CITY SANITATION PLAN
MYSORE, KARNATAKA

Draft Report | December 2011

Submitted to

Directorate of Municipal Administration
Government of Karnataka

Submitted by

Administrative Staff College of India, Hyderabad

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ACKNOWLEDGEMENT

"Water is life and sanitation is dignity".....

To achieve the dignity of people, there are many people working towards improving the standards of living. Thus, it is imperative to thank their contribution.

We wish to thank the DMA, GoK for having entrusting and facilitating with financial support for preparing the City Sanitation Plans (CSP) for selected 8 cities of Karnataka, Mysore being one of them. I thank Mr. Anjum Parvez, former DMA, GoK and Mr. Suprasanna, JD(D), DMA, GoK for their continuous support and encouragement given during the preparation of the CSP. Great acknowledge is extended to the MRC of DMA, GoK in furnishing the digital maps and sharing slum surveyed details under the programme Asha Kiran Mahiti. To ensure and monitor the progress of CSP, we are acknowledged to the CMAK for rendering their support in regularly coordinating with the city ULBs during the preparation of CSP.

In order to ensure the authenticity and good judgment of the data collected and surveyed our sincere acknowledgement to the Mr. K.S. Raykar, Commissioner, Mysore City Corporation, Mr. Nagaraj, Health Officer, Mysore City Corporation, Mrs. Girija, Mrs Rekha and Ms. Shafinaaz, Environmental Engineers, Mysore City Corporation, team of Town Planning Department, Mysore City Corporation and Mr. Subramanyam, Executive Engineer, Vani Villas Water Works, Mysore. The ULB officials have not only lent their expertise and word but also gathered data, assessed environmental issues but also debated their causes and effects for better planning of CSP. Greater acknowledgement is extended to the CSTF members who have actively participated in the regular meetings and shared their views and concern on the development of the city's infrastructure. I also thank the Bhageerath team for their dedicated efforts made during the primary survey. This report is built on data gathered in 2010-2011, the relevance of which cannot be underestimated.

The report also benefitted greatly from a large number of constructive comments from the MoUD, GoI and Water Sanitation Programme (WSP), New Delhi for building an operational framework and provided assistance in formulating the report.

Lastly, appreciation and greater acknowledgement goes towards our team of ASCI who has committed constructively during the meetings, workshops, discussions, data collection, analysis and documenting the City Sanitation Plan for Mysore in a good shape.

This Mysore CSP looks forward to develop effective strategies for safe disposal of solid and liquid waste generating in the city by suggesting environment friendly with low cost technology options for a better living. I wish Mysore city achieves its goal in providing its city with 100% sanitation infrastructure which could as well improve the sanitation ranking at national level.

Prof. Srinivas Chary Vedala
Dean and Director
Centre for Energy, Environment, Urban Governance
and Infrastructure Development (CEEUG&ID)
Administrative Staff College of India, Hyderabad

FORWARD

(To be included)

CSTF Chairperson
Mysore

THE TEAM - ASCI

The team of ASCI that has put forth dedicated efforts towards the completion of Mysore City Sanitation Plan includes the following members:

1. **Prof. Srinivas Chary Vedala** *Dean and Director, Centre for Energy, Environment, Urban Governance and Infrastructure Development (CEEUG&ID)*	**Team leader and Task Manager |** Overall coordination and guidance, inputs on institutional arrangements and finances
2. Mrs. Vasavi Narla *Assistant Professor*	**Senior Urban Planner & Additional Task Manager |** Project coordination, infrastructure inputs and plan and over see activities regularly.
3. Ms. Uzra Sultana *Senior Research Associate*	**Local Coordinator |** Local coordination, organizing workshops, data collection and gap analysis, data validation, stakeholder consultations and report preparation.
4. Ms. Sneha Mala Kesiraju *Senior Research Associate*	**Environmental Planner |** Inputs of environmental planning and conducting the workshop
5. Ms. Krithika Sridharan *Senior Research Associate*	**Urban Planner |** Expert inputs of demographic analysis and conducting the workshop
6. Ms. Lakshmy Poorna *Senior Research Associate*	**Urban Planner |** Analyses of primary survey data
7. Bhageerath Consultant	Primary survey

1 INTRODUCTION

1.1 Preamble

The National Urban Sanitation Policy (NUSP) 2008 envisages "All Indian cities and towns become totally sanitized, healthy and livable with a special focus on hygienic and affordable sanitation facilities for the urban poor and women." The policy aims to ensure sustained public health and environmental outcomes for all cities by making them free of open defecation; providing adequate and properly maintained individual, community and public sanitation facilities, especially for the poor; ensuring safe and sanitary disposal of waste; altered mindsets, collective behavior change and health and hygiene practices, and re-oriented institutions that work collaboratively to achieve and sustain health and environmental benefits. The overall goal of National Policy is to transform Urban India into community-driven, totally sanitized, healthy and livable cities and towns. Specific goals include:

A. Awareness generation and behavior change,
B. Open defecation free cities,
C. Integrated town-wide sanitation,
D. Sanitary and safe disposal, and
E. Proper operation &maintenance of all sanitary installations.

Against this background, and in recognition of its importance to national and state development, the Integrated Town-Wide Sanitation Plan for MCC Town is prepared to provide town-wide systematic approach and framework to achieve the goals contemplated under NUSP.

1.2 Objectives of City-Wide Sanitation Plan

NUSP mandates ULBs for universal access, safe management of human excreta, including its safe confinement, treatment and disposal and associated hygienic related practices. Hence, city-wide strategies are important as they prioritise investment needs and can directly fund to, where they are most needed. CSP not only emphasis on the physical infrastructure but also focus on behaviour change outcomes, proper usage, institutional reorientation, regular upkeep and maintenance, increased accountability and service delivery by ULBs and their partners. The main objectives of the CSP are:

- To achieve better sanitation, addressing the issues of spatial imbalances especially in slums and peri-urban areas in access, treatment of waste water, solid waste management, etc.
- To carry out consultations with all concerned stakeholders and bring consensus on the strategic approach to safe and environmental sanitation practices and adopt locally suitable methods, technology and materials.
- To workout the institutional and financial implications of managing urban sanitation and ensure an optimum use of funds allocated under various schemes so that the agencies may align their plans on similar lines.
- To encourage community and private participation and define their role in creation and maintenance of sanitation infrastructure, thereby ensuring a sense of ownership and behavior change.

1.3 Scope, methodology and limitations

The CSP detailed out how city plan deliver the sanitary outcomes defined in NUSP and state strategy, in coordination with other line departments to ensure a well collaborated approach engaging all stakeholders including governmental and nongovernmental service providers. The scope of the CSP includes but not limited to the following major tasks:

Box 1: National Urban Sanitation Policy

Vision of NUSP: All Indian cities and towns become totally sanitized, healthy and livable; and ensure and sustain good public health and environmental outcomes for all their citizens with a special focus on hygienic and affordable sanitation facilities for the urban poor and women. To transform urban India into community-driven, totally sanitized, healthy and livable cities and towns, the policy sets out the following goals:

- Awareness generation and behavior change
- Open defecation free cities
- Integrated city-wide sanitation

1. Reorienting institutions and mainstreaming sanitation
2. Sanitary and safe disposal: 100% of human excreta and liquid wastes must be disposed of safely
3. Proper operations and maintenance (O&M) of all sanitary installations

The policy envisages the preparation of state sanitation strategies within the overall national policy framework. In turn, cities are expected to prepare their city-wide sanitation plans that need to be prepared in a consultative and participatory manner and using an incremental approach to addressing the issue of sanitation in a comprehensive city-wide manner.

Source: NUSP, 2008

a) **Collection of secondary data**: Secondary data collection and review of available data from various sources as per demands of CSP (the officials of City Municipal Corporation, Water Boards or other parastatal agencies).

b) **Preparatory work (profiling of ULB and preparing city report)**: As a preparatory work, a preliminary profiling of ULBs undertaken using SLB indicators and city ratings to highlight the open defecation free (ODF) status, sanitation situation, health indicators and current projects. This also guided further investigation through field visits and primary data collection.

c) **Stakeholder analysis and City Sanitation Task Force (CSTF) constitution**: As per the requirement of CSP, major role is to be played by the members of institutions, NGOs, organizations, individuals, academics, journals, local councilors, industry owners, consultants, representatives of private sector, etc. Constitution of CSTF was facilitated by drawing members from these groups in consensus with the ULB to constantly support the CSP preparation by analyzing the strengths and competencies required to overcome the current situation and for better sanitation facilities.

d) **Primary data collection and sampling**: Data collection to a limited extent through rapid field surveys, case studies, consultations, transacts walks, FGDs, etc., to validate and supplement the secondary data. The data collected as per formats/templates and questionnaires after brief orientation to the stakeholders. Random stratified sampling in typical cases (slums, schools, wards commercial places, public latrines, surface drains, solid waste arrangements, industries, health and educational institutions, etc.) evenly distributed all over the city to cover all representative types of situations.

e) **Review/study of the current practices**: This included a review of sector strategies in water, sanitation and solid waste management at state and city level. DPRs prepared on these sectors and studied in detail and analysed.

f) **Condition assessment**: Choices of toilet in the city and their effectiveness along with pictures on super structure, below ground, design models and materials used for different uses like residential, industries, public spaces and new areas captured.

g) **Ward profiling as per City Sanitation Ranking parameters**: City as a number of spatial units looked at indicators pertaining to the practice of open defecation, access to sanitation (individual, community and public), collection, treatment and disposal of solid and liquid wastes, proper upkeep and maintenance of the sanitation infrastructure, clear institutional roles and responsibilities and improvements in health and environment as per the City Sanitation Rating.

h) **Communication gap and needs assessment**: IEC needs assessment carried out and broad communication strategy developed in consultation with the ULB officials and other stakeholders.

i) **Developing a situation analysis report**: The situation analysis, prepared by taking into consideration the ground realities, local conditions and assessment of the present sanitation situation. It included inputs from all the above activities with the details of existing household sanitation arrangements, public sanitary conveniences, wastewater disposal, solid waste management and water supply. The report also included an analysis of the ULB's legal framework and byelaws and financial analysis, data on key public and environmental health, user charges, willingness to pay, etc.

j) **Formulation of vision**: This involved understanding the major aspirations with respect to urban development in the state through consultations and building an overarching vision that may be appropriate to the articulations. This involved the following ;
   - Secondary information, data analysis and report review
   - Brainstorming with key stakeholders and focus groups
   - Understanding visions of concerned sectors and other constituents e.g., cities and development agencies and concerned authorities.

k) **Development of strategy:** This involved understanding of major issues of the sector, major priorities laid down and an assessment of how the current arrangements are working with respect to urban development in the city. Also, the key strengths, major weaknesses, potential opportunities as well as likely threats would also be analysed to move towards the identification of the action/intervention areas that form the strategy development. This involved:
   - Completion of information analysis, with quick estimates and review of current policies and priorities
   - Consultations with key stakeholders/ focused group discussions
   - Detailed discussion with departments/ agencies/ cities/ authorities

l) **Preparation of draft CSP:** Finalization of CSP along with recommendations based on the situation and solutions for making open defecation free city and totally sanitized, public toilet and community toilets models and operational models; proto-type design recommendation for all typical situations, waste disposal mechanisms, starters for sewerage layouts and estimation of requirement in terms of capacities, quantity and finances.

m) **Preparation of implementation road map**: It involved identifying and documenting interventions for the improvement of sanitation. The cost estimates of such interventions (only ball park figures); the institutional responsibility as well as broad timelines for implementation indicated in the CSP.

Initially, the situational analysis is done with the help of both secondary data and primary survey. For this purpose, statistical data, information from past reports, institutional sources and publications will provide, which will be analysed to the requirements of various aspects/subjects

of the study. The sources and methods for data collection included collection of data from ULBs and/or the water and sanitation utility provided to the city on water supply, sanitation, sewerage, wastewater treatment, solid waste management, drainage, etc. Comprehensive data required for CSP preparation included adequate provision of toilets, open defecation free status, no manual scavenging, safe handling and treatment/ reuse of human excreta, sullage, drainage and solid waste management will be collected from secondary sources if possible.

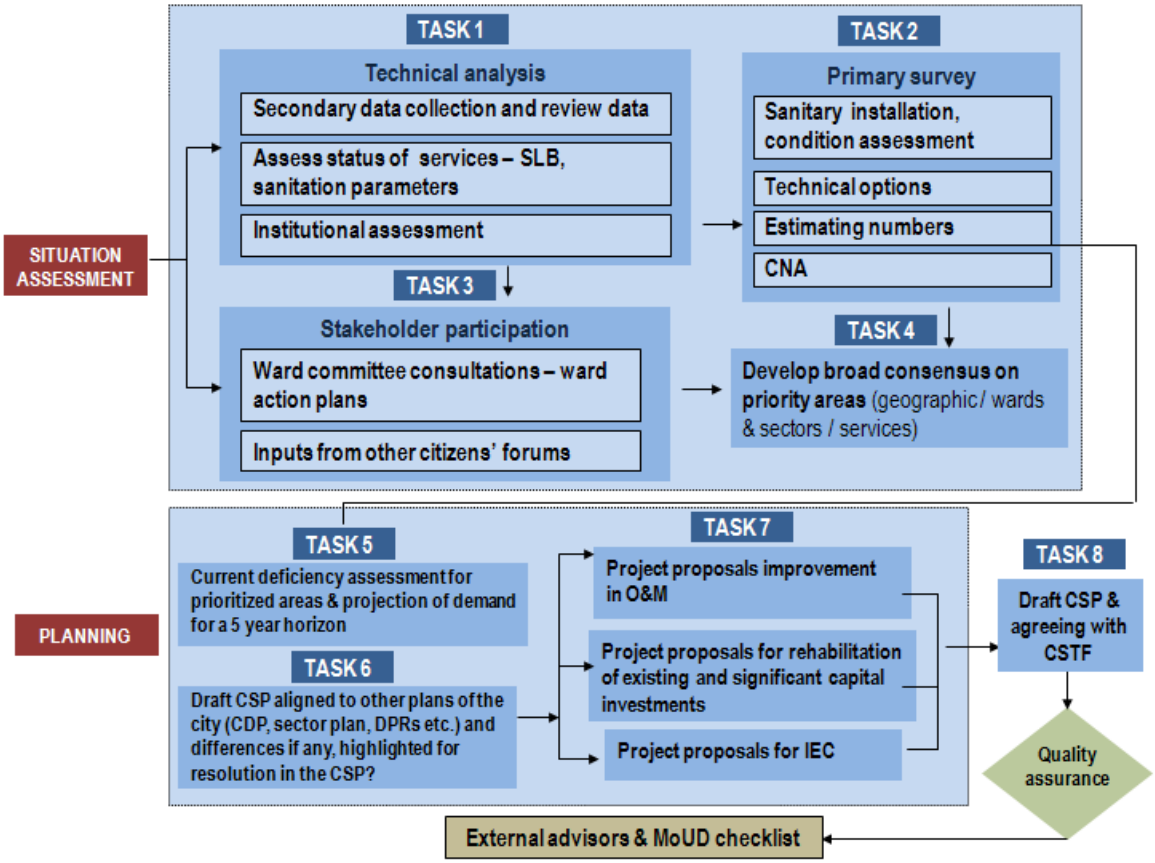
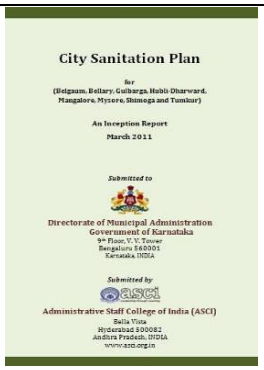


Figure 1: Essential components of City Sanitation Plan

Wherever information is unlikely to be available, a combination of published information and estimates available with city agencies are used. Estimation will be validated and cross-checked by random sample surveys, short structured field-visits to make physical observations and interactions with local residents. Discussions with local populations formed important feedback to validate data on certain indicators for example, proportion of slum households practicing open defecation, perusal of records and interactions with officers at facilities on arrivals of solid waste at landfill, proportion of sewage being re-used, water quality after treatment, etc. Physical observations included photo-documentation where relevant information like instances of pits or septic tanks letting out wastes into drains or nalas, accumulated solid waste dumps, cesspools or flooding, etc., are also considered.

Brainstorming meetings were held in focus groups having wider representation from various quarters of the society in order to understand current sectoral priorities and aspirations. Time to time orientation and consultation workshops with stakeholders both at state and city level were held. Activity outline is given below. The objectives of these workshops included building capacities of the concerned stakeholders, assessing the drawbacks and potential of these areas, validation of issues and build consensus in accommodating and addressing the concerns of various distinct pockets within the given city.

Table 1: Activity outline on Mysore CSP

Progress made	Activity	
1. **State launch workshop** ***held at Bangalore on 25th November 2010***	The launch was aimed to sensitize elected representatives and administrative functionaries on National Urban Sanitation Policy and City Sanitation Plan. Honorable Minister for Urban Development, Government of Karnataka had participated in the workshop and delivered key note address.	 ***Launch workshop, Bangalore***
2. **State level technical workshop** ***held at office of Directorate of Municipal Administration, Government of Karnataka on 7th January 2011***	The objective of the state level technical workshop was focused on sharing the understanding on the CSP and its importance to the ULBs. It was primarily focused on the present status of solid waste management practices, sewerage system, water supply, toilet facilities in the city. It was also focused on the methodology for the preparation on CSP.	 ***Participants at technical orientation workshop at DMA, GoK***
3. **CSTF orientation workshop** ***held at Conference Hall of City Corporation, Mysore on 25th January 2011***	The workshop was intended to introduce the CSTF members the need for the constitution of CSTF and their role in the preparation of City Sanitation Plan. This was followed by the group activity among the CSTF members to seek their views on the problems and solutions in regard to the sanitation in the city.	 ***CSTF orientation workshop at City Corporation, Mysore***
4. **Preparation of Inception Report** ***Submitted to DMA, GoK in March 2011***	An Inception Report was prepared with the progress made until the submission of the same. In included the mention of the activities since the State launch workshop till the first workshop with the CSTF members of the cities under preparation of CSP. Also, illustrated the way forward approach for the CSP.	 ***Coverpage of Inception Report***
5. **2nd round of CSTF meeting** ***held at the Conference Hall of City Corporation, Mysore on 28th April 2011***	The 2nd round meeting was intended to share the progress made along with the clarification and understating of the data to be validated. It covered the methodology adopted for the primary survey, focused group discussions, situation analysis, etc., and the workable suggestions from CSTF members were taken into consideration while following the methodology and drafting CSP.	 ***Participants at the 2nd round CSTF meeting***

6.	***Collection and review of secondary data/ reports /documents***	A review of reports or supporting documents available with City Corporation was done for understanding of the existing status and proposed infrastructure of the city.
7.	***Focused Group Discussions (FGD)***	Conducting FGDs have provided to identify problems. FGDs have been conducted in slum areas, market, residential areas and slaughter house. The FGDs have given an understanding to prepare the situation assessment of the city's infrastructure for CSP.
8.	***Draft City Sanitation Plan***	Comprises basic city profile, demographic details, SWM, water supply, waste water treatment, sewerage network in the city, situation assessment, demand supply gap assessment, municipal responsibilities, financial assessment, etc. The integration of the available information along with the outcome of primary survey and FGDs has been used to prepare the draft CSP.

1.4 Process, detailed steps and limitations

The process detailed below for planning urban sanitation and wastewater management improvements offers a step-by-step guide for:

Step 1: Preparatory works	•Profiling of the City •Stakeholders analysis
Step 2: Stakeholder analysis	•Ulb's, Water Boards, DUDA, NGO's, etc
Step 3: Sensitization/ Orientation	•Oranizing •Sensitization/Orientation •Workshop
Step 4: Constituting teams	•City Sanitation Task Force •Core team - Technical
Step 5: Initiating IEC activites	•Social marketing approaches •IEC training activities (ULB's, NGO's, volunteers, health institution, etc)
Step 6: Situation analysis and mapping current status	•Mapping current status •Identify gaps
Step 7: Problem analysis	•Identifying stress zones •Assessment of options
Step 8: Developing and consolidating CSP	•Planning for Ssolutions •Selecting options, new facilities , behavior change
Step 9: Formulation of action plans	•Short, medium & long term goals/measures to achieve City Sanitation
Step 10: Finalization of CSP	•Final stakeholder workshop

Step 1: Profiling ULB: As a preparatory work, a preliminary profiling of ULBs using SLB indicators and city ratings to highlighted the ODF status, sanitation situation, health indicators and current projects was undertaken.

Step 2: Stakeholder analysis: The ULBs are in the frontline of implementation and have a key role in ensuring sanitation and should focus on demand responsive approach. Plan formulation through stakeholder consultation will provide the foundation for CSP which has government

endorsement as well as an informed civil society to monitor its implementation. To play their part, as per the requirements of CSP, institutions, organizations, individuals, NGOs, academics, journals, local councilors, industry owners, consultants, representatives of private sector, etc., are identified in Mysore and analyzed the strengths and competencies required for sanitation.

Step 3: Sensitization / orientation workshop: With this background knowledge, a city level orientation workshop at city level involving identified stakeholders has been organised to highlight the need to engage with issues relating to access and arrangement especially in slums; awareness generation for changed behaviour and practices; community participation and mobilization to accord sanitation priority at all levels from policy to action on ground; a number of technical, institutional and financial issues to be addressed in CSP and its various steps of preparation. Date of meeting and proceedings are given in Annexure 2.

Step 4: Constituting CSTF technical core team: CSTF has been constituted by MMC to mobilize stakeholders to elevate the consciousness about sanitation in the mind of municipal agencies, government agencies and amongst the people of the city. CSTF will organize a multi-stakeholder, multi-party meeting in the preparatory stage and take a formal resolution to make the city 100% sanitized. Details of CSTF, date of constitution, members, etc are given in Annexure 1.

Step 5: Initiating IEC activities: The objective of well driven IEC has to be demand-driven with social marketing approaches to increase demand for toilets and ensure hygiene behaviors, promote no subsidies for household toilets in future and encourage diversity in technology and design. For this purpose ULBs may utilize suitable player for inter-personal IEC and training from the existing system like; ward development committees, health institutions, schools, National Service Scheme (NSS) volunteers, the private sector (retailers, contractors, suppliers, plumbers, masons), neighborhood committees, NGOs and Anganwadi workers.

Step 6: Situation analysis and mapping current status: The situation analysis, prepared by taking into consideration the ground realities, local conditions and assessment of the present sanitation situation has been undertaken and broad framework is indicated below:

Table 2: Broad framework of CSP

Sectors	Spatial units	Finances	Institutional
Service levels & benchmarks for: • Solid waste management • Water supply • Storm water • Drainage • Health situation – Statistics and anecdotal comment • Environmental situation – Local & downstream & groundwater	• Household sanitation • Slums • Public sanitary conveniences • School sanitation • Institutional sanitation map spatially • Any town specific areas	• Cost recovery, policy & tariffs collections • Budget transfers • PPPs • Study of current programs (SJSRY, ILCS, etc.)	• Institutional arrangement– policies, plans, implementation , management • Staffing • Organization & competence

Tools used: Data templates, survey formats, transect walks along with schedules of interviews (slums, industrial areas, water bodies), FGDs, technical analysis, impact, indicators, stakeholder consultations at city level, etc.

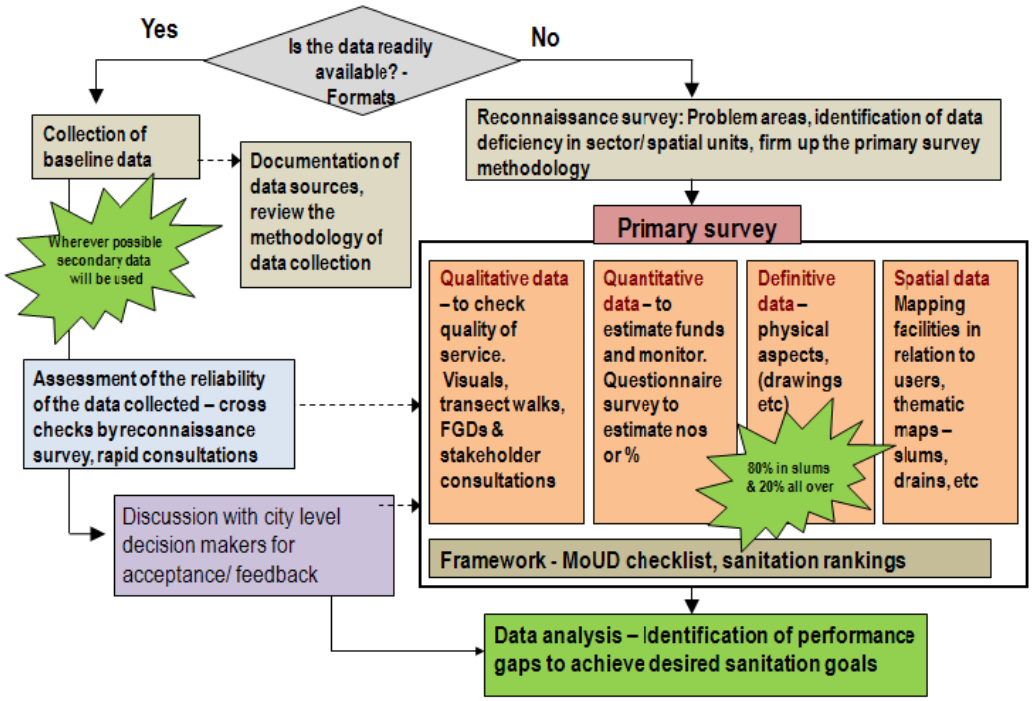


Figure 2: Process followed for data assimilation

Table 3: Research techniques with the tasks identified

Tasks	Research tools
1. To assess the current social and environmental issues in Mysore city.	▪ Literature review ▪ Baseline survey ▪ Case studies ▪ Consultations/ FGDs
2. To assess the policies, acts, operational procedures to address, mitigate and manage the social and environmental issues in sanitation.	▪ Literature review ▪ Survey ▪ FGDs ▪ Case studies ▪ Discussions ▪ Stakeholder consultations
3. To assess people's perception on sanitation, its maintenance and investment (analysis of data).	▪ Literature review ▪ Secondary information review ▪ Case studies ▪ Analysis of rapid survey data ▪ FGDs ▪ Stakeholder consultations
4. To assess and recommend on the existing institutional arrangements in the urban sector in managing and mitigating social and environmental issues.	▪ Literature review ▪ Stakeholder consultations ▪ FGDs ▪ Survey data analysis
5. To evolve a social and environmental framework to mitigate adverse/ negative impacts.	▪ Literature review ▪ Stakeholder consultations

Step 7: Problem analysis and assessment of options: Followed by situational analysis problem, challenges have been identified in coverage, access, treatment and disposal, institutional, financial, social and cultural aspects and capacity concerns. Also reviewed comprehensive range of sanitation and wastewater management options including industrial and municipal sewerage, sewage treatment, conventional and low cost, centralized and decentralized sewerage, separate

and combined effluent disposal options, on-site sanitation options, separate programs for schools, public toilets, sanitation in slums, community-based NGO supported programs, etc.

The main purpose of analyzing the options is to identify plausible technical, financial and institutional solutions considering (i) unit cost per beneficiary, (ii) maximizing both human and environmental benefits, (iii) sustainability, (iv) a long-term plan, (v) government policy including land use zoning, (vi) piloting new approaches, (vii) beneficiary participation, (viii) wastewater as a resource, (ix) lessons learned from the past and (x) political commitment.

Step 8: Developing and finalization of CSP: Having completed above steps, CSP has been formulated to articulate sanitation goals, specific quantifications both in terms of technical, capacities and financial based on stakeholder consultations and the analysis of choices made depending on costs of capital investments, operation and maintenance, monitoring and evaluation. Project priorities for sanitation need to consider:

- Serving the unserved urban poor
- Serving the unserved schools
- Serving the unserved public areas
- Institutional capacity building for sustainability and environmental monitoring
- Grant elements for demonstration pilot projects for eco-sanitation (private developers)
- Rehabilitation of existing facilities
- Improvement of existing sanitation (septic tank sludge and effluent treatment)
- Extension of existing sewerage and sewage treatment (as a last priority)

1.5 Primary survey

The objective of conducting the sample field survey was to validate some of the information collected from secondary sources and assess few situations where data is not available, also the services at the customer level / field level and validate the information given by officials.

1.5.1 Methodology adopted for the sample surveyed

The samples surveyed accounts to 3% of the 2001 Census population and 2.1% of estimated 2011 population. Thus, 4361 households were randomly selected for sample survey in Mysore city comprising 73% slum and 27% non-slum in order to assess the sanitation issues in the households and validate the available secondary data. The random sampling was adopted for the survey. In each ward 67 samples have been surveyed. Notified slums households 1608 (36.83%), Poor immense families 2010 (46.03%), other ward households 737 (16.88%). (Total 4366 households that is 100%).

Survey carried in areas notified by MCC on slum and also poor immense families residing areas to have a better understanding of the sanitation situation. Out of 4366 a total of (36.83%), (46.03%) households are covered in slum and low income areas in this city, low income areas (not in slums) are substantial and we have taken care to capture sanitation status.

The sanitation arrangements in households surveyed needs considerable improvements in order to achieve higher scores in the city sanitation ranking. The survey has also helped in finding the gaps in implementing the city sanitation plan. It was observed that the available secondary information gathered from associated departments needs regular updation and thorough check in inconsistent data.

Areas covered: The survey considered spatially from all parts of the city, but the main focus was given to the following areas.

Table 4: Surveys and sample numbers

Type of survey	No. of samples
1. Households	4427
2. Slum survey	1594
3. School survey	87
4. Institutions	6
5. Public toilets	33
6. Slaughter houses	1
7. Water bodies	7
8. Commercial places	60
9. Hospitals	23

Picture 1: FGDs in slums

1.5.2 Communication Needs Assessment

The key idea for the Communication Needs Assessment (CNA) is to carry out a needs assessment within the existing infrastructure as well as the strategy for expansion of infrastructure. Following steps were identified before visiting the field.

- Identifying stakeholder groups and available channels of communication
- FGDs, interviews, transect walks with stakeholder groups were planned
- Topic guides were prepared for each stakeholder group
- Data collection, field assessment of communications needs was carried out

Stakeholders: Residents, establishments and ULB officials. Resident includes all those living within city can be classified as HIG, MIG, LIG and slum dwellers. In smaller towns a division into higher income group, middle class and slum dweller could be sufficient. Shop keepers and

commercial establishments constitute a separate group especially for generation of market waste. Opinion leaders to be targeted as a high influence group both for FGDs and implementation of communications strategies.

- Key officials-Commissioners, sanitation inspectors, medical/health officers
- Councilors, community elders
- City media: newspapers, reporters
- RWA office bearers
- NGOs
- Safai-karamcharies union office bearers
- Heads of commercial establishments & shopkeepers, including public places such as bus stands
- Slum residents
- Residents from neighborhoods
- School teachers, employees
- School children

Three key parameters

- Environmental sanitation SWM: market waste, domestic waste, waste segregation at source and at collection point, waste disposal measures
- ODF: public toilets, individual latrines, toilet maintenance, disposal of human waste
- UGD: awareness, user charges

The issues on these parameters as explored in primary data will create a basis for topics to be raised in FDGs.

1.6 Verification of MoUD checklist

The MoUD has prepared a common checklist for the preparation of CSPs by various organizations for cities in various parts of India. This checklist will help cities assess the quality of the draft version of the CSP. The indicators in the checklist are drawn to measure whether the key dimensions of sanitation are addressed in the contents and ensure that the process followed in the preparation of the CSP was consultative and has full ownership of the city stakeholders. This is a ***self-assessment*** result and indicates the gaps in contents and process that need to be remedied and ensure that CSP is ready for submission and presentation as one of the model CSPs prepared for implementation under the NUSP. An attempt has been made to prepare the CSP under the guidelines of the MoUD checklist. The checklist is in two parts: **Content** and **Process**.

1.6.1 Content Self Assessment

Table 5: CSP Content self-assessment

No.	Item	Yes/No
I	**Baseline data collection & situational analysis in terms of identification of short-term or mid-term or long-term measures**	
1)	Has the city carried out a baseline data collection (secondary and primary) and situation analysis of different aspects of sanitation viz:	(Score overall 'Yes' if at least 9 indicators below score 'Yes, else 'No)
	i. Access to household level sanitation arrangements in general residential and slum areas	Yes
	ii. Community and public toilets – location and status	Yes

	iii. Safe collection and conveyance of human excreta (on-site and sewerage) – infrastructure and management (including status of de-sludging services)	Yes
	iv. Treatment and safe disposal of human excreta	Yes
	v. Solid waste collection, transport and safe disposal	Yes
	vi. Drainage and flooding	Yes
	vii. Drinking water quantity, quality and coverage	Yes
	viii. Institutional arrangements and finances for capital creation and O&M management of environmental services (water, sanitation, solid waste, drainage)	
	ix. Current population and socio-economic categories and projections by different categories	
	x. Arrangements and practices of commercial, public and other institutions in respect of sanitation and solid wastes	Yes
	xi. Maps and physical features of settlements (wards, slums, etc.) and key city infrastructure (water, sewerage, drainage, roads, treatment plants, water and sewage pumping stations, etc.)	Yes
	xii. Data on health-related indicators of sanitation and water supply	Yes
	xiii. Other important and locally relevant details (specify)	
2)	Has the draft CSP identified specific data gaps and developed a plan for detailed data collection?	Yes
II	**Institutional roles and issues**	
3)	Has the city identified an institutional home/s for sanitation planning, implementation, monitoring and regulation?	
4)	Has the draft CSP proposed specific actions to resolve institutional gaps and overlaps for:	(Score overall 'Yes if at least 5 indicators below score 'Yes, else 'No)
	a. Planning and financing	
	b. Creation of physical infrastructure	
	c. O&M management	Yes
	d. Training and capacity building	Yes
	e. Monitoring of outcomes	
	f. Communications	
	g. Regulation	
III	**City-wide sanitation campaign**	
5)	Does the draft CSP contain a plan for the launch of a 100% sanitation Campaign in the city?	
IV	**Technology options and city-wide design**	
6)	Has draft CSP detailed and evaluated different technology options (on or off-site as well for collection, transport and safe disposal – i.e. full-cycle) for sanitation?	Yes
7)	Do the proposed sanitation interventions (rehabilitation, retrofitting or new investments) consider the whole city? (not just a part thereof)	
V	**Urban poor and unreached**	
8)	Has the draft CSP identified the locations or settlements of the urban poor and other unreached population segments with have no or limited access to sanitation?	Yes
9)	Does the draft CSP identify actions for assisting unreached/poor households with individual, community or public sanitation facilities (in that order); and efficient disposal from these facilities?	Yes
10)	Has the draft CSP identified or proposed sources of financing the CSP (schemes, grants, loans, etc.) for extending access to sanitation and related behavior change communication activities?	
VI	**Financing and O&M management**	
11)	Does the draft CSP consider an appropriate time-frame and spatial and demographic dimensions to remain relevant (at least for the 12th	

	Five Year Plan period, even if investment numbers are indicative or work-in-process)?	
12)	Were the different sanitation options (hardware plus software) evaluated on the basis of financial viability? (i.e. Cost Benefit Analysis done)	
13)	Whether O&M implications of each of the investment options evaluated i.e. implications on tariff increases and willingness to pay for services; personnel number and capacities etc.?	
14)	Has the draft CSP considered options for partnering with private sector, NGOs etc. for implementation or O&M management of sanitation facilities?	
VII	**Expedient and other actions**	
15)	Has the draft CSP identified the steps for implementing improved enforcement of existing laws and provisions? (e.g. prohibiting hazardous discharge of untreated sewage, scrutiny about sanitation arrangements before issue of building permits)	
16)	Have gaps and overlaps in existing regulations identified for resolution? (e.g. provisions in development regulations or building bye-laws to promote sanitation including safe disposal)	Yes
17)	Does the draft CSP have a plan for *improving septage management?*	Yes
18)	Whether the draft CSP includes an implementation plan and timeline?	Yes
19)	Whether the draft CSP has a disaster preparedness component?	
20)	Whether the draft CSP identifies short-term/ medium-term/ long-term measures to achieve identified outcomes?	Yes
21	Does this draft CSP leads to improvement of service levels with respect of SLB related to MSW/storm water drainage/solid waste management?	Yes
22)	Outline of expected improvements on rating as per NUSP?	Yes

1.6.2 Process Self Assessment

Table 6: CSP Process Self-Assessment

No.	Item	Yes/ No
I	**Stakeholder participation**	
1)	A multi-stakeholder City Sanitation Task Force has been formed and has met at least sufficient consultations have been held?	Yes
2)	All agencies working in the City (ULB, State Government, NGOs, private sector involved in planning, implementation, management or regulation of environmental services (water, sanitation, solid waste, drainage), representatives of different community groups and key waste-generating segments have been consulted in the process of preparation of the draft CSP?	Yes
3)	Number of area Sabhas/ Mohallas/ RWA's etc. consulted?	Yes
4)	Whether sufficient consultations have been held with urban poor groups in the city? Indicate the number.	Yes
II	**Ownership of the draft CSP**	
5)	Has the draft CSP gone through an appropriate process of "appraisal" or "agreement" at the ULB and the City Sanitation Task Force?	
6)	Is the draft CSP aligned to other plans of the city (CDP, Master-plan, Development Plan, etc.) and differences if any, highlighted for resolution in the CSP?	
7)	Are there are any current or pending/ proposed projects (under various schemes) that are in conflict with the recommendations and decisions in the CSP? Have these been highlighted for resolution?	
III	**Communications**	
8)	Has the CSP process formally recognized the importance of communicating with stakeholders, right from the beginning of the process and drawn up as a *Communications Plan?*	

9)	Have the basic steps of the communication plan started being implemented?	
10	Level of awareness in the city about CSP (Indicate Yes/No)?	Yes
IV	**Links with related exercises**	
11)	If the city is participating in the Service Level Benchmarking exercise, have the relevant indicators been measured and uniformity ensured between that and the CSP?	

1.7 Chapter Plan

This section intends to present a brief overview of the CSP report, giving an idea of the content and the purpose of the various chapters. The report has two major sections namely, situational analysis and sanitation strategies. The former section depicts the city and its present status with regards to sanitation with an aim to highlight the existing conditions regarding access and coverage of sanitary facilities, identifying gaps and striking issues and understand the behavioral aspects of various sections of the society. This section is covered from Chapter 1 to Chapter 5. The latter section in Chapter 6 provides strategies and solutions to bridge the identified gaps, mitigate the existing issues and provide ways and means to aid the sustenance of the existing and proposed strategies and projects.

Chapter 1 gives an introduction to the CSP process, its background and the objectives behind it. This is followed by the step-by-step methodology of the CSP process, as well as the status of the CSP for the particular city. The process of collection of baseline information, both primary and secondary has been explained at length. The CSP process at Mysore has then been evaluated on the basis of the CSP checklist as prepared by MoUD, GoI.

Chapter 2 presents a review of the policies and programs that are prevalent and followed in the state to improve the sanitation conditions in the urban areas. It gives detailed insight into the NUSP and the sanitation ranking of cities, the MSW 2000 rules, the ILCS projects and other such projects which have been taken up for the improvement of access & coverage of sanitary facilities.

Chapter 3 deals with the city profile where the various aspects of the city are discussed in order to get a fair idea about the city itself. Aspects such as location, regional linkages, demography, economic, land use and housing profiles, the urban governance, the slums and squatter settlements are discussed in brief.

Chapter 4 forms the central focus on the situational analysis. The aim of this chapter is to present a clear picture of the existing systems of sanitation in the city. It contains four sectors – sewerage and sanitation, storm water system, solid waste management and the water supply system of the city. Within each sector, the gaps and issues in access and coverage are identified, the problem areas are clearly demarcated, the performance of each of the sectors is evaluated through SLB indicators and projections are also made for the future years.

Chapter 5 aims to evaluate the institutional capacity and the financial structure to find out if the ULB along with the associated organizations is able to cater to the sanitation needs of the society, with regards to both adequate qualified personnel and adequate financial sources.

Chapter 6 aims to present the strategies for the CSP. It provides the vision for the CSP and its goals and the basic guiding principles on which the strategies are based. Thereafter, strategies have been provided to improve coverage and access to sanitation facilities, to implement effectively the various proposals, options, mechanism for effectively financing the strategies and proposals along with proper phasing.

2 STATE URBAN SANITATION POLICIES AND PROGRAMS–A REVIEW

2.1 National Urban Sanitation Policy and National Sanitation Awards

NUSP has been formulated by the Government of India in 2008 with a vision to provide appropriate sanitation facilities in all cities and towns, through policy, institutional, technical and financial interventions. Some of the areas to address under NUSP include open defecation free towns, providing access to toilets for poor people, waste water treatment, solid waste treatment and its disposal, achieving public health outcomes and environmental standards.

Box 2: NUSP 2008 "All Indian cities and towns become totally sanitized, healthy and livable and ensure and sustain good public health and environmental outcomes for all their citizens with a special focus on hygienic and affordable sanitation facilities for the urban poor and women."

2.1.1 Components of National Urban Sanitation Policy

The components of NUSP as supported by Government of India are as follows:

- Awareness generation
- Institutional roles
- Reaching the un served and poor households
- Knowledge development
- Capacity building
- Financing
- National monitoring and evaluation
- Coordination at the national level

2.1.2 National award scheme for sanitation for Indian cities

In order to rapidly promote sanitation in urban areas of the country (as provided for in the National Urban Sanitation Policy and Goals 2008) and to recognize excellent performance in this area, the Government of India intends to institute an annual award scheme for cities. The award is based on the premise that improved public health and environmental standards are the two outcomes that cities must seek to ensure for urban citizens. In doing so, governments in states and urban areas will need to plan and implement holistic city-wide sanitation plans, thereby put in place processes that help reach outputs pertaining to safe collection, disposal and disposal (including conveyance, treatment and/ or re-use without adverse impacts on the environment in and around the cities).

It may be noted that the awards will not recognize mere inputs, hardware or expenditure incurred in urban sanitation but assess how these lead to achievements of intermediate milestones toward the final result of 100% safe disposal of wastes from the city on a sustainable basis. Cities will need to raise the awareness of city stakeholders (households, establishments, industries, municipal functionaries, media, etc.) since improved sanitation can ensure improved public health and environmental outcomes only if considerable changes in behavior and practice take place across the spectrum of society.

2.1.3 Concept of totally sanitized cities

A totally sanitized city will be one that has achieved the outputs or milestones specified in the NUSP, the salient features of which are as follows:

- Cities must be open defecation free
- Must eliminate the practice of manual scavenging and provide adequate personnel protection equipment that addresses the safety of sanitation workers
- Municipal wastewater and storm water drainage must be safely managed
- Recycle and reuse of treated wastewater for non potable applications should be implemented wherever possible
- Solid waste collected and disposed off fully and safely
- Services to the poor and systems for sustaining results
- Improved public health outcomes and environmental standards

2.1.4 Rating and categorization of cities

The Ministry of Urban Development (MoUD), GoI has identified a set of output, process and outcome indicators to assess the existing sanitation conditions in the town. The list of indicators pertain to the practice of open defecation, access to sanitation (individual, community and public), collection, treatment and disposal of solid and liquid wastes, proper upkeep and maintenance of the sanitation infrastructure, clear institutional roles and responsibilities and improvements in health and environment. A total of 19 sanitation parameters such as access to community toilets, safe management of human excreta and solid waste collection and treatment are being assessed. The rating exercise involves three categories of indicators as follows:

1. **Output indicators:** pertain to the city having achieved certain results or outputs in different dimensions of sanitation ranging from behavioral aspects and provision to safe collection, treatment and disposal without harm to the city's environment. *There are 9 main output-indicators accounting for 50 points of the total of 100 points.*
2. **Process related:** indicators pertain to systems and procedures that exist and are practiced by the city agencies to ensure sustained sanitation. *There are 7 main process-indicators accounting for 30 points of the total of 100 points.*
3. **Outcome related:** indicators include the quality of drinking water and that of water in water-bodies of city, as also the extent of reduction in sanitation-related and water-borne diseases in the city over a time period. *There are 3 main outcome-indicators accounting for 20 points of a total of 100 points.*

Table 7: Category of city color codes

Category	Marks	Description	No. of cities in each category
1. Red	< 33	Cities on the brink of public health and environmental "emergency"; needing immediate remedial action	204
2. Black	34 - 66	Needing considerable improvements	228
3. Blue	67 - 90	Recovering but still diseased	4
4. Green	91 - 100	Healthy and clean city	0
		Total	**436**
		Mysore Rank	**2**

Ideally, data for the above outputs, processes and outcomes are regularly collected by city authorities but at present, very few cities will have, at best, partial data available. This rating exercise will help in highlighting the need for regular data collection and monitoring of indicators. National rating survey data utilizes these categories for publication of results.

On the basis of plans prepared and implemented, cities will be able to measure the results of their actions and be able to clearly chart out their improvements over time compared to their baseline situation. On achievement of remarkable results, i.e. coming into the Green category (Healthy and clean city), cities will typically become eligible for the national award. Other cities showing remarkable incremental performance or selective achievements may also be given special or honorary awards. Cities in different size-classes may also be considered for category-wise awards. Based on results of the rating survey and selection of awardees, cities will be invited to participate in a National Urban Sanitation Award ceremony.

Findings of a survey commissioned by the MoUD rated Indian cities on safe sanitation practices of 423 Class-I cities (with a population of more than 1,00,000). Four color codes have been assigned to the cities based on the points they obtained in the rating; Red means the cities need 'immediate remedial action', Black means 'need considerable improvement', Blue means 'recovering,' Green means 'healthy and clean', community-driven Nirmal Shahar, or totally sanitized, healthy and liveable cities and towns. One of the objectives of CSP is to improve the scores by identifying their interventions areas. None of the cities fall in the green category. The distribution of the 436 cities in the said categories has been presented in the table as follows.

2.2 Municipal Solid Waste 2000 Rules

The Municipal Solid Wastes (Management and Handling) Rules, 1999 were published under the notification of the Government of India in the Ministry of Environment and Forests. In exercise of the powers conferred by section 3, 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby made the rules to regulate the management and handling of the Municipal Solid Wastes, 2000. Municipal Solid Waste (Management & Handling) Rules, 2000 are applicable to every municipal authority responsible for collection, segregation, storage, transportation, processing and disposal of municipal solids. The rules contain four schedules as given in the table below:

Table 8: Schedule details of MSW Rules, 2000

Schedule	Description
I	Relates to implementation schedule
II	Specifications relating to collection, segregation, storage, transportation, processing and disposal of municipal solid waste (MSW).
III	Specifications for land filling indicating; site selection, facilities at the site, specifications for and filling, Pollution prevention, water quality monitoring, ambient air quality monitoring, plantation at landfill site, closure of landfill site and post care.
IV	Indicate waste processing options including; standards for composting, treated l lactates and incinerations.

The MSW Rules (2000) very categorically state the roles and responsibilities of ULBs, the State Government, the Union Territory Administrations and the Pollution Control Boards. The roles of the ULBs as stated are as follows:

1. Every municipal authority shall, within the territorial area of the municipality, be responsible for the implementation of the provisions of these rules and for any infrastructure development for collection, storage, segregation, transportation, processing and disposal of municipal solid wastes.
2. The municipal authority or an operator of a facility shall make an application in **Form I,** for grant of authorization for setting up waste processing and disposal facility including landfills from the State Board or the Committee in order to comply with the implementation programme laid down in **Schedule I**.
3. The municipal authority shall comply with these rules as per the implementation schedule laid down in **Schedule I.**
4. The municipal authority shall furnish its annual report
   a. To the Secretary-in-charge of the Department of Urban Development of the concerned State or as the case may be of the Union Territory, in case of a metropolitan city; or
   b. To the District Magistrate or the Deputy Commissioner concerned in case of all other towns and cities, with a copy to the State Board or the Committee on or before the 30th day of June every year.

2.3 Karnataka Urban Drinking Water & Sanitation Policy, 2002

Good quality reliable drinking water supply and sanitation are essential basic needs of every citizen. Increasing urbanization has resulted in greater pressure on the existing urban water supply and sanitation systems leading to increasing demand on the one hand to augment the source and improve distribution and on the other to increase the coverage of underground drainage (UGD). At the same time, as stated in the State Water Policy brought out by the Department of Water Resources, there is an urgent need to conserve the limited water resources of the State to ensure sufficient availability of water for various needs as well as for the future. The Government of Karnataka in partnership with urban local bodies in the State, the Karnataka Urban Water Supply & Drainage Board (KUWS&DB) and the Bangalore Water Supply and Sewerage Board (BWSSB) will continue and strengthen its efforts to provide all residents of urban areas of the State, piped water supply and sanitation services at or near their dwellings. The efforts of the Government of Karnataka and its partner agencies will be to:

1. Ensure universal coverage of water and sanitation services that people want and are willing to pay for and
2. To do so in a manner that preserves the sustainability of the precious water resources of the State, project and enhances the commercial and economical sustainability of the operations at the same time.
3. Ensure a minimum level of service to all citizens.

The Government of Karnataka will continue to be responsible for:

- Ensuring provision of the bulk of the resources required for capacity creation
- Regulation, monitoring and evaluation of the efficiency of operations, including prescribing reporting requirements, procurement procedures, etc.
- Setting minimal service standard
- Encouraging the use of public private partnerships as well as private sector participation to achieve the sector goals
- Promotion of the economic and commercial viability of water supply systems and the exploitation of economies of scale and scope by appropriate aggregation options

- Institution of necessary incentives for ULBs and service providers to implement sector reforms
- Ensuring co-ordination and collaboration among the various agencies both at the policy and operational level through the establishment of appropriate committees and agencies.

2.4 Integrated Low Cost Sanitation

The Integrated Low Cost Sanitation (ILCS) programme envisages construction of new sanitary latrines in households not having latrines by adopting the low-cost leach pit system, with an objective to eliminate dry latrines and manual scavenging. The scheme is being implemented with 63% HUDCO loan, 32% Government of India subsidy and 5% of contribution of beneficiary. Initially during the year 1992 the ILCS was taken up in 34 municipalities, subsequently extended the program covering all the Urban Local Bodies in a phased program.

	Below Plinth	Above Plinth
Government of India subsidy	45%	
HUDCO loan	50%	95%
Beneficiary contribution	5%	5%

2.4.1 Objectives of ILCS

- To stop proliferation of dry toilets and open defecation
- To remove the dehumanizing practice of manual scavenging
- To provide better sanitation facilities to the people of all municipalities in the state
- To motivate people of latrine less areas, to come forward and build toilets
- To inculcate healthy practice of maintaining sanitation

2.5 Asha Kiran Mahiti

Asha Kiran Mahiti (AKM) is a web-based application of the Karnataka Municipal Reforms Cell, Directorate of Municipal Administration, Government of Karnataka. It has taken a major step in the direction of mapping 3,400 notified and non-notified slums all over Karnataka and has the socio-economic database of six lakh slum households across Karnataka. Based on this, it needs to generate the social indicators, evolve plans and set targets for improvement in each of them and measure the audit outcomes periodically.

2.6 Swarna Jayanti Shahari Rojgar Yojana

The Government of India has launched a rationalized poverty alleviation scheme called Swarna Jayanti Shahari Rozgar Yojana (SJSRY) replacing three existing schemes, namely, Nehru Rozgar Yojana (NRY), Urban Basic Services for the Poor (UBSP) and Prime Minister's Integrated Urban Poverty Eradication Programme (PMI UPEP). SJSRY seeks to provide gainful employment to the urban poor (living below the urban poverty line) unemployed or under-employed, through setting up of self-employment ventures or provision of wage employment.

SJSRY online application: SJSRY is an application developed to capture and track the beneficiaries, financial and physical progress of the works under the 'Swarna Jayanthi Shahari Rojgar Yojana', a scheme under which all the beneficiaries can be enrolled for professional and career oriented training programs being conducted across the 227 ULBs of Karnataka. It is used to capture all the eligible applicant's details and provide a reliable database for the municipal

administration to govern at ease. The application includes features like maintenance of applications in draft mode, approved mode and approving facilities by designated authorities and report generation facilities to track the progress of commissioning this program across the ULBs. The SJSRY online application modules are:

- Urban Self Employment Program (USEP)
- Urban Women Self-help Program (UWEP)
- UWSP- Revolving Fund (RF)
- Skill Training for Employment Promotion Amongst Urban Poor (STEP-UP)
- Urban Wage Employment Program (UWEP)
- Urban Development Community Network (UCDN)
- Administrative & Other Expenditures (A& OE)
- Annual physical targets

2.7 Rajiv Aawaz Yojana

A Central Government scheme was introduced in 2009 with a vision of "Slum-free India" called Rajiv Awas Yojana (RAY). The scheme aims to provide support for shelter and basic civic and social services for slum redevelopment and creation of affordable housing that are willing to assign property rights to slum dwellers. The scheme proposes to address the problem of slums in a holistic and definitive way adopting a multi-pronged approach focusing on bringing existing sums within the formal system and enabling them to avail of the same level of basic amenities as the rest of the town; redressing the failures of the formal system that lie behind the creation of slums and tackling the shortages of urban land and housing that keeps shelter out of reach of the urban poor and forces them to resort to extra-legal solutions in a bid to retain their sources of livelihood and employment. The overarching aim of RAY would thus be to drive a fundamental change in policy and reform in the existing urban development systems to make cities inclusive and equitable.

The preparatory phase of RAY has already commenced under Slum free City Planning Scheme from 2010 and action plan has being drawn to proceed towards the goal of slum-free cities in a systematic and time bound manner.

2.8 Jawaharlal Urban Renewal Mission

The aim of Jawaharlal Urban Renewal Mission (JnNURM) is to encourage reforms and fast track planned development of identified cities. It focuses on efficiency in urban infrastructure and service delivery mechanisms, community participation and accountability of ULBs/ parastatal agencies towards citizens. The objectives of JnNURM are as follows:

a. Focused attention to integrated development of infrastructure services in cities covered under the Mission;
b. Establishment of linkages between asset-creation and asset-management through a slew of reforms for long-term project sustainability;
c. Ensuring adequate funds to meet the deficiencies in urban infrastructural services;
d. Planned development of identified cities including peri-urban areas, outgrowths and urban corridors leading to dispersed urbanization;
e. Scale-up delivery of civic amenities and provision of utilities with emphasis on universal access to the urban poor;
f. Special focus on urban renewal programme for the old city areas to reduce congestion; and

g. Provision of basic services to the urban poor including security of tenure at affordable prices, improved housing, water supply and sanitation and ensuring delivery of other existing universal services of the government for education, health and social security.

