Nashik Municipal Corporation

Draft City Sanitation Plan

Executive Summary

Sept 2011
Background

The City Sanitation Plan (CSP) for Nashik provides an integrated action plan to achieve universal sanitation access as envisioned in Government of India's National Urban Sanitation Policy (NUSP). This CSP has been prepared for the Nashik Municipal Corporation by ICRA Management Consulting Services Limited (IMaCS) on behalf of Gesellschaft für Internationale Zusammenarbeit (GIZ).

The CSP identifies issues, priorities and actions along five sanitation components namely, a) Water Supply, b) Access to Toilets c) Wastewater management, d) Storm water drains and e) Solid Waste Management (SWM). Apart from Technical Actions in these areas, the CSP also identifies issues and actions across cross-cutting aspects including a) Governance/Institutional Framework, b) Capacity Development, c) Awareness Generation and d) Financial sustainability. The CSP follows constitution of a City Task Force (CTF), consultations with NMC officials and CTF members, analysis of baseline information including a primary survey and a slum mapping exercise in 65 slums, spatial mapping and city level reconnaissance visits. It also factors past and on-going initiatives including City Development Plan (CDP), Master Plans and Detailed Project Reports (DPRs) for various services.

Context

Nashik, the third-largest city in Maharashtra, is the District headquarters of Nashik District and an important node of the industrial triangle with Pune and Mumbai. Located along the river Godavari, Nashik is famous for its grape vineyards and is also an important pilgrim centre. Spread over 259 sq.km, Nashik had an estimated population of 1.4 million in 2009. Population is projected to cross 3 million in 2026 and 5 million in 2041, with implications for planning of civic services and land allocation for various uses. Being an industrial and pilgrim centre, Nashik has a large floating population that needs to be factored in sanitation service (water kiosk, public toilets etc.) delivery and infrastructure for water supply, wastewater and SWM.

While Nashik does not fare too badly on sanitation indicators (a recent exercise of the Ministry of Urban Development Government of India (MoUD) placed Nashik at 42nd rank among 423 cities covered in the survey), its score of 45.91 on 100 in the survey reflects the sanitation challenges it faces. Though Nashik is well covered with water supply and sewerage infrastructure, open defecation is still prevalent in more than a quarter of its slums. Nashik has a fairly extensive door-to-door waste collection system and is among the few cities to have a waste processing facility. However, pollution in river Godavari is emerging as a key concern. While NMC has taken a number of pro-active measures in terms of preparation of master plans and DPRs for Water Supply, Sewerage and SWM,

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1 This document presents an executive summary of the Report on City Sanitation Plan (CSP) for Nashik. Readers are requested to refer the complete report for further details of observations and recommendations made herein.
2 The focus of the study is area under the jurisdiction of Nashik Municipal Corporation (NMC).
3 Refer section 1.2 and 1.3 for Scope of Work and Approach respectively.
there is a need for synchrony across these through integrated planning and wider stakeholder participation. Financial sustainability of sanitation service provision is another concern area, given the scale of projects currently under implementation. Given this context, this initiative to develop a CSP for NMC is indeed timely.

The CSP considers two time horizons:

- **Planning Horizon (30 years 2012-2041):** The Planning Horizon covers 30 years from 2012 to 2041 and involves planning for an Intermediate Stage (2021 or 10 years) and an Ultimate Stage (2041 or 30 years).

- **Action Horizon (10 years 2012-2021):** The Action Horizon covers 10 years from 2012 to 2021. Actions are prioritised along a) Short Term: 3 years b) Medium Term: 5 years and c) Long Term: 10 years.

The rationale and recommendations with respect to critical issues identified in the CSP are summarized below:

### Priority Issues and Actions

| 1. Prevalence of open defecation in slums and around religious areas and open urination at public places. |

#### Rationale

**Open Defecation (OD) is widely prevalent in select slum clusters within NMC.** Prevalence of Open defecation prevalence is high in Wards 1, 2, 8,10,11,59,69,76,94 and 96. In 13 of the 65 slums covered in the slum mapping exercise, OD was due to a lack of facilities or poor maintenance. Hygienic conditions in Public Toilets were poor with 34 of the 65 slums ranking the toilets as poor. 35 of the 74 toilet blocks surveyed did not have lights and were inaccessible during night time. In 26 slums, there is no water connection to individual toilets and people have to carry water from home.

