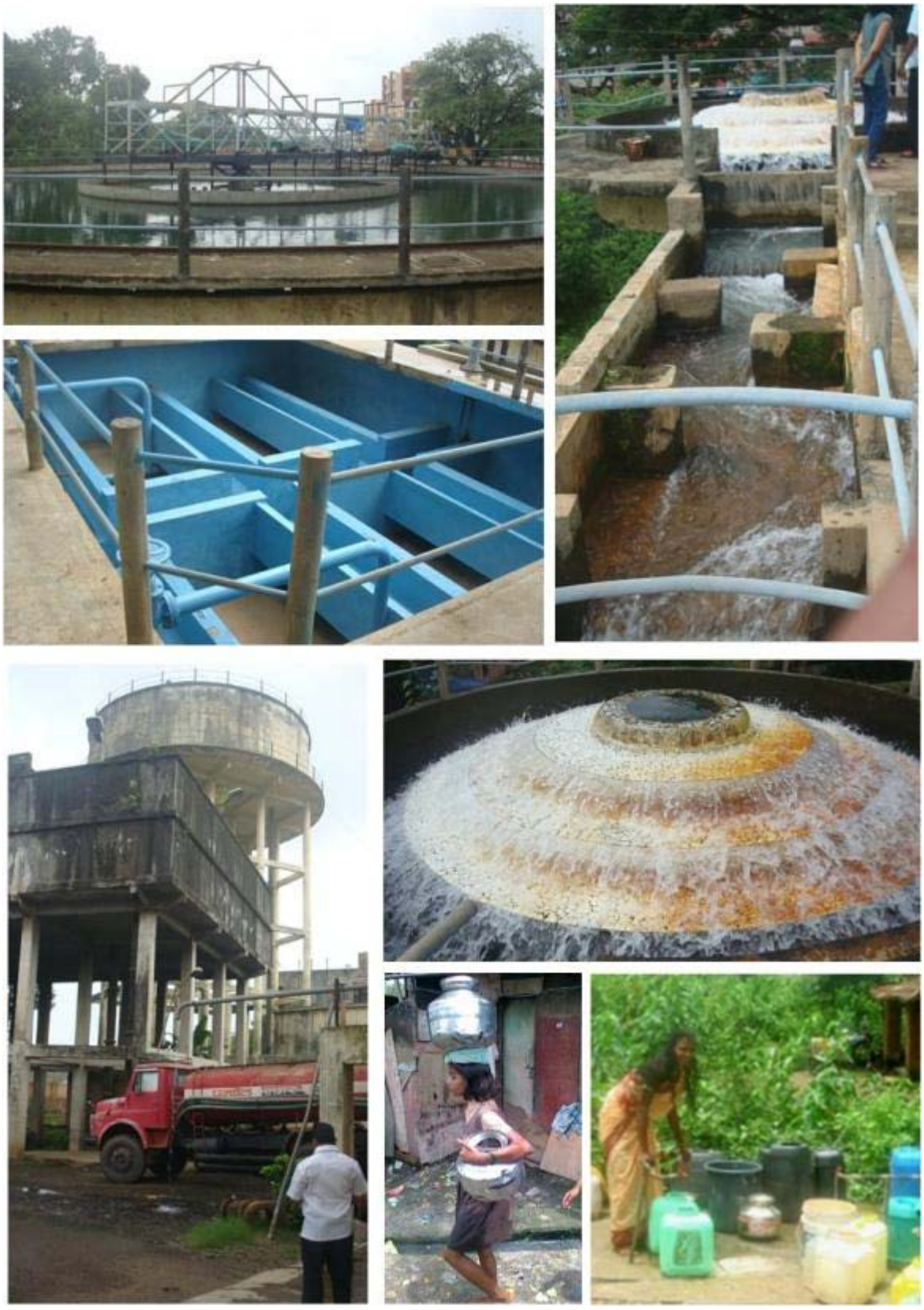
Solid Waste Management: In Panvel Municipal Council, solid waste management related services are managed by private agencies. PMC has contracted out secondary collection, transportation and disposal of SWM. This private agency covers 22 wards of PMC. The treatment and scientific disposal of waste is contracted out to CIDCO.

Table 8 below summarizes the different contracts under various sectors of services along with the scope, duration and value of the contract.

Table 8 Private Sector Participation in Panvel

Sector	Private Agency	Procurement Process	Scope of Contract	Duration/ Period	Value of Contract
Water Supply	Transport Company	--	• Supply of Water by Tankers • Transport Companies own tankers and have to provide for the drivers and bear the O & M cost of the Vehicle.	2010-11	• PMC pays at the rate of Rs.165/trip in case of supply to societies' storage tanks and Rs. 340/trip in case of absence of storage.
Water Supply	D.A. Patil Consultants under SNMA	Competitive Bidding	• Preparation of DPR, work supervision for Water and Energy Audit	2010-11	• 3.6% of Project cost
Waste Water	Shivam Labour Society	Competitive Bidding	• O&M of Public toilets	Started in 2010	• The contractor pays a lump sum amount to ULB on an yearly basis
SWM	S.D. Sirole, Contractor Mumbai	--	• Collection of Solid Waste • Transportation of Solid Waste	Nov 2008 to Nov 2013	• Fixed amount of Rs 13500/day for collection • Rs 440/Ton for transportation
SWM	CIDCO	--	Processing and Scientific Landfill site for solid waste		• PMC has invested Rs 98.27 Lakhs (out of 6 Crores) for Scientific Landfill site. • PMC pays processing charge of Rs 500/MT/day to CIDCO.

Photo Plate 3 Water supply in Panvel



3. ASSESSMENT AND PROPOSALS FOR WATER SUPPLY

This section provides an overview of the water supply system in PMC, performance and issues in water supply and proposals for improvement.

3.1 Assessment of Current Water Supply Systems

The city of Panvel receives 25.36 MLD water from four sources. All the four of them are surface water sources. The water received in PMC is in two forms i.e. raw water & bulk treated water. Bulk purchase treated water is from following three sources:

Figure 3 Location of Dehrang Dam

1. Maharashtra Jeevan Pradhikaran (MJP)
2. Maharashtra Industrial Development Corporation (MIDC)
3. CIDCO

The raw water is produced through PMC's own source i.e. Dehrang dam. This dam is 16kms away from the city as shown in Figure 3. The water from this source reaches the city through gravity. Water is procured from all the 4 sources from July to February when the dam is full. While in the 4 months of summer i.e. March to June, when the dam is dry, water is procured from the remaining 3 sources as shown in the Table 9.

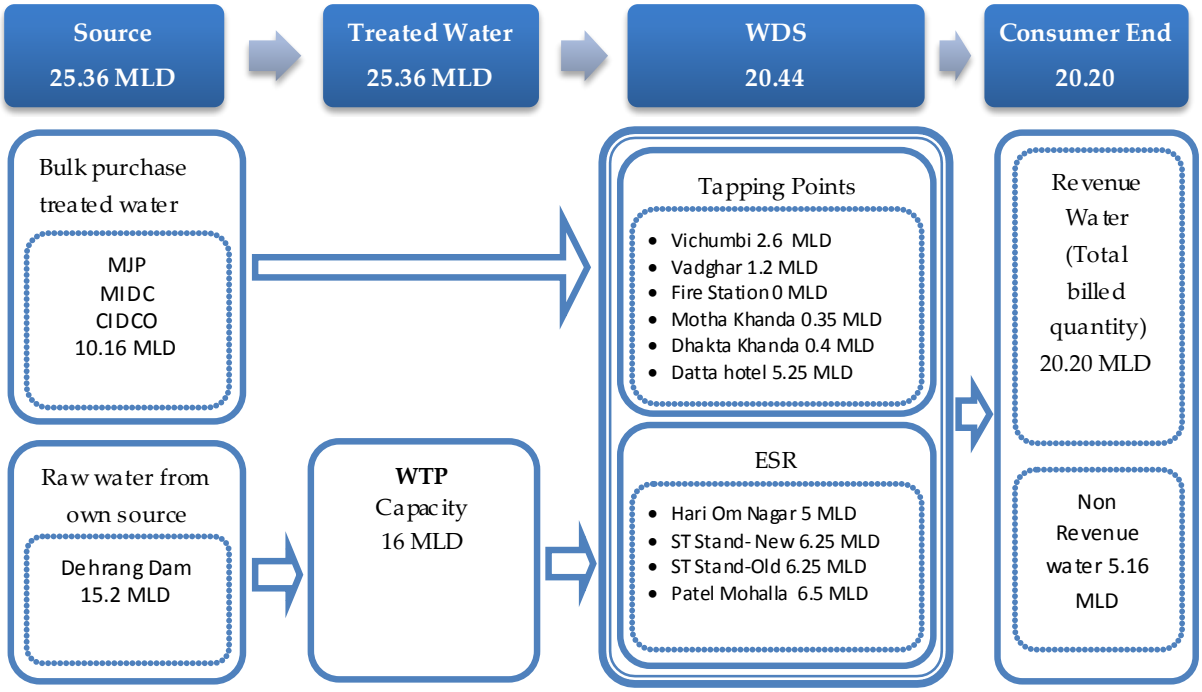
Table 9 Water produced from sources

Sr No	Source	Quantity of water (MLD)		Water charges (Rs/1000 liters)
		When Dam is full	When Dam is dry	
1	Dehrang Dam (Own source)	15.20	0	NA
2	MJP	3.80	19.00	8.30
2.1	Tapping point at Vichumbi river	2.60	3.50	
2.2	Tapping point near Vadghar	1.20	1.30	
2.3	Tapping point at fire station	0.00	14.2	
3	MIDC	6.00	6.00	7.50
3.1	Motha Khanda	0.35	0.35	
3.2	Dhakta Khanda	0.40	0.40	
3.3	Tapping point at Datta Hotel	5.25	5.25	
4	CIDCO	0.36	0.36	7.00
	Average supply (1+2+3+4)	25.36	25.36	

Source: (Water & Energy Audit Draft Report 2012)

The raw water from Dehrang dam goes to WTP for treatment. After treatment this water goes to WDS in ESRs. The bulk purchase treated water directly goes into the WDS through tapping points as shown in Chart 10

Chart 10 Schematic diagram of water supply system in PMC (when the dam is full)