2.9 Namma Mane Yojane (Interest Subsidy Scheme for Housing the Urban Poor)

Interest Subsidy Scheme for Housing the Urban Poor (ISHUP) has been conceived for providing interest subsidy on housing urban poor to make the housing affordable and within the repaying capacity of EWS/LIG. The scheme encourages poor sections to avail loan facilities through Commercial Banks/HUDCO for the purposes of construction of houses and avail 5% subsidy in interest payment for loans up to Rs. 1 lakh. Loan repayment periods will be permissible generally ranging from 15-20 years. The subsidy will be 5% per annum for EWS and LIG, admissible for a maximum loan amount of Rs. 1 lakh over the full period of the loan. Beneficiary borrowers may choose fixed or floating rates (the consequences clearly explained to the borrowers by PLIs). An additional of 1% per annum maximum will be permitted to be charged by banks/HFCs if fixed rate loans are extended which will be subject to reset after a minimum period of 5 years.

The scheme will leverage flow of institutional finance for the EWS and LIG segment households and result in creation of additional housing stock of 3.10 lakh houses for EWS/LIG segments over the next 4 years (2008-12) out of which 2.13 lakh dwelling units are targeted for EWS housing and 0.97 lakh for LIG housing. Households with monthly income of up to Rs 3,300 are classified as EWS while those with monthly income between Rs 3,300 and Rs 7,300 are termed LIG. Preference will be given to scheduled caste, schedule tribe, minorities and person with disabilities and women beneficiaries in accordance with their proportion in the total population of city /urban agglomerate during the 2001 census.

3 PROFILE OF MYSORE CITY

3.1 Introduction and brief history

Mysore is the second largest city in Karnataka and commonly known as City of Palaces and Gardens. The city is famous as a historical, rich heritage and tourist spot comprising of palaces, monuments, gardens, hills, art galleries, zoo, museums, etc., attracting tourists from all around the world. During September and October there is annual ten-day Dasara festival which is celebrated as a traditional festival since the olden kingdom of Mysore.

Mysore formerly was the capital of the former princely state and is now the Divisional Head Quarters. The history of Mysore has been closely linked with the history of the Kingdom of Mysore. References from the times of Mahabharata and Asoka refer to Mahisha Nadu or Mahisha Mandala. References can also be found in Tamil literature about Ezimahi Nadu. The earliest documented evidence of the town is in the form of stone carvings (Saasanas) found in villages around Mysore, inscribed around 1021 AD. From 1499 the name Mahisuru has been recorded in inscriptions. Till the year 1610, when Srirangapatnam was acquired, Mysore was the centre of administration. It became the capital of the Kingdom of Mysore after the death of Tippu Sultan in 1799. The administrative centre was shifted to Bangalore in 1831, as the British moved their garrison from Srirangapatnam to Bangalore, thereby establishing the Bangalore Cantonment.

Mysore once again became the capital of the kingdom in 1881 with the rendition of power by the British to the Wodeyars. Most present day historical landmarks and organization of the city of Mysore were inspirations of the Wodeyar kings and their Dewans. Plans for organized development of the city exist as far back as 1904. Several structures were built around late 1800's and early 1900's.

Table 9: Brief profile of Mysore city

City features	Status
Number of wards	65
Area	128.4 sq. km
Population (2001 Census)	7,85,800
Households (2001 Census)	1,58,472
Population decadal growth rate (1991-2001)	20%
Literacy rate (2001 Census)	84.5%
Female population/ 1000 Male (1991 Census)	967
Average family size	4.8
Population density (per sq. km)	6130
Estimated population (2011)	9,14,819
Estimated households (2011)	2,06,370
No. of slums	69
Slum population	46,776
Slum households	10,380
Percentage of slum population	5.4%
Road length (km)	1762

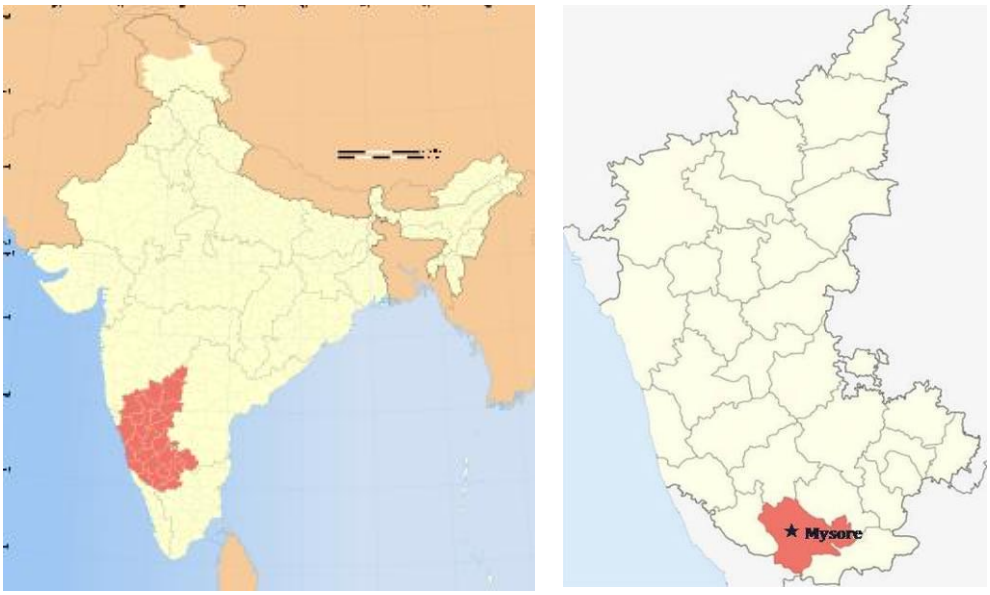
In recent years the city has grown extensively and growth rate is considerably high over the past decades. As the city is now being connected to state capital Bangalore through a new dedicated express highway and airport. It is estimated that the city will grow at a much faster pace due to large scale population migration. The authorities have made adequate efforts to improve the city's infrastructure in terms of providing adequate potable water supply, sanitation, roads, improving overall hygiene of the city.

3.2 Vision of Mysore city

Enhancing the glory of Mysore and enabling it to forge ahead as the cultural, tourism, educational, information technology, information technology enabled services and wellness hub. Further, the objective is to provide better place for citizens and improving their quality of life by providing improved urban services; catering to the needs of the urban poor; sustaining the environment and greenery; preserving the charm and culture of the city and improvement of human resource quality *(Source: CDP, Mysore)*.

3.3 Location and regional settings

It is bounded by Mandya district to the northeast, Chamrajanagar district to the southeast, Kerala state to the south, Kodagu district to the west and Hassan district to the north. It is situated in the southern region of the state of Karnataka. It is situated at the base of the Chamundi Hills spreading across an area of 128.4 sq. km. Mysore is 140 km away from Bangalore, the capital of Karnataka.



Map 1: Location map of Mysore city

Map 2: Mysore City

3.4 Climate and rainfall

The city temperature varies from 16˚C to 27˚C in winter and 27˚C to 35˚C in hot summer. The average annual rainfall is about 800 mm. The summer season is from March to June, followed by the monsoon season from July to November and the winter season from December to February.

3.5 Topography

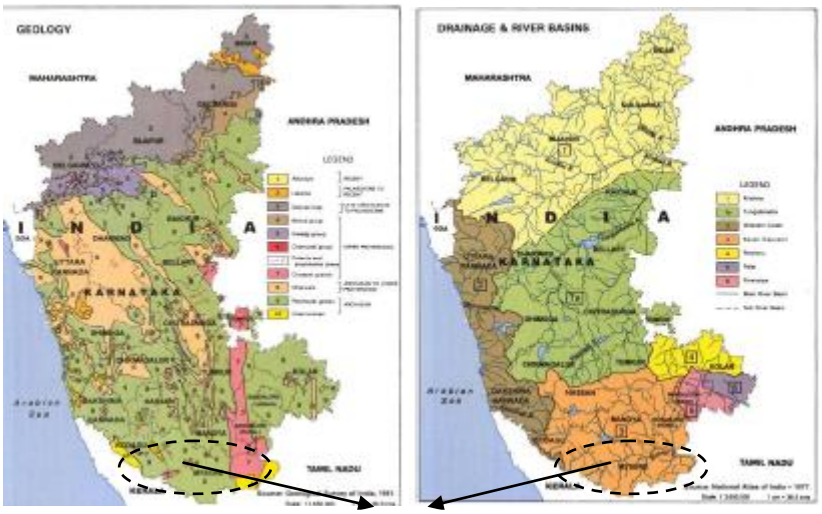
Geographically, Mysore is located between 12.18˚ North latitude and 76.42˚ East longitude with the altitude is 770 meters above Mean Sea Level. The topography of the Mysore city is characterized by a series of well-defined natural valleys which radiate from a ridge on high ground and fall gradually in all directions extending beyond the MCC and also in certain case even beyond Mysore Urban Development Authority (MUDA) boundary. The general slope of the city is from North to South. The general ground elevation of the city varies from both Northwest to Northeast portion (with the difference of 40 m) and North to South (with the difference of 25 m). The city comprises of ponds, ditches, low-lying areas and water bodies which serves as retention basins in reducing the flood intensity and controlling the flood damages during heavy rainfall.

3.6 Soil, geology and hydrology

Situated in the southern part of the Deccan Plateau, Mysore District is an undulating tableland, covered in parts by granite outcrops and fringed by verdant forests. The types of soil found in this district are red soils (red gravelly loam soil, red loam soil, red gravelly clay soil, red clay soil), lateritic soil, deep black soil, saline alluvo-colluvial soil and brown forest soil. Some of the minerals found are kyanite, sillimanite, quartz, magnesite, chromite, soapstone, felsite, corundum, graphite, limestone, dolomite, siliconite and dunite.

Mysore is situated between the rivers Cauvery and Kabini, which are a source of drinking water to the city. Mysore has several lakes, prominent among are the Kukkarahalli, Karanji and Lingambudhi lakes along with the Devanoor and Dalavai lakes. Three of the four major catchments namely, Dalavoy kere catchment, Shetty Kere (Yenne Hole kere) catchment and

Devayyanahundi kere (Lingambudhi kere) catchment run generally from North to South direction dividing the greater part of the city area and clearly demarcating the catchment area into three distinct drainage zones. A fourth major catchment, referred to as the Bannimantap catchment (Devaraya Canal basin) area, forms the drainage zone in the North of the ridge and runs in North East direction and another two minor catchments i.e., Hebbal kere and Kempayyanahundi kere catchments areas drain out independently.



Mysore

3.7 Economy

The city is surrounded by many interesting tourist places viz. sacred pilgrimages, sculptures, reserved forests, wildlife sanctuaries, coffee gardens, hill stations, dam sites, water falls, etc. The city is also well-known for its ten day Dasara habba (Navarathri festival), a hallmark of the old Kingdom of Mysore, which usually occurs annually in early October. The city is also famous for Mysore silk, Mysore sandal wood and Mysore Mallige (Jasmine flower) besides accommodating many educational institutions, research institutions and health care centers. In recent days the state government has projected Mysore City as the second IT city of the state next to Bangalore and has come up with various developmental projects in the city to improve the city's infrastructure. Many IT giants have already started setting up their campuses in the city. Mysore is situated at 140 km from Bangalore and is well connected by rail and road to all parts of the country. In order to improve air connectivity with the major cities of the country, upgradation and expansion of the existing airport is on the anvil.

3.8 Industries

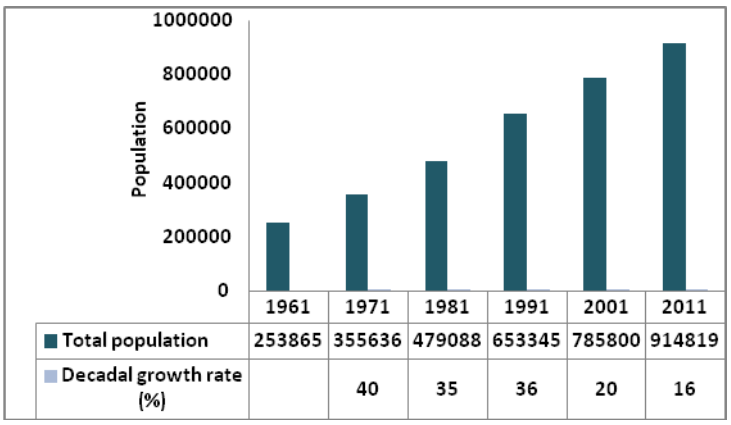
The economy of the city of Mysore flourishes owing to the presence of some of the prominent industries in Mysore. The city has some of the major industries involved in the manufacture of agricultural products, automotive and production of home consumable products. Mysore is also one of the cities known for its booming industries manufacturing computer and software products and manufacturing of electrical and electronic products. The growth in the industrial sector of Mysore is made possible by the well-developed infrastructure of the city. The economy of the second largest city of the state of Karnataka is heavily dependent on the growth of the industries in Mysore. The government earns huge revenue from the emerging industrial sector of Mysore. Some of the functioning industries of Mysore are Hexmoto Controls Pvt. Ltd; Kirloskar Electric Co. Ltd.; Software Paradigms (India) Pvt. Ltd.; Mysore Polymers & Rubber Products Ltd.; Divya

Engineering Works (P) Ltd.; Advance Components & Instruments Pvt. Ltd.; Ideal Jawa (India) Ltd. And Labland Biotechs Private Limited. Other industries include Vikrant Tyres, K. R. Mills (now Atlantic Mills), Electronic Systems (L & T), Bharath Earth, Movers Ltd., (BEML), TVS, Silk Factory, (KSIC) and Information Technology, (Infosys, Wipro). Articles made of silk; lacquer and sandalwood are some of the most famous products of Mysore.

3.9 Demography

According to the 2001 Census of India, the population of Mysore is 785800, while the current estimated population (2011) is around 914819. The literacy rate of urban Mysore is considerably higher than that of the State average, at 82.8%. A majority of the city's population speaks Kannada, while other languages such as Tulu, Tamil, Urdu and Hindi are also spoken. The population has been increasing at a compounded annual rate of 2.5% in the last two decades, which is higher in comparison to the population growth of the state of Karnataka.

In recent years, the city has grown extensively and growth rate is considerably high over the past decades. The population increase during 1971-1991 was due to the increase in heritage and culture as Mysore becomes a regular feature on the tourism circuit. Mysore has multiple industrial zones such as Hebbal, Metagalli, Belagola, Belavadi and Hootagalli industrial areas the development of which has caused the increase in population. The growth in the decade of 1991-2001 and in the last five years is largely due to the growth of IT and IT enabled services in the city. The population is presently is growing again at a faster rate due to influx of many service industry activities and commercial activities. The area of Mysore has also increased significantly over the last 2 decades, which has resulted in the gross population density being constant.



	1961	1971	1981	1991	2001	2011
Total population	253865	355636	479088	653345	785800	914819
Decadal growth rate (%)		40	35	36	20	16

The current population is estimated to be around 914819 representing 16% of a declined average decadal growth. The decline in the population growth rate may be due to the low industrial investment and migration due to city's development in commercial activities, livelihood opportunities and educational conveniences. The city of Mysore is growing predominantly as shown in table below. The population as shown has grown to 40% annual decadal growth during 1961-1971 followed by a decline of 35% during 1971-1981 which again grew by over 36% in the decade of 1981-1991. There has been a decline of 20% growth rate in 1991-2001. Currently, the growth rate is declining with 16% for 2001-2011.

Table 10: Population trends representing the average decadal growth of Mysore city

Year	Population (lakh)	Area of the city (sq.km)	Average decadal growth rate (%)
1901	0.68	-	
1911	0.71	-	4%
1921	0.84	-	18%
1931	1.07	-	27%
1941	1.5	-	40%

1951	2.44	-	63%
1961	2.54	37.7	4%
1971	3.56	40.0	40%
1981	4.79	68.8	35%
1991	6.53	91.7	36%
2001	7.86	128.4	20%
2011	9.14	128.4	16%

Source: CDP, Mysore and Mysore City Corporation, Mysore

3.9.1 Population projections

Census 2001 was the last official and authentic data available on demography of Mysore city. The field surveys for the Census 2011 have been completed in Mysore but the figures on ward wise details are not yet published officially except total households and total population of Mysore. For estimating population projection until 2045, figures for the period 1961 to 2001 are used using standard statistical methods. The estimated projections are tabulated below.

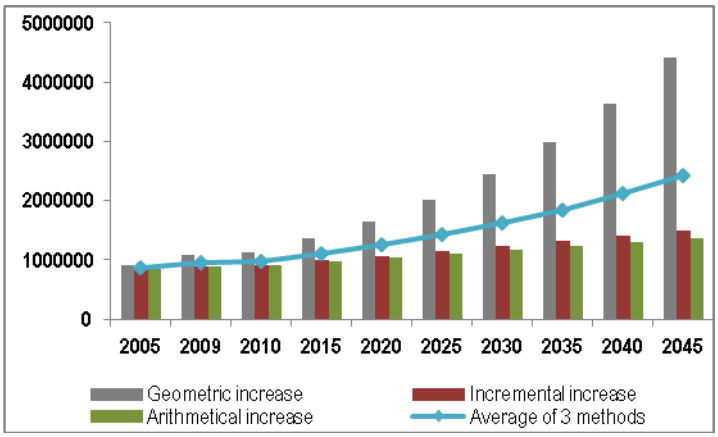


Table 11: Population projection by various methods

Year	Geometric increase	Incremental increase	Arithmetical increase	Average of 3 methods
2005	919323	841857	***838994***	866725
2009	1075535	899551	***892187***	955758
2010	1118571	914230	***905485***	979429
2015	1361002	989160	***971977***	1107380
2020	1655977	1066647	***1038469***	1253698
2025	2014882	1146691	***1104961***	1422178
2030	2451573	1229292	***1171453***	1617439
2035	2982910	1314450	***1237945***	1845102
2040	3629406	1402165	***1304437***	2112002
2045	4416018	1492437	***1370929***	2426461

Source: Estimated by ASCI, Hyderabad based on Census data

The population of Mysore has been projected using statistical methods like Geometric, Incremental and Arithmetic methods. But keenly examining all the three methods, it is desirable to consider arithmetic projection method as it stands close to the nearest values of 2011 census provisional figures. Assuming the historical rate of growth (2.5%), Mysore is forecasted to reach around 10.3 lakhs in the year 2020, 11.7 lakhs in the year 2030 and 13 lakhs by the year 2040 as depicted below. The increase in population is predominantly from natural causes.

Table 12: Population forecast in lakhs

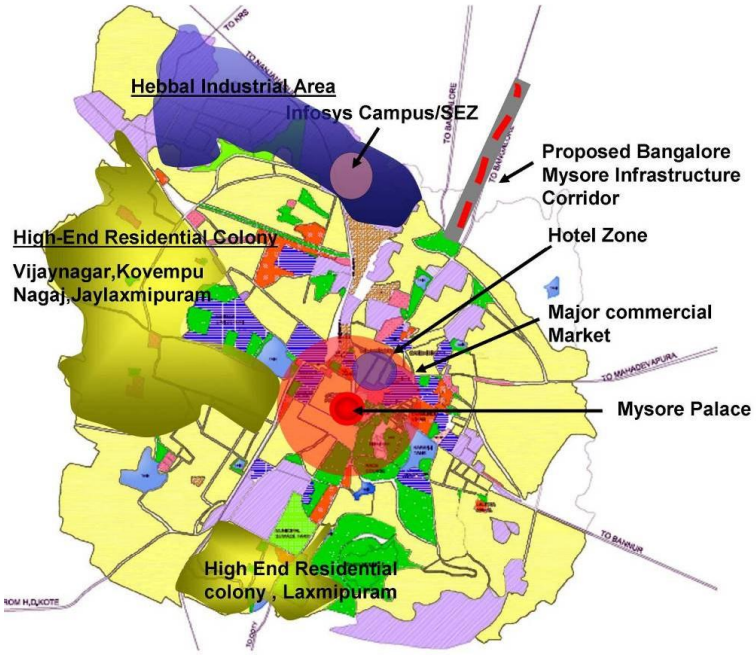
Scenarios	2001	2006 E	2010 E	2020 E	2030 E
Base growth (2.5%)	7.9	8.9	10.1	12.9	**16.5**
Medium growth (3.5%)	7.9	9.3	11.1	15.7	**22.1**
High growth (4.5%)	7.9	9.8	12.2	19.0	**29.5**

Source: Census 2001 and iDeCk estimates

As per the IDECK estimates of population forecast, the growth estimation is illustrated by considering three growth scenarios namely, base growth, medium growth and high growth scenario. In base growth scenario, the population is envisaged to grow at the historical growth rate of 2.5% which indicates that by the year 2030 the population would reach 16.5 lakhs. In medium growth scenario, the city's growth is assumed to be 3.5%, which would be slightly more than the historical growth rate owing to increasing urbanization. This would imply that the population would be around 22 lakhs by the year 2030. In high growth scenario the growth is assumed to be 4.5% which could be due to Mysore's attractiveness as an IT business and education hub. This would mean that the population would increase to around 29.5 lakhs by the year 2030.

3.9.2 Ward wise distribution and growth potential

According to the City Development Plan (CDP), which is a 20-year vision document for Mysore, the expansion is significant and there is a 70 per cent increase in the total area of the city since 2001. The extent of the urban sprawl in the city is evident from the growth rate over the last five years. The area of Mysore city according to the MUDA has increased from 7,569 hectares in 1995 to 9,221 hectares in 2001 representing a growth of 22 per cent. This expansion is expected to continue unabated and the total land area of Mysore is expected to increase to 15,669 hectares by 2011.



An analysis of the land use pattern of Mysore shows a tilt towards residential areas, which cover a greater portion of the city and this is expected to increase in the next few years. At present, residential areas account for 2,850 hectares and this will increase by a whopping 114 per cent by 2011. Residential areas will cover about 6,098 hectares by that year.

The city's development is highly slanted towards south, including the industrial areas located in Nanjangud, while residential areas developed by MUDA have come up in areas such as Vijayanagar and J.P. Nagar. Besides the MUDA layouts, private developers have proposed an array of residential layouts for which plots have been sold and the projects are in various stages of implementation. The North western part of the city is developing as the Industrial area mainly Hebbal Industrial Area with major industries like JK Tyres, Infosys, Wipro, etc., coming with huge

campuses. Mysore city has been growing at faster pace in all the wards simultaneously. All the 65 wards are moderately to highly populated with increasing residential growth. There are 20 wards namely, 2, 3, 6, 10, 33, 37, 40, 41, 42, 47, 48, 49, 50, 51, 52, 54, 55, 59, 60 and 61 which are well saturated and restrict any developmental activity or residential growth. Around 20 wards are moderately dense namely, 5, 7, 8, 9, 13, 15, 16, 17, 18, 26, 27, 28, 29, 31, 36, 43, 46, 57, 58 and 63. Looking on the further residential growth, it is estimated that around 25 wards, namely, 1, 4, 11, 12, 14, 19, 20, 21, 22, 23, 24, 25, 30, 32, 34, 35, 38, 39, 44, 45, 53, 56, 62, 64 and 65 have good scope for improvement city should focus in these areas in extending good services.

Table 13: Ward wise demographic details

Ward No.	Ward name	Area (sq.km)	Estimated population (assumed from estmd ward wise 2011 popn with 2011 census total popn)	Density rate
1	Agrahara	0.99	9729	9827
2	Sunnadakeri	0.34	13403	39420
3	Lakshmipuram	0.67	13454	20081
4	Ramachandra Agrahara	1.11	9190	8280
5	Gundu Rao Nagara	1.27	15394	12121
6	Chanundipuram	0.59	13215	22398
7	Krishna Murthipuram	0.79	11864	15017
8	Jayanagara	0.52	8283	15929
9	Ashokapuram	1.12	14736	13158
10	Vidyaranyapuram	0.44	15859	36043
11	Vishweswaraya nagara	3.22	10378	3223
12	J.P. Nagara	2.57	24131	9389
13	Srirampura 2nd stage	1.39	19272	13865
14	Aravinda nagara	1.66	10938	6589
15	Vivekananda nagara	0.75	10035	13379
16	Ramakrishna nagara	1.63	19373	11885
17	Kuvempu nagara K.H.B	0.76	13286	17482
18	Kuvempu nagara South	1.17	14173	12113
19	Kannegowdana koppalu	1.27	11144	8775
20	Saraswathi puram	1.87	9656	5163
21	Kuvempu nagara North	0.96	8518	8873
22	Sharadadevi nagara	1.95	18872	9678
23	Gangothri	3.11	11184	3596
24	Vinayakanagara	3.06	29086	9505
25	Manchegowdana koppalu	2.63	22843	8686
26	Laxmikanth nagara	1.44	16208	11256
27	Lokanayaka nagara	1.31	25847	19731
28	Kumbara koppalu	0.96	18950	19740
29	Metagalli	1.72	18435	10718
30	Brundavana Badavane	1.95	8812	4519
31	Gokulam	0.82	11319	13803
32	Onti koppal	1.65	14264	8645
33	Paduvarahalli	0.3	9767	32556
34	Medar Block	1.91	10606	5553

35	Devaraja Mohala	1.64	8467	5163
36	Subbarayana kere	0.68	10023	14740
37	Mandi mohalla	0.57	12188	21383
38	Lashkar mohalla	0.22	1090	4954
39	Kailasa puram	0.17	1056	6213
40	Meena bazaar	0.17	9963	58607
41	Eranagere	0.48	10212	21275
42	B.B. Keri	0.72	14455	20076
43	Thilak nagara	0.86	10699	12441
44	Bannimantapa	1.13	9622	8515
45	Bannimantapa Hudco badavane	1.75	14227	8130
46	Kesare	1.49	17547	11777
47	Subhash nagara	0.56	11203	20006
48	Rajendra nagara	0.58	15267	26322
49	N.R. Mohalla	0.49	15893	32436
50	Gandhi nagara	0.22	9606	43665
51	Sathya nagara	0.53	15004	28310
52	Udaya giri	0.74	16113	21774
53	Rajeev nagara	2.55	17612	6907
54	Shanthi nagara (North)	0.81	32993	40733
55	Kalyanna giri	0.54	16638	30811
56	Yaraganahalli	3.37	25631	7606
57	Vidya nagara	0.92	14299	15542
58	Raghavendra nagara	0.67	6727	10041
59	Gousiya nagara	0.57	28380	49789
60	Shanthi nagara (South)	0.18	12954	71964
61	Kythamarana halli	0.41	8258	20142
62	Gayathripuram	1.67	16406	9824
63	Siddhartha nagara	1.15	13140	11426
64	Nazarabad	1.29	9348	7246
65	Ittige gudu	9.04	17569	1944
Total		**84.07**	**914819**	

Source: Mysore City Corporation, Mysore and estimation by ASCI.

Ward wise demographic details and its potentials summarized in the table below:

Table 14: Growth potential

Population density range per sq km	Growth potential	Wards
0-5000	Very high	11, 23, 30, 38, 65 **(Total 5 wards)**
5000-10000	High	1, 4, 12, 14, 19, 20, 21, 22, 24, 25, 32, 34, 35, 39, 44, 45, 53, 56, 62, 64 **(Total 20 wards)**
10000- 20000	Medium	5, 7, 8, 9, 13, 15, 16, 17, 18, 26, 27, 28, 29, 31, 36, 43, 46, 57, 58, 63 **(Total 20 wards)**
20000- 30000	Low	3, 6, 37, 41, 42, 47, 48, 51, 52, 61 **(Total 10 wards)**
30000 and above	Very low	2, 10, 33, 40, 49, 50, 54, 55, 59, 60 **(Total 10 wards)**

Source: Discussions with MCC and density criteria

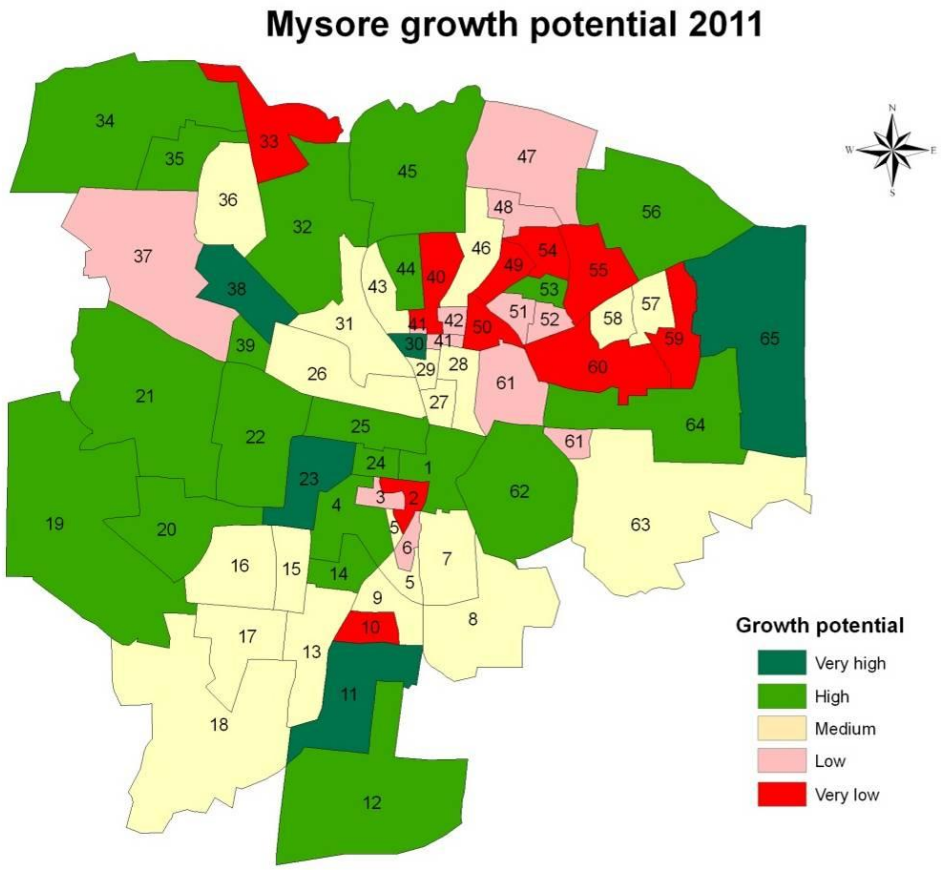


Figure 3: Growth rate potential map of Mysore City

Growth rate potential of Mysore has been demarcated into 5 categories namely, very high (0-5000), high (5000-10000), medium (10000-20000), low (20000-30000) and very low (above 30000) depending on population density. The growth rate as seen in the map is densely population in the interior of the City representing; around 25 wards of 65 wards, mostly towards southern part of the City have more scope for further development in the peri urban areas.

3.10 Land use and spatial growth

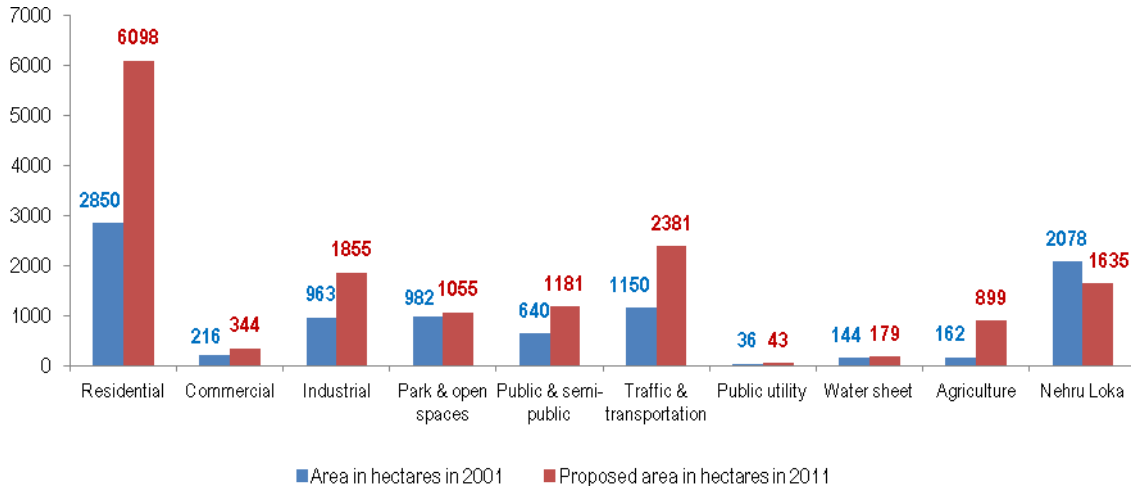
As per the CDP of Mysore, the residential areas, traffic and transportation, industrial layouts and parks and open spaces occupy most of the spaces in Mysore. It is expected that residential areas grow enormously due to increasing population and demand for extension of residential layouts.

Table 15: A comparison of land use pattern of Mysore city for the year 2001 and proposed for the year 2011

Category	Area in hectares in 2001	% of area in 2001	Area in hectares in 2011	% of area in 2011
Residential	2849.9	39.9	6097.8	43.4
Commercial	215.9	3.0	344.0	2.4
Industrial	962.6	13.4	1855.0	13.22
Park and open spaces	981.7	13.7	1055.0	7.5
Public and semi-public	639.6	8.9	1180.7	8.4
Traffic and transportation	1150.2	16.1	2380.5	16.9
Public utility	36.4	0.5	43.3	0.3

Water sheet	143.9	2.0	178.9	1.2
Agriculture	162.3	2.2	898.9	6.41
Nehru Loka	2078.1		1634.8	
Total	**9221**	**100**	**15669**	**100**

Source: CDP, Mysore



The residential area is estimated to be 6098 hectares in the proposed land use pattern for 2011. This would represent an increase of almost 114% over the area of 2850 hectares in the land use pattern for 2001. The total area demarcated for parks, open spaces and Nehru Loka (green spaces) is expected to decrease marginally to 2690 hectares (2011) as per the proposed land use pattern for the year 2011 which is around 3060 hectares (2001). The area allocated to Nehru Loka is expected to help preserve the green spaces around Chamundi Hills. The total area demarcated for residential purpose is expected to increase as new residential layouts are coming up. The percentage of land for agricultural purpose is also expected to increase from 2.8% (162 hectares) in 2001 to 6.4% (899 hectares) in 2011. However, the percentage of area for commercial, industrial and traffic & transportation purpose has not varied significantly since 2001, as illustrated in the graph given below:

Table 16: Ward wise details of types of properties

Ward No.	Number of properties			
	Residential	Commercial	Institutions	Industries
1	895	73	10	0
2	813	26	13	0
3	850	24	3	0
4	1374	49	16	2
5	989	26	2	1
6	964	23	0	0
7	974	46	5	1
8	2117	17	9	0
9	1070	40	2	0
10	984	20	6	0
11	1197	25	12	91
12	3615	14	9	15
13	1603	4	9	0
14	782	8	8	0
15	1135	3	8	0

16	2138	28	8	0
17	3109	23	2	0
18	7448	47	19	1
19	6166	35	6	0
20	2042	31	3	0
21	1447	14	6	0
22	1293	35	9	1
23	890	19	5	0
24	753	44	6	0
25	575	490	12	1
26	461	142	6	0
27	493	338	0	1
28	851	187	7	1
29	1026	66	6	0
30	854	47	0	0
31	480	104	5	1
32	1074	12	8	153
33	2542	7	7	1
34	7803	48	14	0
35	1326	35	5	0
36	1957	12	5	0
37	2316	18	16	0
38	1171	18	8	0
39	1065	9	3	0
40	1164	49	8	11
41	477	59	9	2
42	821	39	7	0
43	914	11	14	0
44	479	30	3	2
45	3148	47	5	21
46	1385	20	1	0
47	2473	9	2	0
48	1206	13	5	0
49	530	11	1	1
50	812	9	7	0
51	826	6	0	0
52	838	5	3	0
53	1123	18	4	2
54	1081	8	2	0
55	2084	26	5	0
56	5001	33	21	0
57	2413	53	3	1
58	1324	22	5	0
59	3563	37	14	1
60	2696	5	3	0
61	1107	40	4	0
62	1001	29	3	0
63	2327	52	9	0
64	2068	21	3	1
65	5153	27	10	2
Total	**1,14,656**	**2,886**	**429**	**314**

The details of registered properties in Mysore city are as follows:

1. Residential: 114656
2. Commercial: 2886

3. Institutional: 429
4. Industries: 314
5. Government Schools: 252
6. Government Hospitals: 185
7. Government Health Institutions: 631
8. Slaughter Houses: 1

Source: Mysore City Corporation

3.11 Slums and squatter settlements

There are totally 69 identified slums in Mysore comprising 53 notified and 16 non-notified slums. The total population of these slums in the city is 46776 (5% of total population) with 10380 families (5% of total households).

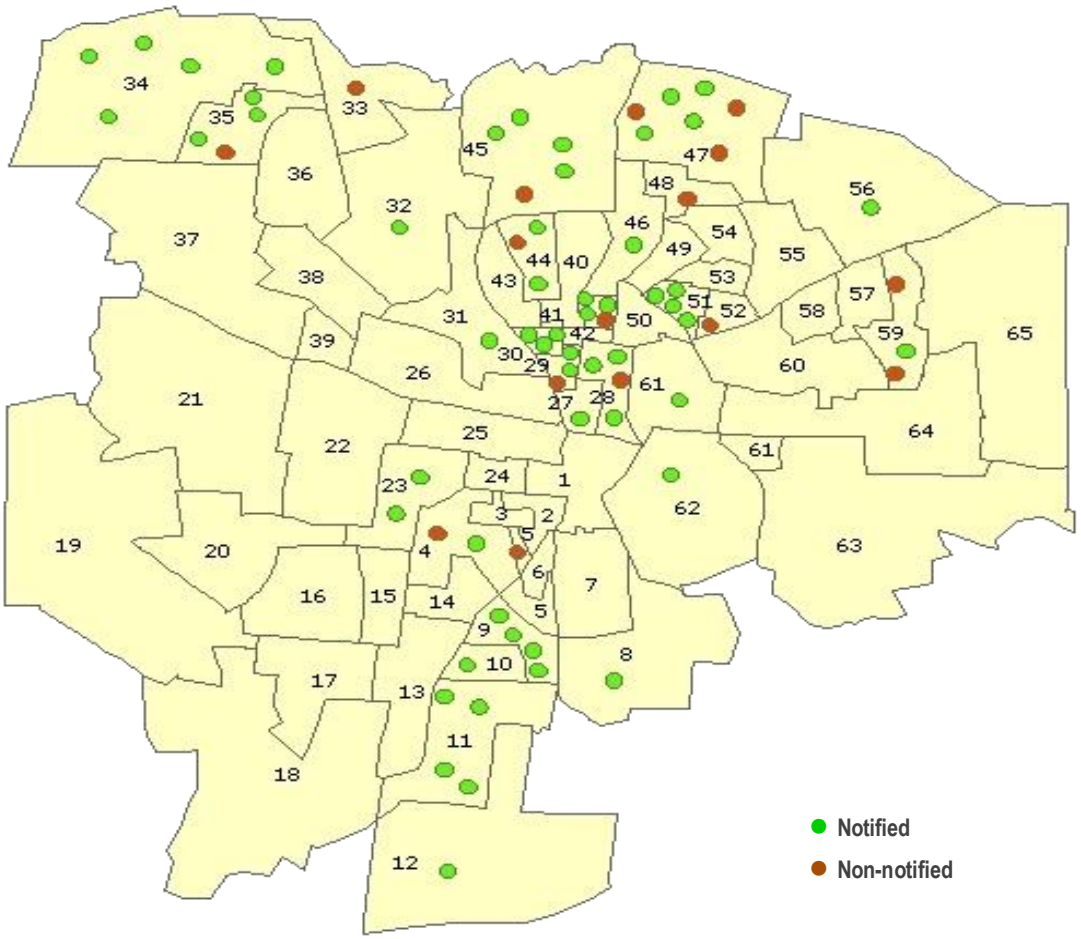
Table 17: Notified and non-notified slum details as on 2010-2011

Ward No.	Slum name	Slum			Below Poverty Line	
		Area	Population	Households	Population	Households
Notified slums						
4	1. Madhuvana	0.0030	259	60	259	60
8	2. Chinnagirikoppalu	0.0304	2163	550	2163	550
9	3. Nellurushed Part A	0.0086	866	200	866	200
	4. Nellurushed Part B	0.0061	594	143	580	140
	5. Ashokapuram	0.0042	336	71	336	71
	6. Ashokapuram 13th Cross	0.0021	987	202	987	202
10	7. Behind Sarvajanika Hostel	0.0012	308	71	234	55
11	8. D. Devaraja urs Colony	0.0012	895	157	895	157
	9. Dharmasingh Colony	0.0049	374	87	374	87
	10. Dharmasingh Colony B Block	0.0040	221	54	221	54
	11. Vishweshwaranagara	0.0032	524	121	524	121
12	12. Nachanahallipalya & J.P. Nagara 2nd Main	0.0091	444	101	444	101
23	13. Behind Coffee Board	0.0081	547	108	547	108
27	14. Hebbal Colony	0.0013	156	34	156	34
28	15. Behind P.K. Sanitorium	0.0040	374	96	374	96
	16. South of Kumberkoppalu P.K. Sanitorium, behind 2nd Main	0.0011	432	105	432	105
	17. Mahadheshwara Colony	0.0007	94	24	94	24
29	18. Metagalli Harijana Colony & Adhijambava Colony	0.0121	963	204	963	204
	19. Metagalli Janata Colony	0.0198	1181	290	1181	290
30	20. Joganakere	0.0013	94	24	94	24
	21. Manjunathapura	0.0081	900	190	900	190
	22. Near Yadavagiri Arasikere Railway Track	0.0036	253	61	253	61
31	23. Gokulam 2nd Main	0.0029	279	65	279	65

32	24. Vanivilasa Mohalla 16th Cross	0.0091	558	120	558	120
34	25. Opp. Mysore Sawmill	0.0030	397	98	397	98
	26. Yaswanth Nagara	0.0091	218	58	218	58
	27. Behind Raja Rajeshwari Rice Mill	0.0028	241	60	241	60
	28. Medhars Block	0.0452	1091	289	1078	285
	29. Bambu Bajar	0.0034	447	114	447	114
35	30. Behind Janatha Sawmill	0.0024	267	69	267	69
	31. R.M.C Board	0.0029	414	96	414	96
42	32. Raja Soap Factory	0.0034	418	110	418	110
	33. Budbudakeri Chikkaveranna Road	0.0014	803	226	794	223
	34. Budbudakeri Pulikeshi Road	0.0172	1438	321	1438	321
44	35. Behind KSRTC	0.0069	560	165	560	165
	36. Shivarathreshavaranagara Bannimatapa	0.0030	386	85	386	85
45	37. Hanumanthanagara Ambedkar Colony	0.0001	120	30	120	30
	38. Vandhematharm	0.0026	383	90	383	90
	39. Ellamma Slum	0.0024	228	83	228	83
	40. Savitha Ambedkar Colony	0.0042	173	31	173	31
46	41. Kesare near slaughter house	0.0091	1258	285	1258	285
47	42. Rajendranagara, Kesare, Kurimandi Block	0.0014	370	76	370	76
	43. Kesare 3rd Main	0.0056	98	18	98	18
	44. Kesare 2nd Main	0.0013	230	45	230	45
	45. Belavattha Janata Nagara	0.0065	529	108	529	108
51	46. Siddappaji Cross Road 1,2,3	0.0338	881	185	881	185
	47. Chamundeshvari Road Gandinagara	0.0324	967	225	967	225
	48. Behind Durgamba Temple	0.0012	707	151	702	150
	49. Siddappaji Cross Block A	0.0652	1038	215	1003	208
56	50. Sathagalli	0.0202	2509	523	2509	523
59	51. Kyatamaranahalli A.K. Colony	0.0132	1781	363	1781	363
61	52. Kyatamaranahalli Masid Road	0.0061	693	150	537	124
62	53. Jyothinagara	0.0050	1278	212	1025	174
Non-notified slums						
4	54. Gopika Gudisalu	0.0010	102	26	102	26
5	55. Chamundi Bettadha Padha	0.3000	444	98	322	72
28	56. Part of Kumbarakoppalu	0.0047	525	122	525	122
29	57. Part of Metagalli	0.0013	465	108	465	108
33	58. Part of Paduvarahalli	0.0051	563	133	563	133
35	59. Behind Women's Medical College, K.R.S. Road	0.0002	143	37	143	37
42	60. Behind Jail	0.0012	240	53	240	53
44	61. Halim Nagara	0.0039	882	163	882	163
45	62. Ekalavya Nagara	0.0354	1383	353	1383	353
47	63. Kesare 1st Main	0.0005	247	50	247	50
	64. Kesare Ambedkara Nagara	0.0003	57	14	57	14
	65. Kesare Bovi Colony	0.0004	95	24	95	24
48	66. Kesare Park	0.0002	451	104	451	104

52	67. Kalyanagiri Usmani Block	0.0044	2067	389	2067	389
59	68. Gousiya Form House	0.0035	1730	357	1730	357
	69. Gousiyanagara A Block	0.0085	3657	730	3657	730
	Total	**0.832**	**46776**	**10380**	**46095**	**10256**

Source: Karnataka Municipal Reforms Cell, DMA, GoK



Map 3: Notified and non-notified slums in Mysore City

Source: Karnataka Municipal Reforms Cell, DMA, GoK

Karnataka Slum Clearance Board (KSCB) has constructed around 2623 houses under HUDCO, 647 houses under VAMBAY and 144 houses under S.C.P. Schemes. As per the DPR, BSUP the total houseless families residing in the slums of Mysore City were 5288. KSCB has build 3414 houses under above said schemes in Mysore city. 83% of them are drawing water from Public Stand Post provided by MCC. 12% of them are drawing water from bore wells in the slum areas. Only 5% of them are having individual house connections in the slum areas. 44% of the dwellers are using public toilet complex, 7% practice open defecation and only 49% of them have access to individual toilets. Majority of the public toilets in use are not maintained properly due to the non capability or the mindset of slum dwellers to pay and use concept which is a successful practice in the areas having floating population *(Source: DPR, BSUP)*.

Table 18: Notified and non-notified slum details as on 2010-2011

Ward No.	Ward name	Estimated population (assumed from estmd ward wise 2011 popn with 2011 census total popn)	Slum HHs	Slum population	Ward wise % of slum population
4	Ramachandra Agrahara	9190	86	361	4%
5	Gundu Rao Nagara	15394	98	444	3%
8	Jayanagara	8283	550	2163	**26%**
9	Ashokapuram	14736	616	2783	**19%**
10	Vidyaranyapuram	15859	71	308	2%
11	Vishweswaraya nagara	10378	419	2014	**19%**
12	J.P. Nagara	24131	101	444	2%
23	Gangothri	11184	108	547	5%
27	Lokanayaka nagara	25847	34	156	1%
28	Kumbara koppalu	18950	347	1425	8%
29	Metagalli	18435	602	2609	**14%**
30	Brundavana Badavane	8812	275	1247	**14%**
31	Gokulam	11319	65	279	2%
32	Onti koppal	14264	120	558	4%
33	Paduvarahalli	9767	133	563	6%
34	Medar Block	10606	619	2394	**23%**
35	Devaraja Mohala	8467	202	824	**10%**
42	B.B. Keri	14455	710	2899	**20%**
44	Bannimantapa	9622	413	1828	**19%**
45	Bannimantapa Hudco Badavane	14227	587	2287	**16%**
46	Kesare	17547	285	1258	7%
47	Subhash nagara	11203	335	1626	**15%**
48	Rajendra nagara	15267	104	451	3%
51	Sathya nagara	15004	776	3593	**24%**
52	Udaya giri	16113	389	2067	**13%**
56	Yaraganahalli	25631	523	2509	**10%**
59	Gousiya nagara	28380	1450	7168	**25%**
61	Kythamarana halli	8258	150	693	8%
62	Gayathripuram	16406	212	1278	8%
Total		**427736**	**10380**	**46776**	

Source: Karnataka Municipal Reforms Cell, DMA, GoK and estimation by ASCI

3.12 Major tourist places in Mysore

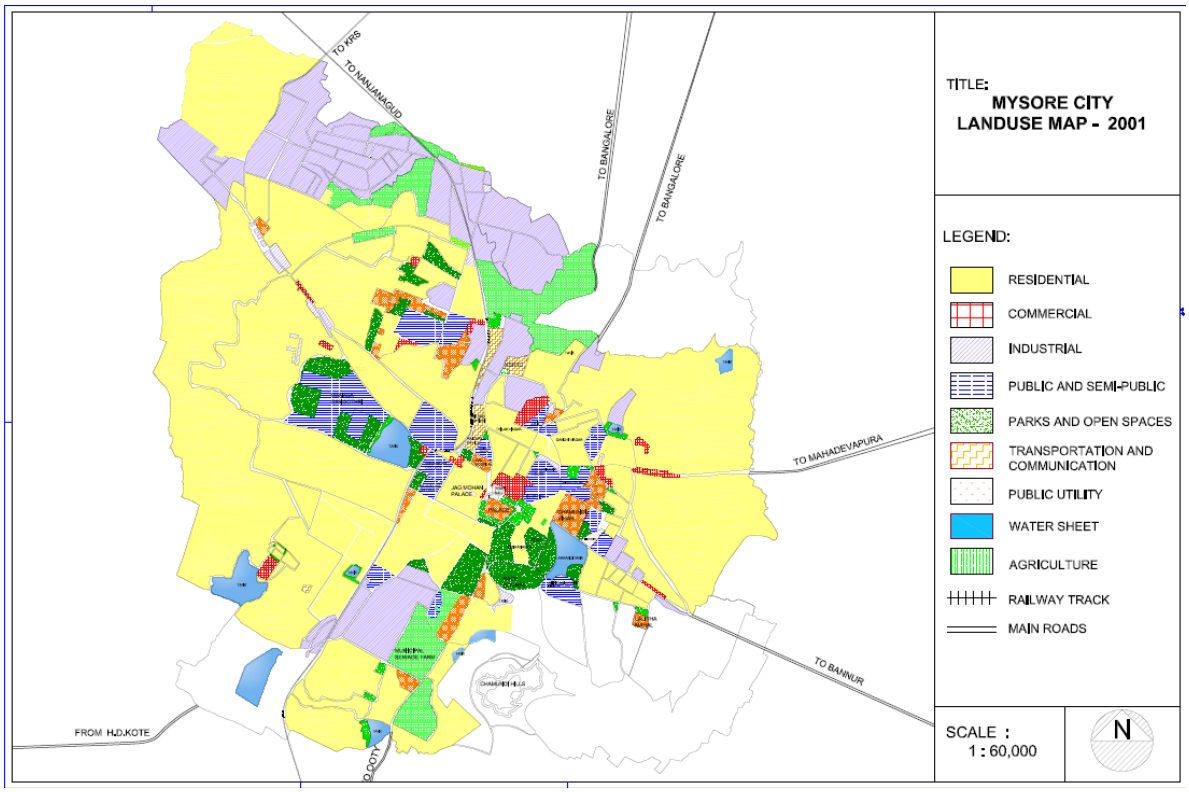
Apart from the existing growing resident colonies, Mysore attracts tourists with its historical, heritage and traditional importance. The significant places of Mysore include Mysore Palace, Art Gallery, Zoo, Museum, Brindavan Garden, Chamundi Hills, etc. Mysore is also famous for its lakes and bird watching. It is estimated that the city is visited by large number of tourists every day and during peak tourist seasons the floating population increases beyond 3.5 lakhs. As per the records of MCC, around 2817343 tourists visit these famous locations of Mysore every year as given in the table below.

Table 19: Tourist inflow at major tourist location (in lakhs)

	2001	2002	2003	2004	2005
Palace	16.1	14.3	16.5	18.3	20.6
Art Gallery	2.3	1.9	2.1	2.3	2.4
Zoo	12.9	11.8	15.9	15.3	16.4
Brindavan Garden	24.8	9.8	18.4	22.9	21.2
Chamundi Hills	-	-	-	35.0	70.7

Source: CDP

The number of floating population is increasing every year and the demand to cater such huge crowd is a big challenge in near future taking into consideration the basic infrastructure facilities like water supply, sanitation arrangements, roads, solid waste management and waste water disposal. Hence, the growing floating population needs to be considered during the planning of an effective CSP.



4 ENVIRONMENTAL SANITATION – AN ASSESSMENT

There is a good progress being made in every sector of sanitation in Mysore starting from access to toilets, treatment and disposal. The coverage on sanitation assessment includes access to individual toilets with connection to UGD, septic tanks and soak pits, adequate water supply, efficient solid waste management, functioning of storm water drains and efficient waste water treatment and disposal. The status of water bodies and its management is also being considered due to its importance in efficient sanitation improvement in the City.

Box 3: Definitions of household sanitation arrangements according to Census 2001

Water closet latrine (WC): The sanitary water flush latrines are those latrines that have water closets fitted with flushing cistern. Such latrines that may be connected to a septic tank or an underground sewerage system will also be recorded as water closet latrines. The fecal matter from these types of latrines is removed without the need for scavenging or manual handling of excreta.

Pit latrine: The latrines attached to the pit that is dug into the ground for the reception of night soil are reckoned as pit latrines.

Other latrine: This category includes service latrines (i.e. those that are cleaned manually); latrines serviced by animals such as pigs, etc., and all latrines other than the pit and the water closet types of latrine.

The secondary information is validated with the primary survey along with the focused group discussions in slums and other areas of concern to understand the problematic areas with regards to improper sanitation, its status and hygiene among the people.

4.1 Household sanitation

The sanitation infrastructure in Mysore is fairly good in terms of connectivity of sewerage network along with water supply, efficient solid waste collection and its disposal. Mysore is the earliest city to have UGD. MCC in the year 1995 with a grant in aid by Asian Development Bank had taken up a project to refurbish and extend the sewerage network facility to the entire city and construct three new sewage treatment plants (STP). Since then, MCC has taken efforts to trace the households without the UGD connections for improvement. The total properties having toilets connected to UGD is around 166860 with the length of UGD being 740 km As per discussions with officials a 10% increase can be considered to calculate households with sewerage which means about 187497 have sewerage facility implying impressive 91% coverage.

Table 20: Details of sanitation arrangements in Mysore

	Sanitation arrangement	*Baseline survey (2010)*
1	Households connected to conventional sewer as per MCC records (166860 connections*10%)	**187497**
	In %	90.85%
2	WC connected to septic tank	**12679**
	In %	6%
3	Pit latrine	**3305**
	In %	1.60%
4	Toilets connected to open nallas	**1270**

	In %	0.62%
5	Households practicing open defecation	**1216**
	In %	0.59%
6	HHs with safe sanitation	204751
	In %	98%
	Total households	**206370**

Other than UGD, few are connected to septic tank with/without soak pit amounting to 12679 (6820 in non slums and 5859 in slums) and the household toilets connected to the open nala are 1270. However field investigations indicated that many resort to open defecation despite they have UGD facility as toilets are not used and many converted them to some other use. Even SLB indicators present different picture. This shows a lack of information base and regular updation pertaining to sanitation. However, the process for UGD coverage in these areas is in planning stage. From the data below it is evident that all registered properties are not connected to UGD and little more than 6% toilets need to be given UGD connection.