While 51 slums that have access to toilet within slum had a toilet seat to person ratio of 1:65 when seats unavailable due to poor maintenance are factored which goes up to as high as 1:330 in Kazichigadhi, the largest slum in Nashik. Even though 62 of the 65 slums surveyed were in the vicinity of the sewerage network, most of them are not connected. Waste-water from septic tanks in about 18 slums percolates into river and water bodies. Further, Open urination is rampant around Ramkund area, Central Bus Stand (CBS) and Railway Station where there is very high floating population. Ramkund area has only two Public toilet complexes which are inadequate considering number of persons visiting it. Maintenance of Public Toilet complexes at the central bus stand and railway station is poor.

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4 The issues are organized in line with the priority areas outlined in the NUSP and the content in the detailed CSP report to facilitate ease of reference to the main report.

5 Only the priority issues and actions are covered in the executive summary. For a detailed analysis, refer chapters 3 to 7 of the CSP for issues and recommendations on sanitation components and chapters 8-11 for coverage of cross-cutting aspects.

6 Issues relating to Access to Toilets and details of Baseline status are discussed in section 3.1 of the CSP.
Recommendations

1. **As an immediate measure, NMC should implement an Inspection and monitoring protocol** to ensure timely maintenance and consistent service delivery in existing Public Toilets. Sanitation Inspectors should be designated responsibility to inspect and report performance of Public Toilets for slums and floating population at a fixed frequency say, once every week to start with. The inspection frequency could be reduced progressively (say monthly) as the maintenance process is streamlined and the existing toilets are made fully operational. An illustrative checklist of issues to be checked as part of the Inspection protocol is detailed in the CSP. In this regard, NMC should consider appointing 3-4 Engineering staff in the Health Department specifically for Operation and Maintenance of facilities and infrastructure in Public Toilets including water availability and waste-waste management.

2. **NMC should initiate development and implementation of a City-wide Toilet Development and Rehabilitation Plan** to eliminate open defecation and open urination within three years. This Plan should be developed at a DPR level of detail to identify specific locations, configuration and sizing for provision of Public Toilets and should be preceded by a city-wide demand assessment exercise. NMC has already initiated actions under BSUP scheme for rehabilitation and redevelopment of slums. The DPR should take into account various initiatives done under the BSUP scheme. The DPR should also estimate capital and O&M costs for implementation. A Terms of Reference for this DPR is provided in the CSP. This Planning effort should be followed with time-bound Implementation along the lines of priorities indicated below.

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7 Refer section 3.5 of the CSP for detailing of these and other recommendations on Toilet Access provision

8 A format with indicators to be monitored is provided in the CSP (section 3.6 Table 3.8)

9 The CSP distinguishes Public toilets into two types: Public Toilets for slums and Public Toilets for floating population in the city.

10 Detailed Terms of Reference for both the Public Toilet Components are provided in section 3.5 point 1
a. Providing Public Toilets in slums and ward locations with high OD prevalence to achieve a toilet seat to person ratio of less than 1:40. Since NMC envisages becoming a slum-free city by 2030, the Public Toilet (for slums) development plan should be synchronised with slum rehabilitation and development plans and should cover rehabilitation and renovation of existing Public Toilets.
b. Providing Public Toilets in commercial areas with high floating population.
c. Providing Public Toilets in other areas to achieve a target standard (say access within every 500 m).

3. NMC should implement **bye-laws** to levy fines for open defecation/urination and incorporate **toilet specifications** as part of **Building regulations**, in consultation with Government of Maharashtra (GoM).

4. NMC should initiate **awareness campaigns** to facilitate awareness, usage and ownership of shared public toilet facilities at the levels of slums, communities and schools.

While development of public toilets will require subsidization, O&M costs could be recovered through community-led maintenance and through monthly user fees.

| Based on normative assessment, an estimated 2,531 Public Toilet seats for slums and 500 Public Toilet seats for floating population are needed in the medium term involving a capital investment of Rs. 20.88 crore\(^\text{11}\). Recurring O&M cost is estimated at Rs. 13.71 crore annually. However, assuming that 50% of the toilet complexes managed on outsourced models, actual O&M cost burden on NMC is estimated at Rs. 6.9 crore annually. |

| 2. **Existing septic tanks could create potential risks of ground water pollution and affect public health and utilisation of Sewage Treatment Plants (STPs)**\(^\text{12}\). |

**Rationale**

As reported in SLB exercise, the sewerage network extends to cover 90% of the population. Even though sewerage connections in the city cover 70 % of properties, due to building regulation necessitating installation of septic tanks, most sewerage connections are being made to septic tanks and not to the waste-water outlets. While there is no baseline data available with NMC on Septic tanks, it is estimated that 60% of the properties have septic tanks of which 40% are further connected to sewerage network.