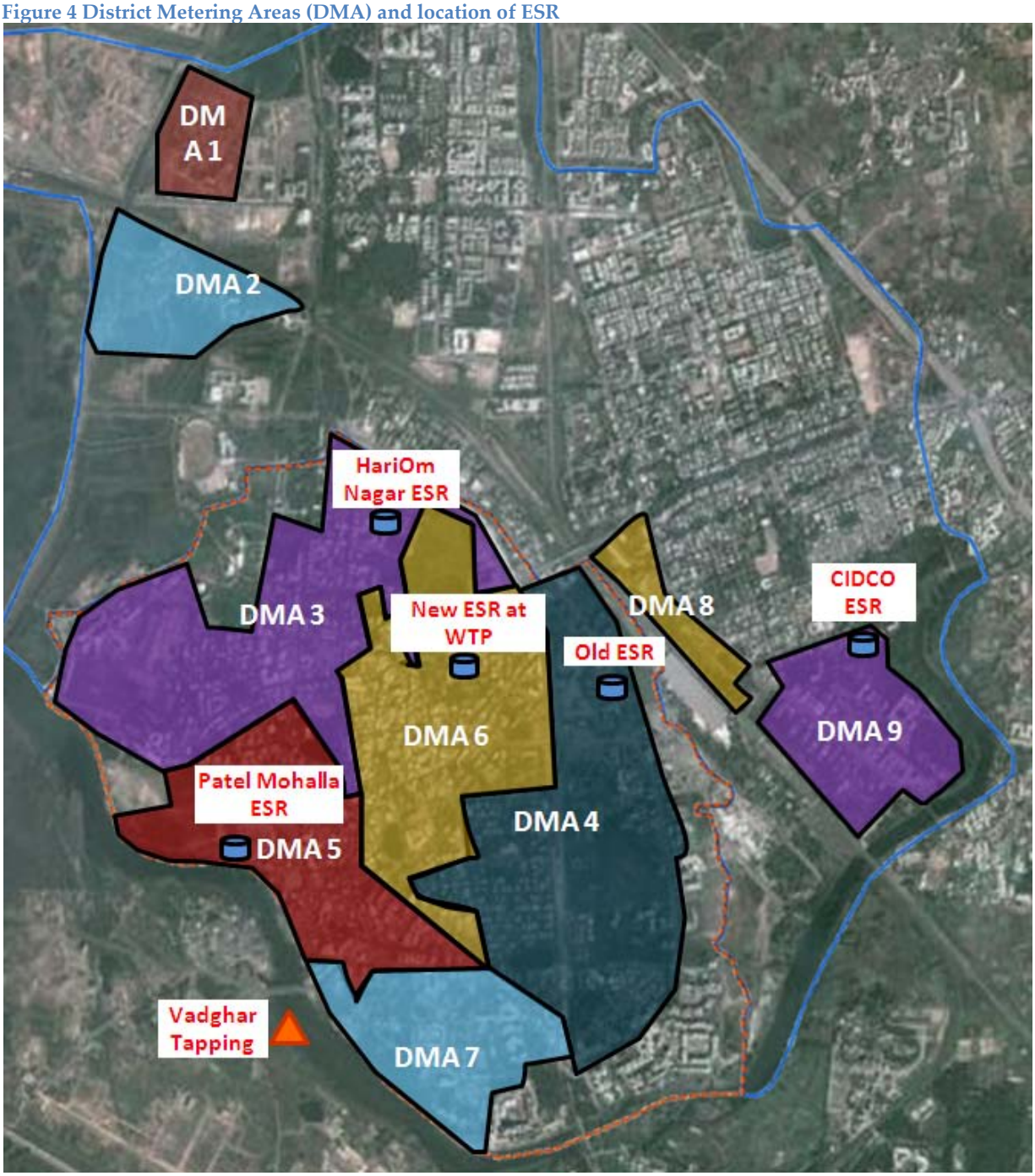


The **dam** has water storage capacity of 3.57 million cubic meters. This storage is sufficient for 9-10 months as per WTP capacity. The **intake structure** at the dam has heavy leakages with deteriorating condition which leads to wastage of water of approx. 1.24 MLD. The **WTP** was completed and commissioned in 2001 with installed capacity of 16 MLD. After the treatment of water, the water goes to ESRs. The WTP is structurally in good condition with no visible leakages. But chlorination & Alum dosing system is not functioning effectively. Also there is no system for recirculation of backwash water. Table 10 and Figure 4 show the details & locations of ESRs. (Water & Energy Audit Draft Report 2012)

Table 10 Details of service reservoirs

Sr. No	Description	Capacity (MLD)	Water supplied to zone
1	Hari Om Nagar ESR	0.500	Zone 1
2	ST Stand – New ESR	0.625	Zone 2
3	ST Stand – Old ESR	0.625	Zone 3(B)
4	Patel Mohalla - ESR	0.650	Zone 3(A)
5	Pumping station New sump	2.000	
	Total storage capacity	4.400	
Source: (Water & Energy Audit Draft Report 2012)			

Figure 4 District Metering Areas (DMA) and location of ESR



Source: (Water & Energy Audit Draft Report 2012)

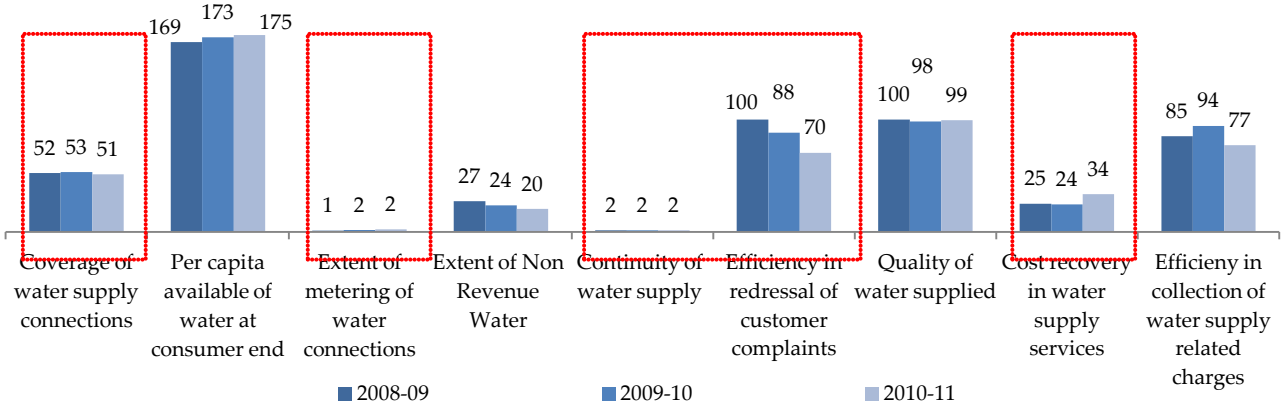
All ESRs are structurally in good condition and at 21 m staging height except Old ESR, which located at WTP. The Old ESR is in deteriorating condition with exposed reinforcement. It has staging height of 11 m hence low pressure was observed at the consumer end.

The water supply system of Panvel has trunk main of 16 km from Dehrang dam to the city as shown in Figure 3. The transmission mains from the PW sump to 4 ESRs are total 4.6 km (Annex 1). The distribution network from WDS to consumer end is around 32 km. The total underground water supply network covers 3.57 sq km area of PMC which is approx. 98% of PMC area. Annex 2 shows the details of areas covered under different zones of water distribution in Panvel.

3.2 Assessment of Service Delivery

In Panvel, water supply provision in PMC area i.e. in 3.63 sq km is by PMC while in the remaining area i.e. 8.54 sq km which is New Panvel area is by CIDCO. Chart 11 below provides an overview of the key performance indicators for PMC across 2009-12. Issues related to water supply services are highlighted in the figure below.

Chart 11 Areas of poor and good performance in Panvel for water supply



Source (CEPT University, 2009 - 2011)

Access and Coverage

Coverage of Water supply connections: As mentioned earlier, the distribution network covers 98% of PMC by area but the actual coverage of household level connections for water supply is approx. 51%.This may be due to lesser connections from existing network in newly developed area. Also the number of connections has not increased in equal proportion to the increase in the number of households. Clearing pending applications for additional connections using existing network can also increase the coverage. It was also found during discussions with the WS officials that they don't have proper records on number of Households dependent on bulk water supply connection to the apartments which affects the coverage of WS connections. Also there is no water supply network and no individual water supply connections in the slums of Panvel which have around 3055 HHs. Regularizing un-authorized connections will also help in increasing the coverage. Table 11 provides the details of consumer connections in PMC.

Table 11 Details of consumer connections in PMC

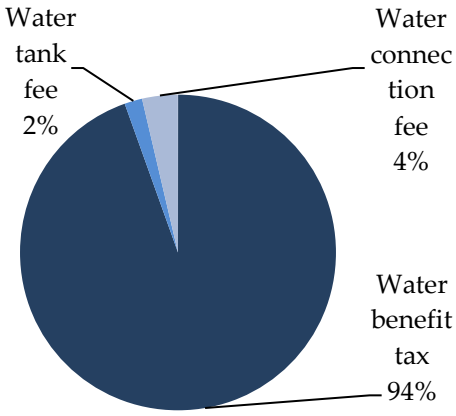
Category	Number of Connections	Metered connections	Flat rate connections
Residential	11019	158	10861
Commercial	647	56	591
Institutional	52	0	52
Total	11718	214	11504
Source (CEPT University, 2009 - 2011) (Water & Energy Audit Draft Report 2012)			

Service levels and Quality

Per capita supply of water: The per capita water supply at production is 227 lpcd while per capita water supply after treatment at WDS is 183 lpcd. On an average the per capita water supply at consumer end is 175 lpcd (Chart 10). This lpcd is higher than CPHEEO specified norms of 135 lpcd. The lpcd varies across individual zones with maximum of 249 lpcd in New ESR zone. The locations of ESRs are provided in Figure 4.

Continuity of water supply: The water supplied in PMC is for one and a half hour daily.

Chart 13 Composition of Revenue income in WS



Source: (Panvel Municipal council Budgets, 2005-06 to 2011-12) (CRISIL Advisory Services)

Source: (Water & Energy Audit Draft Report 2012)

Quality of water supply: Quality of water supplied is 99- 100%. But the reliability of the data is B. The tests are conducted regularly at their own laboratory and accredited centers. The records are still kept manually and not yet computerized.

Metering: As seen from Chart 11 and Table 11, the extent of metering in PMC is less than 2% Remaining around 98% is unmetered and is charged on flat rate tariff. There is no metering at source, WTP and WDS. Drawing lessons from several cities managed by the Maharashtra Jeevan Pradhikaran (MJP), and as required under the reforms required under the Maharashtra Sujal Nirmal Abhiyan (MSNA), PMC needs to ensure that metering is installed for all consumer connections.

Proposals for improvement:

PMC has submitted a proposal under MSNA which is sanctioned by Govt. of Maharashtra and includes hydraulic modeling, GIS, Consumer survey and flow meters at ESRs costing approx. 1.48 Crores. The project is now submitted in MJP - Pune for technical sanction and is under process.

PMC is also initiating to move towards 24 x 7 water supply. PMC is in process of issuing a tender for the preparation of DPR on 24x7 water supply.

Financial Sustainability

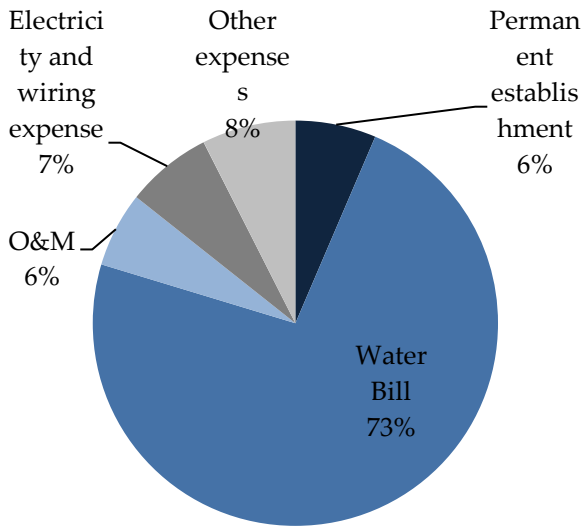
Cost recovery (O&M) of water supply: PMC has shown low performance in financial sustainability as the cost recovery is as low as 34% with efficiency in collection of water supply charges/taxes at 77%. Though cost recovery shows growth in 2010-11 compared to

previous years; the collection efficiency of water supply charges/taxes has dropped during the same period. (Chart 11)

Annex 3 provides the details of the revenue income and revenue expenditure towards provision of water supply services by PMC.

The major contribution (94%) of revenue income in WS department is through Water benefit tax/charges. Currently water is charged on flat rate basis as 98% of their connections are unmetered. (Chart 13) The details of the current tariff structure are provided in Table 12. Around 4% revenue income is through water connection fee. The Council does not subsidize the connection costs for slum dwellers, the slum dwellers can pay the same in installments.

Chart 14 Components of Revenue expenditure in WS



Source: (Panvel Municipal council Budgets, 2005-06 to 2011-12) (CRISIL Advisory Services)

The revenue expenditure of WS department is dominated by the water bills that PMC spends on purchase of bulk treated water accounting to 73%. Permanent establishment and electricity bill forms 13% of revenue expenditure.