4.1.1 Standardized service level indicators for waste water management

The waste water when discharged into the water bodies or used for any other purpose needs to be efficiently treated. Utmost care should be taken by the ULBs to treat the waste water from being contaminated and allow the receiving waters to meet quality objectives in reusing the same. The indicators involved in the service level benchmarking include household sewerage connections, collection efficiency, treatment, extent of reuse and recycle, recovery cost and redressal of customer complaints. The progress made by the Mysore city on waste water treatment is as given in the table below:

Table 21: Service level benchmarking on waste water management

Waste water management	Benchmark	Progress made
Coverage of toilets	100%	74
Coverage of sewage network services	100%	78
Collection efficiency of the sewage network	90%	91
Adequacy of sewage treatment capacity		100
Reuse and recycling	20%	0
Quality of sewage treatment		55
Efficiency in redressal of customer complaints	100%	90
Cost recovery	100%	Not available
Efficiency in collection of charges		26

Source: Notified SLB indicators

As per the notification on service levels, Mysore reported as below but secondary source of information and field investigations indicated different picture on most of the indicators especially on coverage to toilets. This implies a weak database maintenance system at city.

Around 1270 household toilets are directly connected to open nala. The environmental condition in these areas is unsatisfactory with regard to discharged water and its effects on health of the residents. During interaction at Gousiyanagar, ward 59, it was inferred that the residents are not satisfied with the sanitation facilities. The lines that are connected to open nala get blocked

frequently and this causes overflow of waste water in near places causing environmental crisis. Fecal matter in these nals is a quite common site. The complaints are not addressed on time which causes severe problems to the residents of these localities.

Open drain led to open nala at Gousiyanagar, Ward No. 59

Sewer line directly let into open drain at Nehru Nagara, Ward No. 56

Picture 2: Fecal matter thrown into open/nalas

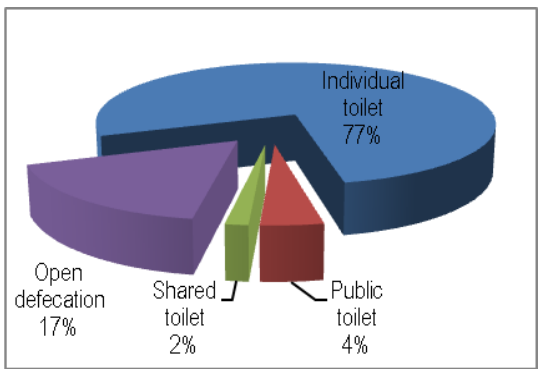


Figure 4: Sanitation arrangement as per primary survey

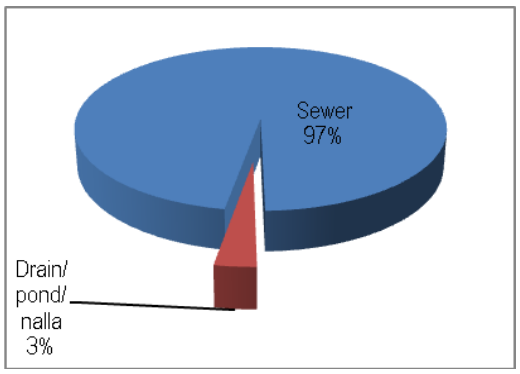


Figure 5: Sewerage network as per primary survey

Primary survey reveals that the toilets of households and most of the slum dwellers are connected to UGD network. The toilet arrangements in slums and non-slums are connected to UGD, some of

them are connected to open drains and nallas. In some households it was observed that around 2% households of the sample surveyed are using shared toilets, public toilets and also practicing open defecation as shown in the graph.

Toilets connected to septic tank with/without soak pit: It was observed that the sewer lines connected to septic tank or soak pit are directly led into the open drains outside the lanes laid beside the houses. It was also observed that the drinking water pipes are also closely fixed to these sewer lines and open drains which carry waste water from toilets. In some places, the conditions of the pipes were damaged in some places which can cause impact on environment due to water contamination and unhygienic conditions ultimately leading to severe health hazards. Survey results revealed that 71% had individual toilets, 4% used public toilet, shared and community toilets at 9%. Open defecation is about 16% which is higher than the secondary data. This may be due to many defunct toilets.

Box 4: Definitions of Housing types, Census 2001

Permanent: Houses with wall and roof made of permanent materials. Wall can be G.I., metal, asbestos sheets, burnt bricks, stone or concrete. Roof can be made of tiles, slates G.I., metal, asbestos sheets, bricks, stone or concrete.

Temporary: Houses with wall and roof made of temporary material. Wall can be made of grass, thatch, bamboo, plastic, polythene, mud, unburnt brick or wood. Roof can be made of grass, thatch, bamboo, wood, mud, plastic or polythene.

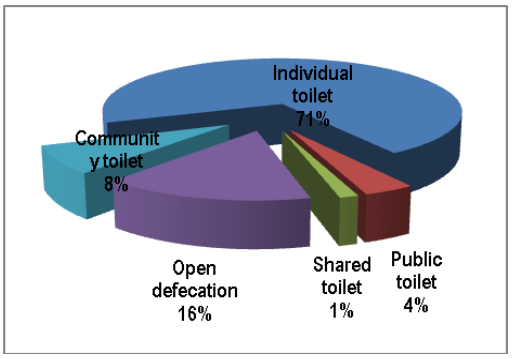
Semi-Permanent: Either of wall or roof is made of permanent material & other is made of temporary material.

Serviceable: Wall is made of mud, unburnt brick or wood.

Non-serviceable: Wall is made of grass, thatch, bamboo, plastic or polythene, etc.

Type of toilet	
Household	3391
Public toilet	181
Community toilet	375
Shared (No. of HH)	67
Open defecation	741
Incomplete *	39

Source: ASCI Primary survey



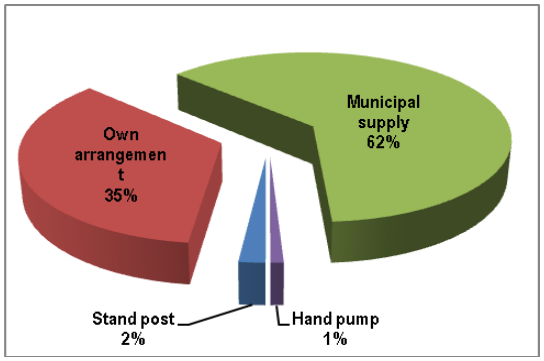
Picture 3: Household sewer lines connected to open nala at Gousiyanagar, Ward No. 59

Picture 4: Drinking water pipe connected close to sewer drain at Nehru Nagara, Ward No. 56

Picture 5: Open drain led to open nala at Gousiyanagar, Ward No. 59

Picture 6: Defunct toilets

Water supply to toilet	
Stand post	79
Own arrangement	1507
Municipal supply	2675
Hand pump	39



Source: Primary Survey

4.2 Slum sanitation

As per the analysis of information obtained from Karnataka Municipal Reforms Cell, DMA, GoK, it is clear that some of the slum areas in Mysore are having toilets either individual or dependant on public toilets or households practicing open defecation. Though there are certain gaps or the missing links in facilitating sanitation infrastructure in slums. As given in the table, it is inferred that approximately 9164 (88%) of the total slum households are having sewerage connections, septic tanks and pits for their toilets. However, according to Asha Kiran Mahiti details, around 1216 (12%) of the total slum households practice defecating in open areas.

Table 22: Sanitation arrangements in slums of Mysore

Sanitation	Total number	Percentage
Public pit	515	*5.0%*
Shared septic tank	710	*6.8%*
Shared pit	1011	*9.7%*
Public septic tank	1096	*10.6%*
Own pit	1779	*17.1%*
Own septic tank	4053	*39.0%*
Open defecation	**1216**	***11.7%***
Total	**10380**	***100%***

Source: Karnataka Municipal Reforms Cell, DMA, GoK

During the field visit it was observed that the slum dwellers are habituated with openly defecating. The toilets are constructed in the houses but do not use as they feel having toilets is not important when open spaces are available for it. Presently most of the houses have converted their toilets into storage houses.

Table 23: Drainage and sewerage network in slum areas

Drainage and sewerage	Total number	Percentage
Digester	3130	*30.2%*
Not connected	3238	*31.2%*
Storm water drainage	4578	*44.1%*
Underground drainage	5510	*53.1%*

Source: Karnataka Municipal Reforms Cell, DMA, GoK

4.3 Open defecation

Open defecation is not so predominant in Mysore city. However, there are areas which are practicing open defecation subject to lack of proper infrastructure facilities and behavior of people who are acclimatized defecating in open areas. Particularly it is observed that children are in to the habit of going in open. Following are the areas which practice open defecation and efforts needs to be addressed to eliminate these areas with totally sanitized facilities. Of total 65 wards in Mysore city, around 21 wards were observed with low to high occurrence of open defecation. Remaining 44 wards can be declared as Open Defecation Free Wards. As per the records, around 12% (1216) of slum households defecate in open areas, which is equivalent to 1% of the total households of Mysore. The site visits revealed that OD is more common among children.

Picture 7: OD in open fields

Picture 8: OD among children

Open defecation is high in wards - 09, 10, 11,12,23,28, 29, 30, 32,34,35,42, 44, 45, 46,47,56,59 and 62. It is further observed that even number of households with access to individual toilets still resort to open defecation. This condition is particularly in above mentioned slums. In Gousia Nagar, K.N. Pura, Ganesh Nagar Kyathamarahahally and Ashokapuram the toilet outlet is connected to public drain /storm water drain.

Table 24: Ward wise details on open defecation in slum areas

Ward No.	Ward name	Ward wise slum HHs	Ward wise OD	Ward wise % of OD
4	Ramachandra Agrahara	86	21	**24%**
9	Ashokapuram	271	59	**22%**
10	Vidyaranyapuram	71	7	**10%**

11	Vishweswaraya nagara	278	22	8%
12	J.P. Nagara	101	50	**50%**
23	Gangothri	108	1	1%
28	Kumbara koppalu	323	105	**33%**
29	Metagalli	602	44	7%
30	Brundavana Badavane	190	1	1%
32	Onti koppal	120	2	2%
33	Paduvarahalli	133	1	1%
34	Medar Block	98	1	1%
35	Devaraja Mohala	37	1	3%
42	B.B. Keri	321	4	1%
44	Bannimantapa	328	206	**63%**
45	Bannimantapa Hudco badavane	474	415	**88%**
46	Kesare	285	1	0.4%
47	Subhash nagara	209	125	**60%**
48	Rajendra nagara	104	103	**99%**
56	Yaraganahalli	523	11	2%
59	Gousiya nagara	1087	36	3%
	Total	**5749**	**1216**	

Source: Karnataka Municipal Reforms Cell, DMA, GoK

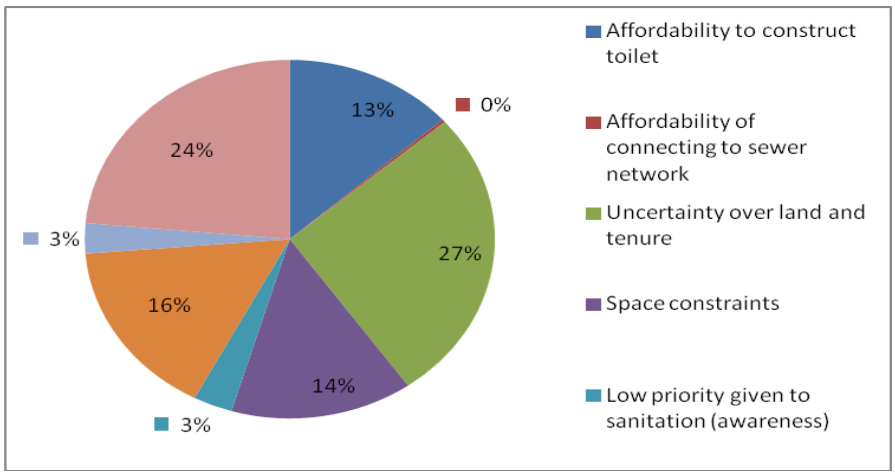


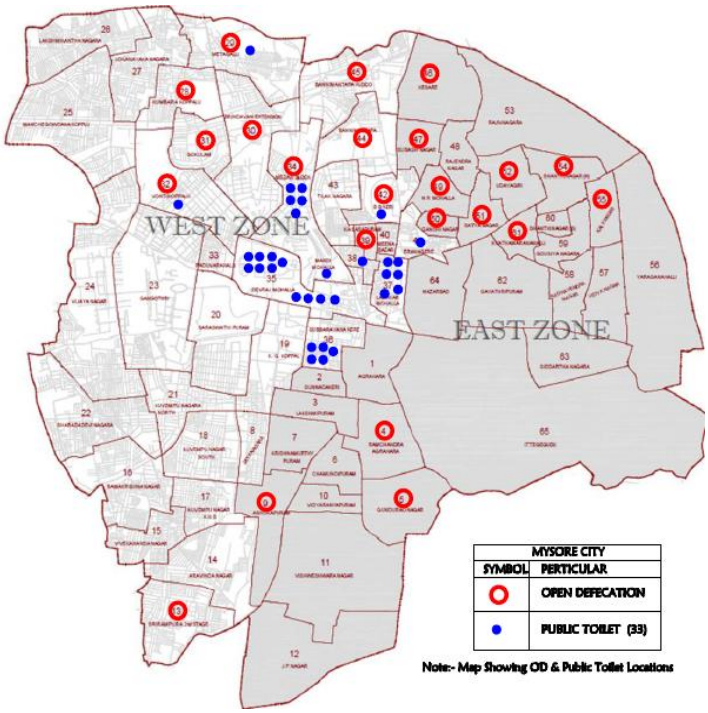
Figure 6: Reasons for not having toilets

The main issues observed for open defecation are lack of water supply, space constraint to construct toilet and behavioral attitude in people who prefer defecating in open places. The percentage of OD in households ranges from 1-99% of the respective slum area. For example, Rajendranagara of ward No. 48 has total 104 slum households, of which 103 households (99%) of the total practice open defecation. Whereas, locations like Gangothri (108), Brundavana Badavane (190), Paduvarahalli (133), Medar Block (98), Devaraja Mohala (37) and Kesare (285) observed 1 household (0.4-1%) practicing OD as shown below in the table. The areas/wards that need immediate action to prevent OD are Ramachandra Agrahara ward No. 4, Ashokapuram ward No. 9, J.P. Nagara ward No. 12, Kumbara koppalu ward No. 28, Bannimantapa ward No. 44, Bannimantapa Hudco Badavane ward No. 45, Subhash nagara ward No. 47 and Rajendranagara ward No. 48. The following table indicates the ranges of OD in different wards.

Table 25: Existing status and the range of open defecation in slums

Range of OD	Ward numbers	No. of wards
	Open defecation free wards	**34**
0- 5%	23, 30, 32, 33, 34, 35, 42, 46, 56, 59	10
6 - 10%	10, 11, 29	3
11 - 15%	None	0
> 16%	4, 9, 12, 28, 44, 45, 47, 48	8
		21
In addition, as per primary survey	5, 13, 31, 39, 49, 50, 51, 52, 54, 55 and 61	11
	Total	**31**

Source: Analysis done by ASCI, Hyderabad based on secondary and primary survey



Open defecation and public toilets in Mysore as per primary survey

20% of the households surveyed indicated disease. Diarrhea reported less in 2009/10 and this may be due to water supply improvements in Mysore. Number of attacks of Gastro Enteritis is very high though reduced in last year. This has to be addressed immediately.

Table 26: Disease scenario in Mysore city

Disease	Total in 2008/09		Total in 2009/10	
	A	D	A	D
1. Gastro Enteritis	590	1	351	0
2. Cholera	29	0	13	0
3. Infective hepatitis	101	0	180	0
4. Typhoid	393	0	459	0
5. Malaria	8	0	27	0
6. Dengue	3	0	20	0

7. Chicken Gunya	15	0	14	0
8. Filaria	0	0	0	0
9. JE	0	0	0	0
10. KFD	0	0	0	0
11. TB	1061	0	1357	0
12. Leprosy	40	0	35	0
13. AIDS	170	18	42	20
14. Handigod syndrome	0	0	0	0
15. Guinea worm	0	0	0	0
16. Measles	0	0	0	0
17. Diarrhea	4884	0	3911	0
18. Leptospirosis	0	0	0	0
19. Plague	0	0	0	0
20. Dog Bite	725	0	15697	0
21. Snake Bite	196	0	298	3
22. Rabies	0	0	3	3
23. Anthrax	0	0	0	0

Note: A – Attack; D - Death

Source: Mysore City Corporation, Mysore

4.4 Public conveniences

Mysore being a major tourist spot and educational hub, it is meeting great pressure in providing basic infrastructure arrangements in the city. On an average one lakh people visit Mysore city every day. Easy access to good condition public toilets is one of the prime needs in places of high tourist inflow. Generally public toilets are constructed in commercial areas or in places where movement of general public is more. Such places include bus stands, railway stations, markets, etc.

There are total of 33 public toilets in Mysore comprising approximately 200-235 seats. Toilets are constructed exclusively for gents and ladies with total seaters 153 and 80 respectively. There are no special toilets constructed for children. The total user per toilet is estimated to range between 50-500 users/day and from total 33 public toilets it is estimated to be around 10,000 users per day. The public toilets are cleaned 2-3 times/day only and around 6 public toilets clean toilets 4-5 times/day. There is sewage connection to all public toilets.

The public toilets are scattered only in 6 wards of central Mysore. The toilets are on pay and use basis, collecting amount ranging between Rs. 1-3 per use. However, 9 public toilets have free usage facility. Around 22 public toilets are maintained by MCC and remaining 11 are maintained and service provided by private agencies and NGOs which include All India Environment & Rural Development Organization, City Care, Civic International Social Service Organization, Janakalyana Foundation, Bangalore, Mahaveer Kalyan Samsthe, Srinivas Enterprises, Hebbal and Sulab International Social Service Organization.

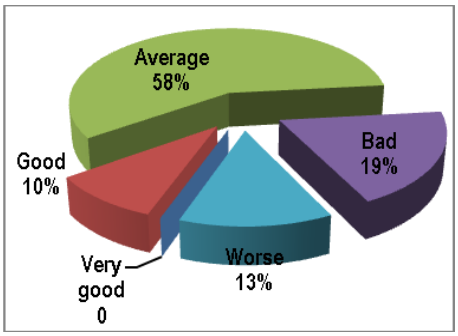


Figure 7: Conditions of public toilet

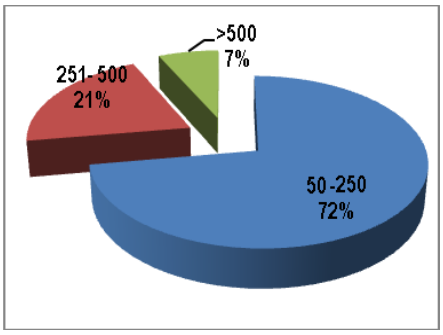


Figure 8: No. of people visiting toilets per day

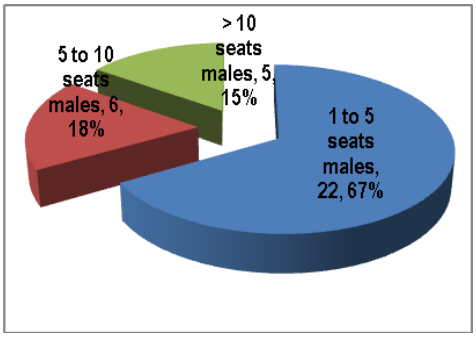


Figure 9: Seats availability for male users

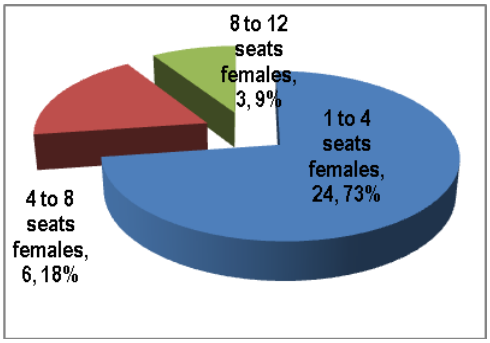


Figure 10: Seats availability for female users

Picture 9: Public toilet near Bus Station

Picture 10: Public toilet at city Bus Stand

Picture 11: Public toilet opp. Land Stone Building

Table 27: Details of public toilets as per primary survey

Location	Ward No	No. of toilet seats		No. of toilets			No. of visitors per day
		Male	Female	Urinals	Bath	Washbasins	
1. V.V. Puram Police Station		2	1	3	2	2	200
2. Santhepete Road	36	4	-	6	-	1	200
3. Santhepete Road	36	4	-	4	1	1	-
4. Medar Block, Bamboo Bazaar	34	4	-	-	-	-	500
5. Mettagalli		5	3	4	2	2	150
6. Pulikeshi Road (BT Kere)		3	1	3	-	1	-
7. Hebbal Mandi Market		4	2	3	2	2	180
8. Irvin Road	37	3	1	4	-	1	150
9. Gandhi Circle, RRR Hotel	37	3	3	3	-	2	300
10. Opp. to Opera Theater		3	2	4	1	3	200
11. Lands down Building		4	1	5	2	1	250
12. Mysore City Bus Stand		8	2	8	-	3	352
13. Mysore City Bus Stand		10	12	12	-	10	1500
14. Mysore City Bus Stand		10	12	12	-	10	1500
15. Fountain Circle, MB Road		5	2	3	1	1	200
16. Irvin Road		4	1	4	2	1	250
17. Sayyaji Rao Road, RMC	34	8	-	-	2	-	125
18. Sayyaji Rao Road, Opp Private Bus stop	34	3	2	4	-	2	300
19. Sajjayi Rao Road	34	4	2	-	-	-	250

20. Sayyaji Rao Road	34	3	2	3	-	-	250
21. Railway station Circle		4	4	-	-	-	-
22. Geetha Mandira Road		4	2	4	-	1	250
23. Devaraja Market		5	3	10	2	2	300
24. Seebhaih Road		-	2	3	1	-	250
25. Dhanvantari Road	35	3	2	3	1	2	200
26. Rajkamal Talkies Road	35	3	1	3	1	1	150
27. Divan Road, opp to Srinagar Hotel		4	1	4	1	-	250
28. Gandhi Square, near Hotel RRR		6	2	7	-	-	300
29. City Bus Stand (VIPs Toilet)		20	10	12	0	8	250
30. City Bus Stand		10	2	8	0	2	-
31. Opp to Land stone building		-	2	5	1	1	100
32. Railway Station		Yes	Yes	Yes	Yes	Yes	100
33. Dhanvantari Road	35	Yes	-	Yes	-	-	50
Total		**153**	**80**				**9057**

Source: Primary survey, ASCI

4.4.1 Institutional sanitation

Around six institutions were surveyed to understand the status of sanitation and the awareness of hygiene in these institutions. It was observed that the toilet facilities are provided in all the institutions surveyed. The basic sanitation infrastructure facilities provided include wash basin, water supply, soaps, lights, doors, etc. The toilets are facilitated with piped water supply and basic infrastructure like lights, buckets, good conditioned doors and bolts. The sanitation arrangements in institutions are noticed to be well under control. In some institutions it is observed that regular operation and maintenance is matter of concern.

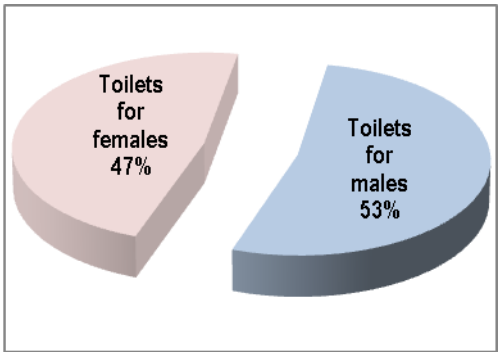


Figure 11: Toilet facilities for males and females

Table 28: Details of primary survey conducted for Institutions

Institution	No. of staffs	No. of toilets provided to male staff	No. of toilets provided to female staff	Monthly / annual budget for O & M of toilets	Operation & maintenance
1. DC Office Mysore	50 & above	3	2	250	MCC
2. Crawford Hall University of Mysore	100 & above	2	2	500	University Staff
3. State Institute for Urban Development	20 & above	1	1	300	SIUD Staff
4. Mysore City Corporation	200 & above	2	2	300	MCC Staff

5. Palace Board Office	25 & above	1	1	450	Board
6. Z P Mysore	150 & above	1	1	350	ZP Staff

Source: Primary survey, ASCI

4.4.2 School sanitation

Having considered that the Private Schools have good provision of basic infrastructure facilities made available to students and staff, the assessment of it has been excluded from the survey exercise. Hence only Government Schools have been considered keeping in mind the operation and maintenance and efficient functioning of toilets within the school premises. There are approximately 252 Government Schools in Mysore. Out of which 87 schools have been surveyed to assess the sanitation condition of these schools.

Students are dependent on toilets in schools but around 5 schools surveyed do not permit students to use toilets and thus they are dependent on nearby homes or defecate in open areas. No school is provided with toilet facilities according to norms. Special toilets for children where they feel attracted to continue using the toilets, especially girl child and disabled friendly water and sanitation design options are not observed.

The overall condition of toilets surveyed is moderately good but needs considerable efforts to improve the cleanliness and maintenance in most of the schools. Many toilets need to be upgraded. It was observed that around 64% of the toilets are under repair and needs to get into operational condition. It was also observed that only 31% of schools have toilets for staffs of which around 5% toilets are under repair and the teachers are dependent on student toilets.

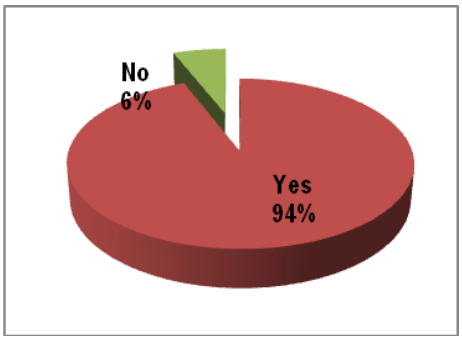


Figure 12: Access to school toilets

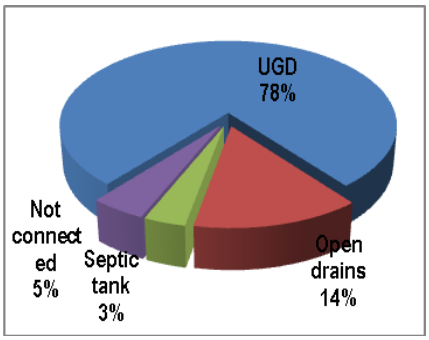


Figure 13: Sewerage network in Schools

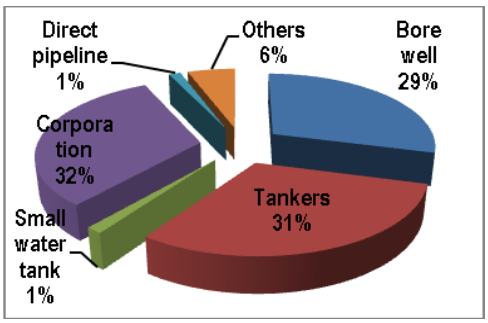


Figure 14: Source of water supply

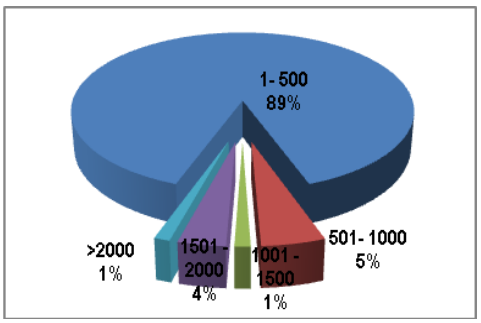


Figure 15: Source of water supply

Around 94% students use toilets regularly and the remaining students visit neighbor's house close to the school or depend on open places for defecation. The majority of the toilets are connected to UGD (69%), septic tanks (3%) and open drains (14%). Water supply connection is quiet good

with 75% (65 schools) having good water connection in schools. 76% schools are having sanitary and hygiene education in their curriculum creating awareness among school children.

Picture 12: Good toilets

Picture 13: Dry latrines in schools

Picture 14: Neatly maintained toilets

Box 5: Guidelines of Total Sanitation Campaign (TSC) for school sanitation

Total Sanitation Campaign guidelines at present stipulate that toilets in all types of Government Schools i.e. Primary, Upper Primary, Secondary and Higher Secondary and Anganwadis should be constructed. The Department of Drinking Water Supply is supporting the construction of toilets and urinals in schools under TSC.

The guidelines say that separate toilets for girls and boys should be provided in co-educational schools which are to be treated as two separate units and each unit is entitled to Central assistance. The unit cost of each school toilet units is Rs. 20,000 of which 70% i.e. Rs. 14,000 is given as Central share, the rest being the State share. Each unit consists of one toilet and three or four urinals. It is evident that the number of toilet units to be built should be linked to the number of students to be catered to by each unit. Hence, the following clarification is issued:

"One Urinal space may be provided for every 20 to 40 boys or girls separately and one toilet seat may be provided for every 80 to 120 boys or girls separately. One school toilet unit should consist of one lavatory and three to four urinals. Construction should be in multiples of units depending on the strength of the school, on whether students are allowed to go to urinals during classes, on whether schools have staggered breaks, space available in the school premises, expected growth in the enrolment and other regional conditions. States are given the flexibility to define their norms within this range depending on existing State norms and the other factors mentioned above. School-wise requirement of toilet units should be worked out based on these factors."

4.4.3 Sanitation in commercial areas

The commercial activities in Mysore are vast due to increasing economy. The commercial areas include shops that trade the materials, markets, malls, complexes, theatres, etc. The sanitation issues need to be considered in these areas as there is usually no provision made during the construction of shops and small commercial places. Thus, the dependency on public toilets or open defecation is high in these areas.

Around 60 commercial places were surveyed to assess the sanitation facilities and dependency on other places for defecation. During the field visits, it was observed that around 50% of the commercial places/shops have 1-5 workers. The shop owners usually do not permit the workers to use the existing toilet. They are dependent on complex toilets, public toilets or defecate in open areas. Garbage is collected on daily basis, but in some areas waste is collected once in 2 days. These areas are prone to accumulation of solid waste. Thus, around 35 shops surveyed dispose waste on road sides and 19 shops dispose waste in near by bins.

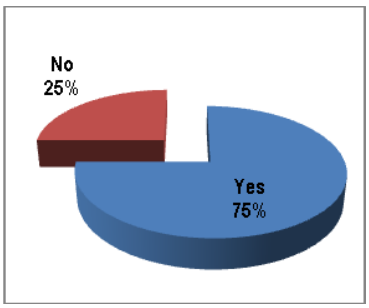


Figure 16: Access to toilets

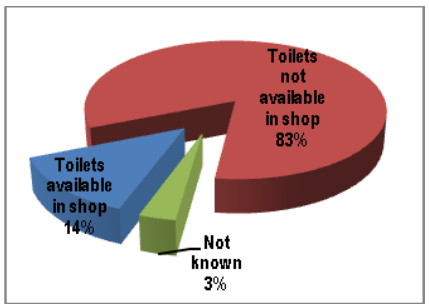


Figure 17: Percentage of toilets in shops

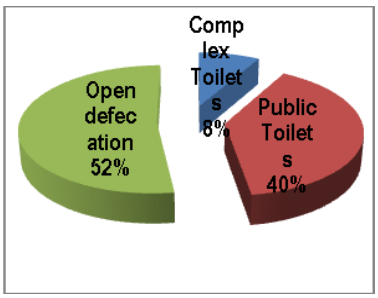


Figure 18: Dependency on toilets

4.5 Septage management

Septage refers to the sludge collected and transported from septic tanks by vacuum trucks for the treatment and safe disposal. The scenario of sanitation arrangement in houses within limits of MCC are having individual toilets connected directly to UGD or connected to septic tanks or connected directly to open nalas or dependent on public toilets or defecate in open areas. Around 6820 household toilets in Mysore city are connected to septic tanks accounting roughly to 1% of the total households.

Box 1: Septic tank maintenance norms

Service agents and councils are not fully aware of the maintenance recommendations. Annual servicing should include assessment of the sludge and scum levels and checking of the outlet and inlet square junctions for blockages. Septic tanks ideally should be de-sludged at a minimum of every three years and other criteria given below are not followed in septic tank maintenance.

- The scum layer is within 100 mm of the bottom of the inlet square junction, or the sludge layer is within 200 mm of the bottom of the outlet square junction.
- The sludge occupies the basic allowance (1550 L) of the septic tank, or
- The total depth of sludge and scum is equal to one-third of the depth of the tank.
- De-sludging procedure should ensure that 400- 500 mm of liquid is retained in the tank and that the tank is immediately refilled with water to the outlet level to prevent the tank from being lifted by soil hydrostatic pressure.

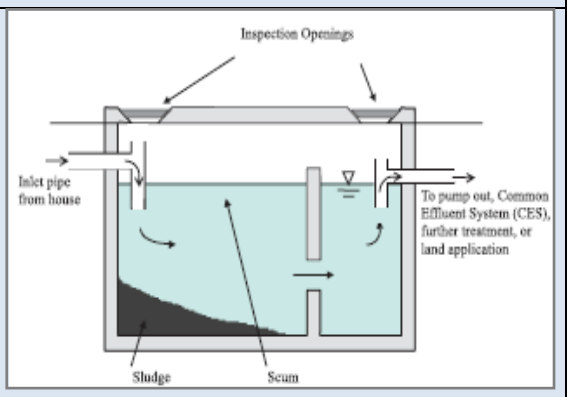


Figure 19: Cross section of septic tank

The cleaning of septic tanks is done mechanically using suction pumps. During the field visit it was discussed that the interval of cleaning was 2-3 years and in some cases the cleaning is done once in 5 years. There are 3 suction trucks with the MCC for sludge removal and sludge is

disposed off in the existing STPs. It is estimated that around 750 septic tanks get cleaned every year. The sludge is transported to the STP for further treatment and used for manufacturing compost. No manual scavenging is performed for cleaning of septic tanks. The sludge is air dried in open land after which it is used as manure in the agricultural fields.

Table 29: Ward wise details of septic tanks, pits and their cleaning procedures

No. of septic tanks with/ without soak pit	Clearing procedure *(Manual or Motorized)*	Interval of cleaning	Quantity of sludge *(litres)*	Monitoring present *(Yes/No)*
6810	Motorized	2 years	1.12 ML	Yes

Source: Mysore City Corporation, Mysore

Table 30: Sludge/Septage equipment and management

No.	Indicator	Municipality owned
A	**Equipment available**	
1	No. of sludge suction trucks/equipment	3
2	Annual number of tanks cleaned (last year's estimate)	750
B	**Cleaned using mechanical equipment**	
3	Estimated volume (ML) cleaned last year	1.12
4	Method of conveyance and disposal: Untreated	By tanker
5	Amount disposed untreated (ML) – last year's estimate	-
6	Location of disposal – untreated	-
7	Method of conveyance and disposal: Treated	Vehicle
8	Amount disposed treated (ML) – last year's estimate	-
9	Location of disposal – Treated	STP
10	Cost per tank cleaning	Rs. 500/-
C	**Manual cleaning of tanks and pits**	
11	Estimate annual No. of tanks cleaned – last year's average	-
12	Cost per tank cleaning	-
13	Method of disposal of sludge cleaned	-
14	Who are the persons cleaning tanks?	-

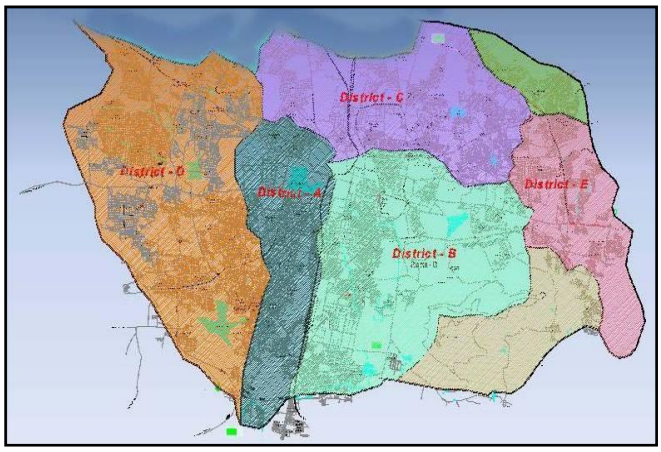
ML = Million litres

Source: Mysore City Corporation, Mysore

4.6 Waste water management

Mysore was one of the earliest cities to have underground drainage in India with a system in place back during 1904. The comprehensive UGD scheme was taken up in 1955 with 11.3 lakhs sanctioned by the government under National Water Supply & Sanitation Scheme. Three sewage treatment plants with total capacity of 157.65 MLD were constructed through ADB funds in 2002.

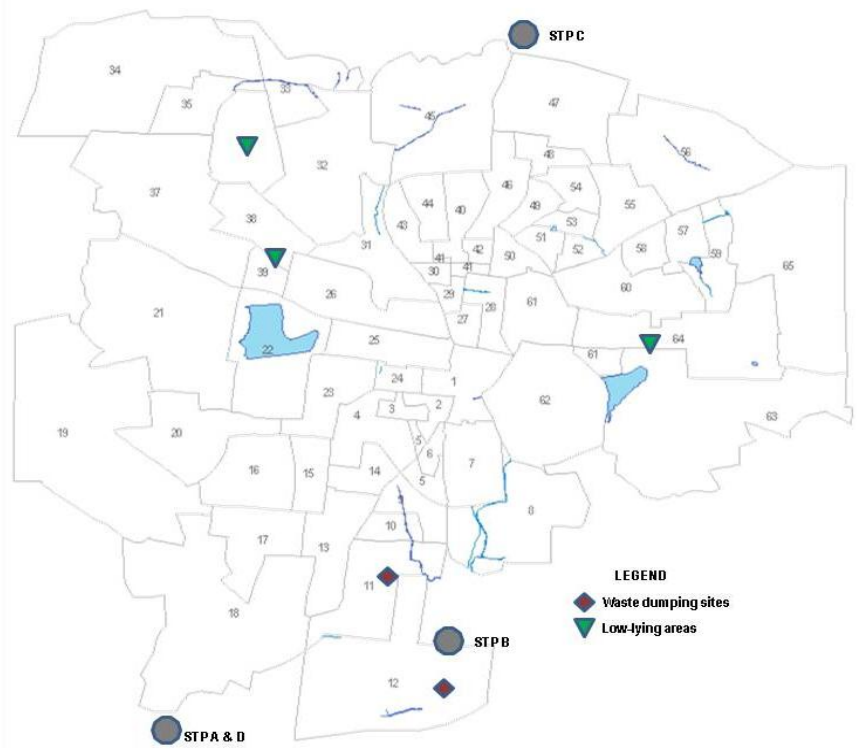
Mysore consists of about 740 km length UGD line with 30,000 manholes and is divided into five drainage districts namely A, B, C, D & E based on the topography of the City. Drainage districts A & D together have one sewage treatment plant. Drainage districts B and C have two separate sewage treatment plants serving drainage districts B & C. The drainage district E cover an area of 11 sq. km does not have treatment facility. It is now proposed to provide STP in District E under JnNURM project. The present inflow to the STP is about 145 MLD with the facultative aerated lagoons as the treatment process. 90% of the total population in the city is covered by the sewer system. Many improvements have been made subsequently including networks in the colonies being laid. It is made mandatory for the new colonies to have their individual networks, before getting approvals.



Drainage district zones in Mysore city

The city has three STPs working with facultative aerated lagoons with sedimentation basins located at Rayanakere for district A & D, Vidyaranyapuram for district B and Kesare for district C. The districts A & D make up for the largest drainage zone in Mysore covering an area of approximately 41 sq. km. In some areas of these districts sewer lines are missing.

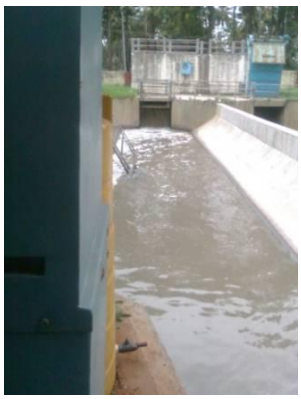
These areas are RMP Quarters, Aravind Nagar in district A and V Mohalla, Janatha Nagar in district D. The length of sewer line in these districts is 18 km. The district A & D are serviced by a common sewerage treatment plant located in Rayanakere. The capacity of this STP is around 60 MLD.



Location of STPs and MSW dumping

Recently, MCC has taken very innovative initiative to treat sewage water and reduce O&M of one. This is run on PPP mode. Use of OS1-DMS solution reduces the running time of aerators, delays the rusting process, reduces the coli form count, BOD, COD and SS. Now expenditure on Energy has come down from 14.4 lakhs/ month to 8 lakh which is 46% savings. It reduces the volume of sludge generated and reduces the amount of foul odour / gasses and can be used in Septic tanks very effectively. Effluents are within Pollution Control Board norms. No Sludge cleaning required in STPs. Hence, minimal labour costs. Treated effluent can be used for horticulture or water bodies. Quantity of the waste water recycled; (used in Golf course at Chamundi Hills)

The present sewerage capacity of the STPs is 157.65 MLD which was designed as per the requirements of the city in the year 2011. In addition a STP with a capacity of 22 MLD has been proposed for drainage district E, which covers an area of 16 sq. km. The total city's sewerage inflow treated by the three STPs which is about 158 MLD, out of which 112 MLD of sewage water gets treated everyday accounting to collecting and treating efficiency of 77%. The expected inflow of sewerage to the plant is expected to increase after all the missing sewer line.



Picture 15: Inlet to STP

Picture 16: STP

Picture 17: Outflow Point

Table 31: Details of STPs

Drainage district serving and location	Plant capacity in MLD	Wet wells	Drainage area covered (sq. km)	Length of trunk sewers (km)	Areas	Flows to
 **1. A & D** at Rayankere	60.0	1. STP campus 2. Beside D	54	20.4	RMP Nagar, Quarters and Aravind, VV Mohalla and Janatha Nagar	Daily flow of 38-44 MLD on an average and output flows to Yannehole kere.
 **2. B** at Nanjangud Road, Vidyaranyapuram	67.7	1. J.P. Nagar 2. STP campus	34	16.2	Surrounding areas of Kabeer road,Ashokpuram, Dhanavanthri Road, CFTRI, Chamaraja Double Road, JSS, Kanakagirinagar and Gundu Rao Nagar	Daily flow 45-48 MLD on an average and output flows to Dalavai kere.
 **3.C** at Kesare	30.0	1. Hebbal 2. Siddiquinagar 3. STP campus	30	16.8	Surrounding areas of Yadavagiri, Kumbara Koppalu, B.M.Shree Nagar, Metagalli,, Pulikeshi road, C.V Road, Subash Nagar, Kesare, Hebbal 1st stage, Adhidravada Paurakarmika Colony, CFTRI Quarters, Rajivnangar 3rd stage, V.V. Mohalla, Gokulam, Gandhinagar, Sathyanagar, Hebbal	Daily flow 14-16 MLD on an average and output flows to Mirza channel.
Total	**157.7***		**118**	**53.4**		

4.6.1 A note on STP-B, Vidyaranyapuram, Mysore of design capacity 67.5 MLD

The STP at Vidyaranyapuram receives more than 50% of the sewage generated in Mysore. It was constructed with the assistance of ADB in 2002. The treatment procedure consists of aerated lagoons and maturation ponds. There are 36 blowers of 20 hp each to enable surface aeration. The STP is running successfully with no foul odour and huge reduction in the accumulated sludge has been observed. The overall saving on O & M cost is about 40%, keeping in view the true cost of power. The power consumption is just 4% of what is actually required to run the conventional STP. MCC proposes to make use of the treated waste water for gardens, parks, golf course etc. Thus MCC is able to save electricity and at the same time operate the STP with few personnel (just 6 as against 25 earlier). This technology needs less manpower, no electricity and ensures less sludge.

Under the Karnataka Urban Infrastructure Development Project (KUIDP) with assistance from Asian Development Bank (ADB), three STPs and pumping stations were constructed. The STP of capacity 67.65 MLD comprising Facultative Aerated Lagoons with sedimentation basins located on the Ooty Road. This drainage covers an area of around 25 sq. km with a sewer length of 7000 meters. The system is running on PPP mode.

4.6.2 Quality analysis of waste water from STPs

The samples from treated water from the STPs are analyzed with parameters like pH, BOD, COD, Total Solids, Total Dissolved Solid, Chloride, Total Suspended Solid, Nitrate and Phosphate. All the parameters sampled are within the prescribed permissible limit. BOD, COD and nitrate seem to be above permissible limits.

Table 32: Water quality analysis from STPs

Sl. No.	Location	Sample	Parameters								
			pH	BOD	COD	TS	TDS	Chloride	TSS	Nitrate	Phosphate
			5.5 to 9.0	<30	<250	<2000	<2000	<450	<600	<40	<1
31-01-2011											
1.	STP A & D, Rayanakere	P1-R	9.0	290	283	1481	1370	372	83	42	0.14
		P1-T	8.0	19	193	232	535	186	31	22	0.11
		P2-R	9.0	290	283	1481	1370	372	83	45	0.14
		P2-T	8.4	20	210	637	568	219	32	28	0.12
2.	STP B, Vidyaranyapuram	P1-R	9.0	320	293	1493	1517	390	58	41	0.12
		P1-T	8.4	20	193	512	620	240	30	30	0.10
		P2-R	9.0	320	293	1493	1517	390	58	41	0.12
		P2-T	8.3	18	187	493	549	219	27	17	0.11
3.	STP C, Kesare	P1-R	8.9	270	309	1586	1434	380	60	37	0.13
		P1-T	8.4	16	210	450	523	240	34	16	0.12
		P2-R	8.9	270	309	1586	1434	380	60	37	0.13
		P2-T	8.7	14	230	418	520	237	30	14	0.10
25-04-2010											
1.	STP A & D, Rayanakere	P1-R	9.0	290	283	1481	1370	372	83	42	0.14
		P1-T	8.0	19	193	232	535	186	31	22	0.11
		P2-R	9.0	290	283	1481	1370	372	83	45	0.14

		P2-T	8.4	20	210	637	568	219	32	28	0.12
2.	STP B, Vidyaranyapuram	P1-R	9.0	320	293	1493	1517	390	58	41	0.12
		P1-T	8.4	20	193	512	620	240	30	30	0.10
		P2-R	9.0	320	293	1493	1517	390	58	41	0.12
		P2-T	8.3	18	187	493	549	219	27	17	0.11
3.	STP C, Kesare	P1-R	8.9	270	309	1586	1434	380	60	37	0.13
		P1-T	8.4	16	210	450	523	240	34	16	0.12
		P2-R	8.9	270	309	1586	1434	380	60	37	0.13
		P2-T	8.7	14	230	418	520	237	30	14	0.10
03-05-2010											
1.	STP A & D, Rayanakere	P1-R	8.9	294	310	1584	1617	383	68	43	0.12
		P1-T	8.4	17	224	524	624	244	31	24	0.10
		P2-R	8.9	294	310	1584	1617	383	68	43	0.12
		P2-T	8.5	19	230	498	594	230	30	20	0.10
2.	STP B, Vidyaranyapuram	P1-R	8.7	311	370	1670	1570	380	57	37	0.14
		P1-T	8.0	20	230	680	688	290	26	18	0.12
		P2-R	8.7	311	370	1670	1570	380	57	37	0.14
		P2-T	8.4	24	218	690	624	308	20	17	0.11
3.	STP C, Kesare	P1-R	8.6	320	340	1670	1584	310	68	39	0.16
		P1-T	7.4	19	234	630	640	270	30	16	0.14
		P2-R	8.6	320	340	1670	1584	310	68	39	0.16
		P2-T	8.4	20	217	610	630	240	28	18	0.11
08-06-2010											
1.	STP A & D, Rayanakere	P1-R	8.7	294	340	1435	1548	380	60	34	0.1
		P1-T	8.0	17	224	310	620	217	30	27	0.10
		P2-R	8.7	294	340	1435	1548	380	60	34	0.1
		P2-T	7.9	15	210	494	590	217	28	24	0.9
2.	STP B, Vidyaranyapuram	P1-R	8.9	314	317	1617	1640	340	60	40	0.12
		P1-T	8.3	18	240	627	680	240	29	25	0.11
		P2-R	8.9	314	317	1617	1640	340	60	40	0.12
		P2-T	8.6	19	230	614	608	210	30	20	0.10
3.	STP C, Kesare	P1-R	8.4	280	367	1410	1450	330	80	30	0.11
		P1-T	7.0	15	190	530	540	236	30	18	0.10
		P2-R	8.4	280	367	1410	1450	330	80	30	0.11
		P2-T	6.8	13	186	470	537	238	28	19	0.11

Source: Vani Villas Water Works, Mysore

Note: Inference: Yellow color marked is within permissible limits

Outfall points: The topography of the city entail the entire city to drain into three valleys viz., northern outfall into Kesare valley and other outfalls to the south one into Dalvai tank feeder valley and another to Malalavadi tank valley. The northern outfall drains the area of Narasimharaja Mohalla, Jalapuri, Eeranagere and part of Mandi Mohalla, Medar's block and Yadavagiri Railway Colony, art of Vanivilasa Puram and Kumbarakoppal. A mechanical plant with a capacity of 3 MG of sewerage is constructed at a cost of Rs. 7.43 lakhs for treating the sewerage collected from the above areas. But all the areas mentioned above are yet to be connected to the main drain even though the drainage work of each area is completed. The sewerage is let into the storm water drains and natural valleys at present. The owners of the gardens and other lands adjacent to the

main line are blocking the manholes on the way to divert the water for irrigation. Thereby, the mechanical plant is not getting all the sewerage of the area for which it has been designed. The treated effluent is let into the RBL canal of the Krishnarajasagar reservoir.

The second outfall draining the part of Chamaraja, Nazarabad and Lashkar Mohallas and the entire area of Fort Mohalla and Krishnaraja Mohalla is utilized by the sewerage farm after treatment. The sewerage farm is situated along the Mysore – Nanjangud Road occupies an area of about 146 hectares and is maintained by the city corporation. The sewerage is collected in two septic tanks of capacity of 18 lakh litres and after preliminary treatment it is utilized for growing grass, vegetables, fruits, flowers, etc., in the sewerage farm. The sludge collected is utilized for manufacturing compost. The third outfall draining the portions of Devaraja and Chamaraja Mohallas joins the Malalavadi tank valley without any treatment. The new areas on the western part of Kuvempunagar flow towards southwest of Lingambudi tank. The fourth outfall drains towards Belavatha village and covers the area such as Yadavagiri, Hebbal layout, Metagalli, Brindavan extension, part of Gokulam and Bannimantap layout. The present sewerage system in Mysore city caters to around 100 sq. km and comprises of 5 drainage districts based on the topography of the city, namely, A, B, C, D and E.

Picture 18: No outfalls to Nala

Picture 19: Overflowing manholes

Table 33: Projection for the waste water generated

Year	Projected population	Waste water generated in MLD
2010	905485	**117**
2015	971977	**125**
2020	1038469	**134**
2025	1104961	**143**
2030	1171453	**151**
2035	1237945	**160**
2040	1304437	**168**
2045	1370929	**177**
Note**: The average waste water generation is taken as **129 lpcd		

Source: Estimated by ASCI, Hyderabad

4.6.3 Waste management from slaughter house

Mysore is currently having only small animal slaughter house facility at Rajendranagar, Kesare. This was established 50 years back and was upgraded in 1977. The slaughter house is run by the MCC,

however the slaughtering activity is under taken by the local licensed butchers. MCC has nearly 200 licensed butchers. The slaughter house is surrounded by residential houses and it is necessary to maintain the area clean. Presently, around 350 animals comprising of goats and sheep are slaughtered every day to produce 6300 kg of meat. This amounts approximately 350-400 kg/day. All of this is washed to clean the floor using 10,000 liters of water every day.

Composition of slaughter house waste: A goat weighing approximately 22-25 kg yields 17-18 kg of saleable product, while 3-4 kg is solid waste. The effluent consists of 1-1.5 kg (in small pieces) solid waste per animal gets mixed with fresh water used for washing and blood, which eventually flows out. The waste consists mainly of blood, skin, hair, horns, flesh, undigested food, hide and dung etc. The waste gives out obnoxious odour and decomposes very fast. The slaughter house waste is organic in nature. This waste has no long lasting impact on the environment. However there are certain issues to be addressed to treat slaughter house waste as follows:

i) *Blood*: This is the major component of the waste effluent to be treated. This cannot be let off into the nalas or drainage system without proper treatment.
ii) *Solid wastes*: The solid waste produced decomposes gradually and the waste is non-hazardous. However the disposal of solid waste needs greater attention as this attracts vultures.
iii) *Odour*: The slaughter house waste on decomposition emits an obnoxious odor which attracts vultures and makes the place unhealthy and unhygienic.

Quality of waste water: On an average 350 animals are slaughtered (goat & sheep). The organic waste thus generated is washed using 10,000 liters of water. The waste water thereafter that flows contains blood, pieces of skin, bones, flesh, undigested food, excreta, urine, etc.

Table: Parameters of waste water treated at the slaughter house ETP (data to be collected)

Parameter	Value	Raw water	Treated water
pH	7.6		
Total Suspended Solids (mg/L)	1930		
Total Dissolved Solids (mg/L)	4484	4374	4.8
Biochemical Oxygen Demand for 5 days at 20˚C (mg/L)	2600	2364	34
Chemical Oxygen Demand (mg/L)	5375	3876	164
Chlorides (mg/L)	800		
Sulphates (mg/L)	28		

Source: ?

Process description of slaughter house ETP: The effluent from the entire contributing units is brought by pipe to the ETP through the screen chamber. All the floating non-biodegradable matter is removed manually from this chamber and waste water is collected in the sump before it is pumped to the grease trap. Grease trap collects all the floating fatty materials and settled solids. These solids and grease is disposed in compost yard. From this chamber, effluent flows via gravity to the equalization tank cum DAF unit manually. From this chamber waste water is pumped to aeration tank 1.

In the aeration tank, especially cultured microorganism Organic Solution (OS 1) is dosed on daily basis for rapid fermentation and decomposition of biodegradable organic matter. Microorganism assimilates BOD load and helps in reduction of foul odor. The bottom of aeration tank supplies air

through two positive displacements (roots type) air blowers (1W+1S) located out side the tank. Submerged air diffusers provide oxygen for the living microorganisms. The blowers maintain DO level in the aeration tank of approximately 5 mg/liter. From this unit the waste water flows to settler tank 1.