In New Nashik Zone area there are several households have soak pits as well. At many places especially, the septic tanks of public Toilet Complexes, are not properly maintained e.g. near Ramkund area-bridge which directly drain into river or water body and they even cause ground water contamination. Septic tanks are cleaned by NMC on demand basis from citizens.

Currently, NMC has 6 vehicles to de-sludge septic tanks from six zones of Nashik city, out of which only 4 vehicles are in working condition. Therefore, there is need for additional vaccum suction vehicles on priority.

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\(^\text{11}\) Based on a normative estimate computed given that 20% of slum households are in need of Public Toilets (@ one Toilet seat for 8 Slum Households) and one Public Toilet (floating population) for every 200 floating population. Refer Table 3.3. of the CSP.

\(^\text{12}\) Issues and Recommendations relating to Wastewater management are covered in chapter 4 of the report which analyses baseline issues pertaining to issues 2, 3 and 4 of the Executive Summary
As per NMC officials the septage collected from septic tanks by vacuum suction trucks is disposed in sewage pumping stations or into sewers. This practice of providing sewerage connections through septic tanks could potentially lead to sub-optimal waste-water collection, STP infrastructure utilization and create potential risk of ground water pollution. Reported BOD levels at the STPs particularly at Tapovan and Chehedi STPs, show significant variation with very low BOD levels noticed for extended periods of time.

**Recommendations**

1. NMC should prepare a **Detailed Action Plan** to progressively phase out septic tanks undertaking following actions:
   a. The phasing should start from the old city area with septic tanks which are older than 10 years. Then the septic tanks which are constructed during previous decade but are not functioning effectively will be phased out. The action plan should have provision for people participation and awareness campaign.
   b. NMC should carry out property level assessment of availability of septic tanks and collect following information:
      i. Whether the property has septic tank
      ii. How many and which of the Septic Tanks are connected to sewerage network
      iii. In case septic tank not connected to sewerline, does that property have access to sewerage line
      iv. Is that sewer line of adequate size/capacity to handle additional load etc.

2. As the existing number of vacuum suction trucks are inadequate to serve the large number of septic tanks within Nashik. Therefore, **Two new vacuum suction trucks** need to be purchased by NMC.

3. NMC should in consultation with GoM, clarify and enforce **bye-laws for monitoring and regulation of on-site sanitation**. The monitoring will be done by Health Department. The sanitary Inspectors from different divisions will submit monthly report to the department on number of requests for cleaning of septic tanks, amount collected and citizen grievances. The provision should be made for fines/ penalties for improper disposal of septage.

**Based on normative assessment, the cost of implementing above actions and provision of is estimated at Rs. 2.50 crore**\(^{13}\) during 2011-16.

3. **Lack of information on waste water volume flows and non-automated sewerage system.**

**Rationale**

Reported BOD levels at the STPs particularly at Tapovan and Chehedi STPs, show significant variation with very low BOD levels noticed for extended periods of time. Further the analysis of variation of BOD levels is constrained because of non-functioning or non-availability of bulk meters at STPs and lack of information on volume of flows.

Presently NMC has STPs of 170 MLD capacity, which are working satisfactorily. However to improve the functioning and information base, the sewerage system need to be automated fully. The centralized monitoring through PLC-SCADA system is adopted by various cities like Pune and Surat for automation of sewerage and water supply system.

\(^{13}\) Normative estimate
The automation of system can enable controls from a centralised location and help better monitoring and trouble shooting. The remote access and control of plant processes like TSS, DO, TOC, pH, flow etc. can be achieved by applying superlative online instrumentation.

As per census 2011, the population of NMC in the year 2011 is 14.87 lakh while as per Water Supply Master Plan it is estimated at 15.4 lakh and CDP estimated it at 17.5 lakh. The population projections between the proposed sewerage system (48.5 lakh in 2041) and water supply master plan (52.5 lakh in 2041) are different and have not been harmonised.

**Recommendations**

1. NMC should revise population estimates and projections based on Census 2011 population. It should harmonise population and demand projections that are made under different DPRs to enable synchronised planning and implementation.