Per capita expenditure of the system is Rs. 655 in 2009-10. This is higher than Rs. 302 recommended by Zakaria committee and Rs. 491 as recommended by HPEC in 2009-10. (CEPT University)

Proposals for improvement: PMC has revised the rates which are effective from 1st April 2012. The revised tariff structure is provided in Table 12. The total increase in revenue after revised tariff as per Tariff GR will be 11.18 Crores. PMC will be able to recover its cost with this revised tariff in next 5 years by optimizing the O&M. (Water & Energy Audit Draft Report 2012)

Table 12 Tariff structure of Water Supply in PMC (Rs/KL)

Type of Connection	Current tariff structure	Revised tariff structure	Tariff proposed as per Tariff GR
Residential	7.00	9.00	9.47
Mixed Residential	-	-	18.94
Institutional	8.00	15.00	18.94
Commercial	32.00	35.00	37.87
Industrial	32.00	35.00	47.34
Source: (CEPT University, 2009 - 2011), (Water & Energy Audit Draft Report 2012) & (CRISIL Advisory Services)			

Efficiency in Service Operations

Extent of NRW: PMC water supply system has NRW of approx. 20.36%. The details of water losses are provided in Table 13. Apart from unbilled consumption and apparent losses, the main water loss was observed in real losses (18.33%). The major leakages which contribute to these real losses are in distribution network (2.63 MLD), Intake well (1.24 MLD), Gravity main from Dam to WTP (0.84 MLD), Hari-Om Nagar transmission main (0.6 MLD) followed by WTP backwash, Patel Mohalla pumping main and losses through valves, gates & tank filling. Energy audit shows that the average pumping efficiency of the 4 ESR/GSR pump house is only 50%. (Water & Energy Audit Draft Report 2012)

Table 13 Detailed Water Audit - NRW

<table>
<tr><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th></tr>
<tr><td rowspan="9">System input volume at source
25.36 MLD</td><td rowspan="3">Authorized Consumption (Billed & Unbilled)
20.44 MLD
(80.61%)</td><td rowspan="2">Billed Authorized consumption
20.20 MLD
(79.64%)</td><td>Billed metered consumption (Including water exported)
2.07 MLD (8.17%)</td><td rowspan="2">Revenue water (Total billed quantity)
20.20 MLD
(79.64)</td></tr>
<tr><td>Billed metered consumption
18.12 MLD (17.47%)</td></tr>
<tr><td rowspan="2">Unbilled Authorized consumption
0.246 MLD
(0.97%)</td><td>Unbilled metered consumption
Nil</td><td rowspan="8">NRW

(system input volume – Revenue Water)

5.16 MLD

(20.36%)</td></tr>
<tr><td>Unbilled un-metered consumption
0.246 MLD (0.97%)</td></tr>
<tr><td rowspan="6">Water Losses (System Input volume - Authorized Consumption)
4.92 MLD
(19.39%)</td><td rowspan="2">Apparent Losses
0.26 MLD
(1.04%)</td><td>Un-authorized consumption
0.17 MLD (0.67%)</td></tr>
<tr><td>Metering Inaccuracies
0.09 MLD (0.37%)</td></tr>
<tr><td rowspan="4">Real Losses (Water losses - Apparent Losses)
4.65 MLD
(18.35%)</td><td>Leakages from Gravity Main & Transmission Main
1.85 MLD</td></tr>
<tr><td>Leakages from WTP including Backwash
0.15 MLD</td></tr>
<tr><td>Leakages from valves, Overflow and others
0.019 MLD</td></tr>
<tr><td>Leakages observed in Distribution Network
2.63 MLD</td></tr>
<tr><td>25.36 MLD</td><td></td><td></td><td></td><td></td></tr>
</table>

Source: (Water & Energy Audit Draft Report 2012)

Proposals for improvement: As recommended after draft water & energy audit, actions recommended for PMC includes construction of intake well, new ESR, new GSR, backwash water treatment, rehabilitation of distribution network, replacement of pumps & pump

accessories, installation of flow meters and ancillary items. (Water & Energy Audit Draft Report 2012)

Efficiency in redressal of customer complaints: The efficiency of redressing customer complaints in 24 hours has gradually decreased in the 2010-11 as shown in Chart 11. PMC has a system to record complaints received and redressed. Though the system allows for monitoring and analyzing complaints on a regular basis, the records system is manually maintained and not yet computerized. The reliability of efficiency in redressal of customer complaints is A. Consumers have multiple mechanisms to register complaints (through telephone, in person, by email).

Equity in Service Delivery

Coverage in Slums: The coverage of individual water supply connections in slum HHs is zero. The slum dwellers are served only through group connections. There are 397 such group connections serving 15 slum settlements. Hence, the average ratio is approx. 7-8 HHs per group connection.

3.3 Proposed actions for water supply

The following interventions are proposed based on discussions with the Council, analysis of the key indicators and their data reliability. The proposals listed below mainly include the no-cost or low cost interventions that need to be carried out by PMC. Capacity building of the staff must also be conducted to ensure proper implementation of these interventions.

As the focus of improvement in water supply is to move towards "24X7 water supply" system, the interventions mentioned below needs to be carried out immediately by PMC to ensure the basic systems are in place. Detailed interventions which will incur capital investment by PMC are discussed in the next section (3.4)

Table 14 Low cost interventions in Water Supply Service Improvement

Categories	Interventions required
Access and Coverage	• Regularizing un-authorized connections and unbilled unmetered connection will help in increasing the coverage. • Clearing pending applications for additional connections using existing network. • Proper records should be maintained on the number of HHs dependent on Bulk water supply connection for flats etc
Service levels and quality	• Hydraulically redesign the water supply system for equitable water supply system. • Introduce flow meters at tapping points and ESRs as well as consumer end metering. • Appoint technical staffs including senior management. • Appoint meter readers once Panvel move towards 100% metering. • Increased monitoring of quality procedures and reporting

Categories	Interventions required
	• Simplifying connection application procedure.
Financial sustainability	• Once metering is in place for the entire city, the Council should incorporate telescopic rates in water supply.
Efficiency in service operations	• Reduce apparent losses through unauthorized consumption by regularizing them. • Increase complaint redressal and upgrade systematic computerized record keeping of complaints received and redressed.

3.4 Moving towards 24 X 7 water supply in Panvel

Govt. of Maharashtra's major focus in performance improvement has been the planning and implementation of 24X7 water supply system in all Class A cities in the state. PMC has submitted proposals under MSNA which will enable its progress towards 24X7 water supply system. The status of the proposal is provided in Box 1 below.

Box 1: Status of the proposal by PMC for moving towards 24x7 WS under MSNA (as on July 2012)

- WS proposal submitted by PMC under MSNA
- Rs 1.48 Crores is sanctioned by GoM
- The proposal is submitted in TS Office of MJP, Pune for technical sanction of Hydraulic modeling, GIS mapping, Consumer survey and installation of flow meters at ESR.
- PMC is in process of issuing a tender of DPR for 24x7 water supply system for the entire city.
- The Water Audit and Energy Audit of Water Supply in PMC was given to Tandon Urban Solutions and the draft report is submitted to PMC with current status and recommendations.

PMC has also initiated to provide 24x7 water supply system in pilot testing area of Pioneer Society with 5000 population. Chart 15 provides the steps PMC is taking to move towards 24x7 WS in pilot area shown in Figure 5.

Chart 15 Steps for 24x7 WS in pilot testing area

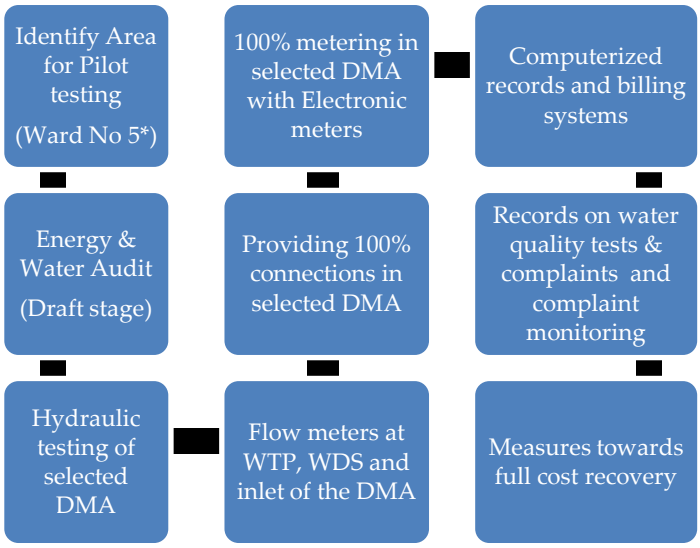
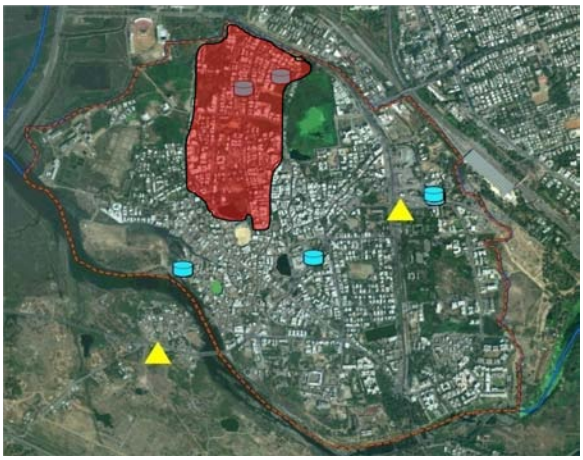


Figure 5 Identified pilot testing area



*As suggested by ULB

While steps towards achieving 24X7 water supply requires substantial efforts, certain actions related to up gradation of human resources and improved management information systems are easier to implement. The technical guidelines suggested by MoUD towards 24X7 WS systems provide an approach based on the technical, commercial and institutional improvements that are required. (MoUD, 2008)

Technical improvements:

The technical inadequacies in Panvel water supply system which may obstruct the shift towards 24x7 water supply are discussed below.

- Reliable data on distribution networks and customers do not exist;
- Pipelines comprising distribution network (32 km) is quite old which leads to leakage to the extent of 2.63 MLD;
- There is virtually no metering for the bulk water produced, its transmission or distribution at any point;
- Consumer end meters are not there for approx. 98% of connections;
- Efficiency of pumps is approx. 50% of its capacity;

Some of the technical and commercial constraints mentioned by MoUD guidelines are resolved through the implementation of GoM's reform program of MSNA. These are listed below.

Reliable data on distribution network and customers is achieved through:

1. Consumer end survey: 100% consumer survey will help in identifying and subsequent regularization of illegal connections. It will provide data on household consumption which will help in assessment of augmentation of water sources, if required.

2. GIS mapping and hydraulic modeling: GIS mapping will provide detailed network maps with results from consumer survey while hydraulic modeling will help to implement equitable distribution zones in the city.

Proposal submitted by PMC: As mentioned in the Box 1, PMC is already in the process of undertaking Consumer End survey, GIS mapping and Hydraulic modeling. PMC is waiting for a technical sanctioning of these surveys from TS Office, MJP, Pune.

Pipelines comprising distribution network (32 km) is quite old which leads to leakage to the extent of 2.63 MLD, this can be reduced through:

3. Water audit & leak detection study: PMC has recently conducted Water audit, which has helped in identification of major points of losses (real: physical and apparent) from source to consumer end in the network. Along with leak detection studies, this has helped to locate critical areas in the network. The network refurbishment and augmentation can then focus on these areas on the priority basis.
4. Rehabilitation of Distribution Network: From the leaks detected in distribution network through Water Audit & GIS mapping, rehabilitation work of distribution network can be undertaken which will help in reducing NRW by controlling real losses in the system.
5. Fixing other major & minor leakages in the complete WS system: The minor & major leakages mention in Table 13 can be reduced by repairing such points in the intake wall, gravity main, Hari Om Nagar transmission main and others.

Metering at bulk production and distribution points including consumer connections

6. Demarcation of District Metering Area (DMA)s & installation of bulk flow meters: The analysis of results generated from GIS mapping and hydraulic modeling will be used for demarcation of DMA. Once the DMAs are demarcated, bulk flow meters should be installed to monitor quantity of flow into these DMAs.
7. Consumer end metering and volumetric tariff: The reforms mentioned above related to regularization of illegal connections, implementation of recommendations from water audit and energy audit, formation of DMA, etc. will reduce the operation and maintenance expenditure. Once these reforms are in place, the city should introduce metering at consumer end and volumetric tariff to recover full O & M cost.