From the settler 1, the water flows to the aeration tank 2 and then to the settler 2. From the settler 2, treated wastewater flows via gravity in the oxidation pond. This treated water is filtered through sludge filter for further reduction of solids to make it suitable for letting out or recycling for non-potable purposes. Excess sludge from the settler tanks is taken out periodically into the anaerobic digester for sludge decomposing. The sludge is air dried in open land. The dried compost is then used in the agricultural fields as manure.

Table 34: Financial details of sewerage system

Sl. No.	Particulars	Value
1	No. of customers being charged for sewerage services	166680
2	Connection fee (one-time) to connect to system	4710/2
3	Average monthly tariff (Rs. per connection)	Rs 10/- per collection/ month
4	Annual demand for sewerage tariff (Rs.) – last year data	-
5	Annual collection for sewerage tariff (Rs.) – last year data	162.22 (Lakhs)
6	Personnel expenditure charged to sewerage system (O&M, Rs.)	33.50 (Lakhs)
7	Other expenditure charged to sewerage system (O&M, Rs.) – last year data	83.00 (Lakhs)
8	Percentage of total water and sanitation budget spent on sewerage system (O&M, Rs.)	-

Source: Mysore City Corporation, Mysore

Key observations and recommendations on sewerage network

- Tourist places need more public toilets.
- UGD lines need more attention.
- Open UGD pipes to be linked to nearest manhole and broken pipes should be replaced and or repaired. No regular monitoring and maintenance of overflowing manholes results in to overflowing of sewers and manholes.
- There are few network intermittent areas where UGD can be extended easily.
- No consistent IEC programme.

4.7 Storm water drainage

The topography of the city is such that the waste water drains into three valleys viz., towards north Kesare valley, towards south Dalvai tank feeder valley and another into Malalavadi tank valley. The northern ones drains the area of Narasimharaja Mohalla, Jalapuri, Eeranagere and part of Mandi Mohalla, Medar's block and Yadavagiri Railway colony, art of Vanivilasa Puram and Kumbarakoppal.

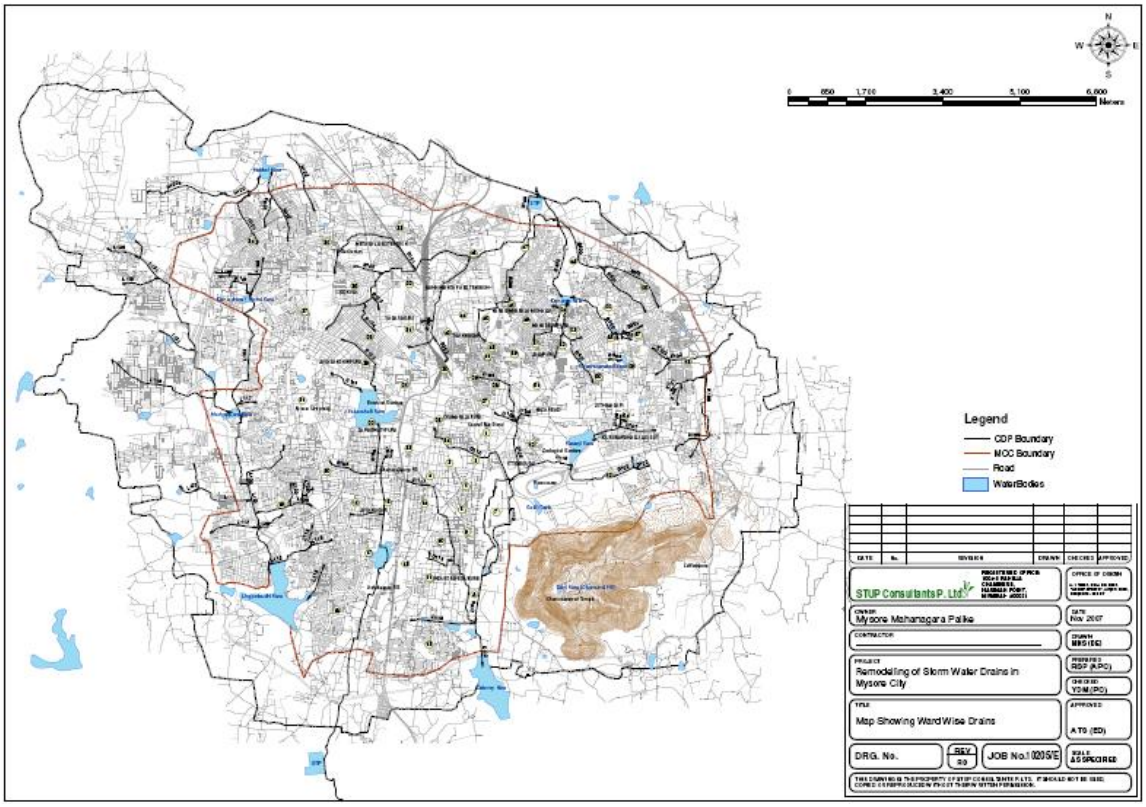
But all the areas mentioned above are yet to be connected to the main drain even though the drainage work of each area is completed. The sewerage from these areas is let into the storm water drains and natural valleys at present. The owners of the gardens and other lands adjacent to the main line are blocking the manholes on the way to divert the water for irrigation. The city has 3 big drains, all of which are 4-5 m wide.

The total length of storm water drainage (SWD) network in Mysore is 1200 km. Out of this, 500 km of length of SWD is covered. While there is an inspection mechanism for monitoring the cleanliness of the SWDs, silt deposition is a major issue along with the street waste deposition. This silt deposition causes overflowing of the SWDs. Flooding is common during heavy rains in Devraj Urs Road, Agrahara, Chamundi hills area. However, the southern part of Mysore is better off and does not experience any flooding.

Table 35: Catchment area of Mysore City

Catchment	Catchment area in Ha	Maintained by
1. Kyathanarnahalli kere	110.0	MCC
2. Kukkarahalli kere	160.7	Minor Irrigation Department
3. Hinkal kere	315.6	MUDA
4. Devanur kere	345.1	MCC
5. Hebbal kere	514.0	MUDA
6. Karanji kere	852.7	Minor Irrigation Department
7. Mariappana kere	1096.5	MUDA
8. Rayara kere	1652.7	MUDA
9. Shetty kere (Yenne hole kere)	1652.7	Minor Irrigation Department
10. Dalvoy kere	3557.1	MCC
11. Lingambudi kere	4377.4	MUDA
Total		

Source: DPR-Storm Water Drains, Mysore



Map representing storm water drains in Mysore city

Source: DPR-Storm Water Drains, Mysore

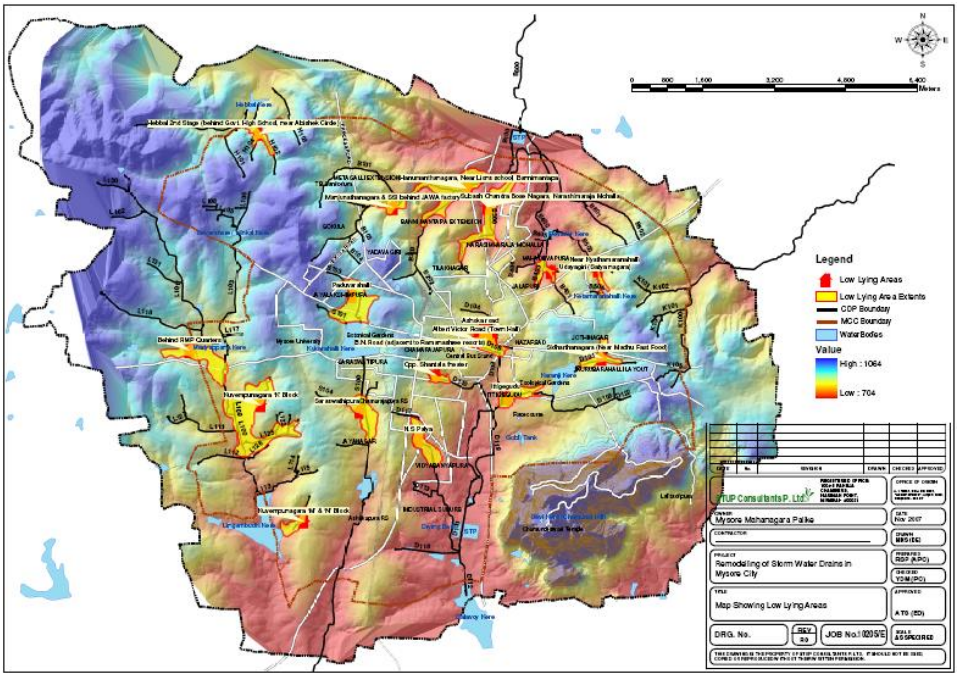
4.7.1 Flood prone areas and disaster preparedness

Majority of areas in Mysore city encompasses plain land, natural valleys certainly some areas experiencing variations in the height. The elevation of highest and lowest point ranges between 800 m contour to 710 m contour interval whereas the Chamundi hill and its surrounding area varies from 710 m contour to 1025 m contour. The average elevation of the city is 767 m above mean sea level. Critical low-lying areas have been identified during the reconnaissance survey and subsequent discussions with MCC engineers during preparation of DPR on Strom Water Drains, Mysore. There are number of ponds, ditches, low-lying areas and water bodies within Mysore which serves as retention basins in reducing the flood intensity and controlling the flood damages during heavy rainfall.

Table 36: Low-lying areas of Mysore city

Ward No.	Low-lying area	Land use type
Narashimaraja Zone		
45	Hanumanthanagar Near Lions School, Bannimantapa	Residential
47	Subhash Chandra Bose Nagar, Bademakan area, Narashimaraja Mohalla	Residential
55	Udayagiri (Satyanagara)	Residential
59	Kyathamaranahalli	Residential
14	Haladakeri (Ashoka Road)	Commercial
Chamaraja Zone		
61	Albert Victor Road (Town Hall)	Public and Road
26	Mahavira Nagara behind Sub-Urban Bus Stand	Residential
61	B.N. Road (Stretch adjacent to Ramanashree Resorts)	Commercial (Hotels & Cinema Halls)
24	Subbarayana Kere (Opp. Shantala Theater)	Commercial
17	Kuvempunagara M & N Block	Residential
17	Kuvempunagara K Block (Srirampura)	Residential
17	Behind RMP Quarters (Kuvempunagara, Udayaravi main road)	Open land allotted for layout formation
17	Saraswatipura (Kantharaja urs road)	Residential
17	Nachanahallipura (near N.I.E College)	Residential
26	Paduvarahalli	Residential
26	Sidhathanagara (near Madhu fast food)	Residential
26	Ittegegudu	Residential
32	Manjunathanagara & Small Scale Industries behind JAWA factory	Residential
32	Hebbal 2nd Stage (behind Govt. High School, Abishek Circle)	Residential

Source: DPR-Storm Water Drains, Mysore



Map representing low-lying areas in Mysore city

Source: DPR-Storm Water Drains, Mysore

4.7.2 Major reasons for flooding in the low-lying areas

a. Unscientific planning in land development activities destructing natural drains
b. Dense vegetation in the areas
c. Narrow drain width
d. Dumping of solid waste in low-lying areas
e. Siltation in the drains
f. Sewage being let out into storm water drains
g. Drain bed being flat in flood prone areas
h. Improper maintenance of manholes, sewer pipes and other drainage network systems
i. Improper tertiary network arrangement
j. Floor levels of residential buildings being much below drain levels

4.7.3 Management of water bodies

There are 14 existing water bodies in the jurisdiction of MCC boundary viz., Hinkel kere, Hebbal kere, Manchegowdana koppalu kere, Devanur kere, Kythamaranahalli kere, Karanji kere, Gobli kere, Dalavoy kere, Rayara kere, Tayappana kere (Bogadhi kere), Mariyappana kere, Lingambudhi kere, Kukkarahalli kere and Srirampura kere.

Until recently all the existing water bodies were neglected and not maintained by the authorities. The lakes are maintained by Mysore City Corporation, Mysore Urban Development Authority (MUDA) and Minor Irrigation Department. The water bodies benefit irrigation and some of the lakes are used for recreation purpose like boating, bird watching, etc. Recently only two tanks i.e, Kukarahalli kere and Karanji kere were desilted and taken up for maintenance by the authorities and used for boating and recreation purpose. Some of the water bodies have been encroached and layouts have been allowed to form in the buffer zones area. Major issues regarding water bodies include indiscriminate dumping of debris, encroachment of tank areas, severe siltation, dense

vegetation growth, large quantity of raw sewage entering, etc., is observed and resulting in flooding and deterioration of ground water quality.

Picture 20: Sewerage outlet let into Kyatamaranahalli lake

Map showing the storm water drainage network and the water bodies, Mysore

[Source: DPR - Storm Water Drainage, Mysore]

Recently, only two tanks i.e, Kukarahalli kere & Karanji kere were desilted and taken up for maintenance by the authorities and used for boating and recreation purpose. Remaining water bodies are not maintained. Layouts have been allowed to form in the buffer zones area. Indiscriminate dumping of debris, encroachment of tank areas, severe siltation, dense vegetation growth, large quantity of raw sewage entering etc is observed and resulting in flooding and deterioration of ground water quality.

Remodeling of primary and secondary storm water drains

- DPR prepared by Stup Consultants Pvt. Ltd.
- Project area – 6 out of 12 aforesaid catchment areas
- Total project cost = Rs. 347.28 crores

Key issues

- There is only 30% network coverage
- In the slum areas, the storm water drainage coverage is 44%
- Narrow drain width
- Dumping of solid waste in low-lying areas
- Siltation in the drains
- Sewage being let out into storm water drains
- Drain bed being flat in flood prone areas
- Improper maintenance of manholes, sewer pipes and other drainage network systems
- Improper tertiary network arrangement

Major recommendations

- De-silting of the primary and secondary storm water drains
- Improvement of storm water drainage near downstream end/tank bed areas
- Removal of bottle necks in the system
- Providing drain improvement in low-lying areas

- Drain widening and construction of new drain walls
- Providing rehabilitation to existing drain walls, bridges and culverts
- Providing drain bed protection
- Community awareness campaigns
- Training and maintenance

4.8 Solid Waste Management

Generation of solid waste is increasing in Mysore due to tremendous growth of population, urbanization and development in commercial and industrial activities. The total solid waste generated by the Mysore city ranges from 380-400 tons/day. Efforts have been taken by the MCC to combat the increasing waste generation. Mysore being a tourist city there are many locations within the city and occasions especially during the Dasara where special efforts for cleanliness are required. Special contingents of staff are dedicated for these operations. The service charges levied are in the range of Rs. 10-15/month/house.

MCC staff for waste management: The Health Officer from the MCC is in charge of the SWM activities. The Deputy Health Officer, 2 Environmental Engineers and Health Inspectors along with 2 Senior Health Inspectors and 18 Junior Health Inspectors assist in performing the operations. The Health Inspectors are assisted by the 36 conservancy dafedars who in turn manage the pourakarmikas of the City Corporation and the staff on contract.

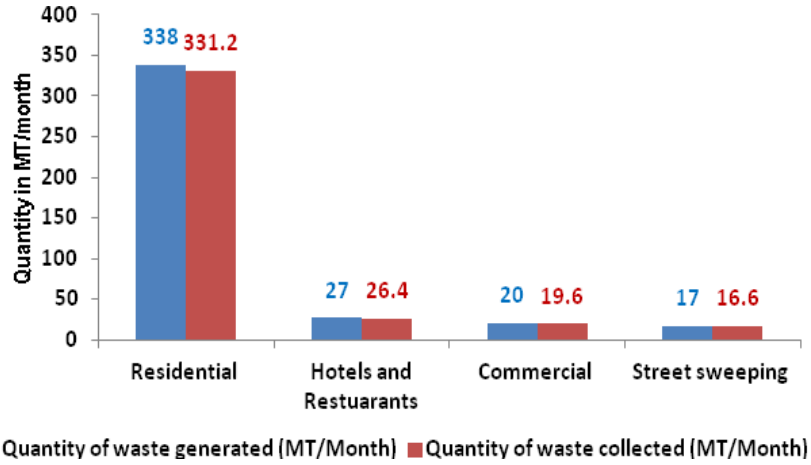
4.8.1 Waste generation, quantity and characteristics

A normative standard of 360 gm/capita/day of waste generation is preferred and used as the basis for estimating the waste generation for Mysore city. Considering the waste generation and the present estimated population of 9.1 lakhs, the waste generation is estimated at 255 tons/ day based on the normative standards. The estimate of the source wise waste generation is 300 tons/day. The waste collected by both the City Corporation and the contractor vehicles are transported to the compost plant. The vehicles are weighed at the compost plant for its quantity. The records show that the average waste transported is 273 tons/day and minimum is 226 tons/day and the maximum is 321 tons/day. The collection efficiency based on these numbers is 80-90%.

Table 37: Waste generated from different sources

Generator	Number	Unit generation per day	Estimated quantity (MT/day)
1. Population	9,38,386 (including floating population)	360 gm/capita/day	338
2. Commercial establishments	20,000	1 kg per unit/day	20
3. Hotels and Restaurants	410	50 kg/unit	21
4. Choultries	124	50 kg/unit	6
		Total MSW generated	**385 MT/day**

Source: CDP, Mysore



Domestic households: The waste generated in the domestic households forms the major component of the total MSW generated in the city. Assuming the waste generation of 360 gm/capita/ day, the total waste generated is ***338 tons/day*** from total population of 9,38,386 including floating population as shown in the graph.

Commercial establishments: There are approximately 20,000 commercial establishments in the city, majority of which are general shops, petty shops, bakeries, juice shops, electrical & electronics, wholesale and retail stores. Based on the waste quantification studies undertaken, the MSW generation rate is approximately 1 kg/day per establishment and the estimated quantum of MSW generated is ***20 tons/day***.

Choultries: There are approximately 124 Choultries in the city generating 50 kg of MSW estimated to generate about ***6 tons/day*** of municipal solid waste.

Hotels, Restaurants & Lodgings: Hotels, restaurants and lodgings mainly generate biodegradable waste. There are approximately 415 hotels in the city. The MSW generation rate is approximately 50 kg/unit/day and the estimated quantum of MSW generated by the hotels is ***21 tons/day***.

Markets: Vegetable, meat shops and other market areas are the other sources of waste generation in the city. There are approximately 387 markets in the city which generate an estimated quantum of ***28 tons/day*** of MSW.

Street sweepings & drain cleanings: Street sweepings and drain cleanings are the other major components of total MSW generated in urban areas. The street sweepings range from 60 kg per km road length in high density areas to around 15 kg/km road length in less density areas. The quantum of street sweeping waste generated per day has been estimated at ***17 tons/day***.

Slaughter houses: There is one slaughter house at Kuri Mandi in Ward No. 47 of Subhash Nagar. Approximately ***0.5 ton/day*** of waste is generated at the slaughter house.

Others: Hospitals, clinics, industries and other generators such as schools, institutions, temples, etc., generated an estimated quantum of ***13 tons/day of MSW***.

Table 38: Categories of waste generated and collected

Category of waste	Quantity of waste generated (MT/day)	Quantity of waste collected (MT/day)
Residential	338	331
Commercial	20	19.6
Street sweeping	17	16.7
Market waste	28	

Hotels, restaurants and choultries	27	26.5
Slaughter houses	0.5 tons	0.49 tons
Others	13	
Total	**402.5 tons**	**394.5 tons**

Source: Mysore City Corporation

4.8.2 Primary collection and coverage

Door to door collection is being implemented in all the 65 wards with the collecting efficiency of 97.8% of total solid waste generated in the city as indicated in the table below per capita generation varies from 400 to 450 gm/per capita except in ward No. 9 which is very high at 600 gm/per capita. The waste is collected from domestic households by the pushcarts and the road side waste is dumped in RCC bins/masonry bins as the open collection points facilitated by the MCC. In order to facilitate collection of MSW from the bulk generators, 20 secondary storage bins (dumper bins) have been placed at commercial areas and bulk waste generation points. The MSW stored in the dumper bins is transferred to the compost facility using dumper placers.

The chicken and mutton market waste is collected by MCC and transported separately to Kesare. Approximately 15-20 tons/day of waste is generated from chicken and mutton markets and the waste is buried deep at Kesare. Dead animal waste is collected and disposed by burying deep near compost plant at Vidyaranyapuram. A separate section on slaughter house waste treatment dealt in this CSP.

Street sweeping: The street sweepings and the silt collected from the road side drains are temporarily stored is small heaps on the road sides or are collected in the bins and transferred to tractor placers for disposal. The estimated road length in Mysore is 1,765 km, which has been classified into three categories depending upon the frequency of sweeping as given in table below:

Table 39: Road classification and frequency of sweeping

Classification of Road	Road length (km)
1. **Type A**: Sweeping on daily basis	684.68
2. **Type B**: Sweeping twice a week	610.95
3. **Type C**: Sweeping once a week	468.90
Total	**1764.53**

Source: MSW Action Plan, DMA, 2006

The roads and drains are swept by the pourkarmikas which is then collected in the bins. The waste is primarily collected using bins and containers which are then dumped into the auto tippers at the waste collection points. The secondary waste is then collected using trucks, tractors and dumper placers for further treatment.

Heritage areas: Being Mysore a historical city there are many heritage areas in Mysore. MCC has identified specific heritage areas in the city to be demarcated as "litter free zones" including Devaraj Urs Market and Heritage walk areas. Since these areas would be visited by bulk of the floating population, it becomes necessary to provide litter bins for disposal of waste by these people and needs special focus.

Table 40: Vehicles used for door to door waste collection

Vehicle type	No. of vehicles	Capacity of each vehicle (tons)	No. of trips	Total waste collected (tons)
Auto tippers	131 ATS	131 x 0.075	2	196.5

MCC distributed red and green dustbins to about 1,50,000 houses for segregation of wet and dry wastes. For managing the increasing quantity of waste, it is proposed to procure:

- Cleaning machine for street and footpath sweeping
- 2 compartmented auto tippers to collect wet and dry waste from households
- 4 compartment containers to segregate the dry waste further into 4 types viz., paper, glass, metal and hazardous
- Skip containers for collection of bulk waste
- Sweeping of main roads during night time
- Separate lorries for removal of debris
- Imposing fine to publics for littering the streets

To encourage SHGs and RWA in SWM activities, 5 wards are handled by Federation of Mysore City Wards Parliament for door to door collection in which segregation is initiated. 42 wards are outsourced for street sweeping and door to door collection. 23 wards are maintained by MCC pourakarmikas. The ward wise waste generated and collected from the door to door collection is given in the table below:

Table 41: Ward wise SWM details

Ward No.	SWM generated quantity (MT/day)	SWM collection quantity (MT)	Door-to-door HHs collection	Collection efficiency	Per capita generation
1	3.9	3.8	1,940	97.4	418.8
2	4.3	4.28	2,188	99.5	409.4
3	2.1	2	1,091	95.2	401.0
4	4.3	4.2	2,165	97.7	413.8
5	3.9	3.8	1,930	97.4	421.0
6	4.3	4.2	2,179	97.7	411.1
7	3.7	3.6	1,838	97.3	419.4
8	5.4	5.3	2,723	98.1	413.1
9	6.1	6	2,084	98.4	609.8
10	4.3	4.2	2,174	97.7	412.1
11	4.1	4	2,064	97.6	413.8
12	9	8.7	4,460	96.7	420.4
13	6.3	6.2	3,197	98.4	410.5
14	3.1	3	1,575	96.8	410.1
15	6	6	2,909	100.0	429.7
16	5.4	5.3	2,743	98.1	410.1
17	7	7	3,544	100.0	411.5
18	12.7	12.5	6,385	98.4	414.4
19	11	11	5,462	100.0	419.6
20	7	7	3,530	100.0	413.1

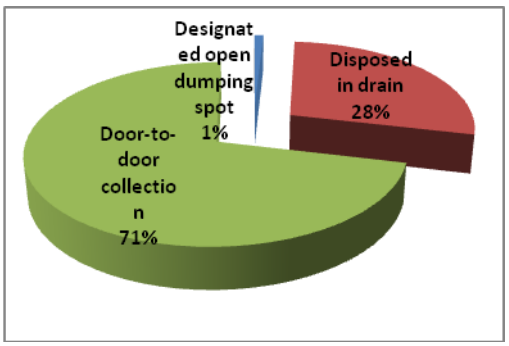
21	6.3	6.2	3,168	98.4	414.3
22	4.4	4.3	2,231	97.7	410.9
23	4.2	4.1	2,141	97.6	408.7
24	3	3	1,411	100.0	442.9
25	2.7	3	1,343	111.1	418.8
26	3	2.7	1,359	90.0	459.9
27	2	1.9	1,012	95.0	411.7
28	5	4.8	2,469	96.0	421.9
29	4	3.8	1,945	95.0	428.4
30	3.1	3.1	1,597	100.0	404.4
31	3.1	3	1,562	96.8	413.5
32	5.5	5.4	2,788	98.2	411.0
33	6.6	6.4	3,304	97.0	416.2
34	16.6	16.2	8,310	97.6	416.2
35	6.4	6.3	3,242	98.4	411.3
36	5.2	5	2,601	96.2	416.5
37	5.8	5.7	2,925	98.3	413.1
38	4.7	4.6	2,374	97.9	412.5
39	5.3	5.2	2,659	98.1	415.3
40	5.1	5	2,574	98.0	412.8
41	3.2	3.1	1,601	96.9	416.4
42	4.5	4.4	2,276	97.8	411.9
43	4.2	4.1	2,112	97.6	414.3
44	3.7	3.2	1,884	86.5	409.1
45	8.2	8	4,117	97.6	414.9
46	5.5	5.4	2,774	98.2	413.1
47	7.4	7.2	3,724	97.3	414.0
48	4.5	4.4	2,275	97.8	412.1
49	2.2	2.1	1,108	95.5	413.7
50	4.1	4	2,074	97.6	411.8
51	5.6	5.5	2,820	98.2	413.7
52	3.7	3.6	1,858	97.3	414.9
53	4.4	4.3	2,239	97.7	409.4
54	4.1	4	2,072	97.6	412.2
55	6	6	3,044	100.0	410.6
56	11	10.5	5,368	95.5	426.9
57	10	9.6	4,932	96.0	422.4
58	4.6	4.5	2,304	97.8	415.9
59	4.7	4.6	2,354	97.9	416.0
60	7.7	7.5	3,863	97.4	415.3
61	4.1	4	2,089	97.6	408.9
62	3.5	3.4	1,767	97.1	412.7
63	6.3	6.2	3,190	98.4	411.4
64	6.8	6.6	3,402	97.1	416.4

65	11.3	11.1	5,697	98.2	413.2
Total	**357**	**349**	**1,78,140**	**97.8**	**417.5**

Source: Mysore City Corporation, Mysore

Table: Solid waste disposal

Disposed in road side bin	0
Disposed at designated open dumping spot	3
Disposed in drain	95
Door-to-door collection	244
Incomplete	402



4.8.3 Transportation of solid waste

The MSW collected from the generators is transported to the compost facility by deployment of 51 vehicles of which, 26 are owned by MCC and 25 are deployed by private contractors. Out of 65 wards in Mysore city, 30 wards are managed on contract involving the sweeping, transfer of waste to the bins, its collection these points and transporting them to the waste processing facility or any other designated disposal point. Each contract is for 3 wards. The contract deploys an average of 2 trucks, 40 to 60 persons for sweeping and transportation of wastes.

Table 42: Details of vehicles used for secondary waste transportation

Vehicle type	No. of vehicles	Capacity of each vehicle (Tons)	No. of trips	Total waste collected (Tons)
MCC vehicles				
Tractors	19	3.5 m^3	2	77
Tippers	4	5.0 m^3	2	24
Dumper placers	20	7.5 m^3	3	154
Compactors	2	14 m^3	2	42
Contractor vehicles				
Tippers	32	5.0 m^3	1	96

4.8.4 Treatment and disposal of solid waste

The city practices door to door basis collection in all the 65 wards and the waste is segregated only in ward 28. At present 3 tons of waste is being segregated and processed in ward 28. Workers are provided with 2 compartment auto tippers to collect the segregated waste from the household itself. After collection of wet and dry waste from household, it is transferred to zero waste management (ZWM) unit, where secondary segregation of these waste take place. Wet waste is composted and dry waste is sent to recycling. It is planned and efforts are being made to have such decentralized ZWM units in zone 1, 4 and 6 covering 10 wards.

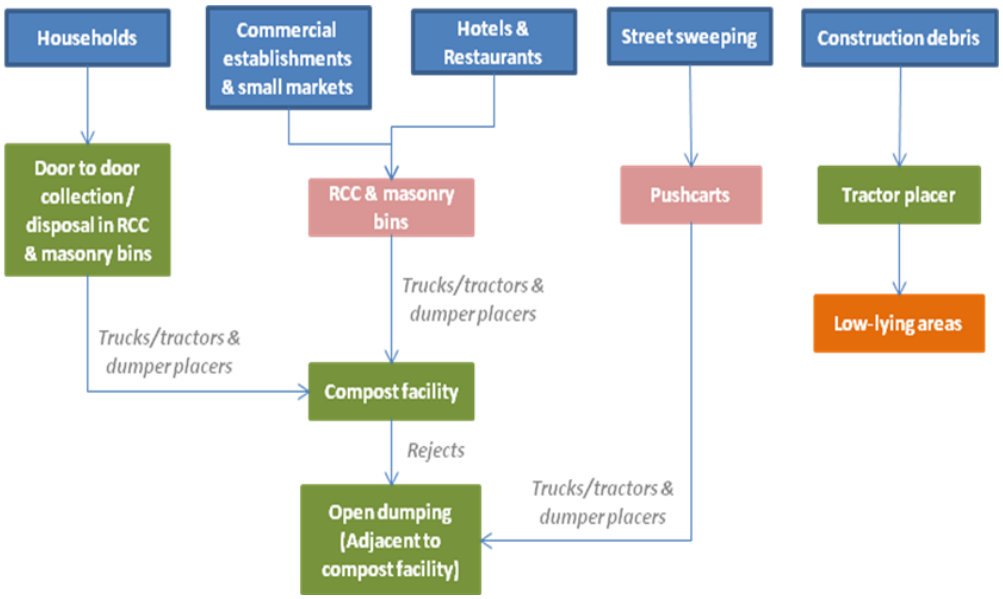


Figure 20: An overview of procedure practiced to manage Municipal Solid Waste

Source: DPR, Mysore

4.8.5 Zero waste management at Vidyaranyapuram, Mysore

The MSW generated within the limits of the MCC area, prior to year 2001, was dumped in an ad-hoc manner at several locations as convenient in the peripheral area of the city. As a part of MSW Management Program taken up under Asian Development Bank assisted Karnataka Urban Infrastructure Development Project (KUIDP), setting up MSW treatment facility in 2001 with a capacity of 200 TPD on 5 acre of land in Sewage Farm, Vidyaranyapuram, under public private partnership framework to treat the MSW generated in the city. M/s Excel Industries, Mumbai in association with M/s Vennar Organic Fertilizers Limited was identified as the developer for setting up of the compost facility under a Build-Operate-Transfer (BOT) framework through a competitive bid process. Another unit of 3 ton capacity zero waste management is in ward No. 28.

Since 2005, MCC has been operating the facility by deploying its own staff and resources. The waste is transported and weighed at the weighbridge wherein details like number of truck loads, weight of each load and the lorry number are recorded. The waste received is dumped in the adjacent vacant land which is getting piled up at the facility, due to intermittent operation of the compost facility. The drains are constructed on the periphery of the facility to collect the leachate generated. The 3 screens namely, 35 mm, 16 mm and 4 mm trommel screen process the inertised MSW. The compost is then air dried at ambient temperature. A quality control lab was constructed at the site to assess the parameter to govern the quality of compost like CN ratio, pH value, etc. The lab is however currently non-operational and no quality checks are being carried out for the compost produced. The compost produced is stored and packed for the marketing purpose. Presently, O&M of the compost plant is outsourced to M/s IL & FS Company on PPP basis and are paying rent and royalty of Rs. 6 lakh/annum to MCC.

Picture 21: Waste management plant at Vidyaranyapuram

Picture 22: Solid waste being dumped for decomposition using windrows method

Picture 23: Waste screening process

Picture 24: Compost being collected after series of treatment procedure

Proposed waste processing and recycling technology: At present MCC is having a 200 TPD capacity compost plant facility, which can handle 250 TPD, where in composting of wet waste is done using windrows composting method. Mixed waste which is brought is segregated mechanically at compost plant and bio-degradable waste is composted. M/s. IL & FS is handling compost and disposing of the non-degradable waste by recycling. MCC has also taken up zero waste management at ward level. There is a zero waste management plant in ward No. 28, where all the recyclables is segregated and routed to recyclers. Remaining wet waste is composted in the same place. It is proposed to also extend segregation of waste by having similar plants in zone 1, 4 and 6 covering 10 wards.

Picture 25: Waste segregation at ward level

To accommodate the present waste generation, expansion of existing compost facilities through M/s. IL&FS is under planning stage. The compost expansion facility is expected to include presorting, segregation and shredding of incoming waste. The augmentation of refinement section would be done by installing additional rotary screens and its accessories. After implementation of these, there will be waste segregation, recovery of recyclables along with composting of waste.

Biomedical Waste Management: M/s. Sree Consultants, a private agency authorized by KSPCB has setup a biomedical waste incinerator at Varuna near Mysore of capacity 100 kg/hr where it receives 0.5 MTPD of waste from the hospitals, nursing homes and clinics from Mysore. KR Hospital and PKTB hospital have the facility to treat infected liquid waste. Out of 1016 hospitals and clinics, only 304 have registered for BMW disposal facility and 694 have not yet registered. MCC has issued notice to the remaining clinics and nursing homes to tie up with private facility, M/s. Sree Consultancy for collection, transportation, treatment and disposal of biomedical waste or action would be taken to cancel their trade license. The operations of the biomedical facility are being undertaken as per the requirements of the Pollution Control Board.

Box 6: SWM initiatives by the Government

The Karnataka Municipalities Act, 1964 and Karnataka Municipal Corporation Act, 1976, have emphasized the need to collect and dispose 'rubbish and filth' in a defined manner, so as to keep public places clean. However, there is no reference to scientific collection and disposal of the same. Hence, rules have been laid down fixing the responsibility of management of solid waste disposal and various standards for disposal solid waste. Rules that regulate the management and handling of solid waste in Mysore are:

- Municipal Solid Wastes (Management & Handling) Rules, 2000;
- Karnataka State Policy on Integrated Solid Waste Management (ISWM);
- Bio-Medical Waste (Management & Handling) Rules, 1998;
- Hazardous Waste (Management & Handling) Rules, 1989, 2000, 2003;
- Batteries (Management & Handling) Rules, 2001; and
- Recycled Plastics (Manufacture & Usage) Rules, 1999.
- Guidelines for managing E-waste, 2002

4.8.6 Disposal of municipal solid waste

At present, there is no sanitary landfill facility in the city for disposal of the MSW generated and is processed in the compost facility. The non-biodegradable component of the MSW collected and the rejects from the compost facility are being dumped in the open areas adjacent to the compost facility.

Around 35 acres of land has been identified for landfill site at Sewage Farm, Vidyaranyapuram. Under GoI, JNNURM project, MCC has taken up development of sanitary landfill site and capping of existing waste. The work is in progress, pre closure period is for 13.8 years and post closure period is for 10 years. Bottom liners provision is made for landfill and fresh capping area to prevent ground water quality contamination.

Complaints redressal system and its efficiency: MCC is having 24 hours help line facility in which computerized complaint register is maintained and operated in 3 shifts. Maximum time taken for attending each complaint is 24 hours. Wireless set is distributed to all the health staff. Daily garbage cleaning and other complaints from public are recorded through control room using

toll free numbers and they are forwarded to concerned Health Inspector/Officer through SMS or wireless, which can be attended within 24/7 based on the type of complaint.

GPS navigation system

- All SWM vehicles are equipped with GPS units
- Enables the route optimization
- Monitors the movement of vehicles from collection point to disposal point and has improved the collection efficiency
- Savings on fuel

Solid waste management Cess: The SWM Cess is being collected along with the property tax since 2007. Around 2.71 crore rupees was collected as SWM Cess for the year 2008-2009 and 1.37 crore rupees was collected for the year 2009-2010 until September 2009.

Table 43: SWM tariff structure

Area in sq. feet	SWM Cess collected w.e.f January 2007 per month
Residential	
<1,000	INR 10.00
1,000-3,000	INR 30.00
>3,000	INR 50.00
Commercial establishments	
<1,000	INR 50.00
1,000-5,000	INR 100.00
>5,000	INR 200.00
Hotels and Choultries	
<10,000	INR 300.00
10,000- 50,000	INR 500.00
>50,000	INR 600.00
Industrial establishments	
<1,000	INR 100.00
1,000-5,000	INR 200.00
>5,000	INR 300.00
Note: Council resolution for the proposal of linking the SWM Cess for a house measuring less than 1,000 sq. ft from INR 10 to INR 20 was scaled down to Rs. 17.5. In case of commercial establishment, it is proposed to double the Cess with another 5 percent increase is passed on 13-01-2011 at council meeting.	

Source: Mysore City Corporation

4.8.7 Health of sanitary workers

The sanitary workers are supplied with protective measures during collection, transportation and disposal of solid waste. The workers are provided with gloves, masks, shoes, etc., and wearing the protective measures has been made compulsory to the workers to avoid or prevent from health hazards. The workers are provided with medicines and regular antiseptic injections by MCC.

Table 44: Health Department staffing pattern

Staffs	Manpower
1. Health Officer	1

2. Deputy Health Officer	1
3. Environmental Engineers	3
4. Health Inspector	11
5. Health Inspector – on contract basis	10
6. Conservancy Dafedars	36
7. Total Pourakarmikas (PKs) - Permanent	772
8. Pourakarmikas (PKs) – Private contract service deployment	1412

Source: MSW Action Plan, DMA, 2006

4.8.8 Standardized service level indicators for solid waste management

As per the Karnataka State Policy on Integrated Solid Waste Management 2003, it is imperative for ULBs to adopt scientific method in collection, storage, transportation, processing and disposal of municipal solid waste to ensure on improving the environment and health conditions of citizens. The Service Level Benchmark checks the solid waste collection efficiency, door to door collection, treatment, segregation, disposal, redressal of customer complaints, etc., in a rating system to ensure its efficiency. The progress made by Mysore on MSW management is given in the table below:

Table 45: Service level benchmarking on solid waste management

Solid Waste Management	Benchmark	Progress made
Household level coverage	100%	**56**
Efficiency of collection of MSW	100%	**89**
Extent of segregation	80%	**1**
Extent of MSW recovered	100%	**29**
Extent of scientific disposal	100%	**0**
Efficiency in redressal of customer complaints	100%	**95**
Cost recovery	80%	**3**
Efficiency in collection of charges	90%	**16**

Source: Ministry of Urban Development, GoI

4.8.9 IEC Programmes

In the year 2009-2010, IEC activities in Mysore were entrusted to People Science Forum (PSF), a part of Karnataka Rajya Vigyana Parishat (KRVP). The tender has been invited under which a series of selection procedure will be conducted in order to select the NGO pertaining to IEC activities. Before implementation of Nirmala Nagara programme in the city, jatha's, workshops; campaigns on solid waste management were held under various initiatives.

Involvement of SHG's and RWA: After the implementation of Nirmal Nagara programme, house to house campaign on SWM is being held. School children Eco-club have been formed, training for MCC staffs and two workshops have been organized for RWA formation. As of now about 87 RWAs have been formed in the city. At Dasara exhibitions 2005, public dialogues, street plays were also held. Awareness programme in the entire 3 constituency to promote door to door collection of waste involving SHG's & RWA's was held in last 38 months. Already 19 SHGs have come forward for door to door collection of waste at their respective wards.

Picture 26: IEC Programmes

Training activities

- Conducted for Health Inspectors, Dafedars and Pourakarmikas in 3 batches regarding MSW Rules 2000.
- Conducted for leaders and Deputy Leaders of Citizens Committee (18 batches), members of the Citizen Committee (9 batches)
- CMCA (Children's Movement for Civic Awareness) appointed by MCC has trained 2000 children in 900 sessions in 40 high schools in the year 2008-2009. CMCA activities will be taken up in 60 schools (3,000 children) for the year 2009-2010.
- IEC program on SWM was launched by Hon'ble Chief Minister and District Minister on 13-2-2009 by issuing SWM booklets to 15,000 SHG members, in a specially convened conference of SHG members.
- About 290 SHG Federation Leaders and trained SHGs on segregation of MSW initiatives. These 290 SHG members in turn trained 3,000 SHG members in 30 training programs. In the 3rd phase, all the 30,000 SHG members have been trained by these 3,000 trainers and are involved in motivating households in segregation activities.
- 686 Booth Committee Leaders, Deputy Leaders and members monitor the SHG members in proper segregation initiatives.
- Video announcement in Cable TV, 12 times in a day.
- Competitions at Schools and Colleges level like essay, drawing and speech on SWM were conducted.
- Workshop on SWM to bulk waste generators to motivate them to segregate waste at the source has been conducted.
- Distribution of pamphlets containing source segregation details is distributed to all the households.
- Daily garbage cleaning and other complaints from public are recorded through control room using toll free numbers and they are forwarded to concerned Health Inspector/Officer through SMS or wireless, which can be attended within 24/7 based on the type of complaint.

Box 7: Achievements and awards

Award for excellence in SWM: Awarded by MOUD on 4-11-2009 in ICON SWM, organized by Center for Quality Management System, Jadavpur University, Calcutta.

Union Ministry of Urban Development awarded MCC as **Second Clean City** in May 2010 considering parameters like maintaining cleanliness, disposal of solid waste, maintenance of UGD system, rain water harvesting, rejuvenation of lakes, door to door collection of waste, public toilets and other parameters.

Award for excellence in appreciation of participation in Municipalika-2011: 9th International Exhibition on Urban Infrastructure, Municipal Services and Built-Environment Bangalore on 27th-29th January 2011.

Urban Development Department of Karnataka State awarded MCC as first **Best Clean City** on 01-02-2011 with 10 lakh rupees.

- ESI and PF card distributed on 9-02-2011

4.8.10 Future demand and gap

Based on the projected population and the present per capita waste production, the future waste generation has been projected. It has been estimated that by 2045, the waste generation in Mysore city would be 494 MTPD as given in the table below.

Table 46: Projection of future solid waste generation

Year	Projected population	Solid waste generated in MT/day
2010	905485	**326**
2015	971977	**350**
2020	1038469	**374**
2025	1104961	**398**
2030	1171453	**422**
2035	1237945	**446**
2040	1304437	**470**
2045	1370929	**494**
Note**: The average waste generation is taken as **360 gm/capita/day		

Source: Estimated by ASCI, Hyderabad

4.8.11 Future SWM projects and proposals

- **Converting waste to energy plant**: MCC is planning to implement 25 TPD capacity converting waste to energy plant. Project proposal has been sent to Ministry of New & Renewable Energy Department, Delhi in this regard to seek financial assistance. In addition to this, proposal to set up 2 numbers waste to gas plants of 1 MT capacity each has been approved and tender is being called for establishing the biomethanation plants.
- ***Setting up 10 TPD plant to convert waste plastic from SW in hydrocarbon:*** The proposal is cleared by High Power Committee headed by Additional Chief Secretary, UDD, Government of Karnataka. The EOI is called on PPP basis. Three acres of land is given for the implementation and operation of waste management by MCC in Vidyaranyapuram, Mysore.

- ***Energy recovery from SW (vegetable food waste to biogas):*** Two biomethanization plant of 1 MTPD each is approved by Government of India under CPF. A pilot biogas plant technology provided by CREST, Mysore is functioning at KR Hospital with 50 kg/hr and ATI, Mysore with 100 kg/hr. A pilot biogas plant is proposed at Deaf and Dumb School of 1 MTPD and 3 MTPD at KR Hospital.
- ***Installation of GPS tracking for SWM vehicles***
  - For effective monitoring of waste cycle
  - Fuel tracking
  - Generation of MIS reports
  - Optimize use of resources
  - Monitor the movement and optimize the routes
- ***Incinerator of Capacity 350 kg/hour***
  - Disposal of Animal Carcass by Incineration
  - Avoid of mixing of MSW with Dead animal carcass
  - 170 – rodents, 1-2- ox, 150 – cats & dogs per day
  - Scientific disposal of carcass
- ***Disposal facility***
  - Development of a landfill facility
  - 34 acres of land identified and is located adjacent to the existing compost facility
  - 90 TPD facility could be developed with an estimated landfill life of around 17 years
  - Tender is finalized and letter of award is issued for capping and development of existing solid waste dump
  - Estimated project cost is Rs. 11.00 crores
  - To create buffer zone around the compost plant around 6700 samplings are planted
  - Construction of barricade around compost plant

Key observations

- Instruction to public regarding proper segregation of waste.
- Capacity building training of staffs for segregation of waste is very important.
- Existing GPRS technology does not have regular monitoring.
- Inadequate safety measures for the staff.
- Time to time collection of waste is lacking.
- Organic waste segregation can be improved.
- Waste from apartments/hotels/hospitals waste should be kept separately.
- Lack of vehicles for collection of waste.
- Covering of vehicles carrying waste.
- No proper land/space to dump solid waste.
- Single door containers are not made available.
- Training for pourakarmikas regarding waste handling is lacking.
- No proper roads condition near the excel plant.
- Supply of disinfectants for mosquitoes and other insects is inadequate.
- Only 20% of the waste is segregated.
- New landfill site needs to be proposed as the surrounding area is developed supervision especially ULBs. Better strategy should be made to identify various plans following solutions.
- Regularizing government rules and to be implemented properly. SWM rules should be strictly envisaged in coordination with RWA, SHG, etc. Implementation of IEC for safe disposal of SW.
- Awareness among the public can be created only through the ULB.

4.9 Water supply

At present the city is supplied from Cauvery River as source with raw water drawl from three different locations. The head works are located at various locations down stream of Krishnarajasagara Reservoir (KRS). Though sufficient quantum of bulk water is available, due to inadequate and unplanned distribution network, the water distribution is not uniform with some areas getting excess water and many areas receiving very less quantity of water.

4.9.1 Source of water

Mysore City receives water from mainly Cauvery River source with head works located at various locations down stream of Krishnarajasagara Reservoir (KRS). Presently, three different schemes are in operation from Cauvery River source with head works located near Belagola, Hongalli and Melapura villages. The details of each of the above three schemes are described in details below:

Table 47: Water Supply Scheme from River Cauvery

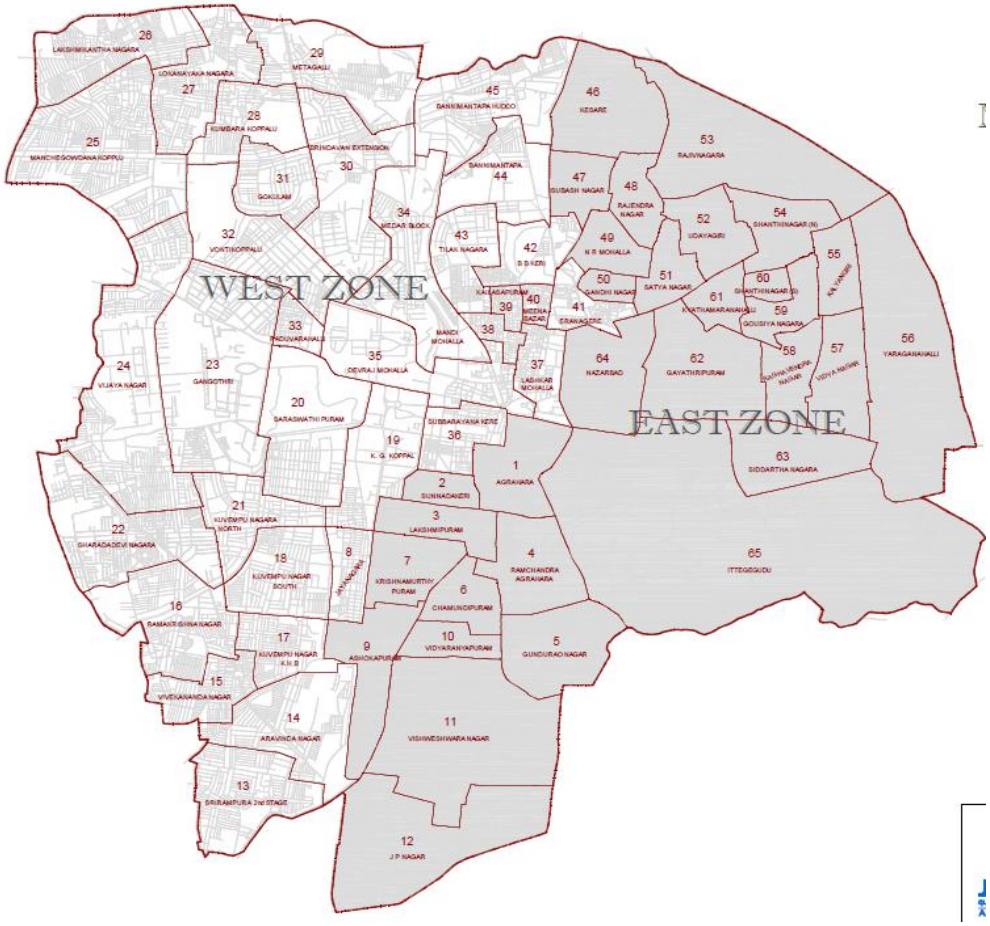
Source	Source	Year	Designed capacity (MLD)	Actual supply (MLD)
Surface water	Belagola 1st stage	1896	16	13
	Belagola 2nd stage	1998	36	27
	Hongalli 2nd stage	1956	36	32
	Hongalli 3rd stage	1978	55	55
	Melapura 1st stage	2002	50	65
	Melapura 2nd stage	2007	50	
Borewell				4.5
		Total	**243**	**196.5**

Source: Vani Villas Water Works, Mysore

From head works near Melapura Village raw water is directly pumped to existing water treatment plants located at Ramanahalli Village through vertical turbine pumps. The pipeline from head works to WTP is 1100 mm diameter MS pipe and covers a distance of about 6.5 km. At Ramanahalli Water Works two treatment plants are in operation with both Phase 1 and Phase 2 WTP's of capacity 50 MLD each.

4.9.2 Existing transmission, distribution and storage capacities

The supply of drinking water is fairly good in Mysore city. The water is drawn from Cauvery River in three different pumping stations. The city has been divided into east zone and west zone for water supply. The water is not evenly distributed with the same quantity to all the wards in the city. In east zone, around 40 wards namely, ward No. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 47, 51, 52, 53 and 64 has daily supply of drinking water. Whereas, in west zone around 25 wards namely, ward No. 5, 22, 23, 24, 40, 41, 42, 43, 44, 45, 46, 48, 49, 50, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63 and 65 gets water supply every alternate day.



Zone distribution of wards for drinking water supply

The water supply situation needs to be improved considerably. Due to inadequate and unplanned distribution network, the water distribution is not uniform with some areas getting excess water and many areas receiving very less quantity of water. At many places the feeder mains have been tapped directly and used as distribution mains.

The distribution system is sub-optimally maintained and needs to be replaced or repaired to improve delivery efficiency in supplying of water. Main reasons for the sub-optimal functioning of the existing water supply system in Mysore city is inappropriate augmentation of source, inadequate storage facility, aged and leaking pipeline network, illegal tapping of transmission water supply pipelines, unauthorized house connections, faulty metering, lack of operation & maintenance of system components, adoption of inappropriate design methodology etc. Certain parts of the city are experiencing severe water supply crisis and level of services offered by service providers has reduced drastically.

The water is supplied through the individual household connections. Total connections are estimated to be 1,74,951 of which 1,71,586 are household connections, 3,076 commercial connections, 289 industrial connections and public stand posts account to total of 2,300. The consumption of drinking water in industries and commercial areas account to 6 MLD, to nearby villages is 3 MLD and to Chamundi Hill and Revenue Layout the water consumed is 2.45 MLD.

Table 48: Water supply connections in Mysore

Ward No.	Domestic	Non domestic	Commercial	Industrial	Total
1	1228	37	73	0	1338

2	2090	65	95	0	2251
3	2163	86	81	0	2332
4	1086	51	40	0	1179
5	1851	35	10	0	1898
6	1334	26	23	0	1384
7	505	32	2	0	540
8	989	20	4	0	1013
9	1990	94	32	0	2118
10	1667	79	30	10	1787
11	1711	106	72	35	1928
12	2933	135	17	0	3085
13	2359	60	7	0	2426
14	2752	55	17	0	2827
15	2679	65	23	0	2772
16	4265	198	8	0	4471
17	2734	44	23	0	2801
18	2447	118	42	0	2612
19	931	61	24	0	1017
20	1505	59	59	0	1624
21	1613	71	42	0	1728
22	2694	62	5	0	2761
23	1842	73	33	0	1949
24	4656	194	25	0	4878
25	3967	170	16	1	4158
26	4059	126	10	0	4197
27	2806	114	14	0	2938
28	1447	35	22	0	1504
29	1574	29	16	226	1846
30	1058	59	83	16	1218
31	1931	48	19	0	2003
32	1625	87	61	0	1774
33	691	22	11	0	724
34	1064	82	205	1	1356
35	1453	105	450	1	2025
36	2086	159	414	0	2665
37	2744	131	203	0	3079
38	1637	34	95	0	1771
39	982	40	39	0	1061
40	947	30	32	0	1009
41	1401	45	18	0	1467
42	980	42	12	0	1034
43	1494	57	113	3	1701
44	756	28	13	0	797
45	2468	87	51	0	2608
46	1906	124	5	0	2041

47	1406	80	8	0	1495
48	1966	49	11	0	2026
49	1469	41	21	0	1533
50	835	13	2	0	850
51	864	21	3	0	888
52	1467	73	4	0	1544
53	2256	195	5	0	2459
54	1528	34	1	0	1563
55	1382	22	2	0	1406
56	3293	234	12	0	3540
57	1491	28	2	0	1521
58	687	4	0	0	691
59	1908	8	0	0	1916
60	785	1	0	0	786
61	1149	32	10	0	1191
62	2261	49	2	0	2312
63	1859	101	4	0	1966
64	1283	55	44	0	1382
65	1449	67	33	1	1550
Others	7199	1850	121	1	9190
GP	4	2	0	0	6
GP-Bogadi	231	7	0	0	238
GP-Mandal	512	0	0	0	512
KHB	20	6	0	0	26
KHB-Hottagalli	1283	6	4	0	1293
MP	78	1	0	0	79
MUDA-3rd stage V Nagar	1129	43	4	0	1176
Total	**128894**	**6502**	**2982**	**295**	**138834**

Source Vani Villas Water Works, Mysore

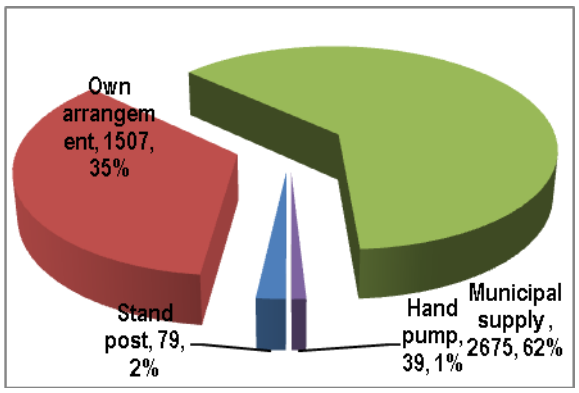


Figure 21: Unaccounted for Water

Unaccounted for water (UFW) is estimated to range around 50% and it is estimated that there are over 20,000 unauthorized connections in the city which needs rehabilitation of existing water

supply system to cut down the UFW. Around 46 MLD of water pumped is reported as distribution loss.