2. NMC should undertake technical improvements to the Sewerage system to improve wastewater collection efficiency and optimise treatment performance covering the following actions.
   a. Purchase and install Electromagnetic Bulk Meters at STPs and Sewage Pumping Stations to capture information on waste-water flows effectively. The bulk meters should be compatible with the PLC-SCADA system to provide information automatically.
   b. NMC should initiate a Rapid Technical Assessment Study of the sewage at various places coming to STPs to confirm trends in BOD levels. Identify reasons for variations in BOD levels based on which implement actions to address the same.

3. In view of the inadequate information on septic tanks, waste-water flows and other sanitation indicators at a household level, NMC should capture baseline information on septic tanks through a Comprehensive Household/ Property Level Water and Sanitation Survey. A list of sanitation parameters on which information is to be captured as part of this survey is provided in the CSP.
   a. Recently NMC has commissioned a household survey under ISIP program of SLB along with the ongoing property assessment survey. The household level data collected by these surveys need to be integrated to form a Master Database of all consumers/ citizens. NMC shall initiate additional surveys to strengthen this master database focusing on baseline information on water supply and sanitation. The baseline information on households, institutional and commercial properties shall cover information on:
      - Type of property, number of persons per household,
      - Availability of septic tank, number of households connected to septic tanks, whether these are further connected to sewerage network, direct sewerage connection,
      - Size of water supply connection, any ground water use, water meters are functioning properly or not etc.
      - Amount of solid waste generated per household; composition of solid waste- in different wards and as per different users-residential and commercial etc.
   b. The Comprehensive Household Level Sanitation Survey is a fairly detailed exercise and will take longer time therefore; NMC should carry out it in two phases. In the first phase the core part of the city will be covered and then the rest of the city covered in second phase.

4. NMC should establish a Waste-water Quality Monitoring Protocol in coordination with MPCB. NMC should in consultation with MPCB implement a waste-water quality sampling, monitoring and information dissemination protocol to ensure compliance of water quality to CPCB and MPCB norms.

**Based on normative assessment, the capital cost of implementing above actions is estimated at Rs.12.5 crore during 2011-16.**

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14 A list of sanitation parameters on which information is to be captured is provided in section 4.5 Table 4.11.
4. **Limited efforts towards waste water recycling and reuse, waste to energy conversion.**

**Rationale**

As per census 2011 the population of NMC is 14.87 lakh which is estimated to reach at 48.5 lakh by 2041. With the population quadrupling in next three decades, the net demand for potable water will also increase substantially to 727 MLD. It would be a challenge for NMC to get this much quantity of water reserved from irrigation department as there would be other demands such as agriculture, industry etc. Therefore, as one of the measures of conservation of water, NMC can explore options to recycle waste water and reuse for non-potable use such as gardens, process water for industries etc.

**Recommendations**

1. With a number of STPs already operational and being planned, NMC should explore scope for improving sustainability of operation and for waste water recycling. In this regard, NMC should **Conduct Feasibility Study for upgradation of STPs and exploring various options** to treat up to tertiary levels and commission waste to energy plants. The details are a below:
   a. **Treating waste water up to Tertiary Level and reuse treated water** to cater to non-potable uses.
      i. NMC has over 400 gardens in the city that are being supplied with potable water or ground water. This could be replaced with recycled waste-water.
      ii. Water requirements for non-potable Industrial applications in areas in and around Nashik could be met through Tertiary treated Industrial Grade water from some of the STPs. Such an approach, apart from enabling NMC to conserve fresh water could also help in improving commercial sustainability of STP operations.
   b. **Upgrading STPs and installation/ rehabilitation of Waste-to-energy plants** at STPs through capture of methane from sewage.
      - In the process of sewage gas into energy major components involved are gas collection system, gas cleaning system, gas storage system, conversion in to electrical system and excess gas flaring system.
      - The Panchak STP and Chehedi STP have gas collection system installed which needs to be properly operated by NMC.
      - The energy so generated can be sufficient for the daily need of STP operations and premises. The recommendation of installation of PLC-SCADA system will be useful for the precise and efficient control over plant process and to collect and store data generated from various field instruments such as digester pressure transmitter, Sewage gas flow meter, on line CH4 and on line H2S analyzer, various engine generator set parameters, etc.

The capital cost of implementing above actions is estimated at Rs. 65 crore during 2011-16. The O &M expenditure of sewerage system in 2016 would be Rs. 36.41 cr.