Efficiency of pumps is approx. 50% of its capacity

8. Energy audit and replacement of Pumps, Panels and Pump accessories: Recently, PMC has conducted Energy Audit through Tandon Urban Solutions. The report shows that Pumps are working at lower efficiency. Average pumping efficiency of New ESR pump house is 62.91%, Patel Mohalla ESR pump house is 54.77%, Old GSR pump house is 31.5% and Hari Om Nagar ESR Pump house is 48%. Head losses in pumping system, uneconomical diameter of valves in pump installations and operation of electrical equipment at low voltage and/or low power factor is leading to energy wastage.

If power factor is maintained as recommended in Energy Audit report and pumping machinery is replaced at these ESRs according to the specifications recommended, then PMC can reduce revenue loss due to penalty charges levied by MSEDCL to the extent of Rs 1.77 lakh per annum. The total saving of PMC can be increased by Rs 18.5 lakhs per annum. (Water & Energy Audit Draft Report 2012)

The capital investment required in improving the technical aspects for moving towards 24x7 water supply are provided in Table 15

Commercial improvements: Given that the technical improvements need to be financially sustainable, the conversion to 24X7 water systems requires advanced commercial systems and procedures. Along with computerized billing and collection system with updated consumer records, PMC also needs to shift from flat tariff towards volumetric tariff. With introduction of metering and volumetric tariff system, consumers will be charged based on the water quantity they consume.

The cost recovery by water supply department is extremely low but the collection efficiency of the water bill is high. Hence, telescopic approach for billing can be explored. Actions for imposing new user charges and improving the cost recovery should be given high priority by the PMC.

According to the state government recommendations, the tariff structure was worked out considering the expenditure incurred by PMC towards servicing the part of the water demand. NRW levels in the existing system are at ~20%. The revenue loss was factored in the calculations for arriving at the revised tariff. The tariff as calculated using the state government guidelines is given in the Table 12. Here the underlying assumption is 100% collection efficiency. Reduction in collection efficiency would necessitate increase in the fare structure to maintain to cost recovery to 100%. Currently, industrial and mixed residential use connections are not given in the city. Categorizing on the existing connections into the categories recommended by the state government would enable some degree of cross subsidization and bring the tariff for residential connections a bit lower. (CEPT University)

Institutional improvements: PMC has to significantly improve its managerial and technical skills to shift towards 24X7 water systems. Some of the technical aspects that will require improved skills and automation are

- Planning and design of water supply infrastructure from source to distribution/ customer for 24X7 system, including concept and establishment of DMAs.
- Restructuring of existing systems, presently operated under intermittent conditions, to continuous supply at minimal cost and simultaneously maintaining supply throughout the conversion process.
- Appropriate hydraulic models and application to planning, design and operation.
- All aspects of pressure management including specification of pressure valves

- Design and specification of flow and pressure measurement and control devices for management of continuous supply.

Hence the operational skills required to plan and implement these measures would include operation under continuous supply, pressure management, proactive detection and repair of leaks, proactive detection and regularization/ disconnection of illegal connections, mapping of water service infrastructure on GIS linked to operational, maintenance and customer services tracking. The staff at PMC needs to be augmented in order to ensure smooth functioning of the 24X7 system.

A summary of the actions and cost implications towards achieving 24X7 water systems is given below.

Table 15 Block cost estimates for 24x7 water supply

Sr No	Description	Amount (in Crores)
1	Work proposed under Water Audit Study	
a	Consumer metering	15.09
b	Intake well	0.25
c	Construction of New ESR	0.66
d	Backwash Water Treatment	0.10
e	Construction of New GSR	0.43
f	Rehabilitation of distribution network	4.28
2	Work proposed under Energy Audit Study	
a	Replacement of Pumps & Panels	1.32
b	Pump accessories	0.27
3	Flow meters & ancillary items	0.81
4	Dosing system	0.30
5	Hydraulic Modeling	0.28
6	GIS Mapping & Consumer Survey	0.34
7	Billing and recovery software	0.10
	Total	24.23
	Contingencies 3%	0.72
	Administrative charges 0.5%	0.12
	Grand Total	25.07
Source: (Water & Energy Audit Draft Report 2012)		

Photo Plate 4 Sanitation and sewerage in Panvel

Photo Plate 5 MSWM in Panvel

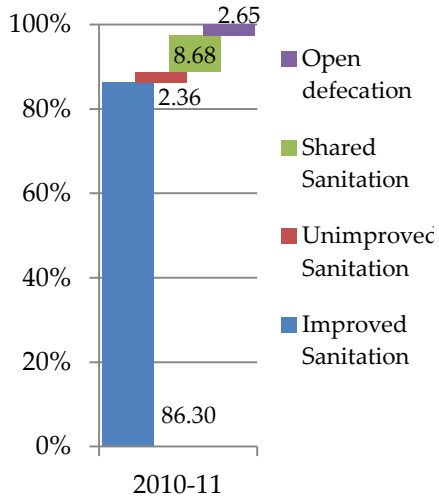
4. ASSESSMENT AND PROPOSALS FOR SANITATION

This section captures the sanitation aspects in Panvel related to coverage of toilets in the city as well as services in the slums, Septage management, and impact of the ongoing sewerage network project and a summary of proposed interventions for improving sanitation in the city.

4.1 Coverage of toilets

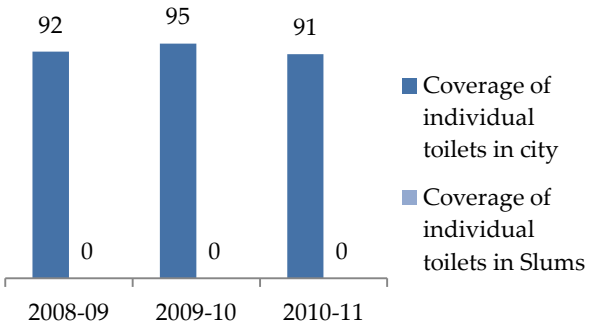
As per the recent figures from census 2011, 88.67% of the households in Panvel have access to latrine facilities within premises and are connected to pipe sewer, septic tank and ventilated improved pit latrine. Around 8.68% of the Households depend on shared sanitation. However, 2.65% of households do not have access to any sanitation (improved/shared/unimproved) and thus resort to open defecation. But the number of Households taken in Census is 42466 which is including CIDCO area. The number of Households in PMC area out of this is only 28319. (CENSUS, 2011)

Chart 16 Access to sanitation in Panvel (CENSUS, 2011)



As reported by PMC, the coverage of toilets in PMC has decreased in 2010-11 to 91% from 95% in 2009-10(CEPT University, 2009 - 2011). This accounts for safe sanitation implying latrine facilities within premises and connected to pipe sewer, septic tank and ventilated improved pit latrine as well as shared sanitation for both residential and non-residential properties. However, coverage of households with individual toilets in slums is zero. The slum population in PMC is dependent on community toilets and pay-&-use toilets.

Chart 17 Coverage of toilets in city and Slums

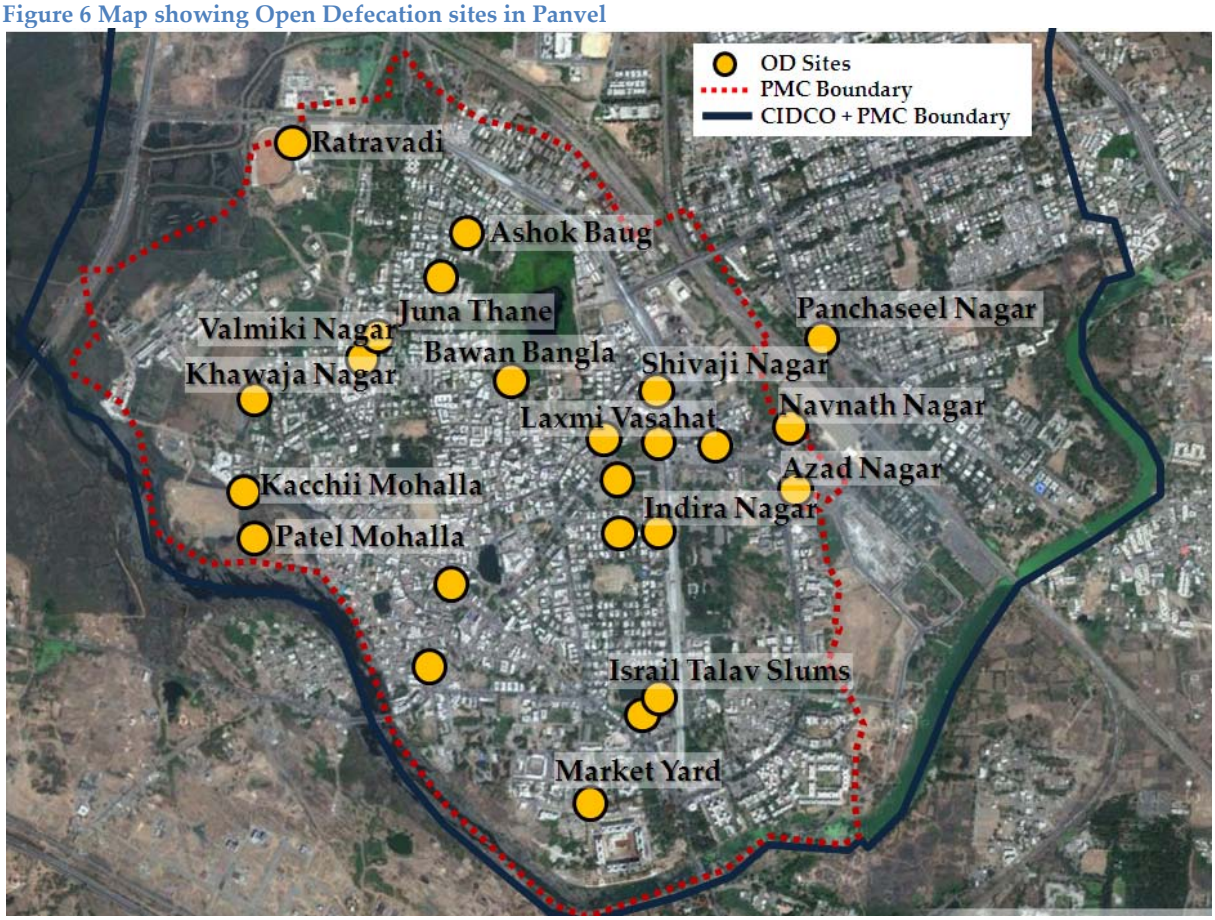


Source: (CEPT University, 2009 - 2011)

According to survey conducted by Society for Training Area Resources (STAR) NGO, there are total 68 public toilets blocks in Panvel with 376 seats; out of which only 273 seats are functional.

PMC has constructed 84 Pay & Use toilet seats under MMR Abhiyan sanitary project funding from 2008 onwards. The toilet blocks are G+2 RCC framed structure with all allied works by NGO. The toilets are maintained by community itself who uses it. They have

Figure 6 Map showing Open Defecation sites in Panvel



provided a person to maintain it. Lodging for him is provided within the toilet block. User can use these Pay & Use toilets through monthly passes.

PMC has also constructed some pay & use toilet blocks under own funding. The O&M of these blocks has been contracted to a private operator. User can use these Pay & Use toilets through monthly passes. These blocks are 100% functional but water availability is limited. Issues regarding cleanliness within and surroundings the block is the area of concern.

During the visit, a few open defecation sites were also identified in the city. Most of these sites are near the slum settlements. Figure 6 provides the open defecation sites in PMC. As per the survey conducted on community and pay & use toilets by STAR NGO in Panvel, the surveyed population was 33855. The slum population out of this is 10947 while remaining is from the chawls which do not have individual toilets and are dependent primarily on community and pay & use toilets. It was observed have access to toilets. This gap in coverage and access to individual as well as community toilets leads to open defecation in Panvel. Approx. 22935 people resort to open defecation.