Table 49: Tariff structure for water consumption charges

Quantity consumed (Liters)	Revised rates applicable w.e.f. 01.01.2006 (Rates per 1000 liters in rupees)
Domestic use *(Monthly minimum rate Rs. 60.00/month and for non metered connections Rs. 60.00/month)*	
<25,000	2.00
25,001-50,000	3.75
50,001-75,000	6.00
75,001-100,000	8.00
>1,00,000	10.00
Non-domestic use *(Monthly minimum Rs. 140.00)*	
0-25,000	5.25
25,001-50,000	7.00
50,001-75,000	8.50
75,001-1,00,000	10.00
>1,00,000	11.00
Commercial use – Treated water *(Monthly minimum Rs. 250.00)*	
0-50,000	14.00
50,001-1,00,000	15.00
>1,00,000	19.00
Commercial use – Raw water *(Monthly minimum Rs. 250.00)*	
0-50,000	13.00
50,001-1,00,000	14.00
>1,00,000	18.00

Source: http://mysorecity.gov.in/sites/mysorecity.gov.in/files/PDL4.pdf

4.9.3 Water quality

The drinking water samples are analyzed at the inlet and outlet points to check the contaminated rate of water. The analysis is done in the lab within the premises of the pumping stations. The analysis is done in 13 different locations as given in the table below to check the contamination levels of residual chlorine, pH, turbidity and conductivity. It is estimated that around 93% of water samples meet the specified potable water standards.

Table 50: Drinking water analysis

Sample location *Sampling date: 31-03-2011*	Residual chlorine	pH	Turbidity (NTU)	Conductivity
Permissible limits				
1. Veernagara Jalasangrahara Yadavgiri	0.5	8.4	1.0	352
2. Bannimantappa Jalasangrahara Yadavgiri	0.8	8.34	1.0	362
3. H.L.R. Jalasangrahara Yadavgiri	1.0	8.38	1.0	356
4. C.S.R. Jalasangrahara Yadavgiri	1.0	8.44	0.9	342
5. Devanoor Jalasangrahara Yadavgiri	1.0	8.35	0.8	412

6. J.L.S.R. Jalasangrahara Yaraganahalli	0.5	8.37	0.8	410
7. VVWW Kelamatada Jalasangrahara L.L.R. Yadavgiri	1.0	8.26	1.0	369
8. VVWW shabda neerina thotte (CWR) Yadavgiri	1.5	8.24	1.0	364
9. No. 68 Khasimsaab, Dr. Ambedkar Gyanaloka Metagalli	0.2	8.29	0.8	344
10. No. 2837, Gita, Pampapati Road, Jayanagar	0.2	8.25	0.8	346
11. No. 1036/1, Prema, S.H. Road, Vidyaranyapuram	0.3	8.30	0.8	347
12. No. 42/2, Amanulla Khan, 2nd Cross, GayaKarnatakam	0.2	8.22	0.8	354
13. No. 3538, Alechandra, 15th Tiruvu, N.R. Mohalla	0.2	8.26	0.7	408

Source: Vani Villas Water Works, Mysore

4.9.4 Standardized service level indicators for water supply

Water supply and its quality is the most essential commodity for the healthy living in urban and rural areas. Mysore is dependent on Cauvery River for drinking water supply. The progress on quality of water supplied, distribution, frequency of supply, etc., needs to be efficiently recorded. The Service Level Benchmarking on water supply ensures in maintaining the efficiency through a rating system for the indicators like production of water, household connections, water treatment, quality of water, metering, redressal of customer complaint, water tariff collection, etc. The progress made by the Mysore city for the year 2010 is given in the table below.

Table 51: Service level benchmarking on water supply

Indicators	Benchmarks	Present status
Coverage of water supply connections	100%	79
Per capita water supply	135 lpcd	135
Extent of metering of connections	100%	65
Extent of non-revenue water (NRW)	15%	22
Continue of water supply	24 hours	4.5
Quality of water supply	100%	81
Efficiency of redressal of customer complaints	80%	95
Cost recovery in water supply services	100%	62
Efficiency in collection of water supply related charges	90%	70

Source: Ministry of Urban Development, GoI

4.9.5 Future demand and gap

The population of Mysore City as per 2001 census is 7.74 lakhs and the present population is about 9.00 lakhs including the population of newly extended areas within corporation limits. The reliable quantum of water from all existing operational sources excluding Belagola source and ongoing Melapura Phase - II scheme is about 140.80 MLD. Hence the present supply level at consumer point is 130 lpcd excluding treatment, transmission and distribution losses. However the above does not include water demand for floating population and other requirements. Though the per capita supply rate is just meeting the present population requirements, the distribution of water is not uniform with few areas getting excess water and many areas experiencing water scarcity.

Table 52: Projections for water supply demand

Year	Projected population	Water supply demand in MT/day
2010	905485	**122**
2015	971977	**131**
2020	1038469	**140**
2025	1104961	**149**
2030	1171453	**158**
2035	1237945	**167**
2040	1304437	**176**
2045	1370929	**185**
Note**: The average water consumption is taken as **135 lpcd		

Source: Estimated by ASCI, Hyderabad

Augmentation of water supply from Kabini river

- DPR prepared by Stup Consultants P. Ltd.
- The project covers an area of 129 km² within MCC limits and 66 km² of extended area beyond MCC limits but within CDP limits.
- Ultimate Project Year – 2039
- Total project cost = Rs. 10881.99 lakhs

Phase	Capacity (MLD)	Year of completion
Phase I	56	2009
Phase II	64	2026
Phase III	64	2031
Total	**184**	**2039**

Remodeling for water distribution system

- DPR prepared by STUP Consultants Private Ltd.
- The project covers an area of 129 km² within MCC limits and 66.0 km² of extended area beyond MCC limits but within CDP limits.
- Ultimate project year – 2039
- 71 proposed distribution zones
- Total project cost = Rs. 230.5 crores

4.9.6 Drinking water supply in slums

The drinking water in slum areas is supplied by the Vani Villas Water Works through the piped system. The slum dwellers have access to public stand posts in the areas for drinking water which comprises around 56% of the total households having access to public taps. There are households which have individual water connection comprising 31% of the total slum households. The other sources of drinking water include tube well with 4.7% and open well comprising 2.7% of the total slum households.

Table 53: Drinking water facility in slum households

Drinking water source	Total number	Percentage
River	0	*0.0%*

Tank	3	*0.0%*
Water tanker	9	*0.1%*
Others	87	*0.8%*
Open well	279	*2.7%*
Tube well	492	*4.7%*
Individual taps	3217	*31.0%*
Public taps	5850	*56.4%*

The main **problems associated with existing distribution system** are un equitable supply, non availability of adequate pressure in distribution mains, inadequate storage capacity of service reservoirs, inadequate size of distribution mains, old and dilapidated pipelines, illegal tapping of feeder mains at many locations, unauthorized house connections, faulty metering, inadequate operation and maintenance staff, adoption of inappropriate design methodology etc. Specific issues are:

- 61% of the households depend on municipal water supply and 32% of the households get water for 6-8 hours/day. But SLB indicator shows duration is 4.5 hours.
- Majority of slum households (57%) depend on public taps for water supply.
- Belagola scheme–not dependable and though total capacity is 293 MLD–only 190 MLD available.
- Many feeder mains are tapped for distributing water to local pockets resulting in considerable loss of head in the pipes and reduction in carrying capacity.
- Most of the distribution pipes are very old and are damaged at many places and distribution system is not adequate to meet the future demand. Faulty metering, lack of proper operation and maintenance, adoption of inappropriate design methodology etc. are adding to equitable distribution problem. Mysore is in the process of implementing city wide 24X7 water supply and expected to complete it by another year.
- The existing distribution system covers only the central core area and does not cover the extended areas resulting in these extended areas facing acute shortage of water.
- The distribution system is not adequate to meet the future demand.
- Bulk consumers such as KIADB, Defence establishments, KSRTC, Archaeological Dept. etc., are also not able to offer the desired level of service to their consumers due to scarcity of water and inadequate distribution network system.

4.9.7 Vani Villas Water Works and JUSCO

Vani Vilas Water Works (VVWW) was a subsidiary of the Karnataka Urban Water Supply and Drainage Board but currently handed over to MCC for bulk water supply. The Vani Vilas Water Works, which was looking after water distribution until Jamshedpur Utilities and Services Company Limited (JUSCO) took over on water distribution in the city. Bulk supply, monitoring and coordination from MCC to JUSCO are done by VVWW. Vani Vilas Water Works along with private agency on tender basis is doing survey on existing UGD coverage within MCC limits.

4.10 National sanitation ranking parameters and observations on Mysore

Table 54: National level City Sanitation Ranking scored by Mysore City

Sl. No.	Indicators	Maximum Points*	Mysore	Remarks
Mysore National : RANK 2				
1	**OUPUT-RELATED**	50		
A	**No open defecation sub-total**			
i.	Access and use of toilets by urban poor and other un-served households (including slums) - individual and community sanitation facilities. *NO OD: 4 marks* *5%: 3 marks* *5% - 10%: 2 marks* *10 - 15%: 1 mark* *> 15%: 0 mark*	4	3.00	Field observation agrees with the marks for OD which is 5%. Short-term: To eliminate OD by 2012. Medium-term: To have 100% sanitary toilets. Long-term: To have 100% sewerage connections.
ii.	Access and use of toilets for floating and institutional populations - adequate public sanitation facilities	4	2.00	Medium term: ----- public toilets with ----- seats to be facilitated for floating population.
iii.	No open defecation visible	4	1.58	Short to long term: MIS, punitive measures and incentives through IEC.
iv.	Eliminate Manual Scavenging and provide personnel protection equipment to sanitary workers	4	4.00	No manual scavenging practiced. Hence requires sustaining efforts in mechanizing cleaning.
B	Proportion of total human excreta generation that is safely collected (6 points for 100%) *90% - < 100%: 5 marks* *80% - 90%: 4 marks* *70% - 80%: 3 marks* *60% - 70%: 2 marks* *40% - 60%: 1 mark* *< 40%: 0 mark*	6	6.00	Short to medium term: The field observation and the records reveal that some toilets are connected to septic tanks and open nallas. The marks obtained are overestimated under these real conditions. Needs efficient and regular cleaning of septic tanks and needs 100% sewerage connection for safe disposal of human excreta. 100% UGD is under planning stage.
C	Proportion of total black waste water generation that is treated and safely disposed off (6 points for 100%) *0% - <100%: 5 marks*	6+3	7.50	Same as above. (Also efficient maintenance of damaged UGD pipes)

	80% - 90%: 4 marks *70% - 80%: 3 marks* *60% - 70%: 2 marks* *40% - 60%: 1 mark* *<40%: 0 mark*			
D	Proportion of total grey waste water generation that is treated and safely disposed off (3 points for 100%) *80% - 100%: 2 marks* *60% - 80%: 1 mark* *<60%: 0 mark*	3 -3	0.00	Marks underestimated. Medium to long term: 100% sewerage connection and sanitary toilets with efficient STPs.
E	Proportion of treated water that is recycled and reused for non potable applications. *20%* - or more: 3 marks* *10% - 20%: 2 marks* *1% - 10%: 1 mark* *< 1%: 0 marks*	3	0.00	Long term: Tertiary treatment to be in place atleast for one STP by 2013 and for other two by 2015. The treated water can be reused for gardening.
F	Proportion of total storm-water and drainage that is efficiently and safely managed (3 points for 100%) *100%: 3 marks* *60% - 100%: 2 marks* *40% - 60%: 1 mark* *< 40%: 0 mark*	3	2.00	Short to long term: 100% coverage of storm water drains by 2014 onwards with efficient management.
G	Proportion of total solid waste generation that is regularly collected (4 points for 100%) *100% daily collection: 4 marks* *80% - 100%: 3 marks* *60% - 80%: 2 mark* *40% - 60%: 1 mark* *< 40%: 0 mark*	4	2.00	Marks underestimated. Medium term: Collection efficiency of 100% to be maintained by 2012.
H	Proportion of total solid waste generation that is treated and safely disposed off (4 points for 100%)	4	2.00	Medium to long term: 40-60% waste segregation to be commenced by 2012. 60-100% segregation to be commenced from 2014 onwards.

I	City wastes cause no adverse impacts on surrounding areas outside city limits. (5 points for 100%)	5	3.00	Long term 100% coverage of waste collection and treatment will cause no damage to the surrounding areas.
	Total	**50**	**33.08**	
A	M&E systems are in place to track incidences of open defecation *Monitoring mechanism (procedures or systems along with staff) to track OD : 1 mark* *Monthly collection of data on OD practices from each ward : 1 mark* *Reportage of monthly data in public forum : 1 mark* *Incentives and awards being implemented for stopping OD: 1 mark*	4	1.00	Short term
B	All sewerage systems in the city are working properly and there is no ex-filtration. (Not applicable for cities without sewerage systems)	0 (5)	9.22	Short to long term: The pipes need regular check. The damaged pipes need immediate recovery. Ex-filtration?
C	Septage / sludge is regularly cleaned, safely transported and disposed after treatment, from on-site systems in the city (MAXIMUM 10 marks for cities without sewerage systems)	10 (5)	0.00	Underestimated
D	Underground and Surface drainage systems are functioning and are well-maintained *Centralized database/maps exist for drainage system: 2 marks* *Pre-monsoon and one other-season cleaning, repairs and maintenance of drains undertaken: 2 marks*	4	4.00	Overestimated. Short to long term: 100% coverage of UGD and surface drainage by 2012 onwards.
E	Solid waste management (collection and treatment) systems are efficient (and are in conformity with the MSW Rules, 2003) *100% segregated wastes on arrival at disposal/treatment facilities;* *80% recycling of wastes;* *100% operational cost recovery.* *Framing rules for:* *SW Collection and Treatment: (formally adopted MSW Rules, 2000): 1 mark* *HHs and establishments by D2D collection 100%=1 mark* *Proportion of streets covered by regular street-sweeping (at least once a day) 100%=1mark;* *Proportion of waste processed or recycled* *80% and above=1 mark*	5	3.85	Medium to long term

	Cost Recovery for SWM Services (including treatment) - 100%=1 mark			
F	There is clear institutional responsibility assigned; and there are documented operational systems in practice for b)/c) to e) above *Availability of written manual and codified procedures for:* *Sewerage: 1mark* *Septage: 1 mark* *Drainage: 1 mark* *SWM: 1 mark*	4	4.00	Sustenance
G	Sanctions for deviance on part of polluters and institutions is clearly laid out and followed in practice	3	3.00	Sustenance
	Total	**30**	**25.07**	
A	Improved quality of drinking water in city compared to baseline.	7	6.30	Short to long term
B	Improved water quality in water bodies in and around city compared to baseline	7	4.20	Short to long term
C	Reduction in water-borne disease incidence amongst city population compared to baseline *50% or more: 6 marks* *40% - 50%: 5 marks* *35% - 40% 4 mark* *30% - 35%: 3 mark* *25% - 30%: 2 marks* *20% - 25%: 1 mark* *< 20%: 0 mark*	6	2.00	Short to long term
	Total	**20**	**12.50**	
	Grand total	**100**	**70.65**	

5 INSTITUTIONAL CAPACITY AND FINANCE

The city is governed by the MCC forming the city legislative branch, headed by a Mayor. The Corporation comprises 65 wards with an elected Corporator for each ward. The Commissioner, Health Officer and Engineers in charge for efficient of water supply and sanitation, solid waste management and health issues form part of the executive branch.

MCC is a local self government institution constituted under the Karnataka Municipal Corporation Act, 1976. It was converted as MCC on 10-06-1977. A combination of civic and parastatal organizations caters to the basic needs of Mysore. MCC is in charge of the responsibilities to provide and maintain roads, water supply, sewerage system, street lighting, establishing markets and shopping areas, development of parks and water bodies, solid waste management.

5.1 Directorate of Municipal Administration

Government through Directorate of Municipal Administration (DMA) supervises the functioning of the municipalities. Government directly supervises the functioning of the Corporations throughout Karnataka except Bangalore. The Directorate has the responsibility to supervise the function of the municipalities, work out suitable human resource policies, exercise disciplinary control over the staff of municipalities, monitor the tax collection of ULBs, lay down policies for transparency in expenditures, hear appeals against the decisions of municipalities, release the Government transfers to the ULBs, as well as implement schemes like SJSRY (for urban poverty alleviation), IDSMT, Nirmala Nagar, etc. The Directorate also collects statistics from ULBs and helps in the preparation of municipal statistics. The Directorate also inspects municipalities, interacts with both elected representatives and the employees to find out both genuine and specific problems of urban administration and urban municipal services and work out the solutions for those problems.

5.2 Urban Development Department

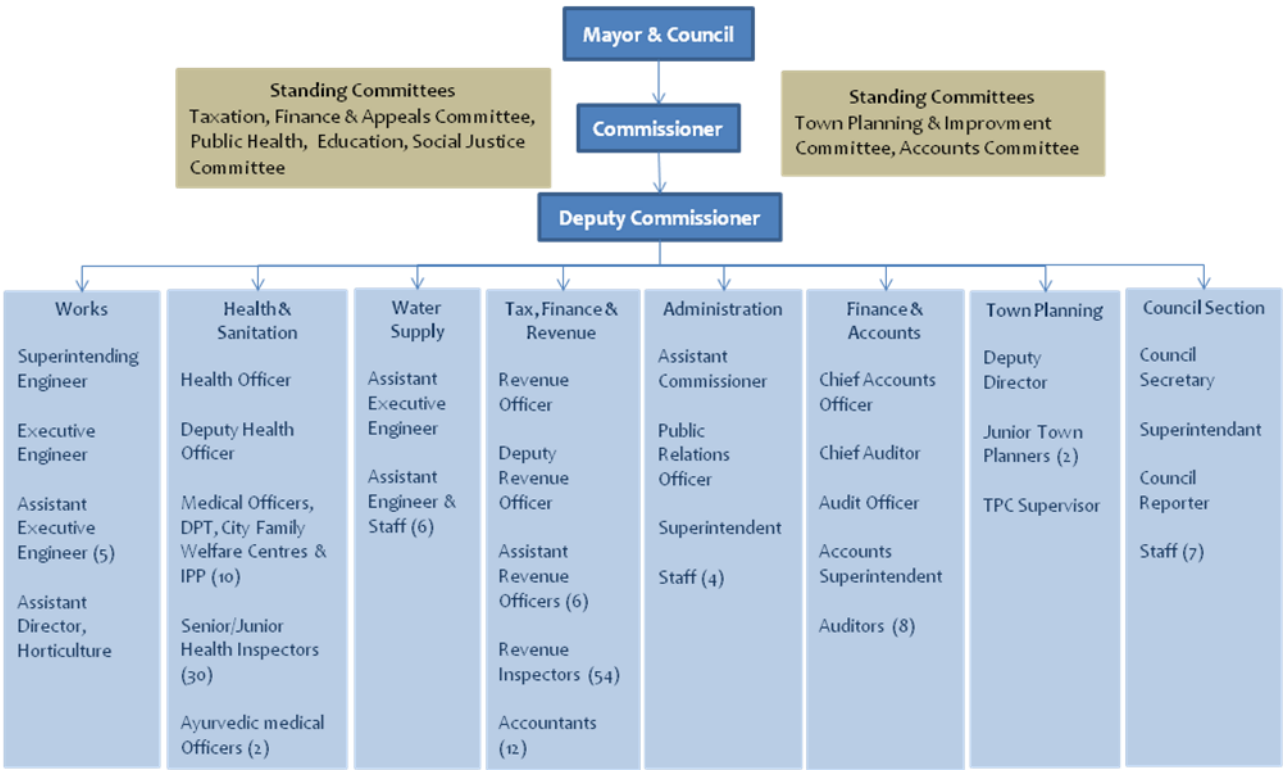
The Urban Development Department (UDD), Government of Karnataka is concerned with matters relating to citizens living in the urban areas of the State. In particular, UDD is responsible for ensuring good governance, catering basic services and fulfilling urban civic needs including all social sectors of the society; executing and monitoring State and Central schemes and administrating various Acts/Rules through which the above responsibilities are discharged.

5.3 Karnataka Urban Infrastructure Development & Finance Corporation

State Government has appointed Karnataka Urban Infrastructure Development & Finance Corporation (KUIDFC) as the State Level Nodal Agency (SLNA) under JnNURM to assist Urban Local Bodies (ULBs), place proposals to SLSC for approval, manages grants, release funds to ULBs, maintain revolving fund and monitor the physical & financial progress and reforms implementation as committed in the Memorandum of Agreement. The funds under the scheme would be released by the Central Government to the Nodal Agency which in turn would release to the Implementing Agency in the form of loan, soft loan-cum-grant or grant.

5.4 Existing institutional structure

Mysore was constituted as Corporation on 10-06-1977. The MCC is a local self government institution constituted under the Karnataka Municipal Corporation Act, 1976. A combination of civic and parastatal organizations caters to the basic needs of Mysore.



The MCC also undertakes poverty alleviation, cultural developmental activities, including promotion of education and providing health care services. In addition to the above MCC is implementing series of projects aimed at providing new infrastructure facilities, strengthening of existing facilities, environmental protection measures, providing civic amenities to the urban poor, beautification of city's environs, education and awareness programs for Mysore city. The resources of MCC are mainly from property taxes from residential and commercial properties, advertisement charges, revenue generated from its own properties such as rents from commercial complex etc. MCC also receives share from the Government of Karnataka. MCC is now empowered to collect solid waste cess and infrastructure cess. The main expenditure of MCC is on infrastructure developmental and maintenance works. MCC has taken several bold steps as a part of its efforts to improve its financial resources and organizational effectiveness.

Box 8: Some of the recent initiatives of MCC

- Separate engineering cell has been created for solid waste management, horticulture and quality control.
- Major infrastructure projects viz junction improvements, footpath improvement, road side drain improvement, up gradation of arterial road, formation of ring roads etc.
- Construction and maintenance of public toilet blocks, swimming pools has been taken on BOOT basis.
- Under "Nirmala Nagara" program door to door collection of garbage has been introduced.
- Establishment of Resident's Welfare Committee in all the wards.
- Establishment of scientific landfill and economical use of garbage for purposes of composting and disposal.

5.4.1 Particulars of organization, functions and duties of Public Authority

The Municipal Council of MCC consists of 65 Councilors elected from the wards. 5 Councilors nominated by Govt. and the jurisdictional MP/MLA/MLC as members. The head of the Council is the Mayor elected from among the Corporators of the wards. There is also a Deputy Mayor elected such powers delegated to him by the Mayor. The Commissioner appointed by the Government is the executive head of the Council. The Municipality has Executive Engineer/ Engineers/ Revenue Officer / ARO's / Health Officer / Manager / FDA / SDA/ Bill Collectors and Pourakarmikas. The Council has obligatory functions such as maintenance of roads, markets, public toilets, drainage, supply of drinking water, cleaning of streets, removal of garbage, regulation of buildings, slaughter houses, public hygiene prevention of contagious diseases, registration of births and deaths, street lighting and discretionary functions like maintenance of parks, gardens, libraries, hospitals providing entertainment in public places, slum upgradation, promotions of cultural, educational and aesthetic aspects, urban forestry maintenance of destitute homes and implementation of urban poverty alleviation programs sponsored by the Government.

5.4.2 Procedures for the decision making process, supervision and accountability

The proposals received by the Municipal Council in the matters of execution/ repairs of infrastructure work are processed and examine by the Commissioner in terms of the provisions of the Karnataka Municipal Corporation Act / the instructions of the Government and placed before the Council for approval. The Council ordinarily meets once in a month. In urgent matters it can meet frequently. The Commissioner is required to prepare the agenda for the meeting of the council in consultation with the Mayor and sent to all the members at least 7 days in advance. After approval of the proposal by the Council the Commissioner can implement the decision if such decisions are within the powers of the Council in such reasonable time as may be required. If the decisions required the approval of higher field officers or the Government, the Commissioner will accordingly seek the approval. The government is vested with the supervisory powers and it can suspend/ set aside the decisions if found to be contrary to the provisions of the Karnataka Municipal Corporation Act. The Council and the Commissioner are accountable for all happenings in the Corporation. Four Standing Committees consisting of 7 Councilors has been constituted in 2005 to deal with the matters of:

- Taxation & finance
- Public health, education and social justice
- Town planning and
- Accounts

Associated Departments: Mysore Urban Development Authority (MUDA) is responsible for creation of new layouts, zoning and expansion of the city. There are several others that play a very important role in the city's functioning and governance that include:

1. Karnataka Urban Water Supply and Drainage Board (KUWSDB)
2. Karnataka Public Works Department (PWD)
3. Karnataka State Road Transport Corporation (KSRTC)
4. Department of Archaeology and Museums
5. Lake Development Authority
6. Zoo Authority of India

Table 55: Institutional responsibility

Urban infrastructure	Planning & design	Construction	Operation & Maintenance
Water supply	KUWS & DB	KUWS & DB	MCC
Sewerage	KUWS & DB	KUWS & DB	MCC
Storm water drainage	MCC	MCC	MCC
Solid waste disposal	MCC	MCC	MCC
Municipal road (Incl. grade separators)	MCC	MCC	MCC
Street lighting	MCC	MCC	MCC

Source: City Development Plan, Mysore

Table 56: Municipal finance (2008 – 2011)

Municipal finances	Benchmark	Progress made
Property coverage ratio	90%	79%
Collection efficiency (Property tax) current year	90%	96%
Collection efficiency (Property tax) arrears	100%	100%
Per capita gross own revenue receipts	CC: Rs. 671.65 CMC, TMC, TP: Rs. 464.55	148
Per capita tax receipts	CC: Rs.188.50 CMC, TMC, TP: Rs. 94.60	296
Per capita own non tax receipts	CC: Rs. 483.14 CMC, TMC, TP: Rs. 370	90
Per capita expenditure	CC: Rs. 752 CMC, TMC, TP: Rs. 431	166
18% utilization (ob+current year)	90%	85%
Income per employee (Rs.)	CC: Rs. 319883 CMC, TMC, TP: Rs. 308492	90
Expense per employee (Rs.)	CC: Rs. 83410 CMC, TMC, TP: Rs. 67091	237

Source:

Table 57: Targets for water and sanitation

Parameter	Current status	2012	2017	2031
Frequency of water supply	3 hours supply	6 hours	10 hours	Continuous
Coverage (population)	85%	100%	All	All
Metering	Not fully covered	100% in all non domestic, commercial & industrial consumers	100% district metering	All categories to be metered
Sanitation coverage	57%	75%	100%	100%
Consumer redressal system	Adhoc system present	Develop consumer redressal system	Response time of less than 2 days	Response time of less than a day

Source: City Development Plan, Mysore

Table 58: Summary of projected infrastructure demand

Year	Population	Water demand in MLD	Solid waste generated in MT/day	Waste water generated in MLD
2010	905485	***122***	***326***	***117***
2015	971977	***131***	***350***	***125***
2020	1038469	***140***	***374***	***134***
2025	1104961	***149***	***398***	***143***
2030	1171453	***158***	***422***	***151***
2035	1237945	***167***	***446***	***160***
2040	1304437	***176***	***470***	***168***
2045	1370929	***185***	***494***	***177***

Source: Projections estimated by ASCI, Hyderabad

A study was conducted by Directorate of Municipal Administration to assess the municipal service delivery in selected towns of Karnataka. Among these towns, Mysore stands out with the highest level of average service delivery for various municipal services in Karnataka as given in the summary below:

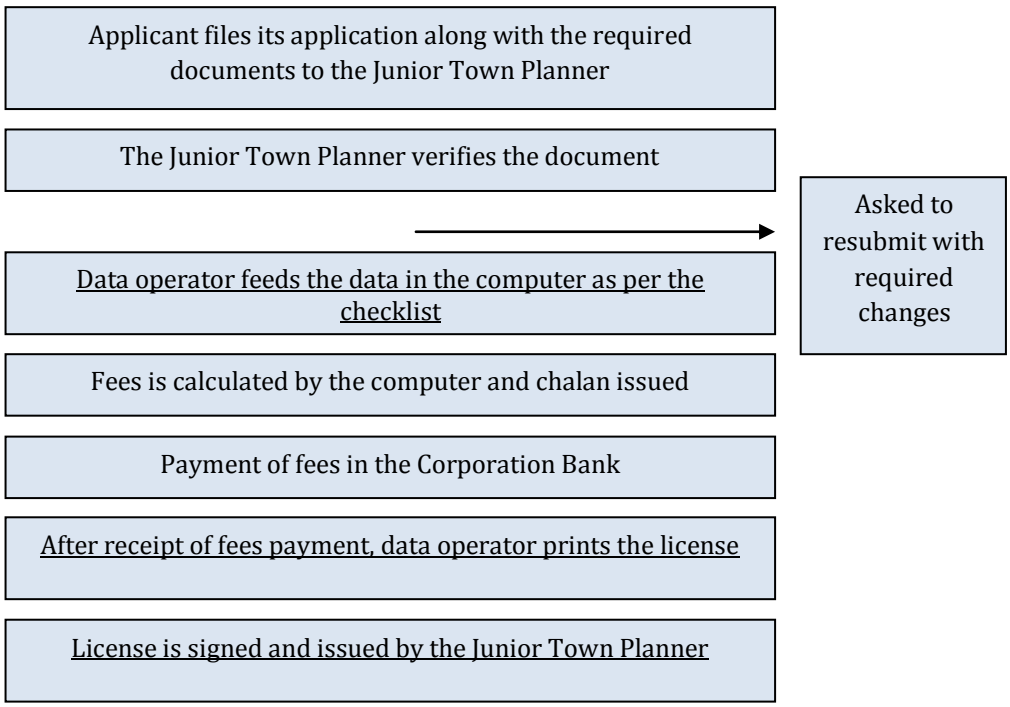
Table 59: Scores for services

Sl. No.	Name of service	Weightage	Score
1	Water supply	10	5.8
2	Solid waste management	10	6.4
3	Sewerage and storm water drains	10	6.7
4	Public health and stray animal menace	6	4.1
5	Roads and bridges	10	7.7
6	Street lighting	6	3.8
7	Public convenience	4	2.1
8	Provision of parks, gardens and urban forestry	4	3.0
9	Naming streets and numbering of houses	3	2.5
10	Provision of burial grounds, crematorium	3	1.3
11	Provision of parking lots and bus stops	4	2.3
12	Birth and death registration	10	6.7
13	Property register and issue of extracts	10	6.7
14	Residential building licenses	5	3.3
15	Trade license and renewals	5	2.2
	Total	**100**	**64.4**

5.5 Building permission process

According to the municipal bye law the commissioner has the authority to delegate its power. A meeting was held between the Commissioner, the Town Planner and the statistician of the Mysore City Corporation. Under the new initiative, the Junior Town Planner was given the authority to approve the building license.

There are two Junior Town Planner and they takes the responsibility turn by turn during the whole week. Hence one junior town planner spends three days in a week in the citizen service centre. The data entry operator is outsourced, as the department is not able to appoint a permanent IT professional. This takes place in the citizen service centre where issue of birth and death certificate also takes place. The new initiative was advertised in local newspapers and television channels and also in the corporation office. After the new initiative, the process has become simpler and less time consuming.



In addition to the license fees, other fees are also included for the building license like the service fees, road-cutting fees, fees for domestic water connection, betterment charges, slum development charges, ground rent, debris removal charges, compound fees, sale deed, property tax and fines (Annexure). This in turn has reduced the number of unauthorized water connections and also led to the increase in city corporation revenue.

5.6 Pressure, State, Impact and Response (PSIR) analysis

(To be inserted)

6 CITY SANITATION PLAN – THE STRATEGY AND APPROACH

6.1 Introduction

From the situational analysis it is evident that urban sanitation is not only lacking investment it is also lack of systematic plan for environmental sanitation. NUSP (2008) mandates the ULBs for universal access, safe management of human excreta, including its safe confinement, treatment and disposal and associated hygienic related practices. Hence city-wide strategies are important as they prioritise investment needs and can directly fund to where they are most needed. Recognising the importance of sanitation and its vision, the following cross cutting strategies are addressed in Mysore City Sanitation Plan.

6.1.1 Vision statement

"Mysore to be safe and sustainable sanitized city so as to ensure good public health standards, human dignity and privacy of all citizens".

6.2 City-wide sanitation planning

Mysore is strongly working on providing better infrastructure and needs considerable planning in executing it efficiently. In view of this, goals have been proposed to be achieved in the immediate as short-term period (2012-2013), medium-term period (2014-2016) and long-term period (2016 onwards) as follows:

Table: Goals for city-wide sanitation planning for Mysore

Period	Goals

Short-term (2012-13)	▪ Elimination of open defecation totally
	▪ Universal access to safe sanitation
	  o Households and community level
	  o Up gradation of unsanitary to sanitary toilets
	  o School and institutional sanitation
	  o Public areas
	▪ Ensuring success of UGD for sanitary & safe disposal of human excreta & liquid waste
	▪ Credible information (MIS)
	▪ City-wide education and awareness campaign
	▪ Decentralized technology options for pockets not covered under UGD
	▪ 100% door to door collection of MSW

Medium-term (2014-2016)	▪ Sanitary and safe disposal of human excreta and liquid waste (continuing process) ▪ Regulation of septic tanks and septage management ▪ Systems in place for good O & M (individual, community level toilets and disposal systems) through behaviour change and good mgmt practices ▪ Institutional arrangements and capacity building ▪ Safe transportation and disposal of MSW
Long-term (2016 onwards)	▪ Litter free areas ▪ Scientific MSW treatment and disposal ▪ Water recycle and reuse ▪ Monitoring and evaluation ▪ Environmental and financial sustainability

6.3 Guiding principles

CSP not only emphasis on the physical infrastructure but also focus on behavior change outcomes, proper usage, institutional reorientation, regular upkeep and maintenance, increased accountability and service delivery by ULBs and their partners. Accordingly the strategies have been developed on the basis of following principles:

- **Right to sanitation and mobilization of community for demand creation:** Access to sanitation facilities shall be universalized (100%) without any barrier of cost/ fee, land tenure etc., but also bearing the associated responsibility as well. Household sanitation is first and foremost the responsibility of a household. Hence, sanitation will be promoted based on demand i.e., communities and households will be encouraged to priorities by contributing to a significant portion of the costs involved in providing and running a sanitation system. All properties/ holdings will be connected to sewerage system, even if they are not connected to a public/municipality water supply system. Sewerage system may not be the only sanitation system for liquid waste and onsite sanitation systems shall be adopted for less dense settlements and outskirts. ULB / Utility may provide free consultations, designs and drawings and quality control for onsite sanitation.

- **Focus on sound finances and maintenance:** Sanitation system should be sustainable. The users should pay against use to maintain sustainability. Similarly, polluters should pay for the cost of cleaning up the impact of their pollution on the environment. Choice and maintenance of facilities have to be well thought of in advance to make service affordable and sustainable. Need to ensure last mile connectivity to water supply system and sewerage system in network coverage area. Door to collection should be 100%.

- **Integrated institutional engagement:** Sanitation cannot be maintained without proper water supply, solid waste management and development is not possible in isolation. Coordination is necessary between different departments, all tiers of Government and other stakeholders with clear roles and responsibilities. Need to ensure last mile connectivity to water supply system and sewerage system in network coverage area. Door to collection should be 100%.

- **Environmental integrity and health benefits:** Sanitation services, which have unacceptable impacts on the environment, should not be considered to be adequate. Environmentally acceptable solutions to local problems that do not cause deterioration of the wider environment must be considered in all development activities. Appropriate protection of the environment should be applied, including if necessary prosecution under the law is required. Sanitation, environment and health are all interlinked and process of improvements which should be accompanied by promotional activities as well as health and hygiene education.

6.4 Strategy formulation

Strategic planning likely to be constrained by the lack of a supportive context – the policies, rules, attitudes and procedures within which planning takes place. Hence, the following components of sanitation strategies are examined in CSP as per parameters of sanitation rating systems.

6.4.1 Components of strategies

The following sections present the strategies for the various related sub-sectors related to sanitation for AMC. The **sub-sector strategies** are followed by guidelines for the **enabling and sustaining** the aforesaid strategies through IEC, proper suitable financing mechanisms, and

guidelines for improvement of Institutional Arrangements and Responsibilities. This is followed by suggestions for proper and adequate **monitoring and evaluation** of the existing and the proposed systems.

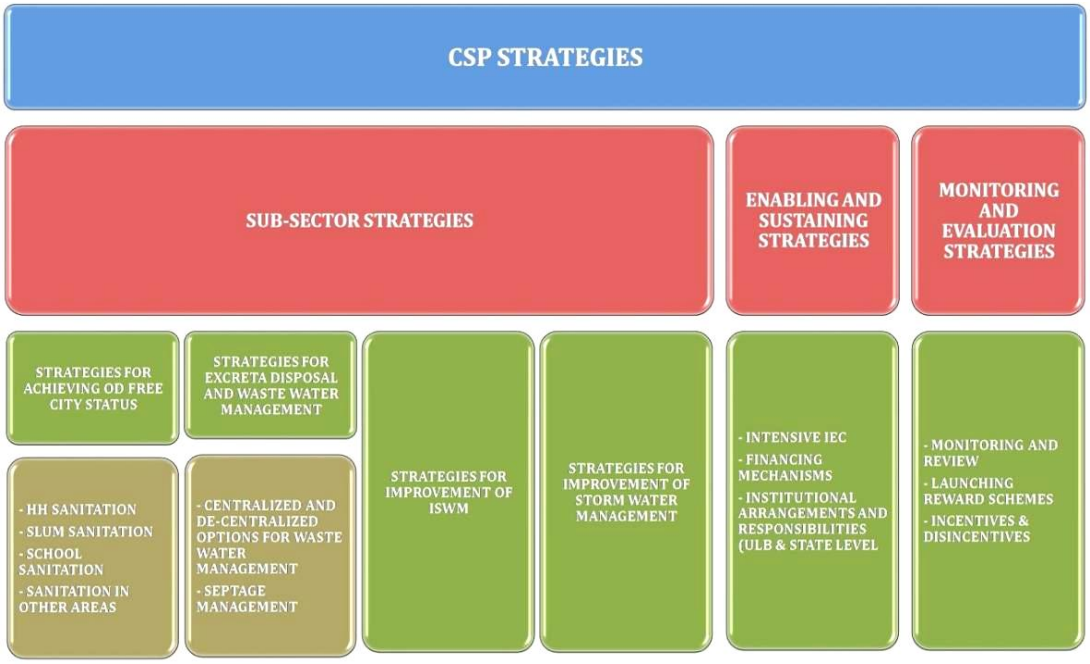


Figure 22: Components of CSP strategies

Table 60: Details of city-wide sanitation strategies

Components of city-wide sanitation strategies		Proposals (Capital, O & M, IEC and rehabilitation projects)
A. Sub-sector strategy (output related)	▪ Open defecation free status by ensuring access to all (including poor and slum dwellers as well as visiting population). ▪ Excreta disposal and waste water management by early commission of ongoing UGD and sustaining its O&M on continuous basis. ▪ Integrated solid waste management.	▪ To provide safe access to the household sanitation and cover entire population by toilets. ▪ For safe disposal of waste water storm water and solid waste. ▪ To meet the national standards for safe disposal of liquid and solid waste.
B. Enabling and sustaining strategies (process related)	Issues to be addressed in preparing the implementation plan; ▪ Awareness raising and hygiene promotion and community participation. ▪ Institutional strengthening and capacity building for sanitation management in achieving better service standards. ▪ Financial management of the sanitation sector and resource mobilization. ▪ Private sector and NGO participation in sanitation development.	
C. Monitoring and evaluation	▪ Strategy for monitoring and evaluation ▪ Implementation plan to propose monitoring systems.	

6.4.2 Assumptions, norms and units costs

Formulation of CSP is based on few assumptions and certain available norms as detailed below.

Assumptions for City Sanitation Plan
• Generally all households to be connected to UGD which designed for 2036 year. • Floating population in 2011 is 1,00,000 per day and is expected to grow. • Households living in some clusters not covered with UGD and are either connected with septic tank with soak pits or directly led into open nallas but can be connected through community latrines and treatment facility.

In order to maintain desired sanitation levels and achieve improved health and environmental indicators certain standard of service have to be maintained. The basis for the maintenance of service levels is Standardised Service Level Benchmarks. This combined with secondary data and field investigations enabled to estimate infrastructure gaps and investment requirements for future.

Table 61: Norms

A	**Household sanitation infrastructure**	
1	Latrine connected to septic tank	1 per household
2	Grit and grease trap	1 per household
B	**Public and community sanitary conveniences**	
Public toilet		
1	Users per latrine seat	60 users/ seat
Community toilet		
1	Users per latrine seat	20 - 35 users/ seat (3-5 households)
C	**Septage clearance, treatment and disposal**	
1	No. of septic tanks cleared per vehicle per day	3 tanks per day per vehicle
2	Frequency of septage clearance from septic tank	Once in 2 years
3	Septage volume removed per tank	2 cum
4	No. of operational days per annum	300 days
Sludge drying beds		
1	Area per drying bed (average)	225 m
2	Dimensions of drying bed	15 m x 15 m
3	Thickness of liquid sludge layer in drying bed	0.2 m
4	Septage sludge drying cycle	10 days
5	Sludge volume per bed	45 cum
D	**Wastewater conveyance**	
1	Street collector sewers	1.50 m / household
2	Branch sewers	0.75 m / household
3	Trunk sewers	0.40 m /household
E	**Waste water treatment and disposal**	
1	Reuse for irrigation/ garden/ parks	Tertiary
2	Disposal into river	Secondary
F	**Solid waster management**	
1	Road length per sweeper	400 –600 m
2	Sweepers per 1000 population	3

3	Garbage collection points	1 for 15 HHs (75 persons)
4	Norms for road sweeping	A Type – Daily sweeping - 20% B Type – Sweeping twice in a week - 30 to 40% C Type – Sweeping once in a week - 40 to 50%
5	One tractor trailer	For every 25 km of sweeping road length, 3 loaders / vehicle.
6	One tipper truck	For every 40 km of sweeping road length, 4 loaders / vehicle.
7	Water supply	Posts 1 for 15 HHs. (75 persons) @ 45 Ipcd to 1 for 10 HHs. (50 persons) 1 Tap for 75 Persons.
8	Markets/Slaughter house	1 worker / 400 m^2 area, for two time cleaning everyday.

Source: Hoshangabad CSP

6.5 Various occurrences of issues versus consequences

Some of the prominent issues faced by Mysore are to maintain sanitation is put in a matrix to show their low to very high occurrence versus their low to very high consequences respectively so as to prioritize solutions in CSP. It is also observed that the issues identified under higher occurrence and higher consequences is directly or indirectly are the solution for the lower prioritized issues.

Salient issues highlighted against occurrence versus consequences in Mysore

↑ CONSEQUENCE ↓					
	Very high	Unscientific planning on **infrastructure development** like roads, drains, UGD network, etc.	Inefficient operation and maintenance of **manholes and sewer pipes**	Unscientific disposal of all **municipal solid waste**	No **community toilets** and insufficient **public toilets** for floating population
	High	Transmission loss of **drinking water**	Inadequate **water supply** to urban poor	**Drinking water** contamination through leaked pipes	Inadequacy in **waste segregation**
	Medium	Inadequacy in door to door **solid waste** collection	Missing links of UGD lines (9000: 5%)	Illegal **drinking water** connections	**Water bodies** being contaminated with sewage and dumping of solid waste
	Low	Behavioral attitude among public on **open defecation**	Incomplete coverage of **storm water drains**	Extensive **open defecation** in slum areas *(1216: 1%)*	Lack of recycle or reuse of **treated water**
		Low	**Medium**	**High**	**Very high**
		← **OCCURRENCE** →			

6.5.1 Subsector strategies

This CSP aims guiding through next steps in achieving the goal of city wide sanitation for Mysore. Broad strategies identified will try to lay down road map for achieving total sanitation and hence detailed out along with infrastructure gaps estimated as per practiced norms mentioned in

previous section. Also both management and technical options and financial requirement to bridge the gap have been assessed.

6.5.2 Open defecation free status by ensuring access to all

In previous section, as stated in condition assessment of sanitation, open defecation is indeed practiced in Mysore slums but at low rates and can be tackled. Non availability of land, inadequate supply of water and behavior of people including children are major causes of open defecation in slums of Mysore. This has to be addressed in short-term with concerted efforts to make OD free especially in the context that there is good UGD network available and cost of constructing toilet is very low if land is not a problem. Providing community toilets of Pune Model can be good option for Mysore. To achieve OD free status socially inclusiveness approaches that can be promoted are:

- Promoting access to UGD at subsidized rate or no cost to poor.
- Demand driven approach for access and promoting community-planned and managed toilets wherever necessary, for groups of households who have issues of space, tenure or economic constraints in gaining access to individual facilities.
- Triggering social action by intensive IEC to prevent OD.
- Adequate availability and 100% upkeep and management of public sanitation facilities in all busy areas and floating population affected areas.
- Promoting partnerships to construct community & public toilets - Public conveyance blocks.
- Increased access of the poor to water for hygiene.
- Norms for sanitation provisions in buildings (including non-residential) and spaces where public congregate through bye-laws.
- Municipal fund creation for neighborhood projects.

6.5.3 Household sanitation arrangements

Around 91% households already connected to UGD of the total 2,06,370 households as per 2011. It is expected and proposed in the CSP to see all HHs in sewage networked area having toilets by year 2012-13. The important milestones for Mysore

1. No more open defecation by year 2012-13 (achieve OD free status by constructing community toilets for households especially in slums).
2. 100% households connected to UGD by 2012-13 in networked areas.
3. By year 2014, conversion of all unsanitary to sanitary latrines and enhancement of UGD connectivity.
4. Halve the pollution of surface waters/water bodies by human excreta and raw sewage water by 2013.
5. Increase the utilization rates of municipal sewerage services to 100% by 2016 onwards.

Table: Indicative figures in household sanitation arrangements over CSP implementation period

Sanitation arrangement	*Baseline survey*	*Pre-CSP year*	CSP implementation period				
	2010	2011	2012	2013	2014	2015	2016
HHS connected to conventional sewer as per MCC records (166860 connections*10%)	1,87,497	192491	205976	202237	216404	221815	227360
In %	90.85	91	91	91	91	91	91
WC connected to septic tank	12679	12679	10840	11112	11390	11674	11966

In %	6.00	5.9	5	5	5	5	5
Pit latrine	3305	2115	2168	2222	2278	2335	2393
In %	1.60	1	1	1	1	1	1
Toilets connected to open nallas	1270	1270	0	0	0	0	0
In %	0.62	0.60	0	0	0	0	0
DEWATs and other types			2168	2222	2278	2335	2393
In %		0	1	2	2	2	2
Community toilets with UGD			2168	2222	2278	2335	
In %			1	1	1	1	1
Households practicing OD	1216	2961	1500	0	0	0	0
In %	0.59	1.4	0.7	0	0	0	0
Total households	206370	211529	216817	222238	227794	233489	239326

** Household growth is taken as 2.5% annual growth rate.*
** By 2012 half the OD and by 2013 make Mysore OD free.*

6.5.4 Slum sanitation provision

As there are no community toilets in Mysore, it is advisable to have provision for community blocks while creating demand responsive participatory approach wherever individual toilets are not possible. This can be done by giving incentives for private contractors, NGOs, community organizers to work together to jointly deliver community toilet blocks. Partnerships can be led either by contractor or NGO with each other. There will be need for high technical standards, high quality service levels and provisions for children with extra comfort for girl children. Considering Mysore situation, series of options need to be worked in slums as follows:

- Provision of new community toilets
- Delinking tenure ship for slum residents to build toilets
- Sewerage for Individual Household Latrines (IHHL)
- Management arrangement of toilets with regards to operation and maintenance

In this regard, estimation done for number of toilets and urinals needed under various categories to make the city fully sanitized. Models for providing shared toilets, public toilets *(The current standard for public toilets is one seat for 40 users on a 24 hours rotation basis)* and urinals as needed and operations and maintenance of the infrastructure, including charging user fees is indicated below. The planning for public toilets has taken consideration the following user groups: slum population, floating population, population during weekly markets, population that comes into cities for special occasions like Dasara festival, etc., population at public place like bus stands, railway stations, tourist places, etc. Such facilities can be managed through community groups, NGOs, CBOs and private operators on a self sustaining basis.

Community toilets separately for ladies and gents need to be constructed in slum areas as per the norms where poor can not afford an individual toilet financially. Here the municipality will act as facilitator to identify land for construction of toilet, approve design and provide finances and sign a Memorandum of Understanding (MoU) with local residents who are going to use it for O & M which is going to be the responsibility of the Community. Options for toilets available indicated below:

Table 62: Options for toilets

Parameters	Individual	Shared	Public / Community
1. Feasibility of construction	Depends on land availability	Possibility of land with one of the beneficiaries is preferred	Depends on availability of public plot

2. Cost	Depends on the design, but more for comparable design	Less than individual toilet	Least per seat, but may increase with a dedicated water supply
3. Cost sharing	By individual	Shared by beneficiaries	Individual household not burdened
4. Acceptability	Maximum, if affordable	Acceptable, if individual toilet not affordable	May be preferred, as no burden of cost
5. Sense of ownership	Maximum	Less	Does not exist
6. O&M	Individual household	Depends on will, capacity & cooperation of beneficiaries	Needs separate organization
7. Sustainability	Maximum	Depends on will, capacity & cooperation of beneficiaries	Depends on capacity of organization (Preferably if pay and use type)
8. Desirability	Most desirable, if affordable	Next choice, if affordability is an issue	Least desirable
9. Suitability	Most suitable	Suitable in low income HHs (e.g., slums)	Should be adopted only when no other option available

Source: CSP, Dewas

6.6 Community/Public toilets

Community toilets are viable for the people residing in slum areas where there is a problem of land availability and affordability. There are no community toilets in Mysore city. It is viable to propose community toilets in open defecation predominant areas. The field observation reveals that some of the slum dwellers are willing to take up O&M of the community toilets if MCC constructs toilets for them who otherwise practicing OD. They have realized in the recent past that going in the open is causing lot of practical difficulties especially for women folk. They are willing on pay and use basis with monthly passes for the users. An amount of Rs. 30/- per month per household can be easily contributed from the users. The toilets for ladies and gents should be constructed separately as per the norms. For household toilets user training and CBO's training is must.

Hence around six to eight community toilets with five to six seats each could be proposed depending on the status of individual toilets and areas of rampant open defecation in slums and also to meet the needs of present population, growing population and also the floating population. It is also observed that wards 5, 13, 31, 39, 49, 50, 51, 52, 54, 55 and 61 which don't have slums also have occurrences of OD. In strategic locations about six toilet blocks with 10 seats each can be proposed.

Table: Estimate of Community toilets

Sl. No.	Name of Slum	Ward no	Population of slums	Population for community toilets	Estimate of toilets seats of community toilets		
					Required	Existing	Balance required
A	Slums with low OD	23, 30, 32, 33, 34, 35, 42, 46, 59, 10, 11 and 29	Behaviour needs to be addressed. No hard aspects of infrastructure may be required	5% population	7 seats	No	7 seats
B	Slums with high OD	4, 9, 12, 28, 44, 45, 47 and 48		20% population (1200	30 seats	No	30 seats

				people)			
C	Non Slums with moderate OD	5, 13, 31, 39, 49, 50, 51, 52, 54, 55 and 61		10 Blocks (5 seats each	50 seats	No	100 seats
					87 seats		

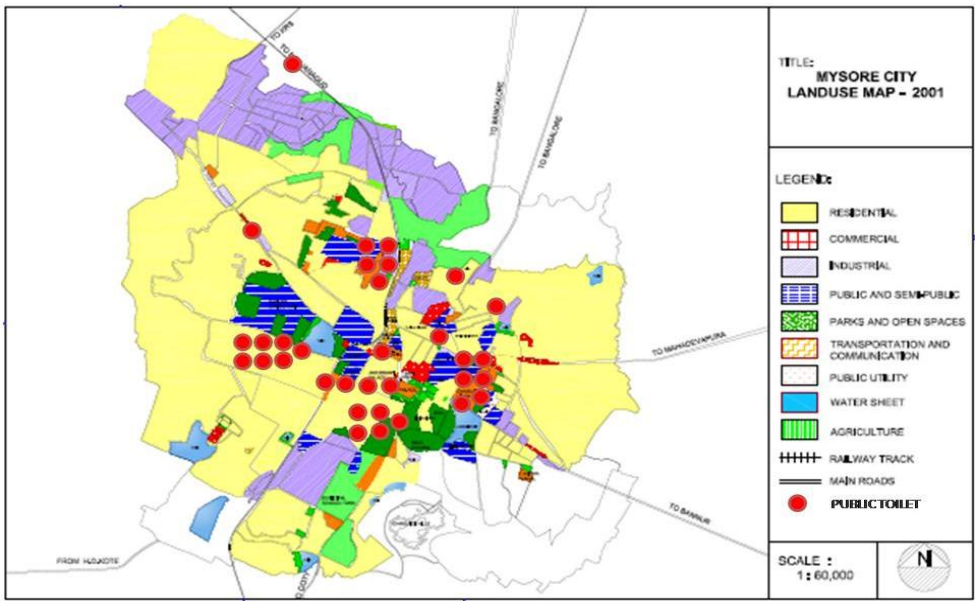
Table: Operation and maintenance of the toilets – Community toilet (each unit of 5 seats)

O&M	In Rs
One seat can cater for 20 HHs. 5 seats can cater 100 HHs. Assuming Rs. 30/month/seat.	100 HHs x 30 =3000
Two walls of the complex shall be used for advertisement (Social welfare, education, etc)	1000 x 2 =2000
Total revenue	**5000**
Expenditure – cleaning material per seat	50 x 5 = 250
Sweeper charges	2000
Civic maintenance (water & electricity)	800
UGD user charges/year	360
Deposit for future repairs, etc.	380
Remuneration to community organizer	5000 – 3000 = 2000

6.6.1 Sanitation arrangements for floating population

Mysore being a tourist place in the country it attracts major floating population. The floating population of Mysore city accounts to around 1 lakh per day and 3 lakhs at Dasara festival. MCC has arrangements to put up temporary toilets during these occasions. In other public areas, the current sanitation arrangements are inadequate to cater such huge crowd during peak seasons. There are 33 public toilets existing in Mysore and it is imperative to increase the number with additional 17 public toilets in the city. These public toilets would also serve the population from commercial areas as well. The public toilets are situated at the core areas of the city thereby catering to that population only. There is huge demand for public toilets in the peripheral areas of the city.