5. **River Godavari in the vicinity of Nashik, faces severe risks of pollution concerns from a combination of industrial and domestic sources along with agricultural run-offs.**

**Rationale**

The presence and spread of green algae, water hyacinth and other species and dead fish in river Godavari is reflective of the inherent pollution risks. Field-level observations and discussions with MPCB and NMC officials indicate three sources of pollution: (1) **Untreated industrial effluent** from Satpur and Ambad industrial areas into Nasardi river; (2) **Domestic waste-water**: From both septic tanks and sewer lines, directly from
slums and isolated residential areas and unserved areas; (3) **Solid waste**: Garbage from open drains, nearby slums and habitations and pilgrim waste along Ramkund area; and (4) **Agricultural runoff**: From Panchavati, Satpur division and irrigated areas in Nashik East division.

While MPCB estimates that 129 of the 314 industries in the Ambad MIDC complex generate industrial effluent of 1809.53 cubic meters per day, there are no Common Effluent Treatment Plants (CETPs) for Ambad and Satpur Industrial areas. The large and medium scale units in these industrial areas have their own Effluent Treatment Plants (ETPs), however details of effluent generation by small scale units are not available. Further, both the industrial areas have only soak pit and septic tank facility for human waste water disposal.

**Recommendations**

1. NMC in consultation with MPCB and MICD, should develop and implement a **Comprehensive Godavari River Pollution Mitigation Plan** covering the following actions:
   
   a. **Constitute a multi-stakeholder council** comprising NMC, Industrial areas, MPCB and other stakeholders with support from GoM to oversee this program implementation.
   
   b. **Compile in collaboration with MIDC, MPCB**, information on waste-water flows into the river particularly from the Industrial areas.
   
   c. **Prepare a Detailed Project Report (DPR)** outlining specific actions along the river to identify points of pollution and measures to mitigate the same, taking into account existing and on-going initiatives of waste water collection and treatment, options for such as waste water recycling and decentralised treatment, analysis of flows from drains that lead into the river, pilgrim activities along the river. The report should also estimate financing needs and sourcing of funds for the same.

2. Implement a time-bound phased investment program to develop / rehabilitate a storm drain network in the city. The DPR for storm drains prepared by NMC needs to be taken up for review and implementation on priority.

   The capital cost of implementing above actions is estimated at Rs. 45 crore during 2011-16. In the long term the recycling of waste water and resell of water to industries, SEZs etc. on revenue sharing basis can help in saving potable water and in turn overall O&M cost.

6. **NRW**\(^{15}\) levels are high and needs urgent attention.

**Rationale**

NMC’s water supply system performance on coverage (91% of population served) and per capita supply (149-155 LPCLD) is good. However, Non-Revenue Water (NRW) is very high at an estimated 57%. Even through 95%

\(^{15}\) Refer chapter 6 of the CSP for a detailed analysis of issues and recommendations on Water supply component
of the connections are metered, billing is not linked to volumetric supply due to a combination of faulty meters and irregular meter reading operation. Water supply coverage in slums is fairly extensive. Most slums (57 of the 65 slums surveyed had at least one public stand post) with supply duration of four hours (two hours in the morning and two hours in the evening). However, only 11 of the 65 slums studies had individual water connections. While reported cost recovery and collection efficiency of NMC’s water supply system was 72% and 92% in 2008-09, ongoing projects could add to O&M cost burden.

**Recommendations**

1. NMC should initiate the following actions to improve Information Baseline on water flows
   a. **NMC should install bulk meters at Intake Works, Water Treatment Plants, Pumping Stations and Storage Reservoirs.** It is recommended to procure meters such as electromagnetic meters which will integrate well with the PLC based SCADA system and can be operated remotely. Wherever required the valves will be replaced to allow proper functioning of Bulk meters and the SCADA system.
   b. **NMC should initiate drive to repair and maintain consumer meters.** This can be done by roping in private meter supplier/operator who will be given the task to operate and maintain consumer meters and replace faulty meters. NMC will prepare a set of performance parameters related to functioning and O&M of meters which will be given to the meter supplier/operator.
   c. **NMC should consider implementing PLC based SCADA system** to improve overall efficiency of monitoring of intake works, WTPs and pumping stations.
   d. A baseline household level survey to be conducted to collect information on water and sanitation as recommended in the sewerage section.