Table 16 Estimated population resorting to open Defecation

Description	Number
Total population	111906
Surveyed Population (by STAR)	33855
Slum Population	10947
Slum HH with Individual Toilets	0
Percent of population with no individual toilets to total population	30.25%
Total number of Toilet Seats in Community/Public toilet	376
Total number of Toilet Seats in Community/Public toilet - Functional	273
Estimated Population with access to Community Toilets i.e. 40/seat (=273*40)	10920
Estimated Population resorting to OD (=33855-10920)	22935
Percent of population resorting to OD to total population (=22935*100/111906)	20.49%

4.2 Moving towards Open Defecation Free Panvel

Given that Govt. of Maharashtra's major focus in urban sanitation has been towards **'making cities Open Defecation Free',** the performance improvement plan in sanitation for PMC has concentrated on the covering the gap in toilet coverage, and related components (like IEC, awareness campaigns, etc.).

Based on the above analysis, various options have been worked out for provision of individual toilets, group and community toilets where constraints for providing individual toilets exist, and construction of additional community toilets with refurbishment of existing ones wherever required.

- **Option 1 is to keep the existing community toilets and provide new community toilets serving 40 persons per seat.**
    - PMC can ensure ODF through provision of additional community toilets and refurbishing existing 103 Non-functional community toilets. Under this scenario, PMC will have to construct 470 new community toilet seats. Assuming cost of Rs 65000 per seat, the total cost works out to be Rs 3.21 Crores.
- **Option 2 is to keep the existing community toilets and provide group toilets with 5 HH/seat i.e. 25 persons per seat**
    - According to this option, along with refurbishing existing 103 Non-functional community toilets, PMC can go for group toilet seats among groups of 5 HHs. PMC will have to construct 753 group toilet seats at Rs 40000 per seat. The total cost works out to be Rs 3.16 Crores.
- **Option 3 is to provide individual toilets to all households and not use community toilets**
    - PMC can alternatively look for the option of ODF through provision of individual toilets to all the HHs without depending on community toilets. In

this scenario, PMC has to construct approx. 4587 individual toilets at an average cost of Rs 15000 per toilet. The total cost works out to be Rs 7.22 Crores.

Table 17 Summary of options to make PMC ODF city

	Scenario 1	Scenario 2	Scenario 3
Total number of community	376	376	376
Total number of community-Functional	273	273	273
Total number of community-Non-functional	103	103	103
Estimated Population resorting to OD	22935	22935	22935
Estimated population catered after refurbishing Non-functional community Toilet seats	4120	4120	0
Remaining OD Population	18815	18815	22935
Gap/ number of new toilet seats required	470	753	4587
	40 persons/seat	5 HHs/seat	1 HH/seat
Cost (Rs/seat)	65000	40000	15000
Expenditure (in Cr)	3.06	3.01	6.88
IEC Activities at 5% of construction cost (in Cr)	0.15	0.15	0.34
Total Cost (in Cr)	**3.21**	**3.16**	**7.22**

Note: Cost of septic tank is not considered as project under UIDSSMT to provide underground sewage network is under process

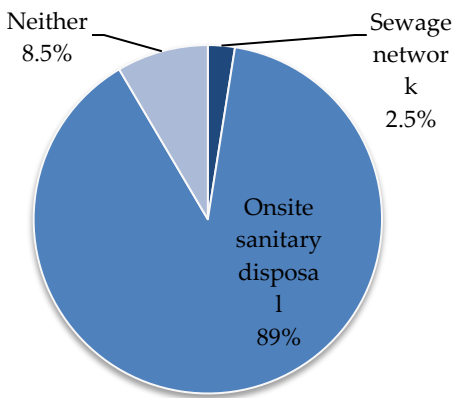
**Total population without individual toilets is considered*

As the slums are Non-notified settlements and due to space constraints, individual toilets as discussed in Option 3 cannot be explored. Though as discussed in Option 1, PMC can make Panvel ODF by constructing 470 new community toilet seats, but its O&M will again be an issue.

Option 2 is more appropriate for Panvel, the existing 273 functional community toilet seats and other 103 non functional community toilet seats (which can be refurnished) can cater this slum OD population. The remaining non-slum OD population can be catered by providing group toilets as one seat per 5 HHs. The O&M in such toilets is not a concern as the users of the toilets can be given the responsibility of O&M. STAR NGO is working out on the options of carving out spaces for group toilets blocks with 4 seats/ 6 seats/8 seats/10 seats/12 seats/16 seats as per land available in respective areas. PMC can construct around 753 such group toilet seats to make Panvel open defecation free.

Awareness Campaigns: The Council must also simultaneously undertake community mobilization and awareness campaigns in order to ensure that the community toilet blocks are maintained / managed properly. Campaigns to bring about awareness related to cleanliness and hygiene practices, safe sanitation practices, and negative health impacts due to open defecation needs to be conducted by the Council. The campaigns should begin by triggering initiation in the slum settlements through awareness on the cleanliness of community / group / individual toilets and their surroundings. Awareness should also be created by undertaking transect walk to the open defecation sites to highlight the impacts of unhygienic conditions on human health and its consequences. The campaigns should also target on changing the mindset and behavioral pattern of people defecating in open and encourage them to use community/ group/ individual toilets.

Chart 18 Breakup of sanitation system in PMC



Source: (CEPT University, 2009 - 2011)

4.3 Septage and sullage management

At present only 2.5% properties are connected to existing sewerage network. Approx. 89% properties have onsite sanitary disposal like septic tanks, etc and remaining has no improved sanitation disposal system. Underground drainage facility is partially available in ward no 13, 15, 18, 19, 20, 21, 22 and 23.

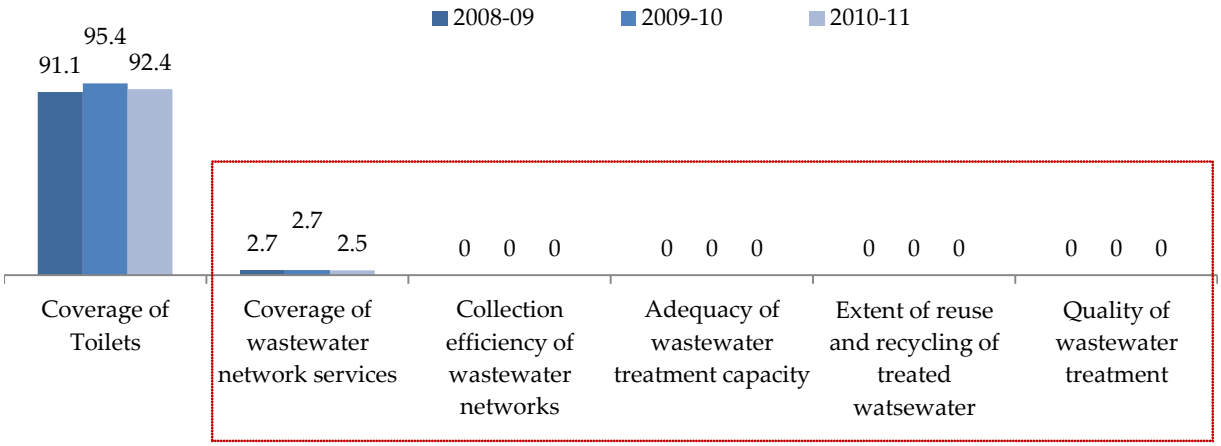
Sewage network: PMC has an old sewerage system and sewage treatment and disposal facility. The scheme was constructed in the year 1973 to serve the population of 30000 with flow of 3.375 MLD. The total length of RCC sewer is 9.5 Km and diameters are 150, 225 and 300 mm. There are approx. 300 manholes constructed on these sewer lines. All sewage (approx. 3.75 MLD) is collected at the sump well located in Patel Mohalla. Peak flows are between 8.30 am to 12 pm and 6.30 pm to 9 pm. For pumping the sewage, 20 HP (1 no) and 7.5 HP (2 nos) pumps are being used.

Collection of septage: PMC and private agencies both provide service for cleaning septic tank in Panvel. PMC empties around 450 septic tanks annually. The charges for empting the septic tank within city limits and outside the city limits are Rs 1000 and Rs 2500 respectively.

Treatment/Disposal: Length of RCC raising main is 2.4 km and dia. 375 mm. The Sewage Treatment plant is located on Uran-Panvel road in Chichpade village. Though two oxidation ditches and four aerated lagoons were constructed, it is not functional due to strong oppose from the villagers. At present, the sewage collected from the sewer network sump well is pumped and directly disposed off in Panvel creek without treatment. The KPIs of sewage network connection, collection and treatment in PMC is provided in Chart 18. PMC doesn't

have facility to treat the Septage collected from the septic tanks. The Septage is collected from septic tanks and is disposed in the open dumps outside the city.

Chart 19 Waste water network KPIs of Panvel



Source: (CEPT University, 2009 - 2011)

Strom water drainage network: Total pucca covered drains in PMC area is around 10 kms which is 20% of the road network. The length of open drain is around 71.5 kms, which covers around 60% area of PMC. As Panvel has heavy rainfall, there are problems related to draining off the rainwater and septic tank effluent. This leads to water logged areas and odour problems causing health hazards in the vicinity.

Proposals for Improvement: Though PMC has ongoing UIDSSMT project for underground sewage network, PMC needs to undertake initiatives to ensure implementation of a proper Septage management plan for areas having septic tanks. Septage management is required till the UIDSSMT project is not completed and fully functional. The project is ~ 50% completed (July 2012 status). It will also be required in the areas which will not be covered under the UIDSSMT project.

Govt. of India's Draft of Advisory on Septage Management in Indian cities (MoUD, 2011) further states that pumping programs that focus on routine inspection and pumping when required (rather than mandated periodic pumping) are most efficient. This is because households generate varying volumes of sludge at different rates. It also mentions that prior to sending the trucks for de-sludging, the service provider (local government/private operator) can consider sending an inspection crew to inform the residents of such activity, locate manholes and access points, and probe tanks to determine level of accumulated sludge. One simple means of gauging sludge depths is by using a probe on a long handle and submerge into the tank. The policy states that the standard practice in India is to de-sludge every two years or so. Community run programs such as distribution of flyers about proper care and maintenance of septic tanks would also help build awareness among people. Some of the aspects that the Septage Management Plan should undertake include:

- **Manual of Practice:** Listing operation procedures for specific equipment and documenting day to day procedures

- **Record keeping and manifests:** Maintain accurate records related to septic tanks and volume pumped for billing and compliance purposes. These records should specify location or address of the pumped septic tank, Septage characteristics (residential/commercial), details of property owner, volume of Septage pumped, any other details like deficiencies in piping/ manholes, etc.

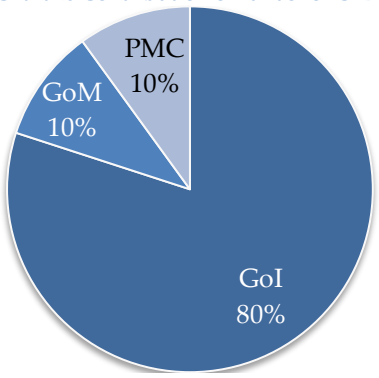
Record keeping is an important part of the monitoring aspect as it allows the local government to keep track of the service it provides.

Improvement in Monitoring: The Septage management plan will include estimation of Septage generated in the city, increased provision of public services to cater safe disposal of Septage, encourage private operators and community based organizations to provide services like emptying of septic tanks, monitor emptying and tracking operator activities, and provide health and safety guidelines for the operators (MoUD, 2011). The Council will need to regularly monitor the effluent and dried Septage quality. Additionally, the state government on its part needs to ensure that the current policies are amended to support and require local governments to improve sanitation, reorganize and clarify institutional roles and responsibilities.

4.4 Ongoing sewerage project under UIDSSMT

The underground drainage scheme for Panvel city is proposed under UIDSSMT Programme. The project was proposed considering 2010 year as the year of commissioning of the scheme and with a 30 years horizon for the estimated population of 172756 in 2040. Considering the topography, levels and slopes the city is divided into two drainage districts. Figure 7 and Figure 8 provides the details of the sewage system and UIDSSMT project.