Map: Major land use, tourist places attracting floating population and positioning of public toilets



6.6.2 Estimation of proposed Pay & Use complex (Each unit)

Promoting partnerships in providing public toilets is a best way to tackle sanitation in public areas. For Mysore kind of ULB, it should not be problem to identify people/ organizations even on Corporate Social responsibility to construct toilets and handover to private agencies for O&M.

Table: Indicative investment requirements, O&M costs and user charges for public/community sanitary conveniences

	Unit	2011 (Pre CSP)	2012	2013	2014	2015	2016
A. Public Sanitary Conveniences		200 seats existing	Additiona 100 seats	Additional 100 seats	Additional 100 seats	Additional 100 seats	Additional 100 seats
Floating population served (including persons served by existing PSCs)	Persons	100000	110000	120000	130000	140000	150000
Capital cost towards construction of public sanitary conveniences	Rs 20000 per seat		20 lakhs	20 lakhs	20 lakhs	20 lakhs	20 lakhs
Indicative minimum user charge (Rs2 per use)	Rs. per use	200000	2,20,000	240000	2,60,000	2,80, 000	3, 00, 000
Annual O&M of public sanitary conveniences	Rs (400/month per seat)		Rs. 40000 per month	Cumulative Rs. 80000 per month	Rs. 120000 per month	Rs. 160000 per month	Rs. 200000 per month
UGD charges (one time)	Rs	91200	247000	228000	228000	228000	228000
UGD user charges							

Assumptions:

- Existing floating population is 1,00,000. About 10,000 will be added every year. 50% of them will be using Hotels etc. Need to have public toilets for additional 5000 each year.
- Land will be provided by the government, respective departments who have huge visitors or ULB.
- To eliminate OD all community toilets will be added in first two years. Later it is assumed that few people will switch over to individual toilets and those additional seats will cater to increase in slum population.
- UGD one time connection cost Rs 3800/household.
- An indicative user charge for community toilet per HH is Rs 30 per month. Or Rs 1/day.
- Indicative user charges for public toilet Rs 1/day/use.
- Capital cost for construction of toilet is Rs 20,000 per seat. (inclusive of water and electricity connection)

Source: Estimation by ASCI

Box 9: Finance options models for Community latrines

1. Municipal fund for neighbourhood projects (Indonesia) Blitar, a small town in East Java, is special for its community development fund. It has twenty neighbourhoods, of which three are poor. The budget of the town was Rs. 6.14 billion (US$ 646,000) in 2004, double the amount of 2002. Under its community block grant programme the city disburses 2% of its income directly to the neighbourhoods for small projects, including an obligatory 13% for low cost housing. The neighbourhoods themselves contribute 13-22% of the project funds in kind or cash. The purpose of the fund is to increase public participation

and self-management and allow local officials and communities to exercise their autonomy. Village Community Empowerment Institutions (LPMSKs) take care of mobilization. Women participate in the mandated community assemblies in which these projects are planned. Since 2003 project selection criteria include the number of poor beneficiaries. Most local grants go to improvement of infrastructure. From 2005 onwards, use of funds for hardware is restricted to 60%. Learning from mistakes is an accepted part of the approach17.

2. **Slum sanitation programme of Mumbai:** A key feature was the involvement of slum communities in project implementation right from the planning stage. The mobilization process facilitated collaborations between NGOs, contractors and CBOs. In each slum a CBO was formed and registered as a trust or a society (under the Bombay Public Trust Act. To express its "demand" each family in the target slum area was asked to pay contribution Rs.100 per adult (maximum of Rs 500 per family) as a membership fee. The amount was deposited in a joint bank account. After construction of the toilet block the CBO typically certifies its satisfactory completion and signs a MOU with the Municipal Corporation. The responsibility of maintaining the toilet block is then handed over to the CBO. MOU specifies that CBO will operate and maintain the toilet block.

3. After the reforms in TSC programme, priority was given for setting up sanitary complexes in a place acceptable for both men and women. The prescribed unit cost is upto Rs 2 lakh, shared by GoI, State Government and the community in the ratio of 60:20:20. However, the community contribution can be made by the local governance from its budget (GoI, CSRS 2002). This approach directly provides subsidy to communities rather than individuals. Though many households are inclined positively to have IHL, the scarcity of space, the traditional taboos have become a constraint for construction of IHL. To overcome such constraints, the Integrated Community Latrines Complex (ICLC) becomes a substitute. The maintenance cost of the community sanitary complexes has to be met by the Panchayats/voluntary organisations/charitable trusts/Self Help Groups and not the committee setup by local government.

Sl. No.	Component	Estimated cost in Rs.
1	No. of seats	12
2	Accommodation of person/seat/day	60
3	Total capacity or persons/day	12 x 60 = 720
4	Revenue per month (720 persons x 1 per person = 720 x 30 days)	21600
5	Revenue by Ad per month (one wall)	500
	Total revenue	**22100**
6	Cleaning articles Rs. 50 x 12 toilets	600
7	No. of sweepers: 2	4000
8	Civic maintenance and other contingencies	1000
9	Caretaker per month?	4000
10	UGD user charges/year	360
	Total expenditure	**9960**
	Estimated Private Operator Income	**12140**

Key observations of public toilets at Mysore

- On an average 1 lakh/day visitors in Mysore.
- There are 33 public toilets.
- Approximately 200 seats are available and 9000 plus users/day, which means one seat serving 45 people. There are few public toilets where visitors are even up to 500 per day.
- Major tourist attractions have own facilities.

- Around 22 public toilets are maintained by MCC and remaining 11 are maintained by private agencies and NGOs.
- The surveyed public toilets have users ranging from 50-500/day.
- Most of the toilets are cleaned 2-3 times/day. While 6 public toilets clean the toilets 4-5 times/day.
- There is sewer connection to all the public toilets.
- At least 50% of the floating population would be availing facilities in hotels/lodges.

6.7 School sanitation provision

In Mysore like any other city, the condition of Government Schools latrines and water points observed are in bad condition and found dirty in some of the school toilets as detailed in the situational analysis report. As a result, they are not used and create a health hazard. School water supply, sanitation and hygiene education are very important for the following main reasons:

- Promotes health and hygiene behavior at an early stage of childhood.
- Improves the health of children and results in a lower drop out rate, especially among girl children.
- Huge network of schools offers a ready-made infrastructure to influence the students, teachers, parents and hence the community.
- Children are the change agents, hence, it ensures generational change in the adoption of the health and hygiene behavior.

Table 63: Toilet requirement in Schools as per norms

No. of Schools	No. of students	Toilets existing	Urinals required as per norms	WCs required as per norms	Investment required for urinals
87 Government Schools surveyed	12470	83			

6.7.1 School sanitation strategies proposed

1. Schools with no toilets to be strictly provided with toilets with proper connection to sewerage network.
2. Toilets under repair need to be attended at higher priority with good maintenance options. All the toilets to be connected to sewerage network.
3. Regular cleaning of toilets.
4. Prevention of school students in defecating in open areas.
5. Regular awareness on sanitation and hygiene.

A good cleaning and maintenance system requires funds, spare parts, people and equipment and a clear division of roles and responsibilities among the actors involved. A number of organizational options for maintenance suggested**: through a cleaning committee, by classes on a rotation basis, with or without a rewarding mechanism or by individual students.** Children should be encouraged to help maintain their own school environment and facilities. The following models are recommended for school sanitation.

Health clubs: School health and hygiene clubs (or similar groups with other names) are usually involved in helping children for maintenance tasks which can be very useful for:

- Stimulating safe hygiene behavior among children;
- Monitoring SSHE program;
- Reaching out into the community;
- Prepare an annual action plan for the School health club;
- Organize school activities in planning, teaching, monitoring, and maintenance;
- Conduct community activities with the help of headmaster and teachers;
- Different actors should be engaged and all work together to promote and implement gender-responsive sanitation, health and hygiene solutions which includes:
    - Schools – (parents, PTAs, school councils, teachers, students)
    - NGOs and CBOs
    - Women's groups
    - Youth organizations
    - Governments – including Ministries of Education, Health, Water
    - Health providers
    - Researchers

School Committee: Often school committees are found very effective and can be established in schools to plan and implement school sanitation programs. These Committees may usually consist of students, teachers, and parents with following roles:

- Take a lead in co-ordinating and preparing action plan of SSHE program.
- Involve other actors in mobilizing local resources and support special activities like fund raising, construction, maintenance and repair;
- Organize various activities periodically to collect funds for various programs;
- Budget, allocate and supervise funds.

6.7.2 Provision of sanitation in other areas for achieving citywide sanitation

National Building Code (NBC 2005) of India is basis for all building regulations and adopted by respective states in the country, which clearly specifies that any building meant for human occupancy or use should have adequate sanitation and disposal facilities irrespective of availability of sewerage. Detailed norms are available in the code depending on occupancy saying in no case less than one water closet should be provided. Wherever disposal facilities are not available they shall be provided as part of the building design for ensuring highest standards of sanitation condition. Part 9 on Plumbing services Section 1 of Water Supply Drainage and Sanitation clearly details the requirements under safe sanitation provision. But authorities are failed in implementation of NBC and Building regulation to check building plan approvals. Various uses generally found in any given city and options to achieve citywide sanitation are indicated below:

Table 64: Addressing access to various categories of uses

Residential	Institutional	Recreational	Commercial	Transport	Schools	Others
Slums: Notified and non notified. Non Slums: Old areas, New upcoming areas, DTCP approved colonies, Govt quarters.	Central Govt offices, State Govt offices and private offices.	Public places, Marriage Halls, Theatres, Auditoriums	Shopping areas, malls, markets, Agricultural markets, Fair areas, etc.	Railway station, Bus stations	All government and non government schools.	Industries

Individual/ Community toilets	Independent toilets	Public toilets on BOT basis (ref management options). These properties have to provide land within their premises.	Individual toilets	Independent toilets
It is the responsibility of private individual to construct and maintain toilet as per NBC and Municipal Act norms. A mechanism to build social pressure to maintain design standards needs to be worked.	Strict implementation of building bye laws like no building permitted for construction and occupation without toilet and all Government buildings need to take approval of ULB for building construction. Monitoring is the responsibility of ULB.			

Note: Wherever UGD is available toilets will be connected to UGD. Otherwise a decentralized concept for black water treatment by biogas facility and duck weed based technology for grey water treatment should be implemented and it is individual responsibility.

Management options: NUSP, National rating award scheme, Standardized Service level Benchmarking framework of Government of India all provide a good structure for defining steps to be taken for CSP and its implementation. Though MMC will have overall responsibility in implementing CSP, it will also require concerted efforts of many stakeholders to achieve various goals identified in the table. For this partnership arrangements with relevant government agencies, private sector, civil society, NGOs need to established and institutionalized for successful implementation of CSPs. It is observed that different models will work in different situations and some of the options to be tested and implemented by NMC are as follows:

Table 65: Management strategies for various problems

	Option A	Option B	Option C	Option D
1. Improving access				
Households	Individual toilets with subsidy.	Up gradation with technical support for alternatives.	Up gradation with financial support for alternatives.	Guidance notes to APL on different types of toilets with technical support.
Community toilet (Ideally to be cross subsidized from public toilets for BOT models)	Mobilizing donor agencies/ individuals to construct toilets and transfer to community for O&M.	ULB bears Capital and transfers to Community for O&M with monthly card system.	ULB constructs toilet and gives for adoption for O&M.	Demand driven approach: Community contribution to toilet construction and O&M where ULB facilitates.
Schools	Designing, field testing and propagating child–friendly, gender friendly and disabled friendly toilets by ULB as part of IEC.	Mobilizing business houses, companies etc., to donate or adopt toilets with Ad rights.	Promoting PPPs for O&M	Education Department bears capital and O&M by outsourcing.
Public/Institutional toilets	Create public-private partnerships between service providers and government agencies.	Mobilizing business houses, companies etc. to donate or adopt toilets with Ad rights.	Generators of huge visitors (railways, KSRTC, Court, shopping complex, market areas, theaters and Govt offices) to give land for pay and use toilets on BOT mode.	Consolidate IEC money of all govt. programs for O&M and use toilet walls.
2. **Black soil and waste water treatment**				
Septage management	Update and amend regulations on tariffs for septage management.	Considering subsidizing of emptying fees to poor.	Frequency of septic tank emptying regulated by authorities to every three years.	Public awareness campaign for enhanced frequency of septic tank emptying and develop annual septage symposium.
Sludge treatment and disposal	Improving on public utility's collection and transportation capacity.	Regulations for and licensing of private entrepreneur involvement in sludge collection and transportation.	ULB manage contractors for scheduled desludging.	Clear policies and guidelines for developers. Promotion of no cost/low costs technologies like soak pits to septic tanks (Areas where UGD is not covered)

UGD Scheme	Ref starters			
ISWM	Promotion of RWAs, local committees in 100% door to door collection.	Making segregated wastes available at disposal / treatment facilities. - 50% (2010-2012) - 80% (2012-14) - 100% (2014 onwards)	Recycling waste - 50% (2010-2012) - 60% (2012-14) - 80% (2014 onwards)	Scientific treatment and disposal by developing pilot initiatives and testing by 2014 and scaling up afterwards.
1. **M&E and awareness**				
Regulation	A strong regulatory framework to be put in place by amending the Municipal Act, Building regulations with rules on following:	Guidelines on penalties/fines to be imposed on littering, obstruction of natural and artificial drainage, fecal and septic effluent discharge in to drains.		
Public awareness campaign	Triggering social mechanisms to prevent OD, behavior change, disuse of toilets. Raise public awareness through multimedia campaigns, targeting children in particular.	Expose NGOs and media to importance of sanitation to gain their support.	Build political support with exposure visits, technical trainings, reports and workshops.	Manuals on guidelines, regulations, O&M of toilets and extensive dissemination.
Monitoring and evaluation	1. Gather information and develop databases and regular updation. - SWM, drainage, sanitation, track O&D 2. Adoption of "Protocol" on monthly collection of data from each ward/slum and publish in public forum.	Framing rules and specifications and effective monitoring especially to make sewerage systems work without any ex-filtration in the future.	Continuing O&M practices(cleaning toilets, emptying pits/septic tanks, maintaining waste water disposal systems)	Technical evaluation and finalization: Appraising models for toilets, solid/liquid waste management, school sanitation, vulnerable and special needs populations, menstrual hygiene.
Sustaining usage O&M and governance	Impact monitoring: periodic and regular monitoring of socio economic, health, ground water and soil impact indicators.	Institutional processes: Community monitoring of construction, usage etc, social pressure on usage and O&M etc.	Establishing linkages for funds defining allocations/sharing costs, determining community contributions.	Documented operational systems and institutional responsibility assigned for each sector by preparing written manual.

6.8 Promoting sustainable waste water management

It should take into account aspects such as maintaining the overall water balance in the city-region, planning for sourcing, treatment, transportation and distribution of water in a sustainable and decentralized manner, collection of waste water, its treatment, reuse and disposal in the most suitable and decentralized manner, protection of natural water systems, and creation of green buffer zones.

Sewerage system need not be the only sanitation system for liquid waste. Covering cent percent areas in any given city at any given point of time with central sewer network is difficult task in Indian conditions. Onsite sanitation systems to treat grey and black water or a combination shall be encouraged and adopted for less dense settlements and other uncovered areas so as to ensure 100% treatment of both black and grey water. For onsite sanitation, periodic cleaning shall be ensured through byelaw enforcement. ULB may provide the equipment at a fee and also safe disposal, depending on the type of onsite treatment involved. The proposals for Mysore consider safe containment, treatment and disposal of human excreta and community liquid waste. This will be achieved by:

- Ensuring that all human wastes are collected, treated and disposed off safely;
- Promoting proper disposal and treatment of sludge from on-site installations (septic tanks, pit latrines, etc.);
- Promoting proper functioning of network-based sewerage systems and ensuring connections of households to them;
- Encourage recycle and reuse of treated waste water for non-potable applications, wherever possible.

6.8.1 Technical options for fecal treatment and waste water treatment

100% of human excreta and liquid wastes from all sanitation facilities must be disposed-off safely. Rudimentary latrines (discharging into drains and *nalas*) are spread nearly about 8900 households in Mysore. The next step in the sanitation ladder is to transform these households connection to improved latrines that ensure more hygienic separation of excreta with connection to septic tank and the final step is a flush latrine connected to a sewer network. Each successive step of the ladder represents a higher unit cost but is assumed to give a correspondingly lower level of health risk (Morella 2008). Different types of sanitation systems indicated in the table below and decentralized wastewater treatment plants can be suggested i.e. septic tanks, biogas toilets and Decentralized Wastewater Treatment System (DEWATS).

The six technologies represent different levels of sanitation services. Whereas the septic tank aims only at providing better hygienic conditions, the ecosan and biogas systems provide additional benefits (reuse of nutrients, biogas). The decentralized systems aim at reusing the treated wastewater for irrigation.

Table 66: Intended benefits for the six technology systems

	Basic sanitation			Waste water treatment		
Intended benefit	**Septic tank**	**Biogas**	**Ecosan**	**SIBF****	**MSF*****	**DEWATS ******
Type	Individual	Individual / Communal	Individual / Communal	Communal	Communal	Communal
Better	Yes	Yes	Yes	Yes	Yes	Yes

hygienic conditions						
Reuse of nutrients and biogas	NA	Yes	Yes	NA*	NA*	NA*
Reuse of treated waste water for irrigation	NA	NA	NA	Yes	Yes	Yes

***Solid Immobilised Biofilter (SIBF)*
****Multiple Stage Filtration (MSF)*
*****Decentralized Wastewater Treatment System (DEWATS)*

All systems provide water for irrigation with which users get in contact so regular monitoring is required to keep the hygienic risks low. Hence education on appropriate hygiene practices as well as the use of the systems as a way to improve aspects, such as smell and breeding insects, should be provided on ongoing basis.

Table 67: Waste water disposal systems

Sl. No.	Parameters	Waste Water Disposal Systems			
		On-site disposal (A)	Local small – bore system (B)	Sewerage (C)	Combined systems (D)
1	Public investment	Least	Low	Highest	High
2	Ease of implementation	Can be achieved faster; depends on user response	Easy and fast	Most difficult	Easier than (C)
3	Ease of O&M	Easy, as user responsible	Easy, less complex, but multiple schemes	Most difficult and expensive	Easier than (C)
4	Use of existing household facility	Maximum	Maximum	Septic tanks will be redundant	More use than in (C)
5	Septage management	Separate system required	Separate system required	Not for household septage	Required to some extent
6	Land availability	Problem in core city and developed area	Problem in core city and developed area	Land for pumping stations and treatment plants	Choice as per land availability feasible
7	Impact on ground water	Maximum	Less than (A)	Least	Much less
8	Willingness to connect and pay	Not applicable	Less	More as HHs does need septic tank	Depends on type of disposal
9	Suitability	Suitable in small isolated areas, not suitable in large urban places	Suitable in isolated and peripheral areas, but not suitable in for integration in central sewerage	Suitable in central /core and developed areas.	Suitable depending on land use

The biogas and ecosan system pose medium risk to the person who is emptying the systems, whereas the SIBF and the DEWATS feature only low risk as users do not get in direct contact with the system. The risk here is dependent on the reuse of water for irrigation practices, type of crops and how well the prior treatment has worked. One factor of success of the decentralized systems is

the well organized operation and maintenance, which is either conducted by a private company or a community committee. Those decentralized systems also require less energy (and have therefore lower costs) than conventional treatment systems.

6.8.2 Sustaining good sewerage

In Mysore the major concern is to maintain STPs and achieving cent percent connectivity to UGD in its networked area. There is no IEC program taken up so far to motivate people in raising connection costs, benefits of UGD and its operation and maintenance. It is highly important that scheme has to be explained in detail about benefits of having sewerage access, need of maintaining STP as per CPCB norms and huge O&M costs involved. Hence an intensive communication program through local cable TV network, news papers etc. should be ideally a starting point. For effective functioning of UGD following actions are suggested.

Operation and maintenance of sewerage

A sewerage system as it is known collects wastewater from residences, industries, hospitals and commercial institutions for conveyance to STPs for treatment and safe disposal. Any obstruction or overloading of the collection system can have dramatic consequences on public health and the environment.

It is the responsibility of the Corporation, to ensure that the performance of the proposed sewerage system is not compromised in any manner by adopting proper practices of operation and maintenance of the system. Effective O&M of an underground sewerage scheme is critical and the direct responsibility rests with the MCC. For ease of operation and maintenance, the proposed sewerage system has to be of locally available materials, skilled manpower and easily available mechanical/electrical equipment.

The primary aim of STP's O&M is the running and maintenance the plant efficiently and economically, so that the effluent from the plant meets the prescribed standards in terms of BOD, SS and faecal coliforms laid down by the local body or the pollution control board while discharging the effluent on land or into water body like Phullong Vagu.

The basic requirements of successful O&M of STP are:

1. A thorough knowledge of plant and machinery and equipment provided in the STP & their functions,
2. A thorough knowledge of the processes,
3. Proper and adequate tools,
4. Adequate stock of spare parts and chemical,
5. Assignment of specific responsibilities to operating staff,
6. Schedule of daily preventive maintenance,
7. Systematic and period inspection,
8. Training of all operating staff in operating procedures and maintenance practices,
9. Maintaining records of key activities and operating logs of equipment, and
10. Good house-keeping.

Requirements of maintenance of sewers

As huge investment are generally made for the implementation of the sewerage system, it is appropriate to operate and maintain the system effectively in order to derive maximum benefit of the investment. Maintenance of sewer system depends not only on proper design and construction

but also on the availability of competent staff for their operation. The requirements of the maintenance of the sewerage system are:

1. Protect the sewerage system against damaging materials, which may be discharged by the public, commercial and industrial institution.
2. Prevent the sewerage system from clogging due to deposition of solids as a result of inadequate flow
3. Prevent the accumulation of foul gases in the sewerage system due to the anaerobic decomposition of the deposited solids
4. Save the workers involved in the sewer cleaning from death due to obnoxious gases.

The preventive maintenance methods to achieve the above requirement are; ensure self-cleaning velocity in all section of the sewerage system at least once in a day for prevention of clogging in the sewerage system. The sewer section where it is not possible to obtain the self-cleansing velocities due to flatness of the gradient especially in the head reaches of the sewer network, flushing is necessary.

The O&M of the created infrastructure includes manning and maintenance of the STPs, power charges for the pumping stations, manning for the maintenance of the net work, maintenance and repairs of the sewer cleaning machinery and equipment, administrative expenditure involved in billing and collection of sewerage cess etc. Also the sewer lines between two successive manholes should be periodically inspected using intrusive equipments & arrangement for silting and blockages. The revenue from the sewerage sector is mainly from the charges being collected while giving new sewerage connection and drainage cess collected along with house tax. Apart from regular O&M of sewer lines following recommendations may be considered to sustain the existing reasonably good sanitation situation and tackle future problems:

1. Sewerage charges shall be levied on the basis of water consumed and in the water bill itself. In case of no water supply, alternative methods of billing shall be used.
2. Sewerage charges should also have an 'energy' surcharge/component, which shall be directly linked to the unit energy charges levied by the power utility.
3. In view of the higher polluting potential, sewerage charges should reflect full cost recovery for all sewerage O&M operations.
4. Future buildings may have double-stack plumbing system for separation of grey & black water.
5. On-site packaged treatment units may be used to treat grey water, black water or a combination, depending on the user choice.
6. Using a combination of on-site and off-site sewerage / sanitation systems for waster water / sewage, 100% treatment shall be ensured, for environmental protection and sustainability.
7. It is suggested that Sewage Management Rules, similar to Municipal Solid Waste (Management & Handling) Rules may be framed and notified under the EPA & Water Pollution Acts etc., in order to consolidate provisions under different Acts/Rules/Notifications and to focus attention on Sewage Management issues. Guidelines/Standards for Septage management and Reuse of Treated Wastewater have to be formulated.

Recycle and reuse of wastewater

1. In case of multi-storeyed constructions and gated communities, internal dual piping for toilet flushing shall be made mandatory. It shall also be mandated for high end users such as Hotels, Malls and Industries.

2. Such building communities and groups of housing implementing dual piping shall also ensure on-site treatment of waste water to the water reuse standards of the nation or as per international best practices till the national standards are developed.
3. Supply of treated wastewater to industrial and other consumers shall be explored.
4. Utilities/ULBs may provide incentive on the quantity of waste water treated and reused for which separate metering may be necessary.
5. Dual piping at street level shall continue to be prohibited due to the public health risks involved. However, dual piping at street level may be adopted in cities with well laid out service ducts and with 24x7 water supplies but the pressure in the main water supply network shall always be maintained at least twice of the pressure in the dual pipe carrying treated wastewater.
6. The water for reuse may be mandatorily colored.
7. Models for reuse of used-water may be developed and its applications identified and widely propagated for encouraging reuse at local level (E.g. Israel is said to practice reuse 6-7 times before the intervention of treatment system. This may be studied and intensive water users encouraged adopting such practices).
8. Incentives may be provided to customers (in water tariff, property tax, etc) for the recycle and reuse of treated wastewater.

Energy efficiency: Energy Audit may be mandated at prescribed intervals for efficient functioning of electro-mechanical equipment in the sector.

Decentralized wastewater systems collect, treat and reuse or dispose of wastewater at or near its point of generation. It includes systems that treat wastewater from individual homes or buildings as well as cluster systems that treat wastewater from groups of two or more houses. Unlike centralized urban wastewater treatment systems, decentralized systems treat wastewater close to the source, typically using small pipes for collecting small volumes of domestic wastewater. They are most cost-effective option especially in peri urban of Mysore. Following guidelines need to be followed for application of sewage water.

Table 68: Degree of treatment needed for land application

Treatment	Device type	Land application system
Primary	Septic tank Grey water tank Waterless composting toilet Combustion toilet	Soil absorption systems Burial (for compost)
Secondary	Grey water treatment Septic tank and re-circulating sand filter	Subsurface irrigation
Tertiary (disinfection)	Grey water treatment Septic tank and re-circulating sand filter	Subsurface irrigation Surface irrigation (non–aerosol)
Grey water tertiary (excluding kitchen wastes)	Grey water treatment	Subsurface irrigation Surface irrigation (non–aerosol) Toilet flushing

6.8.3 DEWATS: Sewage treatment

DEWATS is ideal for 300 person equivalent or 60-65 households equivalent. DEWATS technology is developed by BORDA (Bremen Overseas Research and Development Association). This system provides treatment for waste water from both domestic and industrial sources. The capacity ranges from 1-500 cum per day. It works without electrical energy, guarantees permanent and continuous operation with occasional fluctuations in effluent quality and is best suited where skilled and responsible O&M can not be guaranteed. DEWATS is most appropriate in isolated areas of development. In Mysore this can be promoted in no UGD network areas of isolated development in outskirts.

The sewage treatment unit consists of anaerobic up flow reactor (sedimentation ponds, septic tanks, or imhoff tanks) as a primary treatment and Root Zone Treatment (RTZ) System (constructed wetlands) / fixed bed filters/ baffled septic tanks as secondary treatment system. A maturation pond (tertiary aerobic or anaerobic) is also in place for tertiary treatment. The treated wastewater is finally supplied to the houses for inferior domestic uses like toilet flushing and garden irrigation. Combination of primary treatment with any of the other systems is done in accordance with the quality of the waste water influent and desired effluent quality.

Description of wastewater treatment units: The wastewater treatment system consists of Up-flow Anaerobic Reactor as primary treatment unit. This system was designed & implemented for 300 person equivalent. The cross section of this reactor is trapezoidal section in the bottom and rectangular in the top. The waste water from final receiving chamber is allowed to enter in this reactor at the bottom through a pipe and water rises up at a very low velocity. The treated waste water is collected through gutter along longitudinal walls and enters the secondary treatment system.

Primary treatment unit

- Type of Primary treatment: Up flow anaerobic reactor.
- Design capacity: 300 persons.
- Type of Structure: Reinforced Cement Concrete
- Size of unit: 10m x 3m x 4m
- Design Load Characteristics
- Hydraulic load : 1600 lts/m^2/day
- Organic load: 0.512 Kg/m^2/day

Actual load characteristics

- Hydraulic load: 160 lts/m^2/day (As per Standards)
- Hydraulic load: 177 lts/m^2/day (As per actual measurement before commissioning of recycling system)
- Hydraulic load: 81 lts/m^2/day (As per actual measurement after commissioning of recycling system)
- Organic Load (Maximum): 0.037 Kg/m^2/day (As per actual measurement before commissioning of recycling system)
- Organic Load (Maximum): 0.011 Kg/m^2/day (As per actual measurement after commissioning of recycling system)

1. Volume: 114 m^3
2. Cross sectional area: 12m^2

3. Longitudinal Sectional area at the centre: 40m^2

Secondary treatment unit: The wastewater treatment systems consists of Horizontal root zone system as secondary treatment which receives partly treated wastewater from primary treatment unit.

Horizontal root zone treatment unit: The secondary treatment units are implemented in phase level hence the first level is designed for 50 persons. In the root zone treatment, wastewater passes through filter bed by uniform horizontal flow. Root zone treatment are sealed filter beds consisting of sand, gravel and soil system, occasionally with a cohesive element, planted with vegetation which can grow in wetlands. The wastewater passes through the filter bed where biodegradation of the wastewater takes place.

Root zone treatment system

- Type of treatment system: Horizontal Root Zone treatment.
- Type of Structure: Reinforced Concrete floor with Brick walls.
- Size of Unit: 10m X 5m X 1.2m

Design load characteristics

1. Hydraulic load: 160 lts/m^2/day
2. Organic load: 0.024 Kg/m^2/day

Actual load characteristics

- Hydraulic load: 106 lts/m^2/day (As per actual measurement before commissioning of recycling system)
- Hydraulic load: 49 lts /m^2/day (As per actual measurement after commissioning of recycling system)
- Organic load: 0.0030 kg /m^2/day (As per actual measurement before commissioning of recycling system)
- Organic load: 0.0021 kg /m^2/day (As per actual measurement after commissioning of recycling system)

Type of plant species: Arundo donax

Plan area of filter bed: 50m^2

Tertiary treatment unit: Maturation Pond: In this treatment unit, Maturation pond act as tertiary treatment, effluent from Root zone treatment unit enters in the Maturation pond. The important function of maturation pond is the removal of excreted pathogens to achieve an effluent quality which is suitable for its downstream reuse.

Design of Maturation Pond

Type of structure: Reinforced Concrete floor with Brick walls

Size of unit: 5.75m X 5mX 1m

Cross sectional area: 5m^2

Longitude sectional area: 5.75m^2

Plan area: 28.75 m^2

Capacity of unit: 28.75 m^3

Hydraulic retention time: 4.5 days (as per actual daily sewage inflow)

Year of commissioning: March 2004

Present status of the treatment system:

Person equivalent: 30 numbers

Average rate of sewage flow = 3m^3 /day

Table 69: Cost of construction of the wastewater treatment system

Sl. No	Description	Cost in Rs.	For person equivalent	Cost/ person
1.	Primary treatment unit (Up flow Anaerobic Reactor)	2,75,000	300	916
2.	Secondary treatment unit (Root Zone Treatment)	1,00,000	50	2000
3.	Tertiary treatment unit (Maturation Pond)	25,000	50	500
	Total	**4,00,000**		**3416**

Hence total cost required for the construction of wastewater treatment system is Rs 4000.00 per person.

Table 70: Cost of Operation and Maintenance

Sl. No.	Description of work	Amount (Rs)
1	Monitoring waste water analysis cost	26,500
2	Operation & Maintenance (Since commissioning till date)	30,000
3	Onsite laboratory	
4	Cost of equipment and chemicals	12,000
5	Total (two years)	68,500
6	O&M cost year	35,000

Table 71: Land requirement

Sl. No.	Description	Total area (sq.mt)	Person equivalent	Area/person (sq.mt)
1.	Primary treatment unit *(Up-flow Anaerobic Reactor)*	34	300	0.11
2.	Secondary treatment unit *(Root Zone treatment)*	62	50	1.24
3.	Tertiary treatment unit *(Maturation Pond)*	33	50	0.7
	Total	**129**	**300**	**2.4**

Area requirement per person for the treatment of wastewater is nearly 2.4 m^2/person.

6.9 Cost and impact matrix

The following matrix represents the cost versus impact scenario based on present sanitation condition for achieving and sustaining environmental sanitation. This will help Mysore to decide on priority actions against fund availability.

↑ IMPACT ↓					
	Very high	Good MIS on full cycle of sanitation and regular updation	Water bodies maintenance and storm water drainage	**Community toilets** (bearing capital costs while transferring O&M)	**School sanitation improvements**
	High	Institutionalizing National Sustainable habitat parameters	Intensive IEC programme to prevent OD, behavior change, disuse of toilets	Enhancing waste segregation and disposal	Slum prevention and housing for future migration population
	Medium	Framing rules, specifications and **effective monitoring**	**Capacity building** by exposure visits, technical training and workshops	Pro poor policy on Septage clearance and **connections to UGD**	Sustaining STPs with good effluent quality
	Low	**Institutional responsibility** clearly assigned	Last mile connectivity to UGD with clear technical guidelines	**Public toilets** under PPP model	100% D2D collection and collection efficiency
		Low	**Medium**	**High**	**Very high**
← COST →					

6.10 Improvement of Integrated Solid Waste Management

A summary of the current position of the solid waste management has been dealt in previous chapters. Field surveys and discussions with stakeholders also identified key issues and problems in Mysore. To assess the magnitude of the problem to be tackled in future estimations of waste generation has been done based on population projections done for Mysore taking considering CPHEEO norms (average per capita waste generation is 350 gm). Since growth is expected to be moderate, the future generation trends will be governed by population changes and will be mainly from domestic sources. Waste management in a city from a sustainable planning perspective needs to take into account aspects including planning and implementation of waste reduction initiatives for industry, planning and implementation of efficient and effective systems for collection, transportation, treatment, recycling and reuse or disposal of municipal solid waste in the most sustainable and decentralized manner possible.

Performance indicators in SWM sector explain scope for lot of improvements especially in collection efficiency, treatment and disposal as first step. There need to be considerable focus required to address solid waste management complying with MSW 200 rules. DPR on ISWM for Mysore has been prepared in this connection.

The Health Department of MCC is headed by a Health Officer along with the Environmental Engineers responsible for all activities of collection, street sweeping, transportation and disposal of solid waste and the Engineering Department is responsible for procurement and maintenance of equipment and vehicles.

A systematic action plan for maintaining solid waste management while achieving each recommendation as outlined below:

Table 72: ISWM Action Plan

Recommendation	Strategies	Actions	Possible constraints
1. Achieving benchmark cleanliness (following SLB indicators & parameter in sanitation rankings in phases)	• Establish work norms (per worker) for roads (both congested & wide), open spaces. • Regularize sanitary worker attendance by biometric system. • Encourage successes of visible clean areas. • Involve Corporators and few other who will support such efforts in their wards.	• Promote clean wards/slums/colony etc., by well-planned door to door collection. • Increased involvement of NGOs/Private operators etc. • Good working conditions and recognition mechanisms for workforce.	• Increasing efficiency and productivity of existing staff. • Possible protest from employees.
2. Source segregation of waste into specified types	• Maximum recycling and maximum local composting of bio-degradable waste. • Provide separate collection mechanism for Bulk Waste Producers, construction waste/ debris, garden/ green waste. • Overall training and capacity building of MSW personnel in order to achieve segregation of solid waste at source. • Good communication & awareness program.	• Promote source segregation by keeping 'wet' & 'dry wastes separately, doorstep collection of "wet" waste for bulk waste producers with extra rates, to compost all bio-degradable and recycle dry wastes. • Associate with trade and industry associations for better marketing to segregate recyclable material. • Give priority to the source segregation of recyclable waste by shops and establishments and later concentrate on segregation at the 3 household levels.	• Targeting behavior change of households. • Increased public health and hygiene levels
3. Heritage areas	To preserve the heritage ambience in these areas, it is proposed to place esthetic litter bins on either side of these streets at a distance of approximately 200 meters.	• Special collection crew would be deployed by MCC to ensure continuous cleaning in these areas. • Waste collected in these bins shall be transferred to the secondary containers using auto tippers.	
4. Minimize primary collection, transport & handling cost/ ton	Encourage PPP and out sourcing	• Reduce expenditure on collection per household by imposing user charges @ Rs. 1 per day), encourage source segregation and reduce waste reduction to at least 15%. Planning and optimizing vehicle routing with robust MIS and waste generation database. • Introduction of GPS and monitoring of MSW vehicles in a centralized locality.	

5. Management Information Systems (MIS)	Regular reporting and data updating. Appropriate division of roles and responsibilities.	Developing information base on: • Daily/weekly/monthly reports at town/ward/zone level. • Spatial and seasonal waste generation quantities and nature (Ward-wise waste), collection points linking to GIS, asset inventory, category wise waste generation, number of workers in each ward for collection, transportation and disposal. • Recording weigh-bridge on-site • Number of staff and expected clearance frequencies.	Funds and leadership
6. Levy user charges	• Polluter pays principle and a policy on SWM user charges. • Simple procedures and strict enforcement of regulations. • Share MSW information with the Public.	• Display boards with details of MSW in specific area including Contractor's phone number on the dustbins to be cleared by them and specify how residents can handover waste to municipal body. • Charges for business or trade, eating-houses or hostels, health-care facilities, shops, offices, street-food, fairs and exhibitions and ceremonies. • Avoid NIMBY by sanitizing all wastes near point of collection until composting commence.	Lack of political will.
7. Advanced Locality Management (ALM)	Strong citizen's group to work closely with ULB to develop strategy and improve ISWM as well as other civic amenities in their local area.	Organize citizen meeting in neighborhood and explain concept of ALM through public meetings. Select ALM committee from all representative building, lanes etc.	
8. Promoting Public Private Participation (PPP)	Performance improvement criteria based contracting system.	• Enhancing the strength of ULBs and ability of engaged contractors to perform. • Take up pilot in newly developed areas, under-served areas and particularly in the areas where local bodies have not been providing service through their own labor force. PPP can be considered in: • Door to door collection of household waste, commercial waste, hospital waste, hotel waste, construction waste and market waste. • Setting-up, operation and maintenance of waste disposal facility, operation and maintenance of waste treatment or processing plants. • Supplying refuse collection vehicles on lease, repairs and maintenance of vehicles at a private garage, transportation of waste on contractual basis, etc.	• Lack of credible information • Inadequate internal capacities to monitor private operator
9. Selection of treatment technologies	Developing environmentally sustainable models especially in disposal e.g. scientific landfills.	Setup expert committee.	Coordination and internal capacities issues.

7 ENABLING AND SUSTAINING STRATEGIES

7.1 Awareness raising, hygiene promotion and community participation

The first step in making cities 100% sanitized is to elevate the consciousness about sanitation in the mind of municipal agencies, government agencies and most importantly, amongst the people of the city. The policy also aims to transform cities into ***totally sanitized, healthy and livable cities and towns*** which can be achieved by:

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

There needs to be considerable engagement with households and communities on changing mindsets and understanding incentives to change behavior and practices. A communication strategy has been part of the CSP to create support for and facilitate effective implementation of city-wide, demand-based sanitation programs and for generating awareness amongst urban households on sanitation and its linkages with health, economic productivity and the environment along with facilitating behavior change towards adoption of safe sanitation practices among households.

One reason for the low support to sanitation is that opinion leaders, policy makers and managers do not see the links between sanitation, public health and economics. The first step in making cities 100% sanitized is to elevate the consciousness about sanitation in the mind of municipal agencies, government agencies and most importantly, amongst the people of the city. ULBs are in the frontline of implementation and have a key role in ensuring sanitation and should focus on demand responsive approach. To meet this challenge a systematic 'Communication Need Assessment (CNA)' for different target groups has been taken up as part of CSP and objective of well driven IEC is demand-driven with social marketing approaches to increase demand for toilets and ensure hygiene behaviors, promote no subsidies for household toilets in future and encourage diversity in technology and design.

State government should ensure support to ULBs in providing enabling environment in all respects and provide communication and awareness strategy. The following table details out IEC and advocacy plan in achieving desired goals of environmental sanitation:

Table 73: IEC and Advocacy Plan for Environmental Sanitation

Target audience	Messages/Themes	Channels of communication
Councillors, Commissioner, Engineers	• What are current habits and how the toilets should be designed for social acceptance. • Promoting two pit latrines in slums • How to ensure compliance from people • Rewards/punishments • Better implementation of sanitation projects • Safe handling of garbage by sanitation workers • Safe deposition of garbage by contractors	Council meeting, CSP workshops, News paper Ads calling for meeting Press conference-sharing the goals and plan of action for CSP with press persons
Councillors, office bearers of Sanghabandams and Slum Level Federations representing slums in inner town	• Consultations on preventing open defecation • Toilet size and toilet options like two pit, septic tank • Safe disposal of human excreta • Contamination due to fecal matter • Health and hygiene • Diarrhea, GE, Malaria, Scabies • Consultation on problems with current toilets • Consultation of water supply situation • Consultation on environmental sanitation • Consultation on expectations form Municipality	SLF meeting Door to door campaign New paper Ads calling for meeting Press conference
Councillors, office bearers of Sanghabandams and Slum Level Federations in old town	• Safe disposal of human excreta • Contamination due to fecal matter • Toilet size and toilet options like two pit, septic tank • Health and hygiene • Diarrhea, GE, Malaria, Scabies • Consultation on problems with current toilets • Consultation on environmental sanitation • Consultation of water crisis • Consultation on expectations form Municipality	SLF meeting Door to door campaign Newspaper Ads calling for meeting Press conference
Councillors, office bearers of Sanghabandams and Slum Level	• Health risks due to open defecation • Toilet size and toilet options like two pit, septic tank	SLF meeting Door to door campaign

Federations representing slums in town outskirts	• Contamination due to fecal matter • Safe disposal of human excreta • Health and hygiene • Diarrhea, GE, Malaria, Scabies • Consultation on problems with current toilets • Consultation of water scarcity • Consultation on environmental sanitation • Consultation on expectations form Municipality	Newspaper advertisement calling for meeting Press conference
Office bearers of Residents Welfare Association middleclass localities	• Consultation on problems with current toilets • Consultation on septic tank cleaning • Consultation on environmental sanitation • Consultation of water supply situation • Consultation of willingness to pay for tricycles etc • Consultation on expectations form Municipality	Meetings, door to door campaigning, Newspaper advertisement calling for meeting and Press Conference
Water and sanitation officials	• Display numbers of responsible officials like Sanitation Inspectors prominently in their zones • Restart Call Center facility, establish grievance redressal mechanism. • Appreciation of what people desire	Print pamphlets given with newspapers, news paper advertisements, painting on Elevated/underground reservoirs. Print the phone numbers of responsible officials on the tractors
Water and sanitation workers	Importance of safe handling of waste	
Contractors	Do not dump garbage on roads leading to dump yard Do not burn garbage and segregate waste at the dump yard.	Print the phone numbers of responsible officials on the tractors
Shopkeepers	Do not dump garbage in by lanes and if you need to dispose hazardous waste call the municipality and ask for a tractor.	
Town wide	• Keep house and neighborhood clean • Boil/Filter the Water before drinking • Wash your hands before and after eating/drinking • Do not allow mosquitoes to breed in your neighborhood • Immunize children and do not share clothes of persons infected with skin diseases	Road Side Billboards, Newspaper Ads and Town Cable

Sanitation, despite being a basic human need and a critical need for improved quality of life, has not got the necessary attention in the past. Also, the different aspects of sanitation starting from collection of human feces to the safe disposal (the whole process cycle) have seen different stakeholders.

Table 74: Methods and implementation of awareness activities

Stakeholder group	Message intent	Example of messages that could be used
Households (urban poor / slum dwellers) that lack toilets/ access to sanitation	Motivate citizens to take action and adopt safe, hygienic sanitation practices	• Clean households leads to healthy, strong and successful families • Choose dignity for your wives and daughters! Having toilets at home adds to the comfort, security and privacy of the women. • Improved sanitation facilities, (e.g. use individual or community toilets) will reduce health expenditure of your family.
Service providers – includes • Officials of ULBs • Officials from different arms of the city administration, primarily from ULBs, PHED, OWSSB, etc.	Reinforce that: Sanitation also includes management of human excreta and liquid wastes in addition to solid waste management.	Leverage investments in sanitation and public health and give the residents and their future generations a chance to a healthy and happy future.
Service providers – includes • Officials of DHUD • Officials from different arms of the city administration, primarily from ULBs, PHED, OWSSB, etc.	Proper waste management is not solely the responsibility of the state. Citizens have an equal and important role to play in helping the state achieve the state's urban sanitation goals.	Proper management of household waste + proper confinement, disposal and treatment of human excreta = Clean Cities. Winning the Nirmal Shaher Puraskar is not so difficult. Little effort will result in big gains (for ULB officials).
Politicians	Helping provide basic needs like sanitation will strengthen your popularity with your constituents and could further improve political mandate.	Improve the quality of life of your constituents by influencing them to adopt good sanitation practices.

There are three important components to the communication strategy

1. Inter-personal communications: Using opinion leaders
2. Engaging media and NGOs as partners in promoting sanitation consciousness
3. Adapting and developing multimedia IEC materials for sanitation campaigns

Interpersonal means are known to be very effective in behavior change communications. These are tedious processes to carry out but offer better returns. It is important to understand the needs of the local community and select opinion leaders who could influence the community to further sanitation consciousness. These opinion leaders could be local NGOs, cooperators, school teachers or any other respected elder. A newspaper ad or a public service message on TV without ground level work through opinion leaders will fail to be sustainable in the long run.

For better targeting a need based IEC actions to be implemented categorized into following phases.

Table 75: Phase wise distribution of works

Phase I (1-2 months) Awareness raising phase	Phase II (3 months) Educational phase	Phase III (Continuous) Continuing education - Action promotion phase
Aimed at generating high awareness and a sense of alarm or concern about the OD, problem situation and UGD promotion. Consists of easy to grasp messages (e.g. disease incidences from contaminated water are rising). Technical guidance to proper UGD laying. Short advertisements in various media or communication channels.	To deepen the knowledge and appreciation of the target audience. Information and educational approaches to stress properly designed septic tanks and periodic septic tank inspections and desludging every 2-3 years.	Promotional phase with short campaigns at least once a year. Action to dominate. To trigger the actual adoption of the practices being marketed.
• Media options: o Local Cable TV ads (30 seconds) o Local newspaper ads o Billboards o Tarpaulin posters mounted on mobile vans o Leaflets for those attending meetings o News releases in print, radio and TV o Discussions on radio	• Media options: o Local Cable TV ads (30 seconds) o Local newspaper ads o Billboards o Tarpaulin posters mounted on mobile vans o Leaflets for those attending meetings o News releases in print, radio and TV o Discussions on radio	• Media options: o Continuing radio, TV, print ads o Continuing house to house visits o Continuing short film showing in theaters o Continuing billboards o Continuing but less frequent assemblies, SLF meetings o Continuing news releases on all platforms o Continuing feature articles
• Organise interactive programmes for effective implementation of UGD. Organise walks by children, meeting/workshop with stakeholders e.g. Shopkeepers, RWA, NGOs, communities etc. • Institutionalize regular discussion between various departments for increased co-ordination to further goals of CSP. • Seeking feedback from Councilors to help effective implementation.		
Media: TV, Radio, door to door, billboards, leaflets	Mass announcements	Budget: 3 – 3.5 lakhs / year

7.2 Financing mechanisms

For the effective implementation of the city sanitation plan, it is anticipated that funds will be sourced from following channels:

- The central grants via ministry of Urban Development and Ministry of HUPA, GoI.
- Individual and institutional contributions.
- State's own budget.
- Connection cost of UGD to be collected and deposited for O&M of STPs and should be managed by CSTF.
- Promote public-private partnership for key activities identified in the city sanitation plan. PPP in public and community toilets, CSR funds and mobilize private people in maintaining and monitoring school toilets.

- Funding projects wherever possible from existing schemes such as JNNURM and UIDSSMT.
- Funding from bilateral and multilateral agencies can also be explored.
- Providing assistance for the preparation of Detailed Project Report (DPR) as per city sanitation plan as soon as requests for funding are received.

Criteria for prioritization of towns

- State capitals irrespective of the population
- Pilgrim centre/heritage towns
- Culturally important towns
- ULBs in which the practice of manual scavenging is pre-dominant
- ULBs where there are no machines for sewer and septic tank cleaning operations.

Proposed scheme for mechanical aid for cleaning of sewers and septic tanks (SMACSS)

a. The National Advisory Council (NAC) has observed that the shameful practice of manual scavenging persists in India, despite being outlawed. The NAC has identified the need for a special focus to liberate our society from the norms on social exclusion and discrimination along with an action plan with full ownership of participation of the persons involved in manual scavenging. The Government of India has enacted the Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993. It serves as a primary instrument in the liberation of a broken people enslaved to a life of indignity enforced through ideologies of descent based work and caste. The Act defines a manual scavenger as "a person engaged in or employed in manual carriage of human excreta".

b. However, the existing definition of manual scavenging as per the Act, 1993 does not cover manual cleaning of septic tanks and sewer cleaning. It is essential that such cleaning operations be included in the definition of manual scavenging since there they involve similar issues of dignity as well as health related risks. Therefore, the definition of manual scavenging may be modified as "a person engaged or employed, whether by an individual or an urban local body or any other public or private agency, for manual cleaning, carrying or disposing untreated human excreta, including a latrine, a tank, in a drain or a sewer line".

There are established technologies that convert human excreta into manure in a scientific manner. Such decomposed material and its carriage may not be covered in the definition of scavenging.

c. Accordingly, the MoUD intends to formulate a scheme for facilitating the state government and ULBs in ensuring cleaning of sewer and septic tanks/any latrines mechanically. The scheme will facilitate funding for the procurement of suction machines for cleaning of septic tanks and suction-cum-jetting machines for cleaning of sewers in all cities/towns in the Country. The scheme is envisaged on 'All Town' basis. All 5161 cities and towns as per 2001 census will qualify for assistance under the proposed scheme**.**

d. Financing pattern

- Funds would be provided to the SLNA through State Governments / UTs in the form of 100% grant for capital investment for the procurement of the equipment and machinery. No funds would be provided for operation and maintenance of sewerage and onsite sanitation systems including maintenance of these machines which shall be borne by the ULBs/State Govts.
- The operation and maintenance of sewerage and onsite sanitation system (septic tanks, dry latrines etc) including running and maintenance of machinery shall be the responsibility of the ULB/Water Supply and Sanitation (WSS) Agencies/Boards. If necessary, these activities may be outsourced by the ULBs/ WSS Agencies/Boards to private service providers/ entrepreneurs over a specified period as per the agreement to be executed between ULBs & private entrepreneurs. The O&M cost including desilting, cleaning of sewers & manholes, de-sludging of septic tanks and maintenance of vehicles would be borne by the ULBs.
- The requirement of funds for the purchase of suction machines and suction-cum jetting machines for cleaning of sewers and septic tanks for all 5161 towns have been assessed as Rs. 4949 Crores.
- Funding will be available for the procurement of new machines only.

7.3 Monitoring mechanism

Independent Evaluation and Monitoring Agencies should be appointed by the State Govt. at State level/city level in line with the monitoring mechanism envisaged under JNNURM. The Independent Evaluation and Monitoring Agencies will monitor the status of the procurement of the machines, cleaning operations of the sewer and septic tanks and the status of the action taken on the eradication of manual scavenging by the ULBs and report to the Municipal Administration/State Government which will forward the same to SLNAs. The SLNA will forward the status of the implementation of the scheme to the Ministry of Urban Development.

The concerned ULB/Head of Water Supply and Sanitation Agencies, who are responsible for O&M of sewerage and onsite sanitation facilities shall furnish an action plan each year to the Ministry of Urban Development through Directorate of Municipal Administration and SLNA regarding action taken/action to be taken for elimination of manual scavenging and the number of employees engaged in manual cleaning and mechanical cleaning of sewers and septic tanks in the next 2 years from the date of purchase of machines.

7.4 Institutional arrangement and responsibility

The ULBs are responsible for managing the cycle of sanitation and public health within their cities, in coordination with various departments. Already there are number of provisions to practice and implement in achieving sanitation goals and some additional recommendations are as follows:

- Using existing provisions in municipal and other acts to promote compliance;
- Amending municipal acts, framing of bye-laws and regulations (E.g. Building and construction bye-laws) to promote sanitation by public and private agencies, prohibit discharge of untreated sewage into open areas (Pollution control acts);
- Re-orienting policies to ensure that urban poor households obtain access to improved sanitation facilities;
- Ear-marking land for community and public sanitation facilities;
- Promoting partnerships with public, private and non-governmental agencies for improved service delivery, maintenance and management of sanitation facilities.

The existing multilevel institutional arrangement should be reoriented with clear assignment of specific roles and responsibilities to the institutions. The setup of institutions needs to be addressed at the state, district, and the ULB level. The details of the institutional setup at ULB level has been described as follows:

7.4.1 Urban Local Body level institutional set up

1. A multi-stakeholder 'City Sanitation Task Force (CSTF)' comprising representatives from multidisciplinary fields for overall guidance and oversee sanitation related activities has to be constituted in Mysore. It is thereafter important for the CSTF to conduct meetings once in a month to implement and monitor planned activities.
2. In view of high level of open defecation, Ward Level Sanitation Action Committees (WASCs) should be formed involving SHGs and Community organizer. They will also ensure continuous vigilance and surveillance and effective monitoring, it is suggested to form a ward level Committee in each ward and Municipal level committee (CSTF) to review and monitor the action taken to prevent and control the incidence of the disease. The ward level committee will be headed by the ward member, and the members of the committee are the habitation officers

(convener), concerned Asst. Engineer / Work Inspector, Sanitary Inspector / Health Assistant, NHC president. This committee shall meet once in a week and as frequently as possible during the epidemic period.