2. Build on the findings of the on-going water audit to launch a **Comprehensive City wide NRW Reduction Program**
   a. Prepare a **Detailed Project Report** for city wide NRW reduction program based on outcomes of ongoing pilot NRW reduction and leak detection program supported by GIZ.
   b. Implement the existing Water Master Plan with focus on NRW reduction. Synchronise population and demand projections across water and sewerage master plans and DPRs and factor the actual base population from Census 2011.
   c. **Designate a NRW Cell** comprising engineering staff from water supply and officials from revenue department to plan, implement and monitor the city wide NRW reduction Program.

3. The Illegal connections and faulty meters are major reasons for higher NRW. Therefore, it is necessary for NMC, in consultation with GoM, to **formulate/enforce Connection - Disconnection Policy.** The

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Based on a normative assessment, the capital cost of implementing above actions and provisions estimated at Rs. 109 crore during 2011-16. Recurring O&M cost is estimated at Rs. 66 crore annually in 2016. In the long term the recycling of waste water and reuse for gardening and other purposes can help in saving potable water and in turn overall O&M cost.

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16 Detailed guidelines to carry out NRW Reduction Program is given section 6.6 and Box 6.1.
17 Details of working of this cell are given in section 6.6, point 2 (b).
7. SWM: Lack of source segregation and limited composting / waste recovery levels

Rationale

With per capita waste generation projected to reach 400 gm per capita per day by 2031, waste generation in NMC is expected to quadruple to 1628 MT by 2031. Even though, NMC has abolished waste bins and introduced door-to-door collection through “ghanta gadis” (vehicles with bells), it is constrained by availability of number of vehicles with the present number of vehicles allowing coverage only once in two days. Further, there is no segregation of waste at source because of which composting of biodegradable waste is implemented on a very small scale.

Recommendations

1. NMC should initiate Segregation of waste at Source in phase wise manner.
   a. In the first phase NMC should select 4-5 pilot wards where source segregation will be carried out for 2 months. During this pilot study NMC will analyse the quantity of waste generated and composition of waste. It should explore options to identify feasible composting site around these wards or at any other place.
   b. NMC will give the citizens two bins – one for dry waste and another for wet waste.
   c. NMC should launch an awareness campaign with public participation to complement door-to-door collection and source segregation initiatives. Initiatives like door-to-door collection and source segregation involve significant mind-set change and therefore engaging public involvement and participation in the initial stages through and intensive awareness campaign is critical to get public support.

2. NMC should increase frequency of door-to-door collection from every alternate day to daily by increasing its fleet of Ghanta Gaadis (including adding smaller sized vehicles for narrower lanes) from the current level. NMC should implement this along with source segregation on priority.

Based on a normative assessment, the capital cost of implementing above actions is estimated at Rs. 9 crore during 2012-15. Recurring O&M cost is estimated at Rs. 47 crore annually in 2016. In the long term the initiatives like energy generation from waste and resell of manure from composting would increase revenue for NMC.

8. No Integrated Solid Waste Management Plan (ISWM) and very low O & M cost recovery

Rationale

NMC is doing good work in solid waste collection by becoming dust bin free city and also started various small scale initiatives such as composting, biomedical waste disposal and waste to energy generation. However, there is more to achieve on larger scale such as source segregation, composting, e-waste management and waste to energy generation etc. Therefore, an integrated approach is required to plan and implement these on-going initiatives for Municipal Solid Waste Management in Nashik.
Even though O & M cost recovery is a mandatory reform under JnNURM, NMC has achieved only 35% of O & M cost recovery in Municipal SWM in 2009-10. Presently user charges are not levied on solid waste management however it is collected as conservancy tax as a part of property tax. This conservancy tax is not adequate to recover O&M charge fully. With the waste generation quadrupling in next 30 years and limited own sources of income because of abolition of Octroi in future, NMC will have to explore options for levy of user charges on MSWM with adequate provision for escalation.

**Recommendations**

1. NMC should prepare *Integrated Solid Waste Management (ISWM)*\(^{18}\) Program, which is a comprehensive waste prevention, recycling, composting, and disposal program. This program is based on the principle of Reduce, Recycle and Reuse.
2. With the target of achieving O & M cost recovery NMC should, in consultation with GoM, incorporate *bye-laws for formalising policy* on the following:
   a. Right to levy, collect and retain user charges. NMC should also be able to assign/transfer this right to a service provider through a contractual relationship
   b. Articulate citizens’ duties with respect to maintaining clean environment and to fulfil obligations in implementing modern practices such as door-to-door collection and source segregation.
   c. Right to impose fines in case of non-compliance of citizens in their duties regarding sanitation.