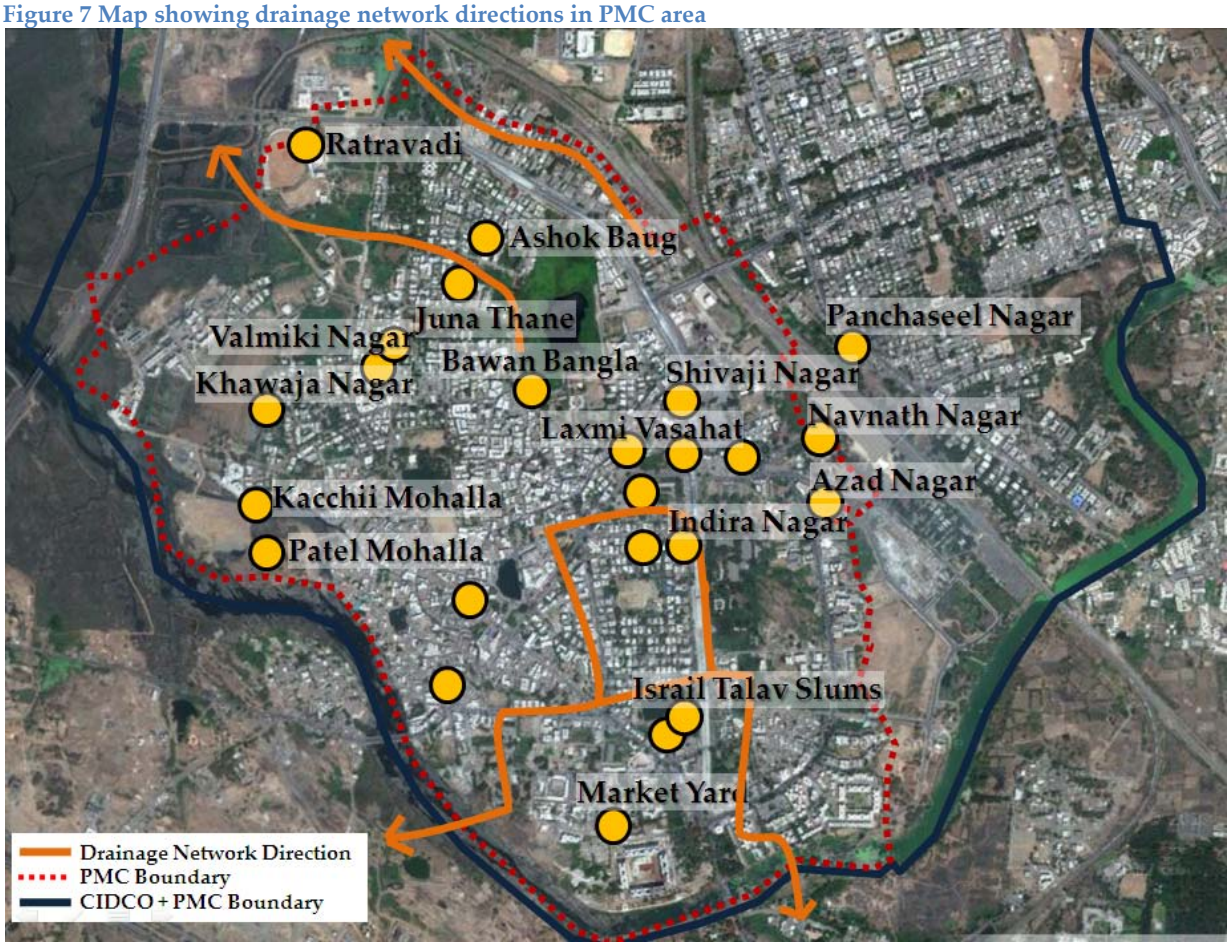
Chart 20 Contribution of funds for UIDSSMT project



Source: (UIDSSMT-DPR)

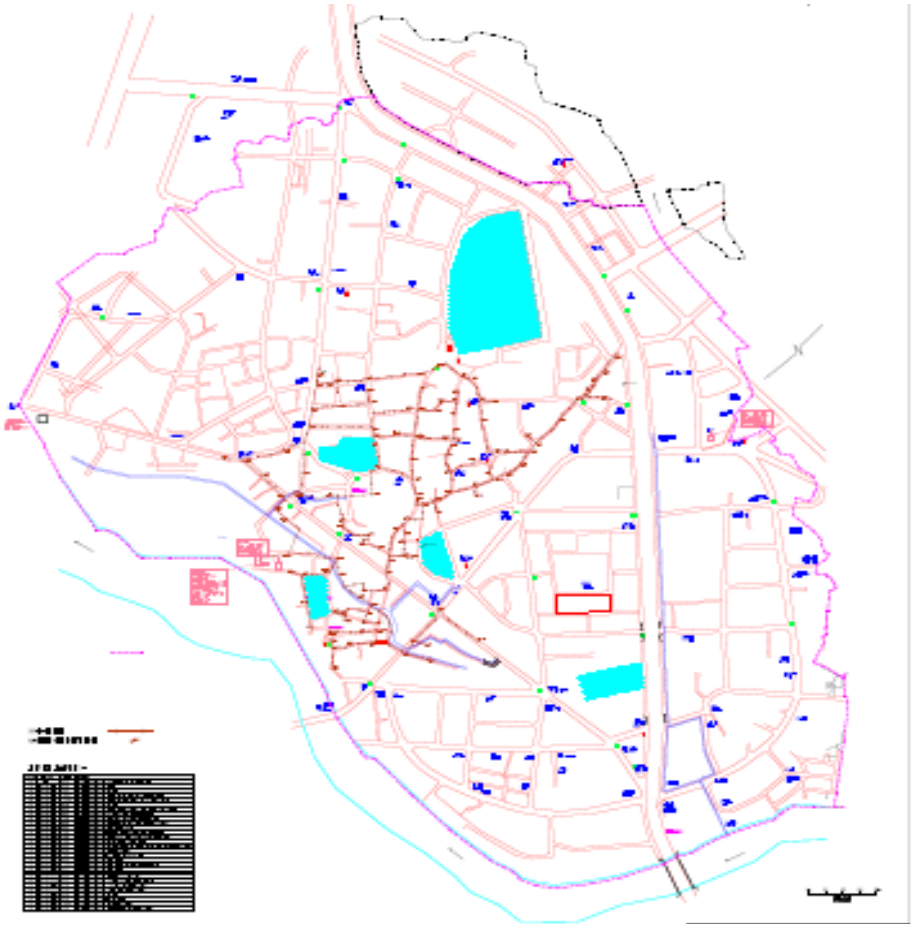
The total length of the proposed collection system is 45.289 km with dia. ranging from 150 to 1000 mm RCC pipes. The length of the collection system in Drainage District I and II is 23.348 km and 21.941 km respectively. From these two drainage districts sewage flow will be conveyed to sump by gravity. The sewage collected in the sump will be pumped to sewage treatment plant of capacity 22 MLD (for intermediate stage 2025). The pumping machinery comprises pumps of 60 HP (2 nos) and 120 HP (3 nos). Looking to the space constraint in the city and to optimize the power consumption in STP process, cyclic activated sludge process plant is proposed. The effluent from the plant will be disposed in the Gadhi River and some part can be used by construction industry and municipal gardens. (UIDSSMT-DPR)

Figure 7 Map showing drainage network directions in PMC area



The total cost of the project is approx. Rs. 37 Crores. The fund sources for the project are provided in Chart 20. Govt. of India is contributing Rs 29.61 Crores, Govt. of Maharashtra is contributing Rs 3.7 Crores while PMC has resolved to provide its contribution and set aside Rs 3.7 Crores for the project.

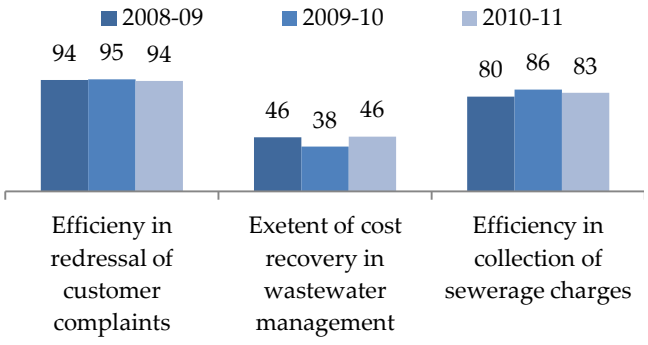
Figure 8 Proposed underground drainage network for Panvel



O&M and cost recovery: Currently Chart 21 provides the waste water KPIs related to financial stability and service efficiency in Panvel. The extent of cost recovery is only 46% while its collection efficiency is high at 83%.

PMC will have to bear electricity charges at pumping stations after the execution of the scheme and have to provide some labour for day to day maintenance of sewer line as well as additional staff for Septage management. For this PMC will have to impose appropriate user charges to cope up with additional expenses to achieve 100% cost recovery in waste water sector.

Chart 21 Financial stability and service efficiency KPIs of WW



Source: (CEPT University, 2009 - 2011)

4.5 Summary of proposed actions

The following interventions are proposed based on discussions with the Council, and analysis of the key indicators and their data reliability. The proposal listed below to make PMC open defecation free is based on experiences and constraints faced in current management of toilet options. Extensive awareness campaigns must also be conducted to ensure achievement of being open defecation free.

Option of group and community toilets is considered here to make PMC Open defecation free City. After a detailed ground level survey and availability of space, group toilets can be constructed. However, where space is a major constraint, construction of community toilets can be opted. PMC also has to prepare a Septage Management Plan to ensure safe and proper disposal of Septage and streamline its operations.

Table 18 Summary of improvement actions for Sanitation in PMC

Activity	Status/ Next steps	Description
Strategies for ODF	Preparation of DPR	Provision of group and community toilets
	IEC Campaigns	Undertake IEC activities Undertake transect walk to the open defecation site Targeting for the change in the mindset and behavioural pattern of the people.
Strategies for Sept Management	Preparation of Septage Management Plan DPR	Preparation of Septage Management Plan for the city till the UIDSSMT underground drainage system project is not completed and fully functional. Preparation of Septage Management Plan for the areas which are not included in the UIDSSMT project and for the new properties which will be added later Systematic implementation of comprehensive Septage management plan.
	Human & material resource improvement procurement	Need to improve the fleet capacity for inspection facilities and efficient working of the Septage management. Filling of the vacant sanctioned seats in the department Procurement of machinery and resources as per the requirement of the Septage management plan.

5. SUMMARY OF PERFORMANCE IMPROVEMENT PLAN FOR PANVEL

This section provides summary of all the improvement actions for water supply and sanitation, including costs of implementing these actions. The section also gives insight into the policy as well as institutional implications along with the phasing of the improvements that have been proposed.

5.1 Summary of proposals

The proposals summarized below are focused on two key areas of establishing 24X7 water supply system and moving towards open defecation free PMC, as well as improvements in key processes and operations related to these two focal areas. The completion of underground drainage system is almost half done; certain process related improvements in sewerage are also suggested. Considering the current experiences, availability of space and capacity of PMC, improvements are considered for both group as well as community toilet provision for coverage of toilets in the city.

Table 19 Summary of Performance Improvement Plan for PMC

Key actions for improvement	Costs required	Current status
Water supply: towards 24X7 system		
Planning and implementation of 24X7 for entire city	Rs. 25.07 Crores (Table 15)	Awaiting technical sanction of TS officer, MJP for Hydraulic modelling, GIS mapping, Consumer survey and installation of flow meters at ESRs
		Water audit and energy audit has been completed
		PMC is in the process of tendering DPR for 24x7 water supply for the city once the technical sanction as mentioned above is done.
Sanitation: towards OD free		
Construction of group and community toilets (including IEC costs)	Rs. 3.16 Crores (Table 17)	Preparation of DPR is required
Total cost of PIP	**Rs. 28.23 Crores**	

Based on the analysis of the water and sanitation sectors in Panvel, the Performance Improvement Plan for PMC will cost around Rs. 28.23 Crores.