3. Within the ULB, there is a need to identify **Sanitation Implementation Unit** in-house from the existing staff for all practical implementation purposes. The unit shall be responsible for preparation and implementation of the city sanitation plan. Commissioner/ CMOH shall be the head of the unit and may appoint suitable officer as the in-charge officer. Commissioner/CMOH may also nominate other suitable officers as members of the unit. This unit should be supported by additional staff like Sanitary Inspector depending on the population of ULBs. This unit can monitor the progress every month, develop and update database on sanitation in ULB. The unit will pinpoint problem areas to address, prioritize projects for implementation, and monitor quality checks. They will identify actions and related spatial and non-spatial interventions. For day to day implementations existing institutional mechanism at ULB level like Ward Committees, Ward Development Committees, Task Force needs to be strengthened with orientation trainings and capacity building training.
4. The Municipal level committee shall be headed by the Chairperson with the members being the Municipal Commissioner (Convener), CMHO, ME, CDS President, Local NGO, DM&HO or his deputy. This committee shall meet once in every fifteen days and as frequently and as possible during the epidemic period

The functions of the unit will be:

- To conduct a baseline survey on city sanitation and update regularly (once in two years)
- To prioritize projects for implementation, monitor quality checks identified under CSP and identify actions and related spatial and non-spatial interventions.
- To develop city wide communication strategy and conduct city wide total sanitation campaign.
- To ensure intra departmental coordination of ULB for sanitation promotion.
- To develop network with several government departments and other agencies for promoting healthy & environmentally sound sanitation.
- To manage all the process like procurement, contracting etc. for sanitation projects, be responsible for implementation, monitoring and evaluation of the program. Develop local sanitation and hygiene regulations in consultation with stakeholders; establish standards and norms; inform citizens of their rights and duties under existing sanitation legislation/ regulations; set up mechanisms for monitoring and enforcing their implementation.
- Clarify roles and improve agency coordination.
- Streamlining policies so as to develop and adopt local septage ordinance, Institute regular desludging mechanism, PPP promotion and regulation, ULB introduce user charges, update and amend regulation in building bye laws.
- Mobilize Government support Capital but local groups to manage O & M.
- Build political support through exposure visits workshops.
- Engaging civil societies to end OD.

For day to day implementations existing institutional mechanism at ULB level like Ward Committees, Ward Development Committees, the Task Force needs to be strengthened with orientation trainings and capacity building training.

Poverty wing of ULB should be responsible to design, implement, and monitor the sanitation promotion programs, converging the source of funds and preparing the budget. ULB should also plan and budget for the operation and maintenance of sanitation systems. It is also responsible for assisting households to provide their own sanitation and to build their own toilet facilities. Specific responsibilities include:

- To design integrated planning and communication strategy for city sanitation promotion.
- To provide access to sanitation to all urban population
- To make communities aware of the importance of sanitation in terms of health.
- To launch together with the communities, health and hygiene promotion programs.
- To monitor the health of communities.
- Establish and improve septage management requirements and guidelines
  - Providing technical support, guidance and training
  - To assist households to operate and maintain sanitation facilities
- To assist Ward Education Committee for the improvement of school infrastructure, including sanitation and for implementing School health promotion programs to create safe and healthy school.
- To coordinate all the internal departments like PWD, Sanitation, Health and Education, and also involving the Community Based Organizations, Welfare Associations, youth clubs, market committees etc. for Total Sanitation Approach and Campaign in the ULB, and make the city open defecation free.
- To develop and design ward wise, & slum wise incentive schemes for reaching the ultimate goal of Nirmal Shahar

7.4.2 State Urban Sanitation Cell

DMA needs to be strengthened for the purpose of functioning as a Sanitation Nodal Agency with a dedicated sanitation cell as **State Urban Sanitation Cell (SUSC)**. The Cell will have a complete office set up with the following constitution, terms of reference. (To elaborate on roles and responsibilities, on investment flows, policy and standards setting, asset creation, financing of capital investments, planning and implementation, operation and maintenance, environmental regulation, monitoring and evaluation, land use/building regulations, ongoing programs, implementation, execution, legal regulatory responsibility, capacity building and IEC).

Constitution of SUSC

- Creation of a strategic urban sanitation cell at DMA, GoK, to be headed by a 'Director' equivalent officer with a fixed tenure of five of mission period for better coordination and integrated development.
- SUSC is expected to provide overall direction and strategic support to ULBs and coordinate with state level organizations in achieving the strategy objectives in a time- bound manner.
- SUSC will support cities in preparing CSPs by giving overall direction, frame work etc with in the first year of mission period.
- It will have three strategic wings (Ref: fig no 23) with specific and designated expertise to offer and support in achieving the mission objectives. Each wing will have two expert staff in required field with the support from "Sanitation Fund".
- SUSC will be central coordinating body and need to coordinate with State, Districts and ULBs. IEC wing should work closely with State Health Department, Education Department and design

awareness programs for convergence. Engineering wing and MIS wings should coordinate regularly with Town and Country Planning Department to ensure all convergence and effective planning.

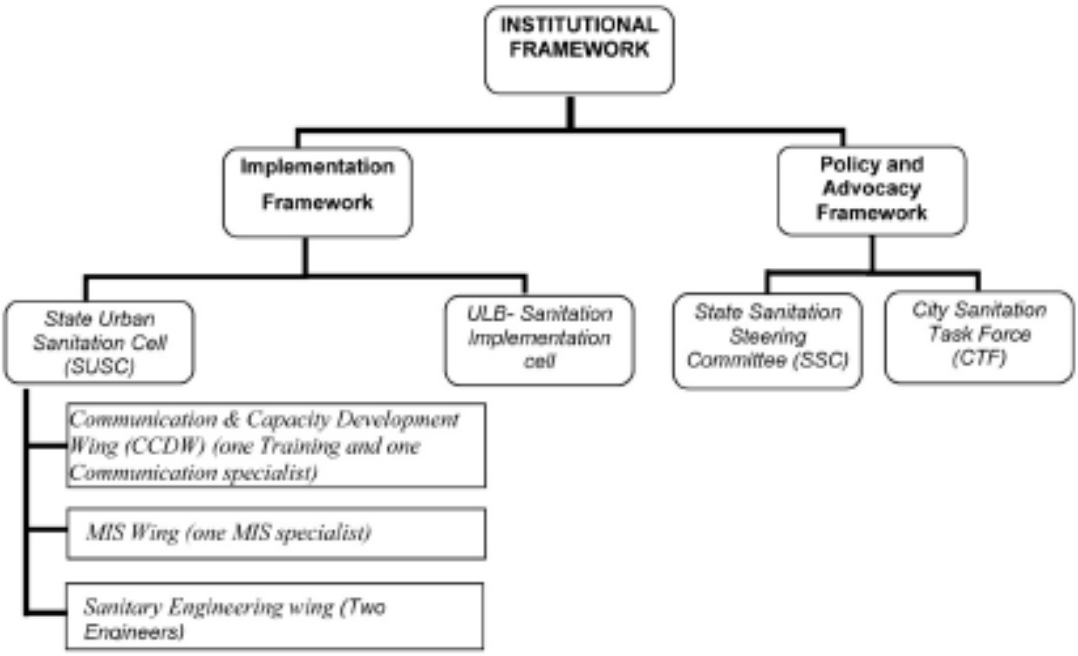


Figure 23: Proposed institutional set-up for sanitation

The responsibilities of the State Urban Sanitation Cell (SUSC) are:

- Monitor integrated planning for sanitation promotion.
- Guide the ULBs in conceptualizing, planning and implementing the sanitation programs while preparing CSPs.
- Will initiate sector reforms so as to invite more investment from lateral and bilateral funding agencies in the sector.
- Channelize the financial and technical support to the ULBs and coordinate with other state departments and agencies engaged in sanitation promotion.
- Design & arrange capacity building programs for ULB staffs and concerned other line Departments. Develop initiatives to promote & facilitate the process of community development.
- Work out standard designs and specifications including construction practices and O&M aspects and bring out a "Sanitation Guidance Manual" to facilitate the target groups in identifying and recommending appropriate technology options for on-site sanitation considering (1) affordability and acceptability by the end users, (2) soil, groundwater and climatic conditions of a location, (3) associated environmental, ecological and health aspects, and (4) availability of water and long term sustainability of the system.
- Monitor the sanitation arrangement and public health and hygiene
- To take up sector studies and strategy papers, to facilitate partnerships

Table: Role of different Institutions

Stakeholder	Role
Citizens	• Carry out segregation of waste at household level • Handover the segregated waste to the primary collection crew at the pre-notified time

	• Pay user fee for the door-to-door collection service offered • Avoid throwing of waste on streets
Area Members Sabha	• Inform the residents about the proposed MSW Management Plan • Ensure that the residents co-operate and follow all the principles • Appoint primary collection crew for door-to-door collection service • Monitor performance of service providers, wherever required
Private Operator	• Carry out their roles and responsibilities as per the contractual arrangement between them and MCC • Ensure that the MSW is handled in the manner set out in the contractual arrangement and is not disposed in any other manner whatsoever. • Obtain compliance certificate from the authorities concerned.
MCC	• Set out MSW Management Plan • Monitor the works being performed by the private operator • Ensure compliance by RWAs and citizens • Make payments to the private operator

8 MONITORING AND EVALUATION

8.1 Monitoring and review

Monitoring is an imperative to verify whether objectives of sanitation plan have been achieved. Elements of this plan will be monitored and reported and will rely on the provision of a range of quantitative and qualitative information. Monitoring and evaluation of sanitation program is of higher relevance and importance as Urban development Ministry, Government of India ranks cities on sanitation and gives Nirmal Shahar Puraskar based on the cities performance. The CSTF should be made responsible for monitoring and reviewing the implementation of the CSP.

At ULB level, the City Sanitation Task Force will monitor the program in support of Standing Committees (Health, Sanitation, Public Works and Water supply) based on implementation agency data, citizens' groups feedback and primary field visits. Periodic verification of following Impact and Monitoring indicators at ULB level are suggested.

To measure 100% sanitation milestone achievements, a number of tools apart from 19 indicators of City Sanitation Ranking can be considered:

a. **Impact indicators**

- Use of safe methods for disposal of infant excreta
- Knowledge of danger of unsafe excreta disposal and hand washing practice
- Percentage of toilets upgraded with own funds by households after monsoon/filling up of pit

b. **Monitoring indicators**

- % of households with access to sanitary latrines: public and personal separately
- % constructed water supply facilities maintained by the communities served
- % households using safe drinking water regularly (public and personal separately)
- Use of toilets by household members (esp. men, aged, disabled, children under 5)
- Range of available affordable options for toilets.
- Use of Recycled Waste Water in Agriculture/ Horticulture as % and absolute quantity. Extent of land made available for housing the poor.

c. Energy planning and conservation

Energy is a key driver of a thriving urban life, and while in India, energy is typically a state subject, cities can benefit by better management of demand and supply and exploring provisions for decentralized alternatives of renewable energy.

- Indicator-ii: Extent of housing/land made available for poor.
- Indicator-iii: Tenure provision to urban poor (percentage of total).
- Indicator-iv: Percentage urban poor households with basic services.
- Indicator-v: Distribution of urban poor housing/land in high and middle income housing areas.
- Indicator iv: Housing
    - Quality of shelter (kutcha/ pucca)
    - Legal/ illegal/ unauthorized
    - Own/ rented

In case of sewage effluent, following standards need to be met and a mechanism to monitor internally by CSTF by way of protocol adoption.

Table 76: Comparison of Standards (issued by CPCB) with effluent values

Parameters	Standard for discharge into inland surface water	Standard for reuse of effluent for irrigation	SIBF (effluent)	MSF effluent	DEWATS effluent
BOD (mg/l)	30	100	6	197	17
COD (mg/l)	250	NA	20	688	50

The review period of the proposed action plan for CSP is five years from the formal adoption date. Progress monitoring and reporting will be conducted monthly by the council, by the taskforce quarterly and by the State Government bi-annually. As a result of the review, some revisions to the targets may be required in order to:

a) Update or remove those targets that have proven to be unclear, unable to be adequately measured, unworkable or out of date in their allocation of responsibility for action.
b) Reflect changes in the wider wastewater management/sanitation service provision landscape.
c) Better reflect progress against the targets and, where necessary, set new targets.
d) Better reflect the current state of knowledge of wastewater management/sanitation facilities.

8.1.1 Launching reward scheme

Periodic rating of wards in respect to sanitation and recognition of best performers by instituting an award system should be practiced.

Open defecation free

a) Totally free from open defecation;
b) Sanitary collection of 100% human excreta and wastes
c) Proper removal and treatment of all wastewater

Wastewater and drainage safely managed

a) All grey water collected and disposed off safely;
b) All storm water is properly managed

Solid waste collected and disposed off fully and safely

a) 100% of solid waste is collected regularly;
b) Solid wastes are disposed off safely (including treatment and re-use)

8.1.2 Incentives and disincentives by MC/NPS

The incentives within the CSP could provide infrastructure funding to those communities that successfully meet reward scheme or by way of incentives may include:

- The provision of collective 'in kind' rewards to motivators that successfully support wards and neighborhoods meeting reward scheme.
- Publicly recognizing those wards and neighborhoods that achieve 'excreta free', 'litter free' or 'foul water free' status.
- Placing a signboard to this effect at the entrance to the neighborhood/ward.

The disincentives within the CSP to be taken by the ULBs on violating the rules and actions deteriorating environment may consider the following:

- Exercising all provisions within the Municipal Act/ Water Act to levy fines, bills for costs incurred and instigates court proceedings for encroachments, releases of industrial waste

or effluent, illegal slaughtering of animals, markets, burial grounds and the provision of essential water/sewerage/drainage connections.

- The provision of 'fine' for all individuals that dispose excreta, litter or foul water in an unhygienic manner in public spaces (Polluter pay principle).
- Sanctions against harmful actions and/or failure to act - for instance, a ban, supported by fines on the use of untreated sewage to irrigate crops/water bodies.

Effective provision of MSW management services would require co-ordinated effort by various stakeholders. The stakeholders in the project comprise RWAs, ULBs, citizens, and private operators. The roles of each stakeholder are presented in the matrix below.

8.2 Project components and costs

Based on strategies and interventions identified, an indicative list of the sanitation components and their broad investment costs are presented below;

Table 77: Estimated cost of proposed sanitation components (basis: consequences Vs occurrences matrix)

Sl. No.	Existing situation	Aggregated city level requirement	Proposed action / budget head	No. of units (seats)	Cost per unit	Budget in crores
1	**No of places of open defecation**	21 slums	Construction of community + public toilets		100000	
			Construction of individual toilets		20000	
			Construction of urinals		40000	
	Reconstruction of community toilets				100000	
	Amount in crores					
2	**No proper disposal of effluent from toilets**		Connection to sewer line or drain		15000	
3	**Disposal of effluent from septic tanks**		Connection to sewer line		20000	
4	**Wastewater generation**					
	Treatment of waste water		Construction of additional STPs		1.60	
	Proper disposal of effluent coming out of treatment plant		Installation of proper system for disposal			
	Amount in crores					
5	**Length of sewer line**					
	Additional length of sewer line				2500 per m	
6	**Construction of eco san type systems**		Location, identification of and preparation of plan			
	Area		Finalization of areas			
	Population		Existing and estimated population at the demarcated locations			
7	**Recycling and reuse**		At least 30% waste		1.25 crore	12.50

	of waste water		water is recycled and reused			
	Flushing					
	Wet lands					
	Composting					
	Electrification					
8	**Solid waste**					
A	Waste collected from HHs		Segregation of waste and 100% collection of segregated waste		100/ household	
B	Waste from community bins		Provision of tilting bins on main streets		10000 per container	
C	Transportation of A and B		Zero waste by transportation of all collected waste		565/ton	
D	Waste generated from urban poor communities		Provision of community bins and its transportation and educating the slum dwellers about waste management.		600/ton	
9	**Treatment unit**		Sanitary landfill for all waste generated			
	Composting		At least 20% waste is composted			
	Generation of fuel or electricity by waste recycling		At least 5% waste is processed and is used as a fuel			
	Recycling and reuse of dry waste		Recycling and reuse of all related waste through ragpickers or through agencies or NGO			
10	**Storm water disposal**					
A	Number of water logging areas		To assess the water logging duration and height of water logging in particular locations and suggesting solutions		50000	
B	Construction of road side drains for disposal of storm water		Completion of all storm water drains as per DPR		(b+c)	
C	Deepening / channelisation of existing water resources -natural disposal of storm water		Deepening or widening as per DPR for disposal of storm water			
11	**Water supply**					
	Water supplied for drinking purpose		Designing and installation of water supply system, network and connections as per			

			demand			
	Purification and treatment of water		Installation of water treatment plant for ensuring 100% purity			
	Water supply to poor urban communities and connections		Provision of more number of connections for 100% coverage			
	24x7 water supply					
12	**Environment**					
	Water resources that are polluted		Study of water pollution levels and suggestive measure to arrest pollution		25 lakh/ zone	
	Major locations of air pollution		Setting up of treatment units for industrial sector		25 lakh/ zone	
	Locations of heavy pollution		System to control pollution		50 lakh/ zone	
13	**Awareness**					
	NGOs working with peoples participatory approach		Encouragement to such NGOs and assistance if required.		12 lakh/ zone	
	NGOs or agencies working towards citizen education		Additional financial assistance if required		3 lakh/ zone	

Note: Project costs will be ascertained in consensus with CSTF and ULB during consultation

Sl. No.	Component	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1	**Toilets**				
	(a) Household connected to sewerage toilets	No.		10,000	
	(b) Public/community toilet seats	No.		50,000	
	Total of Toilets				
2	**Decentralized Systems Sewerage**				
	(a) Sewer network	km.		1,500,000	
	(b) Decentralized treatment plants	MLD		3,000,000	
	(c) Pumping stations, where required	Lump-sum			
	Total of Decentralized Systems				
3	**Central Sewerage Systems**				
	(a) Sewer network	km.		2,500,000	
	(b) Main and intercepting sewers	km.		5,000,000	
	(c) Pumping system	Lump-sum			
	(d) Sewage treatment plants	MLD		5,000,000	
	Total of Central Sewerage Systems				
4	**Storm Water Disposal System**				
	(a) Secondary and tertiary roadside drains	km.		1,500,000	
	(b) Improvement to primary drains	km.		5,000,000	
	Total of Storm Water Disposal System				
5	**Repairs and Upgrading Existing**				

	Sanitation Facilities of				
	(a) Public toilets	Lump-sum			
	(b) Existing sewer network	Lump-sum			
	(c) Existing built-up drains	Lump-sum			
	Total of Upgrading and repairs				
	Total Estimated Investment Cost				

Note: Project costs will be ascertained in consensus with CSTF and ULB during consultation

Project name	**Project components**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-20**	**2020-25**
Open defecation free status		√					
Improving collection system	Designing and implementing strategy for door-to-door collection, source segregation, collection bins, septage management.	√	√	√	√	√	√
Public awareness and communication	Designing and implementing strategies and campaigns.	√	√	√	√	√	√
Secondary collection & transportation	Vehicle Tracking System, Vehicle Fleet, Transfer Station			√	√	√	√
Setting up waste processing facility	Vermi-composting	√	√	√	√	√	√
Sanitary landfill facility	Construction and land development	√	√	√	√		
Institutional Strengthening and Reforms	Training and capacity building, Levy of user charges, creation of separate units	√	√	√	√	√	√

9 ANNEXURE

Annexure 1: CSTF Constitution

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No. MCC/SE/JnNURM/2010-11/೧೪ Date: 22.11.2010

MEMORANDUM

Sub: Constitution of City Level Task Force
Ref: 1. GO No. UDD 145 CSS 2010, Bangalore, Dated, 10.08.2010

PREAMBLE:

Government of India has adopted the National Urban Sanitation Policy with effect from October – 2008. One of the major activities envisaged under this policy is preparing state sanitation energy and city sanitation plan. In this regard Government of India has given sanction for development of city sanitation plan for city corporations in the state.

As per orders of Government of Karnataka, under ref (1), a City Level Task Force is constituted comprising the following members, under the chairmanship of commissioner, Mysore City Corporation.

1. Commissioner, MCC, Mysore	Chairman
2. JDTP, MCC, Mysore	Member
3. Executive Engineer, KUWS & DB, Mysore	Member
4. Executive Engineer, KSCB, Mysore	Member
5. Sri. Kulkarni, Bhageerath NGO, Mysore	Member
6. Ms. Brunda Gowrav, RA, CMAK	Member
7. Sri. BM Sadashivaiah, Asst Prof. Dept. of Environmental Engineering, SJCE, Mysore	Member
8. Health Officer, MCC, Mysore	Member Secretary

The committee shall meet periodically and oversee the implementation of city sanitation plan guidelines issued by GoI from time to time.

Commissioner
Mysore City Corporation
Mysore

Copy to all members of the committee

The Corporation of the City of Mysore, Sayyaji Rao Road, Mysore - 570 024, Karnataka State, India
Ph. : 0821-2418807 / 08 / 09 / 10 Fax : 0821-2529133 www.mysorecity.gov.in

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No. MCC/SE/JnNURM/2010-11/1139 Date: 22.11.2010

To
The Commissioner
Directorate of Municipal Administration
Bangalore

Sir, 10141

Sub: Formation of City Level Task Force
Ref: 1. GO No. UDD 145 CSS 2010, Bangalore, Dated, 10.08.2010
2. DMA/Dev/CR-272/2009-10 Dated: 16.11.2010

26 NOV

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1. Commissioner, MCC, Mysore	Chairman
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6. Ms. Brunda Gowrav, RA, CMAK	Member
7. Sri. BM Sadashivaiah, Asst Prof. Dept. of Environmental Engineering, SJCE, Mysore	Member
8. Health Officer, MCC, Mysore	Member Secretary

The committee shall meet periodically and oversee the implementation of city sanitation plan guidelines issued by GoI from time to time.

Thanking you,

Yours faithfully

Commissioner
Mysore City Corporation
Mysore

The Corporation of the City of Mysore, Sayyaji Rao Road, Mysore - 570 024, Karnataka State, India
Ph. : 0821-2418807 / 08 / 09 / 10 Fax : 0821-2529133 www.mysorecity.gov.in

Annexure 2: CSTF Orientation Workshop

Venue: Conference Hall, City Corporation Office, Mysore
Date and Time: 25th January 2011 | 11:00 AM

The workshop started with a welcome speech by Sri. K. S. Raykar, Commissioner City Corporation, Mysore and Sri. Sandesh Swamy, Mayor, Mysore. The agenda listed the need for the constitution of CSTF members and their role in the preparation of City Sanitation Plan followed by the group activity among the CSTF members to seek their views on the problems and solutions in regard to the sanitation in their respective city, as given below. There were approximately 45 participants during the CSTF workshop including Mayor, Deputy Mayor, Commissioner, Environmental Engineers, Health Officers, CO-SJSRY, CAO-SYSRY, Corporators, ASCI's team, CMAK and NGO Bhageerath. The discussions on the various issues were noted and relevant inference was drawn. The session concluded by the team of ASCI with a thankful note.

Agenda of the CSTF workshop

Session theme	Resource person
Registration	
Welcome and Introductory remarks on the functioning of CSTF for the preparation of CSP for Mysore City Corporation	Chairman, CSTF
City Sanitation Plan – Process and key issues followed by the discussions and queries from the CSTF members regarding CSP	ASCI
Sanitation priorities - Discussion	Moderated by ASCI
Work plan and way forward	ASCI

GROUP ACTIVITY

GROUP I: Solid Waste Management

Issues

1. Instruction to public regarding proper segregation of waste.
2. Training of staffs for segregation of waste is very important.
3. Existing GPRS technology does not have regular monitoring.
4. Inadequate safety measures for the staff.
5. Time to time collection of waste is lacking.
6. Organic waste segregation can be improved.
7. Waste from apartments/hotels/hospitals waste should be kept separately.
8. Lack of vehicles for collection of waste.
9. Covering of vehicles carrying waste.
10. No proper land/space to dump solid waste.
11. Single door containers are not made available.
12. Training for pourkarmikas regarding waste handling is lacking.
13. No proper roads condition near the excel plant.
14. Supply of disinfectants for mosquitoes and other insects is inadequate.

Solutions

1. More number of staffs should be kept for proper management of waste.
2. Municipalities should provide two separate bags for collection of waste.

3. Workshop/training should be conducted on regular basis.
4. Staff list should be checked by the supervisors.
5. Containers to collect the waste bags to be supplied in large quantities.
6. Waste collection timings should be strictly maintained between 7-9 AM
7. Separate counter for vehicles and maintenance with good transportation network.
8. New areas should be indentified within the city as secondary waste collection point to dump solid waste.
9. Staff ID should be given with photos.
10. Dead animals should be immediately disposed and treated before it creates nuisance.
11. Scientifically disposal and treatment of waste is important.
12. Excel plant: the roads must be repaired and broaden for easy access to the dump site.

Other suggestions and views expressed by the CSTF members

1. Capping of existing landfill sites
2. At source segregation of waste for better management and treatment for all the wards
3. Only 20% of the waste is segregated
4. New landfill site needs to be proposed as the surrounding area is developed
5. Source segregation and de-centralization is good, but care should be taken through supervision by ULBs. Better strategy should be made to identify various plans following solutions
6. Regularizing government rules and to be implemented properly. SWM rules should be strictly envisaged in coordination with RWA, SHG, etc. Implementation of IEC for safe disposal of SW
7. Awareness among the public can be created only through the ULB

GROUP II: Waste water

1. Open UGD pipes should be linked to nearest man hole and broken pipes should be replaced/repaired
2. UGD facilities should be provided in slums so as to avoid the toilet water mixing with drainage/water pipes
3. Missing link should be found. If necessary, the whole system need to be re-modelled
4. The drinking water pipe connection is closely kept near the UGD, identify these close links and replace at a better distance.
5. Regular monitoring and maintenance of overflowing manholes.
6. UGD pipe lines should be connected to manhole from soak pit
7. Open defecation should be stopped/reduced by giving IEC
8. Efficient operation and maintenance of UGD lines
9. The design of UGD is not according to the demand
10. Treated water has to be reused in parks, industries, etc.
11. UGD pipelines are laid under JNNURM project and frequent IEC program is under progress
12. Regularise the illegal connections.
13. The pump used to pump waste water from soak pit to STP is in bad condition, thus the waste water is let to open drains and nearby water bodies. Thus, stand by motors are important.
14. Regular cleaning of soak pit, septic tank needs to be done.
15. Tourist places needs public toilet facility
16. Any new development needs to be planned by understanding demand based approach
17. Link pipes/main pipes must be laid keeping in mind the future demand approximately for 10 year plan.

GROUP III: Water

Issues

1. Drinking water contamination and leakage of drinking water
2. Mismanagement of drinking water
3. Contaminated borewell water supply and microorganisms found in the supplied water
4. Lack of man power
5. Difficulty in collecting water cess/tax.
6. Illegal connections
7. Public irresponsibility
8. Irregular in cleaning of tanks
9. Lack of exposure/awareness on rain water harvesting

Solutions

1. UGD lines and drinking water lines should be at 1 m distance to prevent water contamination.
2. Leakage should be taken immediate action adopting quality pipes.
3. Time to time supply of water by having control on the gate wall.
4. Storage of water in overhead tanks to avoid wastage of energy.
5. Regular quality check, cleaning of tanks and monitoring of drinking water.
6. Treatment of water needs to be done immediately after identifying microorganisms.
7. Efficient manpower to appoint staff for water supply.
8. Public awareness for adopting meter system.
9. Awareness needs to be conducted for paying tax/water bills/Cess.
10. Installation of meters for every single connection.
11. Implementing rain water harvesting system.

Picture 27: Pictures of the workshop

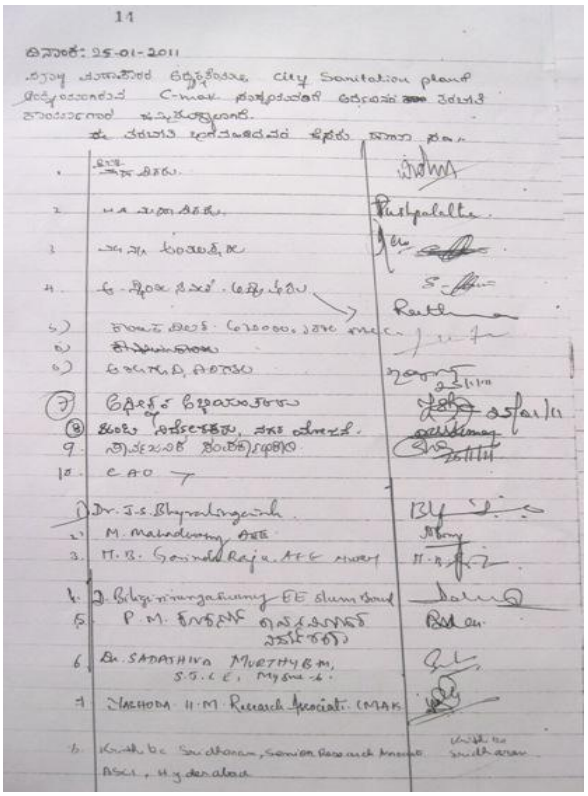
Welcome speech by Sri. K.S. Raykar, Commissioner City Corporation, Mysore and Sri. Sandesh Swamy, Mayor, Mysore

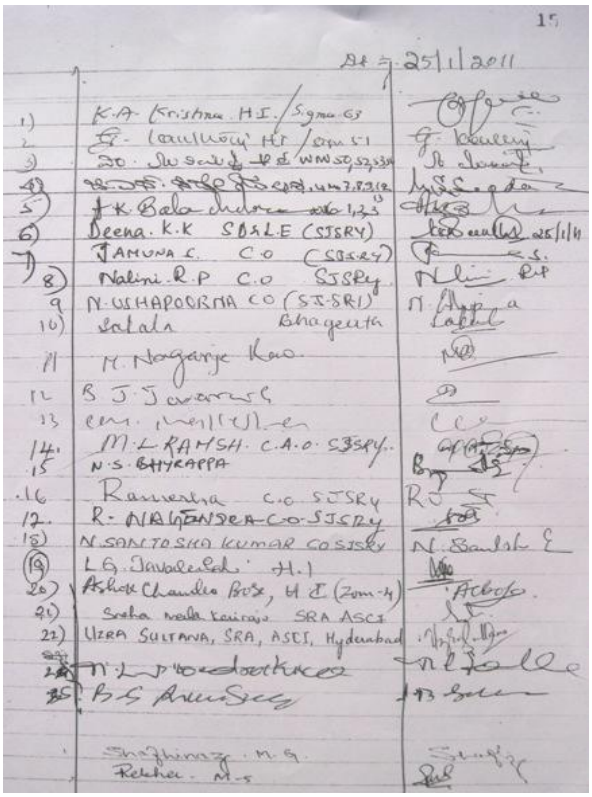
Group activity

Group activity

Group activity

Registration form of the CSTF orientation workshop | Mysore





Annexure 3: CSTF 2nd Round Meeting

Venue: Conference Hall, Mysore City Corporation
Date & Time: 5th April 2011 | 4:00 PM

The meeting commenced with the welcome address to all the CSTF members by the Nodal Officer Sri. Shashi Kumar, Joint Director, Town Planning Department, Mysore City Corporation, Mysore for preparation of CSP. Sri. K.S. Raykar, Commissioner, Mysore City Corporation, Mysore welcomed representative of ASCI, Hyderabad and CMAK, Bangalore. The Commissioner addressed the purpose of the meeting by giving an overall scenario of preparation of CSP and the city sanitation ranking where Mysore holds the 2nd rank at national level.

The presentation on the progress status was made by Ms. Uzra Sultana, Senior Research Associate, ASCI, Hyderabad. The presentation basically aimed in making the CSTF members understand the importance of their involvement during the preparation and finalization, process and methodology, data gaps and support required for the preparation of CSP for Mysore city. The scope for further city's development and performance on sanitation issues was also discussed.

Agenda of the CSTF meeting

Topic	Resource person
▪ Welcome address	**Mr. Shashi Kumar**, JD(D), Town Planning, Mysore City Corporation
▪ Introductory remarks on importance of CSP	**Mr. K.S. Raykar**, Commissioner, Mysore City Corporation
▪ Present status of CSP ▪ Process of CSP and way forward ▪ Discussions on data formats of Mysore City	**Ms. Uzra Sultana**, Senior Research Associate, ASCI
▪ Group discussions	**CSTF members**

The following are the key issues incurred during the meeting:

1. The Commissioner, MCC, raised issues on lakes with in the limits of MCC namely Demnoor kere, Karanji kere, Kupanahalli kere and Delanikere facing poor quality due to untreated sewage entering into the water bodies. Hence suggests considering this fact during the planning of CSP.
2. The CSTF meeting lacked elected representatives/councils in the CSTF members.
3. One of the CSTF members raised an issue on the primary survey of 2.5% of the total population as per 2001 census being less and needs to consider population of 2011.
4. The MCC has identified 29 clusters within the city and surveyed around 8900 households which completely lack UGD connection. The sewage in these households is let directly to the open nallas or let into open drains.
5. Initiatives taken on the low scored marks under the indicators of City Sanitation Ranking:
   a) *Access and use of toilets for floating and institutional populations*: Under Public Private Partnership (PPP) model construction of 42 toilets has been initiated with complete inspection and will be commenced by May 2011.
   b) *Proportion of total black waste water generation that is treated and safely disposed off*: Discussions has been done. Expecting funds for the implementation of work from the CMs 100 crores fund.

c) *Proportion of treated water that is recycled and reused for non potable applications*: Forest Department is taken to recycle some amount of waste water. The recycling is not happening at large scale due to high cost of capital investment.

d) *Proportion of total solid waste generation that is regularly collected*: The landfill site is being improved on the treatment of solid waste collected. The Government of India has approved to get laborers for working on the management of solid waste.

e) *M&E systems are in place to track incidences of open defecation*: 42 public toilets are being constructed. Only some clusters in the city experiences open defecation. Mobile sanitation is being planned to introduce in the city.

6. The construction of toilets is not a problem in the city but the operation and maintenance (O&M) is difficult.
7. It is decided to involve a representative from the Railway-DRM to participate in the CSTF meetings henceforth as the problematic areas of open defecation is identified mostly on the railway tracks.
8. District level officers has done a detailed survey on status of Schools and come up with a comprehensive report.
9. CSTF member suggests using Remote Sensing technology to plot UGD connections for the entire city.
10. Commissioner suggests strengthening the sustainable issues and its holding capacity needs for all the ongoing programs like JUSCO, NURM, etc.
11. Lake restoration and storm water drain maps were prepared under the Asian Development Board (ADB) funded project.
12. Commissioner explained the web based project management taken up by the Mysore City Corporation. The project includes the status of activities on the infrastructure development of the city. The web based project is categorized into **Red** (To be commenced), **Yellow** (Ongoing) and **Green** (Complete) displaying the status on clicking on the ongoing works.
13. The leakages of the drains are being identified and estimates are being prepared.
14. The tariff for the water supply to the households has to be fixed depending on the location from the water supply sources.
15. The MCC has initiated to interact with the public by distributing post cards to express their views of water supply and sanitation problems and its improvement. But MCC did not get proper response from the public.
16. The MCC has been selected for the Under Ground Utility Mapping.
17. The 3rd round of CSTF meeting has been tentatively scheduled on 2nd May 2011 by the Commissioner, Mysore City Corporation.

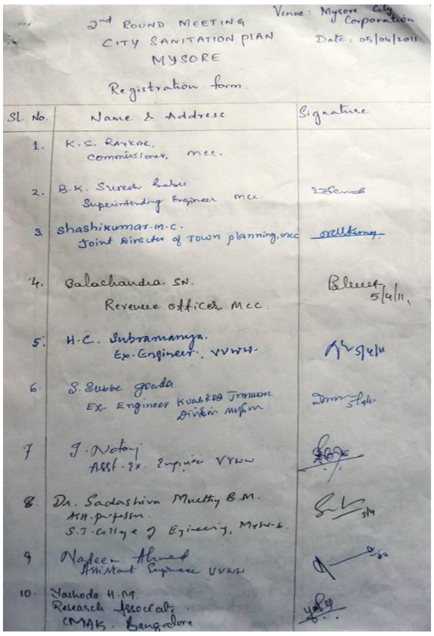
The meeting concluded with a vote of thanks by the Nodal Officer, Mr. Shashi Kumar, Town Planning Department, MCC, to all the CSTF members for having participated in the discussions and sharing their experience with valuable suggestions. A thankful note was extended to the presenter from ASCI for giving the update of the preparation of CSP for Mysore City. The discussions were interactive and the involvement of the CSTF members was appreciative.

Picture 28: Photos of the 2nd round CSTF workshop

Sri. K.S. Raykar, Commissioner, MCC welcoming the CSTF members with the introductory remarks on importance of CSP

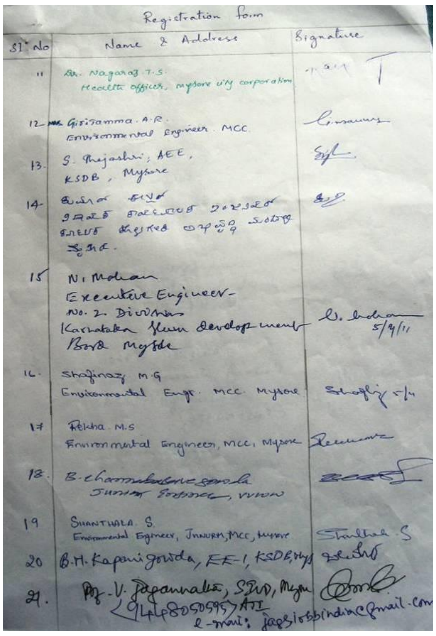
Interactive session during the CSTF workshop

Registration form | 2nd round CSTF meeting, Mysore



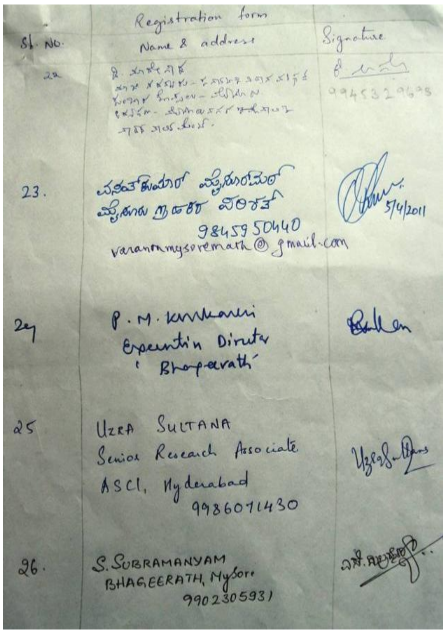
2nd ROUND MEETING
CITY SANITATION PLAN
MYSORE
Venue: Mysore City Corporation
Date: 05/04/2011
Registration form

Sl. No.	Name & Address	Signature
1.	K.S. Raykar, Commissioner, MCC.	
2.	B.K. Suresh Babu, Superintending Engineer MCC	
3	shashikumar.M.C. Joint Director of Town planning, MCC	
4.	Balachandra. SN. Revenue officer. MCC	5/4/11
5.	H.C. Subramanya. Ex-Engineer. VVWW.	5/4/11
6	S. Subbe gowda Ex- Engineer Kwsd&D Division Mysore	
7	J. Natraj Asst. Ex. Engineer VVWW	
8.	Dr. Sadashiva Murthy B.M. Asst. professor S.J. College of Engineering, Mysore.	5/4
9	Nadeem Ahmed Assistant Engineer VVWW	
10.	Yashoda H.M. Research Associate CMAK. Bangalore	



Registration form

Sl. No	Name & Address	Signature
11	Dr. Nagaraj T.S. Health officer, mysore city corporation	
12	Girijamma A.R. Environmental Engineer MCC	
13.	S. Rajashri; AEE, KSDB, Mysore	
14.	[illegible]	
15	N. Mohan Executive Engineer- No. 2. Division Karnataka Slum Development Board Mysore	5/4/11
16.	Shafinaz M.G Environmental Engr. MCC Mysore	5/4
17	Rekha M.S Environmental Engineer, MCC, Mysore	
18.	B. Chamundeswari gowda Junior Engineer, VVWW	
19	Shanthala. S Environmental Engineer, Junior, MCC, Mysore	
20	B.H. Kapanigowda, EE-1, KSDB, Mys	
21.	Dr. V. Jagannatha, SPD, Mysore (9448050995) AII e-mail: jagsie@indiainfo.com	



Registration form

Sl. No.	Name & address	Signature
22	[illegible]	9945329695
23.	[illegible] 9845950440 varanamysoremath@gmail.com	5/4/2011
24	P.M. Kulkarni Executive Director 'Bhageerath'	
25	Uzra Sultana Senior Research Associate ASCI, Hyderabad 9986071430	
26.	S. Subramanyam Bhageerath, Mysore 9902305931	

Annexure 4: Data Formats

Table 1: Details of ULB

Name of the ULB:
Address:
Area:
Population:
No. of wards:
Please attach organizational structure of the ULB:

Table 2: Summary of growth trends

Sl. No	Year	Total population	Total households	Area (sq. km)	Total BPL population	Total slum population	Total slum households	Area of slums (sq. km)
1	1961							
2	1971							
3	1981							
4	1991							
5	2001							
6	2011							

Note: The figures for 2011 will be estimated figures, while the 1961- 2001 figures should be taken from the Census.

Source:

Table 3: Ward wise demographic details

Ward No.	Area *(sq.km)*	Population *(nos.)*	Households *(nos.)*

Table 4: Ward wise details of number of properties in different types

Ward No.	Residential	Commercial	Institutional	Govt. Schools	Govt. Hospitals	Other Govt. health institutions	Slaughter houses	Industries

Table 5: Ward wise slum details

Ward No.	Slum name	Slum area (sq. km)	Type of slum (notified, non-notified)	Slum population	Slum households

Base Maps

1. Map showing ward boundaries, population density
2. Map showing zone wise boundaries

3. Map with location of notified and non-notified slums
4. Master plan (old and new)
5. Transportation network map
6. Map showing location of different types of areas by activities/Land use (industries, commercial activity, recreational activity)
7. Map showing location of public and community toilets
8. Map showing open defecation areas / Septage disposal sites.
9. Map of DTD routing and Location of solid waste dumping grounds and compost yards
10. Location of sewerage network, STPs and outfall points
11. Maps showing water supply network
12. Map of storm water drainage network / drain out falls
13. Map showing location of water bodies
14. Location of slaughter houses
15. Maps showing low lying and water logging areas

Table 6: List of secondary data /reports

CDP		
Master Plan		
DPR's	Water Supply	
	Solid Waste Management	
	Storm Water Drains	
	Sewerage	
	Poverty Alleviation Programmes	Ex: SJSRY, , IHSDP, BSUP, State level programmes (Kanshi Ram Awas Yojana, Indiramma)
	Various ongoing schemes and its current status	Ex: JnNURM, UIDSSMT, ILCS, RAY, etc
Other reports		
• Municipal finance details • Pollution Control board, • Environment Status report • Data of water bodies and extent of pollution • Census, NSSO, • Human Development Report • District handbook • Manual and codified procedures for sewerage, septage, drainage and SWM • Status of State/ULB Act provisions for punishments/fines for littering and letting out waste and excreta in the open • Implementation of above rules in practice • Instances of fines in the last one year • Reports on water borne diseases, annual occurrences, mortality and morbidity, and other diseases • Reports of IEC work done by the ULB or any other agency		

Table 7: Ward wise details of toilets for non-slum areas

Ward No.	Non slum population	Non slum HHs	Own septic tank/flush latrine	Own dry latrine	Shared septic tank/flush latrine	Shared dry latrine	Community septic tank/flush latrine	Community dry latrine	Open defecation

Table 8: Ward wise details of toilets for slum areas

Ward No.	Slum name	Slum type *(Notified /Non Notified)*	Population	HHs	Own septic tank/ flush latrine	Own dry latrine	Shared septic tank /flush latrine	Shared dry latrine	Community septic tank/flush latrine	Community dry latrine	Open defecation

Table 9: Ward wise details of type of toilets outlets

Ward No.	Toilets connected to septic tanks with soak pits	Toilets connected to septic tanks without soak pits	Toilets connected to open nallas	Toilets connected to UGD	Length of UGD (km)	Area covered by UGD (%)	Properties covered by UGD (%)

Table 10: Financial details of sewerage system

Particulars	Value	Remarks
1. No of customers being charged for sewerage services		
2. Connection fee (one-time) to connect to system (Rs.)		
3. Average monthly tariff (Rs. per connection)		
4. Annual demand for sewerage tariff (Rs.) - last year data		
5. Annual collection for sewerage tariff (Rs.) - last year data		
6. Personnel expenditure charged to sewerage system (O&M, Rs.)		
7. Other Expenditure charged to sewerage system (O&M, Rs.) - last year data		
8. Percentage of total water and sanitation budget spent on Sewerage System (O&M, Rs.)		

Table 11: Ward wise numbers and percentage of floating population

	Ward population	No. of people visiting town every day by ward	Percentage to ward population	Areas and localities of visiting	Reasons for visiting	Remarks

Table 12: Access to public toilets in commercial areas and public places

Ward No.	Name of area	Location of public toilet	No. of toilet seats		Number of persons using	Type of management	Remarks
			Ladies	Gents			

Table 13: Details of community toilets in residential / slum areas

Ward No.	Name of slum /area	Location	No. of toilet seats			No. of HHs using	Whether pay & use (Y/N)	Price per use urinal (Rs.)	Price per use defecation (Rs.)	Price per use bath (Rs.)	Type of management	Working /Not working
			Ladies	Gents	Children							

Table 14: Ward wise details of septic tanks, pits and their cleaning procedures

Ward No.	No. of septic tanks	Clearing Procedure a).Manual b).Motorized	Interval of cleaning	Quantity of sludge (litres)	Monitoring present (Y/N)	No. of Pits (specify -Single or double)	Clearing Procedure a).Manual b).Motorized	Interval of cleaning	Quantity of sludge (litres)	Monitoring present (Y/N)

Table 15: Sludge/septage equipment and management

No.	Indicator	Municipality Owned	Private Agencies	Remarks
A	***Equipment Available***			
1	No of Sludge Suction trucks/equipment			
2	Annual No of tanks cleaned - last year's estimate			
B	***Cleaned using mechanical equipment***			
3	Estimated Volume (ML) cleaned last year			
4	Method of Conveyance and Disposal: Untreated			
5	Amount Disposed Untreated (ML) - last year's estimate			
6	Location of disposal - untreated			
7	Method of Conveyance and Disposal: Treated			
8	Amount Disposed Treated (ML) - last year's estimate			
9	Location of disposal - treated			
10	Cost per tank cleaning			
C	***Manual Cleaning of Tanks and Pits***			
11	Estimate Annual No of Tanks cleaned - last year's average			
12	Cost per tank cleaning			
13	Method of disposal of sludge cleaned			
14	Who are the persons cleaning tanks?			

ML = Million Litres

Table 16: Ward wise details of Govt. schools and their sanitation facilities

Ward No.	School name	Category	No. of toilets		No. of toilets working		Is water supply present in toilets? (Y/N)	Toilet outlets		
			Girls	Boys	Girls	Boys		Sewerage system	Septic tanks	Open nallas
Please find attached questionnaire of school sanitation surveys										

Table 17: Ward wise details of Anganwadis and their sanitation facilities

Ward No.	Anganwadi name	Category	No. of toilets		No. of toilets working		Is water supply present in toilets? (Y/N)	Toilet outlets		
			Girls	Boys	Girls	Boys		Sewerage system	Septic tanks	Open nallas
Please find attached questionnaire of school sanitation surveys										

Information required on solid waste management facilities in the ULB

- Waste segregation, process, quantities.
- Bio-hazardous/ industrial waste quantity, treatment procedure.
- Treatment facilities, capacities, identification of dumpsites, area, no. of years of operation, present status.
- Technology of waste processing and recycling, proportion of waste that is processed & recycled
- Category wise numbers of public health workers (cadre, contractual, permanent), provision of safety equipment for them.
- Complaints redressal system, efficiency.
- SWM tariff structure.
- Future SWM projects and proposals.

Table 18: Ward wise SWM details

Ward No.	Quantity of SWM generated (MT)	Quantity of SWM collected (MT)	No. of Door-to-Door collection in HHs	Segregation practiced (Y/N)	No. of local open dumpsites

Table 19: Details of vehicles used for door to door waste collection

Vehicle type	No .of vehicles	Capacity of each vehicle *(Tons)*	No. of trips	Total waste collected *(Tons)*

Table 20: Details of vehicles used for secondary waste transportation

Vehicle type	No .of vehicles	Capacity of each vehicle *(Tons)*	No. of trips	Total waste collected *(Tons)*

Table 21: Details of waste according to different categories

Category of waste	**Quantity of waste generated** *(MT/Month)*	**Quantity of waste collected** *(MT/Month)*	**Category of waste**	**Quantity of waste generated** *(MT/Month)*	**Quantity of waste collected** *(MT/Month)*
Residential			Slaughter houses		
Commercial			Industries		
Street sweeping			Construction waste		
Market waste			Other (please specify)		

Information required on water supply system in the ULB

- Source, treatment facilities,
- Capacity, present production
- Length of distribution network, coverage
- Water quality
- Complaints redressal system, efficiency
- Water tariff structure
- Future water supply projects and proposals

Table 22: Ward wise details of water supply system

Ward No.	**No. of HHs connected to piped water**	**No. of hours per day**	**No. of HHs connected to stand posts**	**No. of hours per day**	**No. of HHs connected to tube wells/own sources and others**	**No. of bulk connections**	**No. of other properties connected to piped water system**

Information required on storm water drainage system in the ULB

- Outfall points,
- Water recycling, re-use and their technology
- Areas of flooding and water logging and no. of instances annually.
- Complaints redressal system, efficiency
- Future drainage projects and proposals

Table 23: Ward wise details of drainage network

Ward No.	**Length of drainage system (Pucca/ semi pucca/kachha)** *(km)*	**Length roads (Pucca/ semi Pucca/kachha)** *(km)*	**% of area covered**	**Volume of grey water generated** *(MLD)*	**% treated**	**Identification of problem areas**	**Functional status**	**Remarks**

Annexure 5: Methodology for primary survey

Activities	Focused areas	Tools	Methodologies
1. Household survey *(Annexure 5.1)*	Household level	Questionnaire	Case study approach – Purposive study – Random sampling
2. Institutions *(Annexure 5.2)*	Collector's office, municipal office, bus station, railway station, etc.	Questionnaire	Case study approach + Random sampling
3. Community toilets *(Annexure 5.3)*	All possible potential areas	Questionnaire + FGDs	Case study approach + Random sampling
4. Public toilets	All possible potential areas	Questionnaire	Case study approach + Random sampling
5. Hospitals	All hospitals with 100+ beds (must) or 50–100 beds	Questionnaire	Case study approach + Random sampling
6. School sanitation	Random sampling in government schools from primary, secondary and high schools.	Questionnaire	Case study approach + Random sampling
7. Slaughter houses	Potential areas	Checklist + Transect walks	Case study approach + Random sampling
8. Commercial areas/ Market places	Potential areas–include both shopkeepers and customers	Questionnaire	Case study approach + Random sampling
9. Industries	Potential areas	Checklist	Case study approach + Random sampling
10. Water bodies	-	Checklist	Case study approach + Random sampling
11. Communication Need Assessment through Focused Group Discussions	Slum areas, residential areas, elected representatives & other potential areas	Checklist + Transect walks*	Case study approach + Random sampling
12. Secondary surveys	-	Checklist	Checklist
13. Sanitation rankings	-	19 Parameters	Field observations

Transect walks involve a walk through the settlement existing sanitation services accompanied by a small and an initial understanding of number of key informants the condition from the from the community. It provides an introduction to existing sanitation services and an initial understanding of the condition from the perspective of local residents.