Based on a normative assessment, the capital cost of implementing above actions is estimated at Rs. 0.5 crore during 2012-15.

9. Diffused accountability, inadequate staffing and lack of exposure to modern sanitation practices within NMC

**Rationale**

Of the total posts, 10% posts are vacant, while in case of Class II category around 13% of the sanctioned posts are vacant. Similarly for Class III and Class IV the percentage of vacant posts to sanctioned posts in respective category is 16% and 5%. In view of the large scale implementation of projects under JNNURM, there is a spike in work load particularly among Class I and Class II officials, where implementation of capital projects is being handled in addition to O&M responsibilities.

There is overlapping and diffused accountability for sanitation even within NMC: As in case of many ULBs, responsibility for sanitation is diffused across multiple departments. O&M of water supply and sewerage infrastructure is being handled by the Engineering department. While Solid waste management services are being handled by the Public Health department, procurement of vehicles is again handled by the Engineering section. Public Toilets are managed through private contracts which are inadequately monitored. The capital work of public toilets is done by Public Works Department (PWD) department while the O & M is with Health Department. However the repairs of public toilets are done by PWD department. There appears to be no regulation and accountability in place for on-site sanitation. Regulatory and monitoring mechanisms for oversight on service delivery and tariff fixation are in place but are weak.

**Recommendations**

*Actions by GoM*

1. GoM should actively support ULBs in implementing local level policy framework through *model bye-laws and guidelines*. Illustrative areas for formulation of such model guidelines are listed below:

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\(^{18}\) Covered in detail in section 7.5, point 1 of main report
2. In the context of rapid urbanisation and evolution of urban management in terms of modern management practices, GoM should undertake an organisation assessment of NMC to identify the number and scale of officers required and detailing of job descriptions and drafting / amendments to service rules as necessary. The following actions may be considered as part of this exercise.

   a. The Revenue and Accounts functions that are currently handled separately should be integrated and handled as a centralised Finance department.

   b. NMC has already computerised its complaint handling process and this should be strengthened through creating linkages between a back-office organisation that tracks, captures and respond to citizen complaints and operating staff under various departments to ensure that complaints are resolved in time-bound manner.

**Actions by NMC**

1. NMC should strengthen Health Department by following ways:

   a. Given additional powers to Health department such as repairs and maintenance up to Rs. 50 lakh per year with sanction from Chief Engineer. For repairs above Rs. 50 lakh will be done by PWD as per existing practise.

   b. Appoint three deputy engineers in the Health Department for doing routine repairs and maintenance works. These engineers will be responsible for monitoring maintenance and repairs of Public Toilets.

2. GIZ has undertaken a Training Needs Assessment focused on Environment related aspects which provides detailed recommendations on areas of training. This should be implemented on priority. Priority Training needs are detailed in the CSP.

3. In order to strengthen monitoring and oversight of sanitation activities, NMC should consider implementing a three level monitoring and evaluation framework on the lines suggested below:

   a. **First level - Elected Municipal Council**: The City Task Force will have the mandate of reviewing and implementing the CSP recommendations along with the CTF. This could also oversee enforcement of bye-laws and tariff fixation/revision.

   b. **Second level - Public Participation**: NMC should engage local stakeholders and encourage public participation in monitoring and oversight of sanitation services. NMC should implement the Community Participation Law (required under JNNURM) in spirit to create statutory ward level committees that can also be entrusted with the responsibility for local oversight of water and sanitation service delivery. As the operations of these ward level committees mature, NMC should actively move to a ‘bottom-up’ approach to an inclusive and participative budget preparation and financial allocation for water and sanitation activities. Such a formal local institutional mechanism could also be utilized for monitoring and oversight of PPP projects and service providers to whom sanitation services are contractually outsourced.
c. **Third level – Independent Evaluation:** NMC and GoM should carry out independent evaluation of service delivery across sanitation components periodically focused on outcomes achieved and to capture wider perceptions of users. The results of such independent evaluation (along with action taken by NMC as a follow up) should be disseminated widely.

4. NMC in consultation with GoM and in synchrony with reform commitments (under JNNURM and other programs of GoI/GoM) should formulate a comprehensive Cost Recovery and Tariff policy for sanitation services to facilitate fixation, revision and regulation of user charges for sanitation services. This Policy should be synchronized with the overall state-level Sanitation Strategy that is envisaged under the NUSP.