PMC also has to undertake improvement actions related to processes followed in the water supply and sanitation operations. These actions being no or low cost can be immediately taken up by the Council. These include

- Regularizing un-authorized connection
- Revision of 'new connection' format
- IEC campaigns

- Appoint technical staffs
- Periodic surveys at source, treatment and consumer end
- Proper sampling regimen for monitoring water quality
- Regular surveys through zonal sanitary inspectors
- Levy telescopic rates for water supply, drainage tax, and improve collection efficiency of sanitation tax
- Implementation of Septage Management Plan
- Increase complaint redressal system with systematic computerized record keeping of complaints received and redressed.

5.2 Phasing and steps to improvement

PMC has to improve its current financial position in order to carry out the improvements suggested above. The suggestions for improvement are based on analysis of the Business-as-usual (BAU) and interventions required to improve the BAU scenario.

Investment capacity in BAU scenario: The BAU scenario is based on the hypothesis that the past trends in key financials of the PMC would continue in the future. To arrive at the investible surplus in the this scenario, calculations are based on

1. Revenue surplus/deficit other than WSS,
2. Net surplus after capital receipt and expenditure,
3. Investible surplus (Net surplus + revenue related to WSS – revenue expenditure related to WSS).

Table 20 provides the investment capacity of PMC in business-as-usual scenario projected till 2021. From the assessment it was observed that currently PMC does not have an investible surplus to consider improvements in the performance of service delivery. Considering the current scheme of things i.e. BAU scenario, PMC would be able manage an investible surplus only by 2015.

Table 20 Projected investment capacity of PMC – Business-as-usual scenario (in Rs. Crores)

Year	Revenue surplus (other than WS, WW and SWM)	Revenue surplus for WS, WW and SWM	Debt servicing	Committed and routine CapEx	Investible surplus/ (need for external funds)
Budgeted					
2010-11	16.27	-12.42	-	-13.93	-10.08
2011-12	14.71	-13.00	-	-7.44	-5.73
Estimated					
2012-13	14.88	-13.32	-	7.66	9.22
2013-14	15.03	-13.64	-	7.77	9.15
2014-15	15.16	-13.98	-	7.45	8.63
2015-16	15.27	-14.31	-	7.08	8.04
2016-17	15.35	-14.65	-	6.66	7.36
2017-18	15.41	-14.99	-	6.19	6.60

2018-19	15.43	-15.34	-	5.65	5.74
2019-20	15.42	-14.22	-	5.05	6.24
2020-21	15.36	-14.45	-	4.37	5.29
2021-22	15.27	-14.66	-	3.62	4.23

Considering the decreasing revenue surplus, PMC should undertake revenue enhancement measures at priority to be able to invest in service performance improvement otherwise it would need to resort to external resources to fund its internal operations as well. Some of the steps that can be potentially taken to increase revenue are discussed in Annex 4, these actions do not require capital investments for implementations and need only process changes. The key points are as follows:

- Improve cost recovery of water supply department
- Levy solid waste management tax through property tax
- Revision of tariff of all municipal services on an yearly basis

With the business-as-usual scenario as provided in Table 20, the ULB doesn't have enough surplus; hence Performance improvement actions can be undertaken immediately only through assistance in the form of grants. But after implementation of the above mentioned improvements (Annex 4), significant improvement in investible surplus is observed. Eventually, PMC would be in a position to invest in required improvements by as early as 2013. This would enable PMC to fund their performance improvement actions from their surplus itself.

The PIP improvements for PMC have been proposed in 2 phases:

- Phase I: Immediate interventions (2013-2014)
- Phase II: Long Term Interventions (from 2015-2018)

Phase 1: Immediate interventions (from 2013 - 2014):

- The interventions mentioned above to augment revenue as well as process improvements which don't require capital investment are proposed to begin in early stage of this phase. This will include interventions such as improving reliability of information through better formats, surveys, etc as well as initiatives such as increasing collection efficiency of charges, introducing drainage tax, etc.

Once the revenue augmentation measures and process improvements are in place, it is proposed that PMC can begin its capital intensive projects in Phase II.

- **Water Supply:** PMC can complete the required activities like consumer surveys, GIS mapping, Hydraulic modelling, etc which are ongoing projects to move towards 24x7 water supply by 2013. In 2013-14, PMC can initiate refurbishment of water supply distribution network and creation of pilot DMAs. PMC should also install bulk flow

meters and consumer end meters to all connections by 2014, so that PMC can levy telescopic rates in water supply to achieve better cost recovery from 2014 onwards.

- **Community toilets:** The common issue observed in existing community toilets was operation and maintenance of these blocks. Before starting construction of new group toilet blocks, it is recommended that the council should first refurbish the existing functional and non-functional community toilets by 2014.
- Currently the O&M of Pay & Use toilets in PMC is contracted out to private operators. The condition in Pay & Use toilets is comparatively better than those of community toilets. Hence for the O&M of the community toilets similar arrangements with CBOs can be explored. Campaigns to bring awareness related to cleanliness and hygiene practices, safe sanitation practices and the negative health impacts due to open defecation needs to be conducted by the Council. The campaigns should begin by triggering initiation in the slum settlements and undertaking transect walk to the open defecation sites to highlight the above issues.

Table 21 Phase 1 of PIP for PMC (2013-2014) and Phase 2 (2015-2018)

Proposed improvement areas	2013	2014	2015	2016	2017	2018
Water Supply						
Regularizing un-authorized connection						
Revision of 'new connection' format						
Appoint technical staffs						
Periodic surveys at source, treatment and consumer end						
Proper sampling regimen for monitoring water quality						
Conduct consumer survey for entire city						
Undertake hydraulic modeling for the entire water supply network						
Installation of bulk flow meters and meters at consumer end						
Distribution network augmentation: creation of pilot DMAs						
Levy telescopic rates for water supply						
24x7 Water supply system for the city						
Sanitation (including sewerage)						
Regular surveys through zone sanitary inspectors						
Introducing drainage tax, environmental tax in property tax, and collection efficiency of charges						
Preparation of Septage Management Plan						
Implementation of Septage Management Plan						
Refurbish existing community toilets						
Preparation of DPR for ODF						
Improve cost recovery and collection efficiency of sanitation tax						
Towards OD Free through provision of group toilets (inclu. IEC costs)						

Phase 2: Long term interventions (from 2015 - 2018)

Once the above measures of Phase 1 are in place, PMC can begin implementation of 24X7 for the entire city from 2015. Similarly in Sanitation, once the surveys, refurbishing existing

community toilets, Preparation of Septage Management Plan and Preparation of DPR for ODF is done in Phase I, PMC can start with implementation of Septage Management Plan and construction of new group toilets.

Group Toilets: As individual toilets option is not feasible due to space constraints in slums and chawls of PMC hence group toilets option is suggested along with community toilets. It is also important to undertake detailed on ground survey of slums and chawls to carve out spaces for group toilets. This survey will help in planning and designing required number of seats (4/6/8/10/12) as per the area available.

As discussed earlier, PMC can generate substantial amount of surplus after taking steps for potential increase in revenue. Table 22 provides the details of sources of revenue to fund 24x7 water supply and ODF city.

Table 22 Sources of revenue to fund 24X7 water supply and ODF in PMC (in Rs. Crores)

Performance Improvement Actions	2015	2016	2017	2018
Implementation of 24X7 system for PMC	6.26	6.26	6.26	6.26
Open Defecation Free City	1.58	1.58		
Investible surplus after increasing the revenue	11.23	10.71	10.12	9.44
External funds required	No external funding required			
Reference from Table 19 and Table 21				

5.3 Institutional imperatives to achieving proposed improvements

In order to realise the targets set for improving water supply and sanitation in PMC, the existing institutional framework must be enhanced to enable better operation and management of these services. While in certain areas, it is the lack of a defined policy restricting provision of services, in other instances it is the improper regulation of the existing policies. PMC has to focus its attention on improving policies related to services, financial sustainability, and accountability to the consumers.

Augment staff at PMC: PMC needs to augment its staff as major percentage of the staff comprises non-technical personnel. Across all sectors, PMC require senior management staff for efficient working of these services.

Mobilisation of external support: Additionally, PMC needs to mobilise external support through NGOs and CBOs in project formulation and implementation, especially related to services of water supply and sanitation in slums. Given that the implementation of proposals related to 24X7 WS requires high technical skills, PMC needs to also bring external support through Project Management Consultants. Arrangements should be made with Project Management Consultants for continued support throughout implementation of the 24X7 project, both immediate and long term.

A summary of the institutional reforms that PMC needs to undertake are given below.

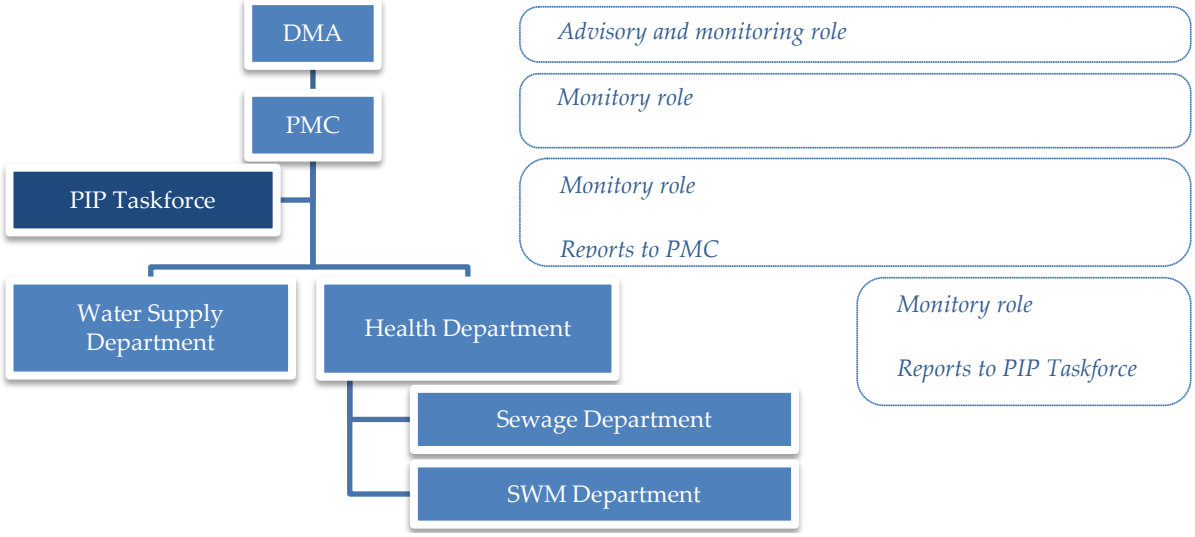
Table 23 Institutional improvements proposed for PMC

Area of improvement	Suggested improvements
Across all sectors	
Human resource management	PMC needs to augment its technical staff in view of proposed projects like 24X7 water supply system and open defecation free PMC.
Equity in service delivery	Introduce policy to improve water supply and sanitation services to slum settlements, as well as un-served areas of the city. Reform institutional arrangements to target and monitor improvement of services in slum settlements.
Financial sustainability	Increase in water supply tariffs, provisions to introduce tariff for SWM and Septage management as per Septage management plan.
Consumer redressal system	PMC to maintain records of customer complaints and redressal for all the services and gradually shift to computerised system.

The Council has to also form a PIP taskforce in order to ensure proper implementation of the proposed projects. This is discussed below.

Constitution of the PIP taskforce: The first step towards implementation of the proposed projects is to constitute a PIP taskforce. The taskforce should comprise managerial and technical staff from water supply and sanitation department. This can also include resource persons with experience in implementing continuous water supply systems as this involves advanced technical skills. The Council must legally mandate the PIP taskforce with implementing the proposed projects. Appropriate budget provisions should be made to properly manage the taskforce. The responsibilities of the taskforce will include quarterly progress updates to Chief Officer and General Body, and annual progress reports to the Urban Development Department (UDD). A broad schematic chart of the institutional structure is shown Chart 22.