Annexure 5.1: Household survey

Basic information

1. Town/City:	2. Date:	
3. Ward No :	4. House No:	
5. Religion:	6. Caste:	
7. Education status:		
8. Respondents gender:	Male ☐	Female ☐
9. Slum	Yes ☐	No ☐
10. If yes, slum name	Notified ☐	Non notified ☐
11. (i) Head of the household (Name):	Male ☐	Female ☐
(ii) Building plan approval	Yes ☐	No ☐
12. Accommodation	Own ☐	Rented ☐
13. Total members (Put number in front of male and female)	Male ☐	Female ☐

Sanitation arrangement

14. Type of Toilet	a. Household	b. Public toilet	c. Community toilet
	d. Shared (No .of HH)	e. Open defecation	
15. If, household or shared facility, Latrine type	1. Service latrine	a. Night soil lifted by scavenger	b. Night soil serviced by animal
	2. Unimproved pit latrine	a. Fill and shift type without any outlet	b. Connected to river/drain/pond/nalla
	3. Dry pit latrine (without water seal)	a. Yes	b. No
	4. Pour flush Pit Latrine	a. Single Pit	b. Two pit
	5. Water Closet	a. Connected to Sewer	b. Connected to septic tank and soak pit
		c. Connected to septic tank without soak pit and flowing to public drain	

16. If water closet connected to Septic Tank	Month and Year of last cleaning:		
	Is it constructed as per approved plan:		
	Is the building plan approved by Municipality:		
	Cleaned by:		
	a. Municipality	b. Private Sweepers:	c. Cost of cleaning toilet
	Frequency of cleaning		
	a. Less than 6 months	c. Once in a year	
	b. Once in 6 months	d. Once in two year	
	Whether the soakpit is working in all seasons		a. Yes b. No
	Where do you dispose the septic tank waste:		
	Is septic tank constructed as per building plan approval:		a. Yes b. No
17. In case of Dry Pit Latrine/unimproved pit latrine	Year of construction:		
	Do you experience overflowing		a. Yes b. No
	Month and Year of last cleaning:		
	Other problems faced by dry pit latrine	a. Odour,	c. hygienic issues
		b. Fly nuisance	d. cleanliness
	Reason for not upgrading:		
18. Water supply to toilet	a. Stand post:	b. Own Arrangement:	
	c. Municipal Supply	d. Hand pump	
19. If Municipal Supply	a. Adequate:	b. Not Adequate:	
20. If, Community /Public, Who in family uses it?	a. All members	b. Only Adult Men	
	c. Only Adult Women	d. All Adults	
21. No. of people using the community toilet	a. 10-20	b. 20-30	c. 30-40
	d. 40-50	e. 50 and above	
22. No. of seats	a. Less than 10	b. 10-15	c. 15-20
	d. 20-30	e. 30 & above	
23. Condition of the toilets	a. Good	b. Average	c. unusable
	d. Not in use		
24. Payment arrangements for community toilets	a. Pay and use (Every use)	b. Monthly family pass	c. Free of cost

25. Charges	a. 50 paise	b. Rs 1-2	c. Rs. 2-3
	d. Rs 3 and above	e. Monthly pass 1. Less than 20 2. 20-30 3. 30-40	
26.Are you satisfied with present arrangement	a. Yes	b. No	
27. If No state reasons* (tick all possible options)	a. poor maintenance	b. corruption	c. lack of facilities
	d. Other, Specify		
28.Why you have not constructed toilet (Applicable if Q 14-15 are answered)	a. Affordability to construct toilet	b .Affordability of connecting to sewer network	c. Uncertainty over land and tenure
	d. Space Constraints	e. Low priority given to sanitation (awareness)	f. Lack of water
	g. Lack of know how	h. Any other	
29.What facility would you prefer over open defecation (Applicable if Q 14-15 are answered)	a. Household latrine (types):	b. Pour flush twin	c. pit/Septic tank with soak pit/ others
	d. Public	e. Community Toilet	
30.In case of Public/Community Toilet; willing to pay for use	a. Yes	b. No	
31. If Yes, How much? (Rs)	a. 50 paise	b. Rs 1-2	c. Rs. 2-3
	d. Rs. 3 and above	e. Monthly pass 1. Less than 20 2. 20-30 3. 30-40	
32.Disposal of household waste water (from kitchen, bath and wash other than latrine)	a. Discharged to river/pond/nalas	b. Reuse in the garden after passing through soak pit	c. Directly to public drain
	d. Both a & b		
33. Were you affected by any diseases in last six months	a. Yes (specify when)	b. No	
34. What type of disease	a. Amoebic dysentery	b. Cholera	c. Diarrhea
	e. Malaria	f. Skin disease	
35. Expenditure towards health (Monthly):			
36. Do you know that good sanitation is linked to health:			

Solid Waste Management

37. Where is household solid waste disposed?	a. Disposed in Roadside Bin	b. Disposed at designated open dumping spot	c. Disposed in drain	d. Door-to-door collection	
38. Distance to Disposal Spot *(Feet)*	a. Less than 50	b. 50 to 100	c. 100 to 200	d. 200 to 500	e. More than 500
39. Does municipality carry the waste dumped in your locality?	a. Yes	b. No			
40. Do you have door to door collection?	a. Yes	b. No			
41. Frequency of collection?	a. Daily twice	b. Daily once	c. Once in 2 days	d. Once in 3 days	e. 3 days & above
42. Is the waste segregated at the source?	a. Yes	b. No			
43. Do you pay for the waste collected from the municipality?	a. Yes	b. No			
44.**How much do you pay (Rs per month)**	a. 0-10	b. 10-20	c. 20-25	d. 25-30	e. 30-35
	e. 35 and above				
45.Are you satisfied with the service	a. Very good	b. Good	c. Average	d. Bad	
46. Frequency of road sweeping	a. Daily once	b. Once in two days	c. Twice weekly	d. Once in a week	e. Irregular
47.Frequency of cleaning drains	a. Daily once	b. Once in two days	c. once in 3 days	d. once in a week	e. Irregular

Housing

48. Structure	a) Pucca	b) semi-Pucca	c) Kutcha

Flooding

49. Whether the area is prone to flooding during rains?	a) Yes	b) No
50. Frequency of flooding/Water Logging	a) During rainy season	b) Once in a while

Sewerage

51. Do you have sewer connection?	a) Yes	b) No					
52. If yes, How much do you pay?	a) 20-50	b) 50-80	c) 80-100	d) 100-130	e) 130-150	f) 150-180	g) 180 & above

Grievance redressal

53. Whom do you approach to give your complaint regarding sanitation and water supply?	a) Sanitary Supervisor	b) Corporator	c) MLA	d) NGO	e) RWA	f) others (Specify)
54. How do you make complaints?	a) Direct (By word)	b) Letter	c) Phone	d) Internet		
55.Time taken to solve the problem	1) Water leakage	a) 0-5 Hours	b) 5-10 Hours	c)10-15 Hours	d)Within 24 Hours	
	2) Solid Waste Management	a) 0-5 Hours	b) 5-10 Hours	c) 10-24 Hours	e) More than a day	
	3) Sanitation	a) 0-24 Hours	b) 2 days	c) 3 days	d) More than 3 days	
56. Are you satisfied with present system	a) Highly satisfied	b) Satisfied	c) Partially	d) Bad	e)worse	
57. Are you informed about City Sanitation if yes how?	a. Yes	b. No	How:	News paper	Advertisement	Wall poster

Suggestions:

1. Open Defecation
2. Disposal of Sludge
3. Disposal of Liquid waste (Black and grey)

Annexure 5.2: Institutions

1. Institution name		
2. Complete address		
3. Number of Staff	1 to 5 ☐ 6 to 10 ☐ 11 to 15 ☐	15 to 25 ☐ 25 and above ☐
4. Condition of toilets (Observation)	Good ☐ Average ☐	Bad ☐ Worst ☐
5. Toilet facility is provided to staff	Yes ☐	No ☐
6. Toilets provided separately for male & female	Yes ☐	No ☐
7. No. of toilets provided to male staff of the Institute	1 to 3 ☐ 4 to 6 ☐	7 to 9 ☐ Above 9 ☐
8. No. of toilets provided to female staff of the Institute	1 to 3 ☐ 4 to 6 ☐	7 to 9 ☐ Above 9 ☐
9. No. of seats available in the toilet for both the gender	1 to 5 ☐ 6 to 10 ☐	11 to 15 ☐ Above 16 ☐
10. Does the toilets have minimum infrastructure	Yes ☐	No ☐
11. If yes, what type of facilities are available	Water supply ☐ Doors with bolts ☐ Buckets ☐ Lights ☐ Tiled bathrooms ☐	Sinks are available ☐ Soaps ☐ Hand wash ☐ Anything else ☐
12. If water supply is there then what is the source	Overhead tank water ☐ Piped water ☐	Ground water ☐ Surface water ☐
13. Are they maintained well	Yes ☐	No ☐
14. Do you need to improve the toilet condition	Yes ☐	No ☐
15. Type of improvement required		
1. Cleaning		
2. Continuous water supply		
3. Maintenance		
4. Change design		
5. Upgrade infrastructure		
6. Others		
(*Note: Take a photograph of the toilets*)		

Interview with Heads		
16. Monthly / Annual budget for O&M of toilets		
17. Who is responsible for operation and maintenance?		
18. Who maintains the toilets?		
19. Are there any user charges collected	Yes ☐	No ☐
20. Other suggestions		

Annexure 5.3: Community toilets

1. Town/ City					
2. Location					
3. Maintained by/ service provider					
4. No. of toilets	Urinals ☐	Bath ☐	Washbasins ☐		
5. Male :	6. Female:	7. Children:			
8. Pay per use (In Rs)	Defecation	Urinal	Bathing		
9. No. of people visiting per day:					
10.Condition	Very good ☐	Good ☐	Average ☐	Bad ☐	Worst ☐
11. Cleaning (No. of times per day):					
12. Type of latrine					
13. Fecal sludge management a) Sewer b) Manually lifted c) Onsite treatment d) Other					
14. Effluent discharge (where does it go)					
15. O & M arrangement					

Annexure 5.4: Public toilets

1. Town/city					
2. Location					
3. Owner of the toilet					
4. Year of construction					
5. Maintained by/ service provider					
6. No. of toilet seats					
7. Number of people visiting/ using (per day)	Male:	Female:	Children		
8. Other provisions (Number)	Urinals	Bath	Washbasins		
9. Care taker	Yes ☐	No ☐			
10. Pay per use (In Rs)	Defecation:	Urinal:	Bathing:	Nothing:	
11. Basis for pay	Defecation:	Urinal:	Bathing:	Nothing:	
12. Condition	Very good ☐	Good ☐	Average ☐	Bad ☐	Worst ☐
13. Cleaning (No. of times per day):					
14. Type of latrine	Septic tank ☐		Pit ☐	Sewerage ☐	
16. Type of flush	Cistern flush ☐		Pour flush ☐		
17. Water supply	Yes ☐		No ☐		
18. Electricity	Yes ☐		No ☐		
19. Soap facility	Yes ☐		No ☐		
20. Visual appeal	Good ☐		Bad ☐		
21. Smell	No smell ☐		Bad smell ☐		
22. Leakages	Yes ☐		No ☐		
23. Fecal sludge management a. STP b. Suction vehicle c. Onsite treatment d. Other					
24. Effluent discharge(where does it go)					
25. Detailed description of O & M arrangement					
26. Description of financials for both capital and O&M costs					
27. Overall rating	Excellent ☐	Good ☐	Average ☐	Poor ☐	
28. Reasons for rating					
29. Observations on hygienic practices of care taker and user					
30. Any other observations/ Remarks					

Annexure 5.5: Hospitals

1. Name of the Hospital			
2. Location			
3. Capacity (Beds)			
4. Services provided			
5. Quantity of solid waste produced by hospital (Kg)			
6. Quantity of liquid waste produced by hospital (Litres)			
7. Is colour coding done for the waste produced	Yes	No	
8. What is the arrangement for disposal of BMW	Municipality	Private	Own arrangement
9. If it is private, how much do you pay?			
10. Is there a system of segregating biodegradable and non biodegradable wastes	Yes	No	
11. Is the system of disposing biomedical waste is in accordance with Biomedical Waste (Management & Handling) Rules, 1998 and amendments		Yes	No
12. Frequency of collection and disposal BMW (Hours)			
13. How is the liquid BMW is disposed, Such as Blood, Mucus, Secretion and urine			
14. Is there a mechanism for management of sludge from hospital cesspools?	Yes	No	
15. If yes, please explain			
16. Is there any decentralized waste water treatment	Yes	No	
If yes, give details			
a. Capacity of plant			
b. What type of treatment			
c. Discharge after treatment (COD level after treatment)			
17. Details of service provider and location of plant			
18. Description of treatment process			
19. Any other observations			

Annexure 5.6: School sanitation

a. Basic Information	
Name of the Respondent: Male/Female Student □ Teacher □ Principal □ Others □	
Name of the School **I.** **II.** **III.**	**Ownership of School Building:** Own □ Rent □
Address and location	**Landmark**

2	**Strength**	
(a)	No. of Students	Girls ☐ Boys ☐
(b)	No. of Teachers	Female ☐ Male ☐
(c)	No. of other Staff	Female ☐ Male ☐

3(a)	**Students**														
	No. of Urinals								**No. of WCs**						
	Total requirement		Presently existed				Balance to be constructed		Total requirement		Presently existing		Balance to be constructed		
			o.k		Under repairs										
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	

3(b)	**Teachers**														
	No. of Urinals								**No. of WCs**						
	Total required		Presently existed				Balance to be constructed		Total requirement		Presently existing		Balance to be constructed		
			o.k		Under repairs										
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	

3(b)	**Other staff**														
	No. of Urinals								**No. of WCs**						
	Total required		Presently existed				Balance to be constructed		Total requirement		Presently existing		Balance to be constructed		
			o.k		Under repairs										
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	

4	Does the school have a waste water disposal (Other than WC water)		
5	Toilets Connected to: Septic Tank □ Sewerage □ Open drains □ Not connected □		
6	Is the toilet properly ventilated?	**Yes**	**No**
7	Is the toilet tiled?	**Yes**	**No**
8	Does the toilet has electricity connection?	**Yes**	**No**
8(a)	If yes, is it working?	**Yes**	**No**
9	Does the school have water connection?	**Yes**	**No**
10	Are there other sources of Water Supply? Borewell □ Tankers □ Others (specify) :		
10 (a)	Is there a facility for water storage? **Yes/No** Overhead Tank □ Sump □ Filled into Barrels/Drums □		
11	Is there flowing water in the toilets?	**Yes**	**No**
12	Is the toilet in working condition? (No Blockades, Usable)	**Yes**	**No**

12 (a)	If no, Reasons: No Water □ Damaged Door □ Bolt broken inside the toilet □ Others(Specify) :		
13	Is Toilet cleaned regularly?	**Yes**	**No**
13 (a)	If so, what is the interval? a) Twice in a day b) Once in a day c) Once in 2 days d) Others(specify):		
15	Who is in-charge of O&M of Toilets? Contractor □ Out sourced □ School Employees □ Others(specify):		
16	Budget allocated for O&M of Toilets Rs……..		
16 (a)	Source of Budget Funding SSA □ Parents □ State Government □ No specific allocation □ Others(Specify) :		
17	Generally, how much is spent on O &M of Toilets, Rs…….. /year		
18	Is there sanitary and hygiene education in this school?	**Yes**	**No**
18(a)	If yes, Special Classes□ Topics in Curriculum□ Others(specify):		

	Drop-out ratio of students	**Drop-out rate**	**Diseases reported**	**Enrollment rate**	**Drop-out rate**	**Diseases reported**	**Enrollment rate**
19		Boys			Girls		
	2007-08						
	2008-09						
	2009-10						

Note: No. of Drop outs on a record basis **(or)** Strength of the students in the respective years.

20	Any improvements made to the toilets during the last three years. Details:
21	When is the potable water stored tank cleaned? Monthly□ 2-6 Months□ Biannually□ Annually□ Others(Specify):
21 (b)	Is the school constructed after taking building plan approval? Yes / No
22	Where is solid waste in the school disposed? At Roadside bin□ Open site□ In drains□ D-D collection □ Others(Specify) :

B. Perception survey

Principal:			
1	Do you use toilets?	**Yes**	**No**
a	If no, Where do you go by? a) Your home is nearby□ b) to neighbor's home □ c) don't drink water □ d) open defecate □ d) others (specify):		
2	Are students allowed to leave in the mid of the classes to use the urinals?	**Yes**	**No**
3	Are students of different classes having breaks at the same time/intervals?	**Yes**	**No**
4	Do you feel any students having dropped out or frequently fallen sick & away from school days due to poor sanitation?	**Yes**	**No**
5	Other Concerns/issues in maintenance of toilets?		
Teachers:			
1	Do You use the toilets?	**Yes**	**No**
a	If no, Where do you go by? a) Your home is nearby□ b) to neighbor's home □ c) don't drink water □ d) open defecate □ d) others (specify):		
2	Do you feel any students having dropped out or frequently fallen sick & away from school days due to poor sanitation?	**Yes**	**No**
3	Have you seen any teacher transferred to another school due to poor sanitation?	**Yes**	**No**
4	Other Concerns/issues in maintenance of toilets?		
Students:			
1	Do You use the toilets?	**Yes**	**No**
a	If no, Where do you go by? a) Your home is nearby□ b) to neighbor's home □ c) don't drink water d) open defecate e) others (specify):		
2	Do they wash their hands after they go to toilets?	**Yes**	**No**

3	Are you allowed to leave in the mid of the classes to use the urinals?	**Yes**	**No**
4	Are different classes having breaks at the same time/intervals?	**Yes**	**No**
5	Have you seen any of your friends having dropped out or frequently fallen sick & away from school days due to poor sanitation?	**Yes**	**No**
6	Other Concerns/issues in maintenance of toilets?		

Girl Students:			
1	Is there arrangement for dustbin in the toilets?	**Yes**	**No**
2	Do you attend school during menstrual period?	**Yes**	**No**
3	Any special menstrual hygiene classes?	**Yes**	**No**

Annexure 5.7: Slaughter house

1. Name of the City/Town:	
2. Location of the slaughter house:	
3. Year of construction:	
4. Condition of the slaughter house (to be written by observation):	
5. Is the slaughter house managed by municipality/corporation:	
6. Is there a veterinary doctor to look after the slaughter house?	
7. How many animals are slaughtered per day:	
8. Does the veterinary doctor examine the animals regularly?	
9. Is there a Karmachari/worker to regularly clean the blood and other waste in the slaughter house?	
10. How frequent is the cleaning done?	
11. Waste disposal arrangement - Liquid waste 1. Open drain 2. Sewerage 3. Open place 4. Other specify	
12. Waste disposal arrangement - Solid waste 1. Open drain 2. Sewerage 3. Open place 4. Other specify	
13. Institutional arrangement for maintenance of slaughter house:	
14. Did approval of the plan taken from municipality:	

Annexure 5.8: Industries

1. Name of the Town/City:	
2. Name of the Industry	
3. Type of industry	
4. Location of the city a) Residential area b) Institution area c) Market area d) Industrial area e) Other (Specify)	
5. Size of the industry a) Small scale b) Medium scale c) Large scale	
6. Amount of solid waste generated per day?	
7. How is the solid waste managed? a) By industry itself b) By municipality c) Private agency d) Other (Specify)	
8. If it is municipality, how much do you pay per month? (Specify the amount)	
9. If it is private agency, how much do you pay per month?(Specify the amount)	
10. Is source segregation done at industry?	
11. Amount of liquid waste generated per day?	
12. How is the liquid waste managed?	
13. Treated in PTP (primary treatment plant) in the industry and left to Nalla	
14. Directly left to sewerage	
15. Directly left to Nalla	
16. Led to open place	
17. Led to a water body	
18. Is there a primary treatment plant in the industry?	
19. What is the O&M cost for maintaining PTP in the industry? (Specify the amount)	
20. Is the industry in conformity with the State and Central Pollution Control Board set parameters?	

Annexure 5.9: Water bodies

1. Type of water body : Canal / River / Pond/ Stream	
2. Map location in city/ town:	
3. Size of the water body (Area):	
4. Outfall of the water body (show in the map):	
5. Uses of the water body: Recreational/ functional/ bathing/ drain receiving point/ drinking water/ any other use	
6. OD practice near water body: Yes or No If yes, how many people (approx)?	
7. Toilet discharge : Yes or No (Estimate No. of toilets discharged)	
8. Water flow: Clogged / smooth flow	
9. Cleaning mechanism and periodicity:	
10. Water quality and pollution levels: i) Thermo-tolerant coli forms (TTC) ii) Residual chlorine iii) Turbidity iv) BOD v) COD vi) DO	
11. Who maintains and monitors:	
12. No. of people using the water body per day:	
13. Flooding in nearby areas: Yes or No If yes, what is the frequency	
14. Any back siphoning reported in toilets nearby	

Annexure 6: Communication Needs Assessment: Focused Group Discussion

The key idea is to carry out a needs assessment within the existing infrastructure as well as the strategy to go with expansion of infrastructure. Following steps were identified before visiting the field.

1. Identifying stakeholder groups and available channels of communication categorize them.
2. Focus Group Discussions, Interviews, Transect Walks.
3. Topic Guides were prepared for each stakeholder group.
4. Data collection. Field assessment of communications needs was carried out.

Stakeholders

FGDs will target the stakeholder groups e.g., residents, establishments and ULB officials. Opinion leaders also need to be targeted as a high influence group both for interviews and implementation of communications strategies. Following are the key personnel to be interviewed:

- Key officials-Commissioners, sanitation inspectors, medical/health officers,
- Councilors, Community elders,
- City media: newspapers reporters,
- RWA office bearers,
- NGOs,
- Safaikaramcharies union office bearers,
- Heads of Commercial establishments and shopkeepers, including public places such as bus stands
- Random Samples of Residents from Rich neighborhoods.
- Slum residents
- School teachers, children, employees
- Hospital employees and doctors

IEC Probes for field trip

As per the City Sanitation Rankings the **Output**, **Process** and **Outcome** indicators cover a whole range of issues such as, quality of water supply (also in non-slum areas), practices of SWM, dumping, segregation at source, collection (also in non-slum areas), ODF, types of latrines, problems and gaps. We conduct FGDs with reference to how city fared on each of these indicators.

1. Residents in slum

- Awareness regarding health and hygiene: The current level of awareness regarding ill-effects of lack of sanitation, ODF, hand washing, SWM, etc.
- Awareness regarding Government policies for improving water and sanitation: NUSP, Sources and channels of such knowledge and communication
- Awareness regarding technical options such as toilet options
- Willingness to upgrade financial and behavioral constraints
- Participation in any public awareness campaign regarding sanitation, Agencies that carried the campaign and learning's from the campaign
- Activities of local SHG's and other community organization, areas of engagement
- In non-slum areas - check for RWAs
- Media consumption patterns reading newspapers, Cable TV etc (also in non-slum areas)
- Information regarding demography of the slum (To be gathered from surveys)
- Complaint resolution system: complaints and mechanisms of resolution, how do they deal with water and sanitation crisis, approaching local corporator, complain to Municipality, Agitate

2. Municipal officials (including Safaikaramcharies)

- Role envisaged for communication for implementing NUSP.
- Channels of communication are at ULB's disposal, extent to which these channels are being exploited.
- Technological options, geographic and infrastructural issues involved in implementing water and sanitation schemes.
- M&E, feedback, support, rewards: Maintenance of citizen grievance records, discernible patterns in complaints, efficiency of complaint redressal.
- Details of any specific communication campaign being taken up, Content, Channels used, budget allocated, awareness regarding multiplying message through media.

- Kinds of training and tools are given to Safaikaramcharies for safe disposal of waste etc and their satisfaction at what has been provided.

3. Commercial establishment and Public places
- Observation regarding sanitation is these places
- Practices involved in disposal of commercial waste such as segregation, shopkeeper participation
- O&M, regular upkeep of public places

4. School sanitation
- Status of school sanitation
- Health problems
- Issues-drop out rates/ enrollment rates
- Girl children, status of SSA
- O&M problems, health problems

5. Hospitals
- Examine disposal of hazardous waste, specifically if effluents are being left into open drains
- Disease burden of the town, data from District Medical/Health Officer, information on campaigns to mitigate, budget allocated
- Disease burden, Diarrhea, GET, Cholera, Malaria, Skin problems
- Communication efforts with reference to diarrhea, malaria, etc.

6. Media persons
- Main Sanitation issues in the city
- Sanitation news stories
- Municipality PR. Who answers media enquiries?
- Municipal Advertisements in dailies.

Checklists

1. Messages: Behavior change communication for residents, sustaining behavior and attitude change, attitudes of officials. Creating awareness about health and hygiene, environmental sanitation, helping officials be good listeners, improving management within existing constraints through better communication. Developing content for manuals for best communication practices, posters etc.

2. Channels of communication: these include grievance redressal mechanism of the MC, MC's interaction with people- feedback seeking mechanisms, postures, hoardings, exhibitions, school activities, cable TV, FM Radio, Handbills, Newspapers, Street Plays, Meetings/seminars, workshops, presentations and interpersonal means.

Interpersonal means include interactive group education and door to door motivational programmes. Here the role of NGO's is important.

3. Parameters: OUTPUT, PROCESS, OUTCOME as per NUSP

Environmental sanitation
- SWM: market waste, domestic waste, waste segregation at source and at collection point, waste disposal measures
- Treatment of solid waste and dump
- Deviance on part of polluters and institutions such as hospitals
- Proportion of solid waste, grey water, black water generated that is treated and disposed safely
- ODF: public toilets, individual latrines, toilet maintenance, disposal of human waste,
- M&E to Track OD
- Check if sewage systems are working properly
- Disposal of septage
- UGS: awareness, user charges, problems
- Water bodies and quality of water in and around the city,
- Reduction in water borne diseases amongst city-population

Annexure 7: Secondary reports - Checklist

I Base Maps

1. Map showing ward boundaries with population
2. Map showing zone wise boundaries with population
3. Map with location of notified and non-notified slums
4. Map showing location of different types of areas by activities (industries, commercial activity, recreational activity
5. Map showing location of public and community toilets
6. Map showing open defecation areas / Septage disposal sites
7. Maps showing water supply network, sewerage network, storm water drainage network and SWM facilities
8. Map showing location of water bodies / drain out falls

II Secondary Information

1. District census handbook
2. Data on access to services from census and NSSO studies
3. CDP for the city
4. Master plan for the city
5. DPRs for water supply, sewerage including STPs, sanitation, storm water drainage, SWM, environment including water bodies and slum development
6. Environment status report
7. Data on number of water bodies and extent of pollution
8. Quality of water in water bodies
9. Data on extent of grey water generation, collection and treatment and a comparative assessment with sewage waste
10. Data on number of STPs, volume of waste generated and treated, extent of reuse and recycle of waste water
11. Arrangements for septage treatment
12. Data on access to toilets by type (connected to sewerage, septic tanks, pits) and by wards – in terms of households and properties
13. Data on number of notified and non-notified slums by wards along with population and access to services
14. Data on community toilets by wards and by slums
15. Data on public toilets by wards and by type of areas (residential, industrial, commercial etc.)
16. Data on manual scavenging practices and areas
17. Data on length of sewerage network and percentage of area and population covered by sewerage network by wards
18. Data on length of drainage network , types of drains, location of drainage outfalls and impact areas
19. Type of existing technological choices and feasibility of the same
20. Number of government and private primary, secondary and higher secondary schools and the sanitation status for both boys and girls in terms of number and type of toilet facilities
21. Details of hazardous, industrial, health and other types of wastes
22. Mapping of key institutions along with roles and responsibilities with a specific focus on sanitation
23. Organogram for each key institution
24. Data on programmes and schemes implemented by various institutions with special focus on ULB schemes and sanitation schemes
25. Existing regulatory arrangements for sanitation
26. Number of workers engaged in sanitation

27. Extent of cost recovery and user charges in sewerage and SWM
28. Type of O&M system
29. Monitoring and evaluation arrangements for sanitation and to track open defecation
30. Monthly collection of data on open defecation
31. Reportage on open defecation in a public forum
32. Incentives and awards for preventing open defecation
33. Complaint registration and grievance redressal mechanisms
34. Special focus on historical monuments and major recreation areas
35. Data on health indicators with a special focus on water and sanitation related diseases and incidence of diarrheal diseases reported in the city over the last three financial years
36. Data on drinking water quality
37. Roles of NGOs
38. Collection of existing IEC materials including news paper clippings
39. Number and percentage of floating population
40. Number of flooding and water logging incidences
41. Percentage of households/properties openly depositing human excreta into nalas and drains
42. Proportion of storm water that is efficiently and safely managed – 100% pacca drains and flooding and water logging incidences
43. Protective gear and safety equipment to sewerage and STP workers
44. Mechanical, CCTV, systems are being used for monitoring and cleaning sewers
45. Whether workers are provided insurance/provident fund/gratuity
46. Whether there is functioning grievance redressal mechanism for complaints related to sewerage and septage
47. Whether septage/sullage (cleaners) workers use protective gear and safety equipment
48. Whether mechanical (non-manual) systems are being used for cleaning tanks and pits
49. Whether the cleaning and disposal of sludge from tanks and pits is monitored
50. Centralized data base, maps exist for drainage system
51. Pre-monsoon and one other season cleaning, repairs and maintenance of drains undertaken
52. Coverage of households and establishments by daily door-to-door collection
53. Proportion of city streets effectively covered by regular street sweeping, at least once a day
54. Proportion of waste that is processes and recycled
55. Cost recovery for SWM services
56. Availability of written manual and codified procedures for sewerage, septage, drainage and SWM
57. Status of State/ULB Act, provisions for punishments/fines for littering and letting out untreated excreta in the open
58. Implementation of above rules in practice
59. Instances of fines in the last one year for littering and letting out in open
60. Conditions at dumping site and treatment plant

Annexure 8: Technology options in urban sanitation

All sanitation technologies are either **''Wet'' or ''Dry''**. Wet technologies require water as the name indicates flush out the feces and they drain in to a leach pit, septic tank or sewer- common practice. Dry technology does not require water as the name indicates. This is our age old pit latrine, ventilated improved pits etc. This is our usually adopted in hilly area where the water table is pretty deep. To feel clean water is a must, so wet latrines are preferred by common man.

'On site' and 'Off site' Systems

On site: Retaining waste in a pit or tank.

Off site: Removing waste to a distant place for treatment and disposal or disposal alone. Even in 'On site' system periodical removal of sludge/septage is necessary.

The conventional offsite disposal system involves collection of the sewage through pipes and conveying to a sewage treatment plant, treatment and disposal. This is an expensive option, requires extensive land etc. So the communities were forced to think of alternative low cost onsite disposal methods of which the most widely used options are 'Septic tank' and Twin pit pour flush latrines.

Septic Tank

A septic tank is a combined sedimentation and digestion tank where sewage is held for one or two days. During the period, the suspended solids settle down to the bottom. This is accompanied by anaerobic digestion of settled solids (sludge) and liquid resulting in reduction in the volume of sludge, reduction in bio degradable organic matter and release of gases like Carbon dioxide, methane etc. The effluent although clarified to a large extent still contains appreciable amount of dissolved and suspended organic solids and pathogens. So the effluent is to be disposed in a very careful way. Because of this unsatisfactory condition of the effluent and also difficulty in providing proper effluent disposal system, septic tanks are limited to individual houses, institutions whose contributory population does not exceed so as to reduce the volume of effluent and thereby reduce the difficulty in treatment. The septic tanks are normally rectangular in shape and can either be a single tank or double tank. In case of double tank, the solid concentration is considerably lower and the first compartment is usually twice the size of the second. The liquid depth is 1-2 m and the length to breadth 2 to 1. Recommend sizes of septic tanks up to 2 users and for 300 users are given below.

Table 78: Recommended sizes of septic tanks

No: users	Length in m	Breadth in m	Liquid depth in m cleaning interval of 2-3years
5	1.5	0.75	1.00-1.05
10	2	0.90	1.00-1.40
15	2	0.90	1.30-2.00
20	2.3	1.10	1.30-1.80
50	5.00	2.00	1.00-1.24
100	7.50	2.65	1.00-1.24
150	10.00	3.00	1.00-1.24
200	12.00	3.30	1.00-1.24
300	15.00	4.00	1.00-1.24

Notes:

a) The capacities are recommended on the assumption that discharges from water closet alone are connected to septic tank.

b) A provision of 300 mm should be provided as freeboard.1.00 m + 0.30 m, 1.05 m + 0.30 m etc.

c) For population over 100 mm the tank may be divided into independent parallel chambers for easy maintenance and cleaning.

Functions of septic tank

1. Septic tank receives black water and excreta from the toilets.
2. Heavier solids settle to the bottom of the septic tank where they are decomposed by anaerobic bacteria
3. The digested sludge is store at bottom
4. The lighter solids such as hair, soap and grease float to the surface forming scum.
5. The gases like carbon dioxide, methane and hydrogen sulphide are produced during anaerobic decomposition and released to the atmosphere through vent.
6. To start with septic tank is filled with water for a depth of about 100 mm and seated with Cow dung or sludge from other septic tank
7. Septic tanks are to be cleaned once in 2 to 3 years to remove the accumulated digested sludge.

Disposal of effluent from the septic tank: Land disposal methods such as soak pits and dispersion trenches: The land disposal methods largely upon porosity and percolation characteristics of the soil as the land disposal methods are designed percolation or seepage into the soil. This also depends on the depth of water table. Soak pits or dispersion trenches shall be constructed in soils where the percolation rate is between 12 to 25 minutes per cm [Time taken for percolation of 1 cm depth of water between 12 to 25 minutes] and the depth of water table is 2.00 m or more from ground level. [The depth we get water when the ground is dug]. If the water table is high, the dispersion trenches shall be partially or fully above ground level or in a mound. Dispersion trenches should be 20.00m away from any source of drinking water and also it should be at least 7.00m away from any house. For soils which have percolation rate more than 25cm other methods shall be adopted for disposal of effluents.

Soak Pits

The soak pits may be of any regular shape and filled with rubble or brick bats. Soak pits need be prepared only when the water table is sufficiently below or when a porous layer underlies an in previous layer at top. Minimum dimension of the soak pit shall be 1.00m and the depth below the invert level or inlet pipe surrounding land to avoid flooding.

Soak pit or Seepage pit

- All seepage pits shall have a diameter of 1.00m.
- All seepage pits shall be designed as any of the following two types
    1. Hollow and lined with acceptable material.
    2. Filled with coarse stone or similar material that range from fines, sand, clay or organic material.
- Pits filled with coarse stone are prepared over hollow lined pits
- Lining of brick, stone, block or similar materials shall have a minimum thickness of 100 mm and shall be laid with overlapping, tight-butted joints
- Below the inlet level, mortar shall be used in the horizontal joints only. Above the inlet, all joints shall be filled fully with mortar.

- For hollow- lined pits, the inlet pipe should extend horizontally at least 300 mm into the pit with a tee to divert flow downward and prevent washing and eroding the side wall
- A minimum annular space of 150 mm between the lining and excavation wall shall be filled with crushed rock or gravel varying in diameter from 20 mm to 65 mm and free from fines, sand, clay, or organic material. The maximum fines in the gravel shall be 2 percent by weight passing through a Standard 10 mesh (2.0 mm) sieve. Clean coarse gravel or rock at least 150 mm deep shall be placed in the bottom of each pit.
- A structurally sound and otherwise suitable top shall be provided that will prevent entrance of surface water, dirt or other foreign material, and be capable of supporting the overburden of earth and any reasonable load to which it is subjected
- Access to each hollow –lined pit shall be provided by means of a manhole, not less than 450 mm in minimum horizontal dimension, or by means of an easily removable cover.
- The top of the pit shall be covered with a minimum of 150 mm of backfill.
- In pits filled with coarse stone, the perforated distribution pipe shall run across each pit. A layer of crushed rock or gravel shall be used for levelling the distribution pipe.

Dispersion Trenches

Narrow and shallow trenches about 0.5m to 1.00m deep and 0.3m to 1.00m wide excavated to a slight slope. Open jointed stone ware or concrete pipes 80 to 100 mm diameter are laid in the trenches over a bed of 15 to 25 cm of washed gravel or crushed stone. The top of pipes shall be covered by coarse gravel and crushed stone to a minimum depth of 15 cm. The balance portion may be filled with earth and finished in the form of a mound above the ground to avoid flooding of trenches during rain.

- Width of trench:300 to 600 mm wide
- Depth :500to 600 mm
- Dispersion pipe: 100 mm diameter open jointed S.W. pipes/ 75mm to 90mm OD perforated PVC pipes
- Maximum length of each trench: 30 m
- Spacing of the trench : 1.8 m
- Slope of the pipe :1 in 400
- Media: 20 to 65 mm size broken stones for a thickness of 150 mm below the pipe.
- Separation distance of trees and rooted plants;
- Trees and other large rooted plants shall not be allowed to grow near to dispersion trenches
- It is desirable to cover the area over onsite soil absorption systems with lawn grass or other shallow –rooted plants
- Soil absorption systems should not be located under vegetable gardens.
- The separation distance of trenches must be at least equal to 3 times the deepest effective depth of trench with a minimum separation of 370 mm between trenches

Pour Flush Water Seal Latrines

Pour flush latrines as the nature indicates, the excreta is hand flushed by pouring about 1.6 to 2 lit of water. The pour flush latrines are with a single leach pit and squatting pan over it. When the pit in use gets filled up another pit is dug and the squatting platform and the slab is placed on it.

The first pit is covered with earth and allowed to decay. After one or two years, the digested excreta are used as manure. The disadvantage of this system is that desludging has to be done almost immediately after the pit has been filled up which involved handling of fresh and undigested excreta. So this is appropriate only if it is desludged mechanically. To tide over this situation a twin

pit design was introduced. When one pit is full, the excreta is diverted into the second pit. The filled up pit can be conveniently implied after $1^{1}/_{2}$ to 2 years when most of the pathogens die off. The sludge can be used as manure.

Leach Pit

Leach pits serve a dual function of

a) Storage and digestion of excreted solids and
b) Infilteration of waste liquids.

Leach pits are designed based on the following parameters.

1) Solid accumulation rate.
2) Long term infilteration rate.
3) Hydraulic loading.
4) Minimum period required for effective pathogen destruction
5) Optimal pit emptying frequency.

The pits are lined with honey come brick work, open jointed or with perforated burnt clay or concrete rings. The pits are circular and used alternatively and designed for 3 years filling period. When one pit is filled it is stopped, the excreta being diverted to second pit. The contents become lich organic humus, innocuous and free from pathogens as well as smell. When convenient, it is emptied and contents used as organic manure. The size of leach pits depends on a number of factors mentioned above. The effective volume under dry conditions should be at least 0.135 m^3 per capita of the house hold for a period of 3 years. In the case of wet pit where water table is high the volume shall be 0.210 m^3 per capita of the house hold for a period of 3 years. Leach pit configuration can be varied to suit site conditions while the least cost design in a twin circular pits.

Design of pits under different conditions

a) *In water logged area:* The pit top should be raised by 300 mm above likely level of water above ground level at the time of water logging. Earth should then be filled will compacted all round the pits up to 1.00 m distance from the pit up to its top. The raising of the pit will necessitate rising of the latrine floor also.
b) *In high sub soil water level:* Where the sub soil water level rises to less than 300 mm above the likely sub soil water level and earth should be filled all round the pits and latrine floor raised.
c) *In rock strata*: In rocky strata with soil layer in between, the leach pits should be designed as for ordinary leach pit construction with low subsoil water level.
d) *Where space is a constraint*: Where circular pits of standard sizes cannot be constructed due to space constraints, deeper pit with smell diameter (not less than 750 mm) or combined oval square or rectangular pits divided into two equal compartments by a partition wall may be provided. In case combined pits the partition wall should not have holes. The partition wall should go 250 mm deeper than the pit lining and plastered on both sides with cement mortar.

Aqua Privy

This is a simplified form of septic tank consisting of a masonry tank filled with water, a squatting pan or a platform placed above the tank and ventilation pipe. A long chute or pipe from the squatting is submerged in the tank water. The excreta fall through this chute or pipe into the tank and undergo anaerobic digestion as in septic tank. The accumulated sludge (digested) from the tank is to be removed periodically. To compensate for evaporation, leakage losses and to maintain the water seal i.e., submergence of chute in the water, water is added every time after its use.

Annexure 9: Good practices

Tiruchirapally (Trichy to most people), the famous temple town of the South, is the fourth-largest city in Tamil Nadu, and is located on the banks of the Cauvery with a population of just over a million — of which 25 per cent live in slums. Trichy has 211 "approved" slums and as many as 75 "unapproved" slums which are located on railway land, Government of India land, and land belonging to the Waqf Board and other private owners. Until the end of the 1990s the slums of Trichy, with their sanitation and toilet facilities in an appalling state, were no different from the rest of the country. But things began to change about 10 years ago, and Trichy has not looked back since. The city was ranked 6th in India in the sanitation ranking of Indian cities by the ministry of urban development in 2009-10.

It all started with a major initiative launched by the NGO Gramalaya in 2000, mobilizing women in the slums in self-help groups (SHGs) and launching an awareness campaign on sanitation through training. They were able to get the support of Water-Aid, a UK-based NGO, to fund the building/renovation of 25 community toilets and child-friendly toilets in the slums, which would be managed by the women of the community on a pay-and-use basis. Sanitation health education teams were set up by the SHGs to propagate the message of sanitation, monitor the behavior of residents, and supervise the maintenance of the toilets.

A community toilet complex typically has 10-12 seats for women and 10-12 for men. Child-friendly toilets are separately provided in an adjacent area, for children up to the age of eight. Each toilet has a tap which supplies 24×7 water. Some have graduated to "sanitary complexes" with room for bathing and washing. Each facility receives its water supply from the Trichy City Corporation (TCC), and a bore well is also provided by the corporation. Each has a provision of underground storage of water and an overhead tank to which water is pumped. TCC has ensured that water is made available also in summer months through tankers. The corporation waives the electricity charge for the pumping of water for the first few years of operating the toilets. Afterwards, the tariff for community toilets is levied at the lower domestic rate and not commercial rate.

The cost of a typical community toilet was around Rs 3 lakh in the initial years that Water-Aid built such complexes. Today, the cost is around Rs 12 lakh. The success of the women in managing and maintaining the community toilets encouraged the TCC to build more of them, so that all the 211 approved slums now have community toilets. Out of a total of 347 such toilets (some slums have more than one), 284 are connected to the sewerage system and 63 function through a septic tank. About 100 toilets are being managed on a pay and use basis by SHGs with Gramalaya, and another 40 by other NGOs. For the rest, the TCC and/or ward councilors take the responsibility for managing the toilets.

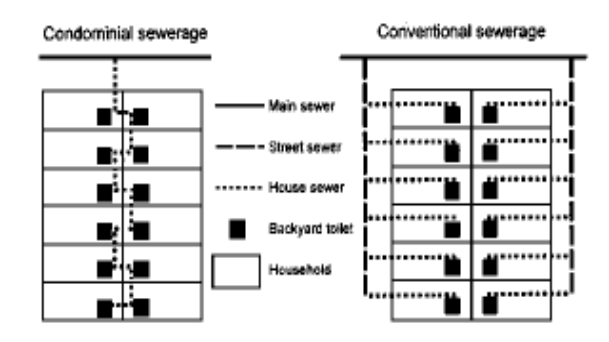
The Kamala Nehru Nagar slum where the toilet was inside the slum area. In West, Devathanam, another complex where the toilet is located between the slum and a public road and caters to the needs of the slum as well as the floating population surrounding the slum. At the community toilets run by SHGs, sanitary health education team members take turns to sit at a table placed outside the toilet complex with tokens to sell as people come to use the toilet. They engage cleaners who clean the complex two to three times a day. I found that the toilets were cleaner than what we may typically find in cinema halls in Delhi.

It is clear from the systems they have put in place to manage and maintain these toilets that these women understand the economics of it all. The collection from user charges is used to pay their electricity bills, the cleaner, the guard who keeps the watch, and expenses of minor repairs. The typical user charge varies from 50 paise to Re 1 per use, while children, the elderly and the physically challenged have free access. The accounts are meticulously-kept and are audited by the TCC.

All teams make a small subscription to come together under Women's Action for Village Empowerment (WAVE) which is a registered society. Monthly meetings of WAVE allow them to discuss their problems and learn from each other in finding solutions. A member of the TCC is also invited to these meetings. They are now extending their sphere to cover solid waste management and better delivery of other public services.

After initial resistance to their cause, men wanted to have a part of the action when the women seemed to be succeeding in making their slums clean. The women obliged by creating AWASH (Association for Water, Sanitation and Hygiene) so that men could also contribute to improving the water and sanitation scenario of their joint habitat. Men also find a role through WATSAN (water and sanitation) committees in monitoring the progress of the overall sanitation status of the slums in the city. The municipal commissioner, T. T. Balsamy, was very appreciative of the role played by the NGOs and the communities in bringing about the much overdue transformation. As Geetha Jegan, executive director of Gramalaya put it: "Together, the city corporation, the NGOs and the communities from the slums of Trichy have transformed the sanitation scenario in Trichy."Trichy has shown the way. Other cities in India must follow to completely get rid of open defecation and work for better sanitary conditions.

Box 10: The Condominial Sewerage System in Brazil



The "condominial" system is the brainchild of Jose Carlos de Melo, a socially committed engineer from Recife. The name condominial was given for two reasons. First, a block of houses was treated like a horizontal apartment building (or condominial in Portuguese) (see figure). Second, "Condominial" was a popular Brazilian soap opera and associated with the best in urban life. As is evident in the figure, the result is a radically different layout, with a shorter grid of smaller and shallower "feeder" sewers running through the backyards and with the effects of shallower connections to the mains rippling through the system. These innovations cut construction costs to between 20 and 30 per cent of those of a conventional system. The more fundamental and radical innovation, however, is the active involvement of the population in choosing their level of service, and in operating and maintaining the "feeder" infrastructure. The key elements are that families can choose to continue with their current sanitation system, to connect to a conventional waterborne system or to connect to a condominial system. If a family chooses to connect to a condominial system, it has to pay a connection charge, which can be financed by the water company, and a monthly tariff. If on the other hand, the family wants a conventional connection, it has to pay an initial cost and a monthly tariff (both of which are about three times higher) reflecting the different capital and operating costs. Families are free to continue with their current system, which usually means a holding tank discharging into an open street drain.

In most cases, however, those families who, initially, chose not to connect eventually end up connecting. Either they succumb to heavy pressure from their neighbours or they find the build-up of wastewater in and around their houses intolerable once the (connected) neighbours fill in the rest of the open drain. Individual

households are responsible for maintaining the feeder sewers, with the formal agency maintaining only the trunk mains. This increases the communities' sense of responsibility for the system. Also, the misuse of any portion of the feeder system, for example by putting solid waste down the toilet, soon shows up in a blockage in the neighbor's portion of the sewer. The rapid, direct and informed feedback to the misuser virtually eliminates the need to educate the users of the system in the "acceptable and unacceptable" and results in fewer blockages than in conventional systems. Finally, because of the greatly reduced responsibility of the wastewater utility, its operating costs are sharply reduced. The condominial system is now providing service to hundreds of thousands of urban people in northeast Brazil and is being replicated on a large scale throughout the country. The danger, however, is that the clever engineering is seen as "the system". Where the community and organisational aspects have been missing, the technology has worked poorly (as in Joinville, Santa Catarina) or not at all (as in the Baixada Fluminense in Rio de Janeiro). Source: Briscoe, 1993; de Melo, 1985.

Adoption of GRIHA ratings

GRIHA is a guiding and performance-oriented system where points are earned for meeting the design and performance intent of the criteria. Each criterion has a number of points assigned to it. It means that a project intending to meet the criterion would qualify for the points. Compliances, as specified in the relevant criterion, have to be submitted in the prescribed format. While the intent of some of the criteria is self-validating in nature, there are others for example: energy consumption, thermal and visual comfort, noise control criteria, and indoor pollution levels which need to be validated on-site through performance monitoring. The points related to these criteria (specified under the relevant sections) are awarded provisionally while certifying and are converted to firm points through monitoring, validation, and documents/photographs to support the award of point.

GRIHA has a 100 point system consisting of some core points, which are mandatory to be met while the rest are optional points, which can be earned by complying with the commitment of the criterion for which the point is allocated. Different levels of certification (one star to five stars) are awarded based on the number of points earned. The minimum points required for certification is 50. Buildings scoring 50 to 60 points, 61 to 70 points, 71 to 80 points, and 81 to 90 points will get one star, 'two stars', 'three stars' and 'four stars' respectively. A building scoring 91 to 100 points will get the maximum rating viz. five stars.

Points scored	Rating
50–60	★
61-70	★★
71-80	★★★
81-90	★★★★
91-100	★★★★★

Evaluation procedure of criterion of GRIHA

Criteria	Description
Landscape architect	
Criteria 1	Site selection
Criteria 2	Preserve and protect landscape during construction
Criteria 3	Soil conservation (Post construction)
Criteria 10	Reduce landscape water requirement

Architect with expertise in passive design/energy efficiency	
Criteria 4	Design to include existing site features
Criteria 7	Plan utilities efficiently and optimise on site circulation efficiency
Criteria 12	Efficient water use during construction
Criteria 15	Utilization of fly ash in building structure
Criteria 16	Adopt energy efficient technology in construction
Energy analyst	
Criteria 13	Optimise building design to reduce conventional energy demand
Criteria 14	Optimise energy performance of building
Criteria 18&19	Renewable energy utilization
Criteria 33	O&M protocol for electrical and mechanical equipment
Public health engineer	
Criteria 8	Minimum sanitation and safety facilities for construction workers
Criteria 9	Reduce air pollution during construction
Criteria 29	Acceptable outdoor and indoor noise levels
Criteria 30	Tobacco and smoke control
Criteria 22	Reduction in waste during construction
Criteria 23	Efficient waste segregation
Criteria 24	Utilization of fly ash in building structure
Criteria 25	Adopt energy efficient technology in construction
Plumbing engineer/MEP consultant	
Criteria 11	Reduce building water use
Criteria 20	Waste water treatment
Criteria 21	Water recycle and reuse

10 ABBREVIATIONS

ASCI	Administrative Staff College of India
BOD	Biological Oxygen Demand
BOT	Buy-Own-Operate
BPL	Below Poverty Line
BSUP	Basic Services to the Urban Poor
CAA	Constitution Amendment Act
COD	Chemical Oxygen Demand
CPHEEO	Central Public Health and Environmental Engineering Organization
CSP	City Sanitation Plan
CT	Community Toilets
CTF	City sanitation Task Force
DMHO	District Medical Health Officer
DPR	Detailed Project Report
ELSR	Elevated Service Reservoir
FGD	Focus Group Discussions
FY	Financial Year
GIS	Geographic Information System
GoI	Government of India
HHs	Households
HSC	House Service Connections
IEC	Information, Education, Communication
ILCS	Integrated Low Cost Sanitation
JnNURM	Jawaharlal Nehru National Urban Renewal Mission
AMC	Agartala Municipal Council
UDD	Urban Development Department
MSL	Mean Sea Level
MSW	Municipal Solid Waste
NRW	Non Revenue Water
NUSP	National Urban Sanitation Policy
ODF	Open Defecation
O&M	Operations and Maintenance
PHED	Public Health and Engineering Department
PSP	Public Stand Posts
SI	Sanitary Inspector
SLB	Service Level Benchmarking
SJSRY	Swarna Jayanti Shehri Rojgar Yojana
SSA	Sarva Shiksha Abhiyan
SSHE	School Sanitation and Hygiene Education
STP	Sewage Treatment Plant
SWM	Solid Waste Management
ULB	Urban Local Body
UGD	Under Ground Drainage
WC	Water Closet

Units of Measure

lpcd	litres per capita per day
m	metre
MLD	Million Litres per Day
sq.m	square metre
TPD	Tonnes Per Day

11 GLOSSARY

1. **Activated sludge**: An aerobic treatment process in which oxygen and micro-organism concentrations in wastewater are artificially elevated to facilitate rapid digestion of biodegradable organic matter.
2. **Aerated pond or lagoon:** A natural or artificial wastewater treatment pond in which mechanical or diffused air aeration is used to supplement the natural reoxygenation processes.
3. **Aerobic treatment:** Treatment of wastewater with the help of micro-organisms that rely on oxygen.
4. **Anaerobic digestion:** Decomposition of organic material by anaerobic bacteria in the absence of air.
5. **Anaerobic lagoon**: A system for treatment of high-strength wastewater and sludge that involves retention under anaerobic conditions.
6. **Biochemical oxygen demand:** A measure of the organic pollutant strength of wastewater.
7. **Biosolids**: See Sewage sludge.
8. **Blackwater:** Wastewater discharge from toilets.
9. **Bucket latrine:** A traditional but unhygienic form of sanitation in which feces is deposited into a bucket which is collected regularly (usually at night) and taken away (usually by 'sweepers').
10. **Composting latrine:** A latrine designed to receive both feces and waste vegetable matter with the aim of reducing moisture content and achieving a carbon-to-nitrogen ratio that promotes rapid that promotes rapid decomposition.
11. **Dry latrines**: All forms of latrines that do not require water for flushing.
12. **Desludging:** Removal of sludge or settled solid matter from treatment tanks such as septic/Imhoff tank, interceptor tank or sedimentation tanks.
13. **Disposal**: Discharge, deposition or dumping of any liquid or solid waste onto land or water so that it may enter the environment.
14. **Domestic sewage**: All forms of wastewater derived from residential properties, as well as black water and grey water from commercial and institutions buildings.
15. **Dry sanitation:** Disposal of human excreta without the use of water for flushing or anal cleansing.
16. **Ecological sanitation (ecosan):** A form of dry sanitation that involves separation of feces and urine in order to facilitate recycling of nutrients in local agricultural systems.
17. **Effluent:** Any form of wastewater or liquid waste that flows from an operation or activity.
18. **Excreta:** Feces and urine.
19. **Fecal sludge**: The undigested sludge that is collected from pit latrines and leach pits.
20. **Grey water** (also know as sullage): Wastewater produced by washing and bathing activities.
21. **Lagoon:** See technology data sheet on 'Wastewater and Fecal Sludge Treatment: Waste Stabilization Ponds' (page 104).
22. **Leachfield:** A trench filled with sand, soil, gravel and brickbats for disposal of septic tank overflow into the surrounding soil.
23. **Leach pit** (sometimes known as a cesspit): An underground tank that is used where there is no sewer and household wastewaters are drained into them to permit leaching of the liquid into the surrounding soil.
24. **Night soil:** Human excreta, with or without anal cleansing material, which are deposited into a bucket or other receptacle for manual removal.
25. **On-plot sanitation:** A sanitation system that is wholly contained within the plot occupied by a private dwelling and its immediate surroundings. Commonly, on-plot sanitation is equivalent

to 'household latrine', but may also include facilities shared by several households living together on the same plot.

26. **On-plot facilities**: The components of a sanitation system located within a householder's plot.
27. **Off-site sanitation:** A system of sanitation that involves collection and transportation of waste (wastewater either by sewerage or septage/fecal sludge by vacuum truck) to a location away from the immediate locality.
28. **Pathogens:** Micro-organisms such as bacteria, viruses and protozoa that cause disease.
29. **Percolation rate:** The rate at which liquids move through soil.
30. **Pit latrine:** A form of on-plot sanitation with a pit for accumulation and decomposition of excreta from which liquid infiltrates into the surrounding soil.
31. **Pour flush toilet:** A type of latrine where a water seal trap is used to prevent smells and to reduce insects.
32. **Sanitation:** Interventions (usually construction of facilities such as latrines) that improve the management of excreta and promote sanitary (healthy) conditions.
33. **Septage:** Mixture of wastewater and sludge removed from a septic tank during cleaning operations.
34. **Septic tank**: A form of on-plot sanitation for the anaerobic treatment of sewage/blackwater.
35. **Sewage:** A mixture of wastewater from all urban activates from residential, commercial properties. It may also contain a component of industrial wastewater.
36. **Sewer**: A conduit, usually a pipe, which is used to collect and convey wastewater away from its point of production to its point of disposal.
37. **Sewage sludge (sometimes referred to as biosoilds):** A semisolid residue generated during the treatment of domestic sewage including both solids removed by sedimentation and biological sludge produced by biological treatment.
38. **Sewerage:** A network of interconnected sewers in a area, district or town.
39. **Soak pit/Soak away:** A pit, typically after a septic tank from where wastewater slowly seeps into the ground through perforated sides and bottom.
40. **Sullage (also know as grey water):** Wastewater from bathing, laundry, preparation of food, cooking, and other personal and domestic activates.
41. **Superstructure:** Screen or building enclosing a latrine to provide privacy and protection for users.
42. **Suction truck:** A vehicle used for mechanized sludge removal from septic tanks and lined latrine pits.
43. **Ventilated improved pit latrine (VIP):** A dry latrine system, with a dark interior and a screened vent pipe to reduce odor and fly problems.
44. **Vent pipe:** A pipe that facilitates the escape of gases and odors from a latrine or septic tank.
45. **Wastewater:** Liquid waste from households or commercial or industrial operations, along with any surface water/storm water.
46. **Wastewater treatment:** A combination of physical, chemical and biological processes to remove suspended solids, dissolved pollutants and pathogens and render the water harmless to the environment.
47. **Water closet:** A pan, incorporating a water seal, in which excreta are deposited before being flushed away using water.
48. **Water seal:** Water held in a U-shaped pipe or hemispherical bowl connecting a pan to a pipe, channel or pit to prevent the escape of gases and insects from the sewer or pit.

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