10. NMC’s financials could get severely constrained; Cost recovery levels in sewerage and solid waste are very low vis-à-vis prevailing O&M costs.

**Rationale**

Though the financial information provided by NMC has facilitated a fairly detailed analysis of cost recovery in water supply and sewerage systems, an analysis of expenditure of other aspects of sanitation such as toilet access is constrained due to classification of expenditure under different heads. Similarly, there is very little information available on costs of onsite sanitation incurred by citizens as the same is not formally captured by NMC. With the implementation of a number of capital projects under JnNURM, a sharp rise in O&M costs can be expected. For instance, it is seen that O&M costs of sewerage network have gone up eight fold in the last five years and is expected to increase further with the construction of new STPs. Cost recovery in water supply and sewerage are at 72% and 48% respectively while Collection efficiency is reported at 92% and 72% in water supply respectively. Cost Recovery in Solid Waste Management is at a low 35%.

**Recommendations**

1. A normative assessment of capital cost estimate across various sanitation components is presented below. The estimated cost required over the next five years is estimated to be Rs. 307.38 crore with priority investments in Access to Toilets, Water Supply, Sewerage and Information Systems Improvements.

<table>
<thead>
<tr>
<th>Capital Investment (Rs. Lakh)</th>
<th>Phasing of Investment</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to Public Toilets- for Slums and Floating population</td>
<td>2,088 - 684</td>
<td>2,772</td>
</tr>
<tr>
<td>Water Supply</td>
<td>8250 2150 0</td>
<td>10400</td>
</tr>
<tr>
<td>Waste water management</td>
<td>3300 1200 0</td>
<td>4500</td>
</tr>
<tr>
<td>Storm Water Management</td>
<td>8100 200 0</td>
<td>8300</td>
</tr>
<tr>
<td>Solid Waste Management (As given in DPR)</td>
<td>2400 1100 0</td>
<td>3500</td>
</tr>
<tr>
<td>ISIP, Project Development and Capacity Building</td>
<td>1350 600 600</td>
<td>2550</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>25,488 5,250 1,284</td>
<td>32,022</td>
</tr>
</tbody>
</table>

Source: IMaCS analysis

2. The estimated O&M costs for sanitation service delivery effectively translate to about Rs. 300 per month per household and suggest that 100% O&M cost recovery is achievable through cross subsidy to lower-income households and leveraging other potential means of revenue realisation including revenues from waste recovery and from recycling / re-use of waste water.

**O&M cost trend**

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19 All cost estimates in this document and in the CSP are normative estimates and need to be validated under further preparatory studies recommended in the CSP including feasibility studies and DPRs. Refer table 12.4.3 of the report for a list of further preparatory studies needed as a pre-cursor to strengthen baseline information and implement investment programs.
3. Clarify cost recovery objectives and approach through a well-articulated and disseminated Tariff policy in consultation with the GoM and mechanisms / accountability for implementation as defined earlier.

4. Implement a framework to track and disseminate information on O&M costs of all sanitation services, particularly in the context of the additional O&M costs arising as a result of implementation of ongoing and proposed projects under JNNURM.

5. Align user charges in sanitation services with cost recovery targets enunciated in NMC’s Tariff Policy. In particular, implement the following actions towards improving cost recovery in the immediate term.
   a. **Water Supply**: Leverage metering infrastructure to implement regular meter reading and volumetric tariffs / user charges
   b. **Sewerage**: Implement a user charge framework for sewerage connections, chargeable as a function of water tariffs.
   c. **Solid Waste management**: Implement slab-based user charges to levy and collect differentiated levels of user charges from different categories of waste generators

**Conclusion**

The City Sanitation Plan for NMC is a useful starting point to escalate attention to the ‘important yet often neglected area’ of sanitation and presents a comprehensive snapshot of the issues and imperatives for sanitation within NMC. It also outlines a possible prioritisation of the above actions needed along short, medium and long term towards achieving the NUSP goal of universal equitable access to sanitation.

NMC should work with the Government of Maharashtra and MOUD to initiate the steps needed to implement the actions recommended in the CSP. A Committee comprising representatives from NMC, GoM and the CTF could be formed to steer implementation. As envisaged in the NUSP, a CTF has been formed as part of the preparation of the CSP and it provides a useful platform to engage with public stakeholders and mobilise public support and participation during the implementation phase of the CSP.