Chart 22 Institutional structure for PIP implementation

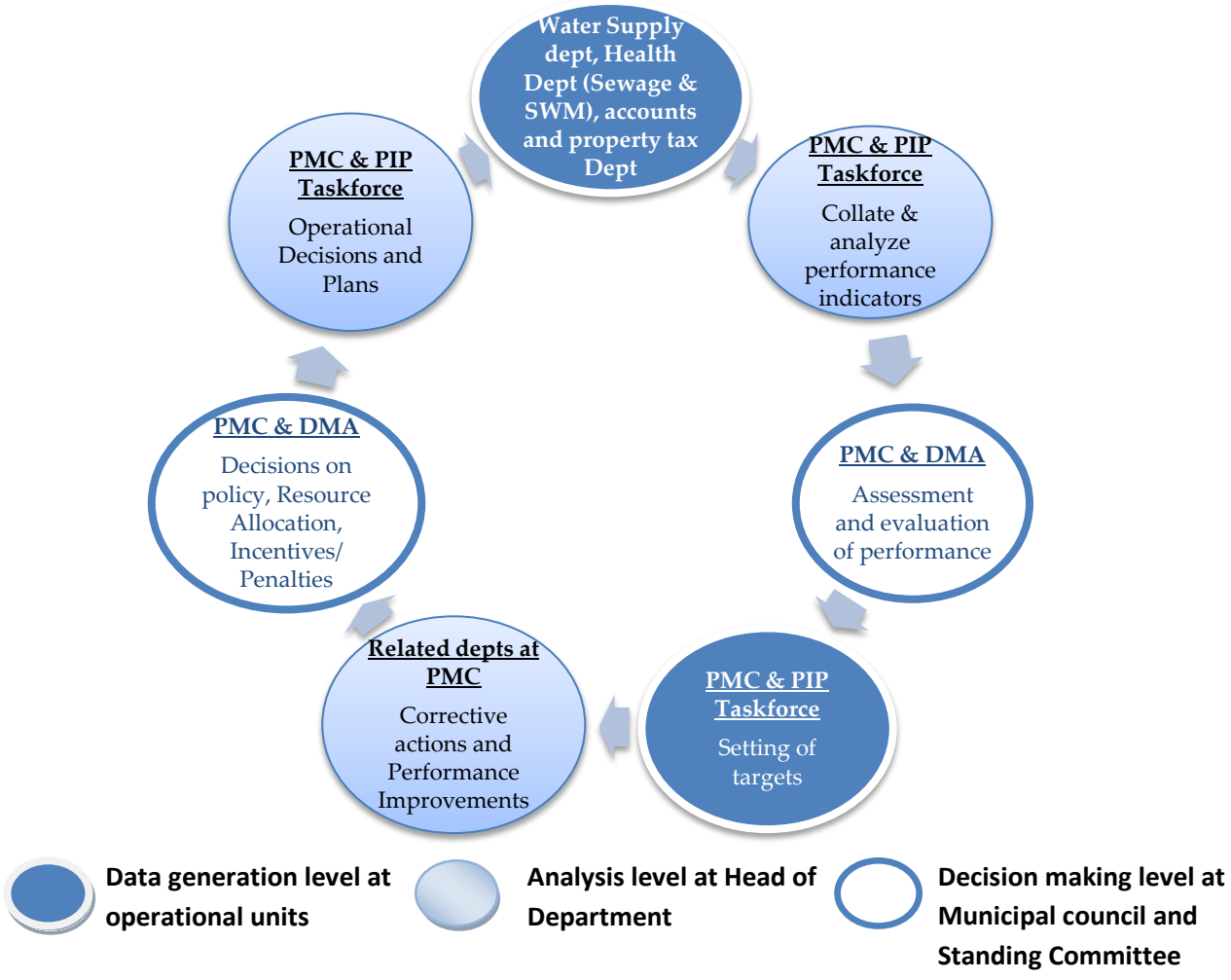


Performance monitoring through regular setting of targets and use of performance indicators: In order to ensure that PMC is able to achieve the performance improvement proposals outlined above, it is necessary that it has a well structured monitoring framework in place. The monitoring aspects will include

- Timely data capture and analysis of performance indicators
- Assessment and evaluation of the progress
- Setting of targets and corrective action if required
- Decisions on policy, resource allocation and incentives/ penalties
- Operational decisions and plans

As the performance improvement proposals are phased from 2013 till 2023, it is necessary for PMC to ensure that through the above process, the targets set for each year is achieved and if required corrective measures need to be incorporated. This will be possible only if the information related to performance indicators are updated and analysed regularly. Similarly, policies to provide incentives and penalties based on their performance needs to be implemented. A possible performance monitoring framework is suggested below.

Chart 23 Performance monitoring framework proposed for PMC. *Adapted from MoUD*



website: http://www.urbanindia.nic.in/programme/uwss/slb/slb.htm

References

(2012). Panvel: Assessment of Municipal Finances. Draft Report for PAS Project. CEPT University [Report] / auth. CRISIL Advisory Services.

Advisory on Septage Management in Indian Cities: National Urban Sanitation Policy [Online] / auth. MoUD // Ministry of Urban Development, Govt. of India. - 2011. - June 2012. - http://www.urbanindia.nic.in/programme/uwss/slb/SeptageMgmtAdvMay20.pdf.

City Level Checklist. Performance Assessment Systems for Urban Water Supply and Sanitation for Maharashtra / auth. CEPT University. - [s.l.] : Mimeo, 2009 - 2011.

Guidance Notes for Continuous Water Supply (24-7 supply). A Guide to Project Preparation, Implementation and Appraisal [Report] / auth. MoUD. - [s.l.] : MoUD, 2008.

PMC Budget / auth. Panvel Municipal council Budgets. - 2005-06 to 2011-12.

Service Level Benchmarks [Online] / auth. MoUD // Ministry of Urban Development. Government of India. Web site. - 2010. - June 2012. - http://www.urbanindia.nic.in/programme/uwss/slb/slb.htm.

Settlement Level Checklist. Performance Assessment Systems for Urban Water Supply and Sanitation for Maharashtra / auth. CEPT University. - [s.l.] : Mimeo, 2011.

Underground Sewerage Network in Panvel DPR [Book] / auth. UIDSSMT-DPR.

WaterAudit, Energy Audit and leak detection of Water Supply System in PMC (Draft) [Book] / auth. Water Audit Tandon Uraban Solutions.

Annexes

Annex 1 Details of Transmission mains

Sr No	Type	From-To	Pipeline Description
1	PW Rising Main - 1	PW Sump to Hari Om Nagar ESR	350 mm dia, 1 Km length
2	PW Rising Main – 2	PW Sump to New ESR @ WTP	350 mm dia, 30 m length
3	PW Rising Main – 3(B)	PW Sump to Old ESR @ WTP	350 mm dia 30 m length
4	PW Rising Main – 3(A)	PW Sump to Patel Mohalla ESR	350 mm dia 3 km length

Annex 2 Zones of water distribution

Zone No.	Covered Area
1	Hari Om Nagar, Pioneer Soc., Lokhandi Pada, Valmiki Nagar, Thana Naka Road, Bushira Park, Total Sai Nagar, HOC Colony, Govt Residence, Nandnavan Soc
2	Takka Area, Middle Class Housing Soc., Godrej, Lokmanya Nagar, Vibhaki Naka, Shiv Shambho Hotel Part
3(A)	Pada Mohalla, Kachchi Mohalla, Koliwada (Half Area), Vani Aali, Bandar Road, Bavanna Bungalow, Kinara Soc., Rohidas Nagar
3(B)	Laeen Aali, Shivaji Road, Kapad Galli, Ambedkar Road, Tapal Naka, Momeen Pada, Patel Park
4	Uran Road, Fish Market Area Of PMC

Annex 3 Revenue income and expenditure for water supply system (in Rs Crores)

Budget Head	2005-06 (A)	2006-07 (A)	2007-08 (A)	2008-09 (A)	2009-10 (A)	2010-11 (B)	2011-12 (B)
Revenue Income							
Water benefit tax	1.20	1.49	1.99	2.16	2.52	2.46	3.25
Water tank fee	0.07	0.03	0.04	0.03	0.01	0.01	0.01
Water connection fee	0.03	0.04	0.06	0.11	0.11	0.10	0.10
Total	1.30	1.55	2.09	2.31	2.64	2.57	3.36
Revenue expenditure							
Permanent establishment	0.38	0.38	0.40	0.44	0.46	0.70	0.79
Water Bill	1.04	3.44	6.69	6.81	5.29	7.10	6.08
O&M	0.27	0.29	0.43	0.44	0.48	0.64	0.89
Electricity and wiring expense	0.26	0.40	0.53	0.52	0.47	0.50	0.60
Other expenses	0.42	0.70	0.47	0.44	0.33	0.68	0.74
Total	2.37	5.21	8.52	8.65	7.03	9.62	9.09
Revenue surplus / (Deficit)	(1.07)	(3.66)	(6.43)	(6.34)	(4.39)	(7.05)	(5.73)
Per capita Revenue Expenditure	261.92	552.19	864.85	841.19	655.41	859.57	780.01

Annex 4 Assumptions for simulation of revenue enhancement

S. No.	Item	Assumption
1	Levy of solid waste management and sanitation charges through property tax	Currently, there is no user charge imposed to recover expenditure by SWM department. An annual per capita charge of Rs 225 would have to be levied. Assuming phased increase in collection efficiency of these charges to reach 90% level in 3 years.
2	Improve cost recovery of water supply department	At present 34% of the total revenue expenditure is recovered through taxes with collection efficiency close to 77%. But there is a need to recover additional Rs 325 per capita per year to break even. Assuming phased increase in collection efficiency to reach 90% level in 3 years.
3	Revision of Rates for user charges of all municipal services	Percent increase over base rate: 3% every year

Annex 5 Investible surplus after revenue improvement measures (Rs. Crores)

Particulars	Balance available for investment in performance improvement actions	Levy of SWM and sanitation charges	Improve cost recovery of water supply department	Net Available Surplus
Budgeted				
2010-11	-10.08	-	-	-10.08
2011-12	-5.73	-	-	-5.73
Estimated				
2012-13	9.22	0.54	0.78	10.55
2013-14	9.15	1.03	1.49	11.67
2014-15	8.63	1.06	1.53	11.23
2015-16	8.04	1.09	1.58	10.71
2016-17	7.36	1.13	1.63	10.12
2017-18	6.6	1.16	1.68	9.44
2018-19	5.74	1.2	1.73	8.66
2019-20	6.24	1.23	1.78	9.25
2020-21	5.29	1.27	1.83	8.39
2021-22	4.23	1.31	1.89	7.42

The Performance Assessment System (PAS) Project

The PAS Project aims to develop appropriate methods and tools to measure, monitor and improve delivery of water and sanitation in cities and towns in India. The PAS Project includes three major components of performance measurement, performance monitoring and performance improvement. It covers all the 400+ urban local governments in Gujarat and Maharashtra.

CEPT University has received a grant from the Bill and Melinda Gates Foundation for the PAS Project. It is being implemented by CEPT University with support of Urban Management Centre (UMC) in Gujarat and All India Institute of Local Self-Government (AIILSG) in Maharashtra.

CEPT-AIILSG team would like to acknowledge the support provided by Panvel Municipal Council for this document. The team is especially grateful to the Chief Officer, Sanitary Inspector and Water Supply Engineer and other staff members of PMC who have assisted us in the PIP exercise.

PAS Project

CEPT University
Kasturbhai Lalbhai Campus, University Road, Navrangpura, Ahmedabad - 380 009 Gujarat, India
Tel: +91-79-26302470
Fax: +91-79-26302075
www.pas.org.in

All India Institute of Local Self-Government
M.N. Roy Human Development Campus, Plot No.6, F-Block, Bandra Kurla Complex
Bandra (East), Mumbai - 400 051, Maharashtra, India
Tel: +91-22-26571713/14/15
Fax: +91-22-2657 2286
www.aiilsg.org

pas performance assessment system

CEPT UNIVERSITY ज्ञानं विज्ञानसहितम्